ISSN:2455-7838 (Online)
DOI : 10.36713/epra2016
SJIF Impact Factor(2024) : 8.675
ISI I.F Value : 1.241

EPRA International Journal of

RESEARCH & DEVELOPMENT

(IJRD)

Monthly, Peer Reviewed (Refereed) & Indexed International Journal

Volume - 9 Issue - 6 June 2024

Research & Development



Chief Editor

Dr. A. Singaraj, M.A., M.Phil., Ph.D.

Managing Editor

Mrs.M.Josephin Immaculate Ruba

EDITORIAL ADVISORS

1. Prof. Dr.Said I.Shalaby, MD,Ph.D.
   Professor & Vice President
   Tropical Medicine,
   Hepatology & Gastroenterology, NRC,
   Academy of Scientific Research and Technology,
   Cairo, Egypt.
2. Dr. Mussie T. Tessema,
   Associate Professor,
   Department of Business Administration,
   Winona State University, MN,
   United States of America,
3. Dr. Mengsteab Tesfayohannes,
   Associate Professor,
   Department of Management,
   Sigmund Weis School of Business,
   Susquehanna University,
   Selinsgrove, PENN,
   United States of America,
4. Dr. Ahmed Sebihi
   Associate Professor
   Faculty of General Education,
   Skyline University College (SUC),
   University City of Sharjah,
   UAE.
5. Dr. Anne Maduka,
   Assistant Professor,
   Department of Economics,
   Anambra State University,
   Igbariam Campus,
   Nigeria.
6. Dr. D.K. Awasthi, M.SC., Ph.D.
   Associate Professor
   Department of Chemistry,
   Sri J.N.P.G. College,
   Charbagh, Lucknow,
   Uttar Pradesh. India
7. Dr. Tirtharaj Bhoi, M.A, Ph.D,
   Assistant Professor,
   School of Social Science,
   University of Jammu,
   Jammu, Jammu & Kashmir, India.
8. Dr. Pradeep Kumar Choudhury,
   Assistant Professor,
   Institute for Studies in Industrial Development,
   An ICSSR Research Institute,
   New Delhi- 110070, India.
9. Dr. Gyanendra Awasthi, M.Sc., Ph.D., NET
   Associate Professor & HOD
   Department of Biochemistry,
   Dolphin (PG) Institute of Biomedical & Natural Sciences,
   Dehradun, Uttarakhand, India.
10. Dr. C. Satapathy,
    Director,
    Amity Humanity Foundation,
    Amity Business School, Bhubaneswar,
    Orissa, India.
11. Dr. Ibatova Shoira Mavlanovna PhD.
    Department of Propaedeutics of Paediatric Diseases, Samarkand State Medical University

ISSN (Online): 2455-7838
SJIF Impact Factor (2024):8.675
ISI I.F. Value : 1.241
DOI : 10.36713/epra2016

EPRA International Journal of Research & Development (IJRD)

Monthly Peer Reviewed & Indexed International Online Journal

Volume: 9, Issue:6, June 2024

Indexed By:

Published By
EPRA Publishing

CC License

SJIF Impact Factor (2024): 8.675| ISI I.F.Value:1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9| Issue: 6 | June 2024 - Peer Reviewed Journal

CONTENTS

S.NO	TITLE	AUTHOR/S	PAGES
1	FORMULATION AND EVALUATION OF POLYHERBAL EMULGEL FOR MANAGEMENT OF RHEUMATOID ARTHRITIS	Shweta Sunil kharat, Pooja Muley, Dipali Raut	1-12
2	A REVIEW ON HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC)	Dr.Sunil S.Jaybhaye, Aniket Narayan Tompe	13-21
3	IMPACT ASSESSMENT ON THE EXTENSION AND COMMUNITY SERVICES OF THE COLLEGE OF INDUSTRIAL TECHNOLOGY (2019-2021)	Daryll R. Gabutin, Medel E. Aloroy, Ramon S. Dueňas	22-36
4	PROBLEMS OF SPEECH DEVELOPMENT CULTURE OF STUDENTS OF THE FACULTY OF ENGLISH PHILOLOGY OF PEDAGOGICAL UNIVERSITIES	Kurbonova Nilufar Nasriddinovna	37-39
5	TYPES AND CONTENT OF INTERACTIVE AND DIDACTICAL TOOLS USED IN ENGLISH LESSONS IN PRIMARY CLASSES OF GENERAL EDUCATION SCHOOL	Mavlonova Rano Murtazo qizi	40-43
6	NATURAL HAIR CARE: FORMULATING AND EVALUATING A HERBAL SHAMPOO BLEND	Darshan Sanjay Vyavhare, Dr. Gulshan Rathi, Mahesh Gaikwad, Pavan Tangde, Dnyaneshwari Umap	44-55
7	DEVELOPMENT AND ANALYSIS OF A MOISTURIZING CREAM WITH GLYCERINE AND ESSENTIAL OILS	Anjali Madan Takle, Dr. Gulshan Rathi, Madhuri Bade, Pooja Fauzdar Nishad	56-65
8	INFLUENCE OF COLONIALISM ON INDIGENOUS EDUCATION SYSTEMS: A HISTORICAL PERSPECTIVE	Dr.Pranay Pandey, Prof. (Dr.) Pragyan Mohanty	66-73
9	FORMULATION AND EVALUATION OF HERBAL TOOTHPASTE	Rutika Bharatrao Solanke, Madhavi Digambarrao Borade , Gulshan Manohar Rathi	74-82
10	DEVELOPMENT AND EVALUATION OF IMPROVISED OVEN FOR BREAD AND PASTRY COMPETENCIES	Santos, Jay Lord S.	83-93
11	FORMULATION AND EVALUATION OF HERBAL INHALANT GEL CONTAINING THYME OIL	Swapnil Bharat Rathod, Avinash Wagh, Sonali Tukaram Chavan	94-102
12	ARTIFICIAL INTELLIGENCE AND PRIVACY: SAFEGUARDING HUMAN RIGHTS IN A DIGITAL AGE	Dr.Kiranbir Kaur, Dr. Arsheed Ahmad Ganie	103-110
13	FORMULATION AND EVALUATION OF POLYHERBAL CHURNA IN AGNIMADNYA	Aditya Ajit Burse, Pooja Pralahadrao Ambhure , Anuradha Tukaram Jaid , Somesh Laxman Kantule, Chaitanya Parmeshwar Shinde,	111-124

		Abhay Omprakash Pardeshi	
14	FORMULATION AND EVALUATION OF ANTISEPTIC SPRAY	Nikita Kailas Madke, Dipali Raut, Pooja Muley	125-133
15	FORMULATION AND EVALUATION OF MORINGA 2 IN 1 HERBAL ANTI-DANDRUFF SHAMPOO AND CONDITIONER	Sachin Rajdhar Badak, Pooja Ambhure, Anuradha Jaid	134-142
16	EXPLORING THE MOLECULAR AFFINITIES OF MEFENAMIC ACID & CELECOXIB BY USING AUTO-DOCK TOOL	Nitin Bajirao Sapkal, Seema Pralhad Rathod	143-163
17	FORMULATION AND EVALUATION OF VITA-C SERUM	Vaishnavi Gulabrao Dalvi, Avinash Gajanan Wagh, Dnyaneshwar Dhondiba Dandale	164-174
18	SEPARATION & IDENTIFICATION OF BINARY ORGANIC MIXTURE BY USING SYSTEMATIC QUALITATIVE ANALYSIS APPROVAL	Dnyaneshwar Dhondiba Dandale, Yogiraj Muley, Vaishnavi Dalvi	175-191
19	COLLECTION AND ANALYSIS OF PRIMARY DATA IN THE PROCESS OF SOCIOLOGICAL RESEARCH	Ulmasbek Karimov	192-195
20	RELIGION IN THE DIGITAL AGE: APPROACHES IN STUDYING RELIGIOUS CONTENTS	Shahzoda Abduraimova	196-199
21	THE EMERGENCE OF SHAZ QIRAT AND ITS TYPES	Madaminzoda Abdulatif Baxtiyor ogli	200-202
22	INNOVATIVE RESEARCH ON IMPROVING THE SCIENTIFIC OUTLOOK AND MATHEMATICAL THINKING OF YOUNG PEOPLE IN THE HIGHER EDUCATION SYSTEM	Kilichev Farkhod Davlatyarovich	203-205
23	HEPATO PROTECTIVE AND ANTIOXIDANT EFFECT OF CNIDOSCOLUS PHYLLACANTHUS AGAINST D-GALACTOSAMINE INDUCED OXIDATIVE STRESS IN RATS	Mr.Prashant Tiwari, Ms Priya Bisen, Dr. Neelesh Kumar Dwivedi	206-214
24	PROMOTING DEVELOPMENTAL MILESTONES IN PEDIATRIC PATIENTS: ASSESSMENT AND EARLY INTERVENTION STRATEGIES	Gayathri N.S	215-218
25	AN OVERVIEW ON CANCER CHRONOTHERAPY	Rachana Botla, Syeda Nishat Fathima	219-222
26	FORMULATION AND EVALUATION OF HERBAL CHURNA CONTAINING FENUGREEK EXTRACT FOR ANTI-DEPRESSANT ACTIVITY	Sonali Tukaram Chavan, Avinash Hatkar, Swapnil Bharat Rathod	223-233
27	EVALUATION AND PREPARATION OF HERBAL COUGH SYRUP BY IN-VITRO METHOD	Nikita Rajendra Ukarde, Avinash D. Hatkar, Dr.Sunil .S. Jaybhaye	234-245
28	ANALYTICAL METHOD DEVELOPMENT FOR QUANTIFICATION OF TINIDAZOLE BY REVERSED PHASE HIGH PERFORMANCE LIQUID CHROMATOGRAPHY	Md Saleem, Dr.Dasari Srinivas, J Sravan Kumar, V.Raju, Sepuri Vijayalaxmi	246-251
29	MOUNTAIN ELEMENTS IN THE FLORA OF BUKANTAU	Serekeeva G.A.	252-254
30	RESEARCH OF AVALANCHE BREAKDOWN OF P-N JUNCTIONS	Abdreymov A.A., Tagaev M.B., Khozhamuratova A.R., Karimboeva V.R	255-260

31	ISSUES OF FINANCIAL SUPPLY MANAGEMENT AND INCREASE EFFICIENCY OF JOINT STOCK COMPANIES	Shernaev Akbar Akmirzayevich	261-265
32	NAVIGATING URINARY TRACT INFECTIONS: ANTIBIOTIC RESISTANCE DYNAMICS AND TREATMENT PERSPECTIVES	Arun K S, Prejish C, Jomol P J, Anakha Vijayan, Bernaitis L	266-269
33	RISK ASSESSMENT IN FINANCIAL DECISION MAKING ANALYSIS ON FISHERMAN PERSPECTIVE IN COASTAL REGION: A CASE STUDY	Mr.Swarn G Kanchan, Dr. C. K. Hebbar	270-273
34	IMPLEMENTATION OF ENERGY EFFICIENT SECURITY MECHANISMS FOR WIRELESS SENSOR NETWORKS	Sirasani Srinivasa Rao, Gajula Madhavi, G.Ravi Kumar	274-279
35	ANALYSIS OF FACTORS MOTIVATING THE BUILDING AND OTHER CONSTRUCTION WORKERS FOR REGISTRATION UNDER THE BUILDING AND OTHER CONSTRUCTION WORKERS WELFARE BOARD	Sushree Sanghamitra	280-284
36	FOUNDATIONS OF SECOND LANGUAGE ACQUISITION FOR YOUNG LEARNERS	Madaminova Umida Rustam qizi	285-287
37	DETAILED EXPRESSION OF THOUGHT IN SEMANTICS	Mullasadikova Nigora Miramonovna	288-291
38	TASK-BASED LEARNING THROUGH BLOGGING AND WRITING COMPETENCE AMONG GRADE 12 STUDENTS OF TANAUAN INSTITUTE INC	Geraldine B. Enriquez	292-300
39	COMPUTER CHARACTERISTICS OF CLINICAL MANIFESTATIONS OF CONGENITAL ATRESIA OF THE EXTERNAL AUDITORY CANAL IN COMBINATION WITH ANOMALITY OF MIDDLE EAR DEVELOPMENT IN CHILDREN	Khasanova U.S., Yusupov S.R.	301-303
40	FORMULATION AND EVALUATION OF HERBAL COUGH SYRUP FROM NATURAL INGREDIENTS	Sima Lahu Rathod, Sachin S. Dighole, Anand Daulatrao Khendke	304-313
41	REARING PERFORMANCE OF CONVENTIONAL BIVOLTINE SILKWORM BREEDS OF MULBERRY SILKWORM, BOMBYX MORI L. AT P2 LEVEL IN DEHRADUN CLIMATIC CONDITION	Sahadev Chouhan, B. Mohan, Amardev Singh	314-317
42	EDUCATIONAL PHILOSOPHY OF SRI AUROBINDO: A TRANSCENDENT VISION FOR HOLISTIC LEARNING	Khokan Das, Suvendu Ray	318-325
43	FORMULATION AND EVALUATION OF ANTI OXIDANT CHOCOLATE BAR FROM DRAGON FRUIT PEEL	Miss Shraddha Kailas Pandit, Mrs. Shital Chaudhari	326-334
44	FORMULATION AND EVALUATION OF SUNSCREEN LOTION	Jyoti Dagaduba Holkar, Dipali .V. Raut Pooja Muley	335-344
45	ON THE STRUCTURE OF POPULATIONS AND REPRODUCTION OF THE GREAT GERBIL (RHOMBOMYS OPIMUS LICHTENSTEIN, 1823) WITH	Allaniyazov N.P, Jumanov M.A. , Allamuratov B.DJ. , Matrasulov G.J., Samandarov O.K.	345-352

	DIFFERENT NUMBERS OF INDIVIDUALS		
46	NAVIGATING THE LAW OF KARMA: UNDERSTANDING, MANAGING, AND INTEGRATING SPIRITUAL WISDOM	Prof.Dr.Gurudutta P Japee	353-360
47	THE ARCHITECTURAL SPLENDOR OF THE CHALUKYA DYNASTY: A STUDY OF TEMPLE DESIGN AND ART	Shruti S Mamadapur	361-365
48	A COMPREHENSIVE LITERATURE REVIEW ON KUSTHA W.S.R TO PAMA KUSTHA IN AYURVEDA	Dr.Swetasmita Sahu, Dr. Manoj Kumar Sahoo, Dr. Saumyaleena Baral	366-373
49	ANTIMICROBIAL ACTIVITY AND GASTRIC EMPTY TIME OF CARAWAY SEEDS	Rucha Ramnath Kurdhane, Avinash. D. Hatkar, Rutuja Santosh Aghav	374-383
50	THE ROLE OF CULTURE IN TRANSLATION	Pirmuhamedov Bahadir Bahramovich	384-387
51	USING TYPES OF INFOGRAPHICS IN TEACHING ARABIC	Z.N.Shakirova	388-391
52	ACTIVITIES OF THE INTERNATIONAL ISLAMIC ACADEMY OF UZBEKISTAN "TREASURY OF RESOURCES"	Usmanov Makhammadsidiq Abdumannonovich	392-394
53	THE SILK INDUSTRY: INDIA'S ROLE IN THE GLOBAL LANDSCAPE AND FINANCIAL DECISION-MAKING DYNAMICS	Mr.Swarn G Kanchan, Dr. C. K. Hebbar	395-401
54	INFLUENCE OF PROJECT MANAGEMENT PRACTICES ON PERFORMANCE OF TELECOMMUNICATION PROJECTS A CASE STUDY OF GOLIS TELECOMMUNICATION SOMALIA	Abdihakin Hassan Kalif, Samuel Nyambega Nyang'au	402-409
55	INTERNATIONAL STANDARDS FOR PROTECTION OF RELIGIOUS FREEDOM, HUMAN RIGHTS AND LAW	Ms.Nandini Mehra, Prof. (Dr.) Monika Rastogi	410-415
56	FORMULATION AND EVALUATION OF HERBAL PAIN RELIEF BALM	Ms.Poonam P.Papule, Mr.Prajwal Papule	416-420
57	DEVELOPMENT OF NOVEL HERBAL-BASED MOUTHWASH EFFECTIVE FOR THROAT PAIN	Ankit Kantilal Sanap, Sakshi Omprakash Jaju, Gokul Nagorao Rathod	421-429
58	APPLICATION OF CORPUS TO THE TEACHING PROCESS	Parpieva Shakhnoza Muratovna	430-432
59	KEY ACHIEVEMENTS IN CORPUS LINGUISTICS	Parpieva Shakhnoza Muratovna	433-435
60	EASTERN MORAL VALUES AS A WAY FOR THE DEVELOPMENT OF THE SPIRITUAL CULTURE OF THE YOUTH	Abdullayev Bakhodir Ismoilovich	436-438
61	COMPUTATIONAL STUDY ON VIBRATIONAL SPECTRAL AND THERMAL CHARACTERIZATION USING ORGANIC DERIVATIVE OF 3-FORMLNITROBENZEN	Dr.B.Rameshe, Dr.P.Geetha, C.Jeevarathinam, Dr. G.V.Pandian	439-451
62	DATA WAREHOUSING IMPLEMENTATION IN HEDGE FUND ADMINISTRATION INDUSTRY	Dr.Neelam Mehta	452-456
63	FORMULATION AND EVALUATION OF ANTIACNEY FACEWASH	Arti Rajendra Kise, Avinash Gajanan Wagh, Somnath Mahadev Kale	457-465
64	FORMULATION AND EVALUATION OF GUAVA LEAVES EXTRACT FACE SERUM	Nitin Prabhakar Tikande, Yogiraj Prakash Muley,	466-475

		Pradip Ramprasad Bhutekar, Avinash Kailash Pawar	
65	PROXIMATE COMPOSITION AND ACCEPTABILITY OF CASSAVA-BASED PANCAKE FOR COLLEGE STUDENTS	Alyssa Tabor Fajardo, Martina Delos Reyes- Peñalber	476-487
66	SENSORY EVALUATION AND ACCEPTABILITY OF CORN-BASED NUTRI-SNACK FOR JUNIOR HIGH SCHOOL	Czarina Mae S. Danzalan, Martina Delos Reyes-Peñalber	488-498
67	FORMULATION AND DEVELOPMENT OF CHEMICAL FREE ECO FRIENDLY HANDWASH POWDER	Yogesh Gaibi Kayande , Gitesh Vyas	499-510
68	SCREENING, PREVENTION AND EARLY DIAGNOSIS OF BREAST CANCER (REVIEW)	Tashmatova Yu.J., Mamarasulova D.Z., Urmanbaeva D.A.	511-516
69	DEVELOPMENT OF MODEL RECIPE FOR MINI DONUTS AS A NUTRITIOUS SNACK FOR SECONDARY SCHOOL LEARNERS	Joyce Lyn P. Gaspar, Martina Delos-Reyes-Peñalber	517-529
70	HUMAN ROLE IN THE 6TH. MASS EXTINCTION PROCESS	Deniz EKINCI	530-541
71	NAVIGATING CLOUD REALMS: AN IN-DEPTH EXPLORATION OF MODELS, DEPLOYMENTS, AND OPTIMIZATION STRATEGIES IN CLOUD COMPUTING	Madhumala G , Dr Suma R	542-547
72	ESTIMATION OF QUININE SULPHATE BY USING PHOTO FLUOROMETER	Rutuja Santosh Aghav, Yogiraj P. Muley, Gokul Nagorao Rathod	548-560
73	DETERMINATION OF ELEMENT BY USING FLAME PHOTOMETRY	Archana Shivaji Jamdhade, Yogiraj P. muley , Ankit Kantilal Sanap	561-580
74	DEVELOPMENT OF NEW STRUCTURING POLYMERS FOR SOILS ARAL REGION	Allamuratov Makhmud Omarovich,Anarbekova Gulshat Dzhumabaevna	581-583
75	BIOMORPHOLOGICAL AND ECOLOGICAL CHARACTERIS-TICS OF THE PLANT LYCIUM BARBARUM	Saitova Azima Kalzhanovna,Idrisov Kamalatdin Abatbaevich,Ametova Dame Kutlymuratovna	584-586
76	THE METHODS FOR SOLVING PROBLEMS OF CIRCULAR MEMBRANE OSCILLATIONS	Tanirbergenov M.B	587-594
77	ORTHOPTERA INSECTS ON THE LOW HILLS OF KARAKALPAKSTAN (UZBEKISTAN)	Yusupova Amangul	595-598
78	ANALYSIS OF THE ACCUMULATION OF MICROELEMENTS IN THE BODY OF SMALL MAMMALS UNDER CONDITIONS OF EXPLOITED ECOSYSTEMS OF THE ARAL REGION	Mambetullaeva Svetlana Mirzamuratovna,Bekmuratova Dilaram	599-603
79	FEATURES OF PARASITEFAUNA OF FISH RESERVOIRS OF THE REPUBLIC OF KARAKALPAKSTAN	Kurbanova Alfiya Ismailovna,	604-605
80	BIOECOLOGICAL FEATURES OF THE POLISTES WASP	Nagashybaeva Aigerim Khojas kyzy	606-607
81	EMPOWERING WOMEN: A TECHNOLOGICAL APPROACH TO WOMEN'S DEVELOPMENT THROUGH SELF-HELP GROUPS IN THE DIGITAL AGE	Mrs.Chanchalakshi , Dr. Parameshwara	608-612
82	PERFORMANCE OF UCB AND CUSTOMERS SATISFACTION TOWARDS	Dr.S.A Mohamed Ali, Ms. Najma B	613-618

	TUCBL		
83	THEORETICAL PROBLEMS OF THE SEMANTIC CATEGORY OF LANGUAGE LEXICON	Komilova Nargiza Xusanboy qizi	619-622
84	STUDY OF THE HERITAGE OF IMAM MATURIDI AT THE IMAM MATURIDI INTERNATIONAL SCIENTIFIC RESEARCH CENTER: ANALYSIS AND PROSPECTIVE PLANS	Dr. Jamoliddin Karimov	623-628
85	SCIENTIFIC-THEORETICAL FOUNDATIONS OF RESEARCHING THE ACTIVITY OF DESTRUCTIVE ASSOCIATIONS	Komiljon Shermukhamedov	629-630
86	FORMAL EDUCATION AND SUSTAINABLE DEVELOPMENT FOR BIRHOR COMMUNITY IN PURULIA DISTRICT: ISSUES AND SOLUTIONS	Tapas Singh Sardar , Dr. Pratap Kumar Panda	631-634
87	TO FORMULATE AND EVALUATION OF MOISTURIZING CREAM BY USING CUCUMBER EXTRACT	Khambayatkar Shruti M , Sachin Dighole , Maniyar Alfisha	635-641
88	HEALTH CONSEQUENCES OF FLOODS: A CASE STUDY	Prashant H, Dr.Anjanappa B.H	642-645
89	IMPLICATIONS OF SAVANT SYNDROME FOR COGNITIVE NEUROSCIENCE AND EDUCATION: BRIDGING INSIGHTS FROM EXTRAORDINARY ABILITIES TO LEARNING ENHANCEMENT	Eunice Meng Yin Tan	646-649
90	REVIEW ON HPLC-UV METHOD TO DETERMINE CIMETIDINE,RANITIDINE, FAMOTIDINE AND NIZATIDINE IN URINE	Alfisha A. Maniyar, Dr. Sunil Jaybhaye, Khambayatkar Shruti M	650-657

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FORMULATION AND EVALUATION OF POLYHERBAL EMULGEL FOR MANAGEMENT OF RHEUMATOID ARTHRITIS

Shweta Sunil kharat[1*], Pooja Muley[2] , Dipali Raut[3]

[1]*Student of Bachelor in Pharmacy, Dr.Babsaheb Ambedkar Technological University, Raigad,Lonere.*

[2]*Department of Pharmacology, Faculty of pharmacology, Dr.Babsaheb Ambedkar Technological University , Raigad, Lonere*

[3]*Department of Pharmaceutics, Faculty of Pharmaceutics, Dr.Babsaheb Ambedkar Technological University , Raigad, Lonere*

***Corresponding Author**

ABSTRACT

Rheumatoid arthritis (RA) is a chronic autoimmune disorder characterized by inflammation and destruction of joints, leading to pain, stiffness, and impaired mobility. Conventional treatments often focus on managing symptoms and slowing disease progression, but they may come with side effects and limited efficacy. Herbal remedies have gained attention for their potential to alleviate RA symptoms with fewer adverse effects.This project aims to develop a polyherbal emulgel, a topical formulation, utilizing the synergistic effects of Vitex negundo, Curcuma longa, Piper nigrum, and Zingiber officinale, known for their anti-inflammatory, analgesic, and antioxidant properties. Vitex negundo (Nirgundi) possesses anti-inflammatory and analgesic properties, while Curcuma longa (Turmeric) is known for its potent anti-inflammatory and antioxidant effects. Piper nigrum (Black Pepper) enhances the bioavailability of other herbal components, and Zingiberofficinale (Ginger) exhibits anti-inflammatory and analgesic properties.The emulgel formulation offers the advantage of both hydrophilic and lipophilic properties, ensuring better skin penetration and prolonged drug release. This project will involve the optimization of formulation parameters such as the concentration of herbal extracts, emulsifiers, and gelling agents to achieve the desired rheological and therapeutic properties .The developed polyherbal emulgel has the potential to provide symptomatic relief, reduce inflammation, and improve joint function in patients with rheumatoid arthritis, offering a safer and more holistic alternative to conventional therapies. The emulgel formulation was optimized for maximum efficacy and stability. Evaluation of the emulgel's physicochemical properties, such as pH, viscosity, and spreadability, stability testing ,rheogical behavior was conducted.

KEYWORDS: *Vitex negundo, Inflammation, Arthritis, polyherbal ,curcumin, piperin, joint pain.*

INTRODUCTION

Rheumatoid arthritis (RA) is a systemic autoimmune condition characterized by inflammatory arthritis and extra-articular manifestations. It is a chronic inflammatory disorder influenced by genetic and environmental factors, such as tobacco use, predominantly affecting synovial joints. RA manifests as joint pain, swelling, and stiffness, attributed to the immune system's misguided attack on healthy tissues, leading to inflammation. This condition affects joints and surrounding tissues, with potential long-term effects on various organs. While RA can develop at any age, it is more prevalent in middle-aged individuals, with women being more susceptible. Factors including infection, genetic predisposition, hormonal fluctuations, and smoking have been associated with the development of RA.[1]

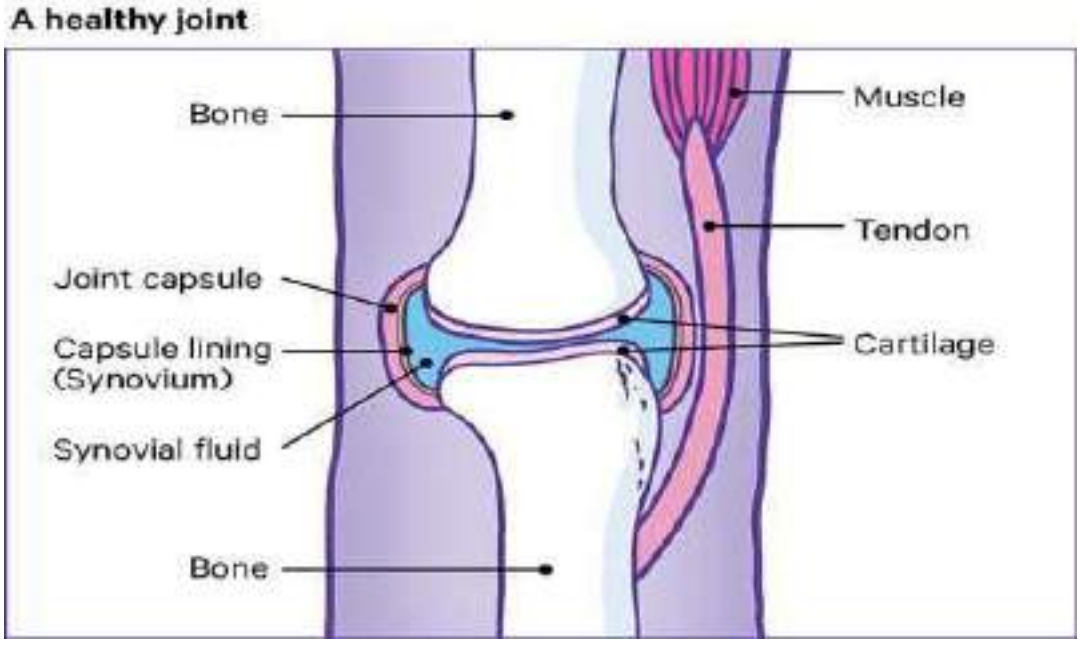
Symptoms:

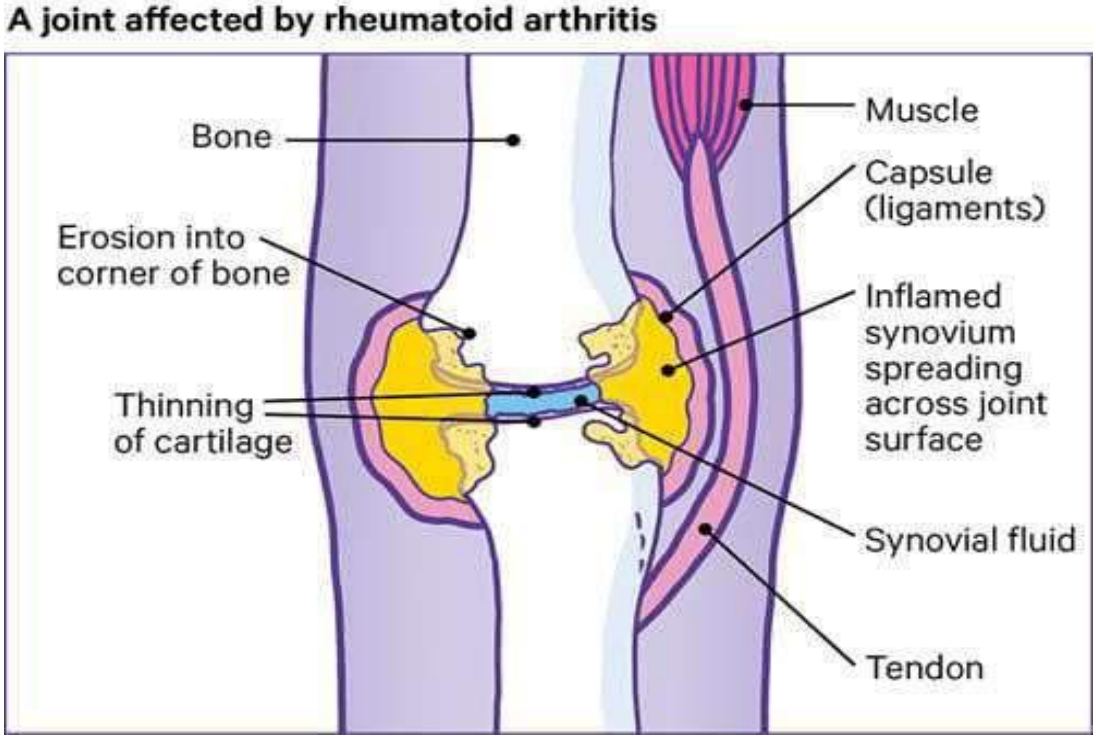
Most of the time, RA affects joints on both sides of the body inversely. Fingers, wrists, knees, bases, elbows, ankles, hips and shoulders are the most generally affected. The lower spine is usually not affected by RA.

The symptoms are commonly associated with rheumatoid arthritis including:

- Morning Stiffness Lasting Over An Hour
- Joint Warmth
- Tenderness
- Swelling,
- Symmetric Joint Pain
- Potential Deformities Over Time[2].

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal





Aditionally symptoms may include:

- chest pain (pleurisy)
- dry eyes and mouth (Sjögren syndrome)
- eye irritation
- skin nodules, and numbness
- tingling in the extremities can occur.

Rheumatoid arthritis can affect any joint in the body, although it's frequently felt in the small joints in the hands and bases first. Both sides of the body are generally affected at the same time, in the same way, but this does n't always be[2].

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

CAUSES

The following can play a part in why someone has rheumatoid arthritis:

- **Age**
  It's a common fact about rheumatoid arthritis, stating its prevalence among adults aged 40 to 60.
- **Sex**
  rheumatoid arthritis being higher in women than in men is a well-established fact in medical research.
- **Genetics**
  Rheumatoid arthritis arises due to a mix of genetic and environmental influences, like smoking and dietary factors. Although the exact genetic connection remains unclear, having a family member with the condition is believed to heighten the risk of developing it.
- **Weight**
  Being overweight significantly increases the likelihood of developing rheumatoid arthritis compared to maintaining a healthy weight. Body Mass Index (BMI) assesses weight in relation to height, with an ideal range for most adults falling between 18.5 and 24.9. Those with a BMI below 18.5 are considered underweight, while those between 25 and 29.9 are categorized as overweight.
- **Smoking**
  Cigarette smoking significantly increases the risk of developing rheumatoid arthritis.
- **Diet:** "Research suggests that a high intake of red meat coupled with low vitamin C consumption could elevate the likelihood of developing rheumatoid arthritis[3]."

Polyherbal formulations refer to mixtures containing two or more herbs. In Ayurveda, drug formulation is based on two principles: using a single herb and combining multiple herbs, with the latter being known as polyherbal formulation. This concept is integral to traditional Indian medicine, where plant formulations and combined extracts are preferred over individual plant extracts. Although the active phytochemicals in individual plants are known, they are often present in small amounts and are insufficient to achieve desired therapeutic effects on their own. Scientific research has shown that combining plants of varying potencies can produce greater therapeutic results compared to using the plants individually. This phenomenon, known as synergism, occurs when the pharmacological actions of herbal constituents are enhanced by the presence of other plants, which may not be evident when the herbs are used alone[4].

Introduction to Emulgel

Emulgel, which is indeed an emulsion that's been gelled using a gelling agent. This formulation can be either oil-in-water (o/w) or water-in-oil (w/o). Emulgels offer stability and are effective for delivering poorly water-soluble drugs, combining the advantages of both emulsions and gels. Despite the benefits, one drawback of gels is their limited ability to deliver hydrophobic medications, which Emulgel addresses by incorporating an emulsion-based solution. This allows even hydrophobic drugs to utilize the unique properties of gels.

Emulgels are capable of delivering both hydrophilic and lipophilic drugs thanks to their combination of aqueous and non-aqueous phases. They have gained popularity as controlled-release formulations in recent years, offering improved drug loading capacity and stability. Emulgels possess several desirable properties including good spreadability, non-greasiness, thixotropy, extended shelf life, lack of odor, and an appealing appearance compared to traditional topical formulations. Essentially, Emulgel acts as a dual control release system by combining the properties of both gels and emulsions[5].

Types of Emulgel

Microemulsion: Microemulsions are isotropic mixtures consisting of an oil-in-water system stabilized with surfactants, which are thermodynamically stable and optically clear. The droplet sizes range from 10 to 100 nm and remain separate without coalescing. They are composed of precise amounts of oil, co-surfactant, surfactant, and water. Microemulsions possess unique properties such as extremely low interfacial tension, a broad interfacial region, and the capacity to dissolve both aqueous and oil-soluble compounds. These properties can enhance drug permeation by reducing the diffusion barrier of the stratum corneum.

Despite their advantages, the low viscosity of microemulsions limits their use in the pharmaceutical industry due to poor skin retention. To overcome this, gelling agents like HPMC K100M, Carbopol 940, and guar gum are added to create microemulsion-based gels, providing a viscosity suitable for topical application[6].

Nanoemulgel

A nanoemulsion is a transparent or translucent oil-water dispersion that is thermodynamically stable, stabilized by surfactant and cosurfactant molecules, with droplet sizes ranging from 1 nm to 100 nm. When combined with a gel, it is referred to as a nanoemulgel. Nanoemulsions provide higher transdermal permeation compared to traditional formulations like emulsions and gels. They enhance transdermal and dermal delivery both in vivo and in vitro. Due to their high loading capacity and small droplet size, nanoemulsions allow drugs to penetrate the skin more easily, achieving therapeutic effects more efficiently[7].

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Macroemulsion Gel

Is a unique formulation for an emulgel, where the emulsion droplet particle sizes greater than 400nm. They are physically invisible, but under a microscope, the individual droplets can be seen clearly. Macroemulsions are thermodynamically unstable, but surface-active agents can help to stabilize them.

Advantages of Emulgel

- Hydrophobic drugs can be easily incorporated into the gel base using water/oil/water emulsions.
- Enhanced stability and drug load capacity.
- Simple and cost-effective production process.
- No need for sonication.
- Bypasses the first-pass metabolism.
- Avoids gastrointestinal incompatibility.
- Enables targeted drug delivery to specific body areas.
- Increases patient compliance.
- High acceptability and suitability for self-medication.
- Allows for easy termination of medication use[8].

Disadvantages of emulgel:

- The drug or excipients may cause skin irritation in individuals with contact dermatitis.
- Some medications have low skin permeability.
- There is a potential for allergic reactions.
- Drugs with larger particle sizes may not be easily absorbed through the skin[9].

The rationale of emulgel as topical drug delivery:

Various semisolid formulations, such as lotions, ointments, and creams, are available on the market for skin care and pharmacological purposes. However, these formulations often suffer from drawbacks like stickiness, low spreading coefficient, and stability issues. Transparent gels are preferred in pharmaceutical and cosmetic applications due to these limitations in semisolid preparations. To overcome these challenges, emulsion-based solutions are employed. This approach allows hydrophobic drugs to be effectively incorporated and delivered through gels.

Emulgels can integrate hydrophobic drugs by incorporating the drug into the oil phase, forming an oil-in-water emulsion. This emulsion is then mixed into the gel base, enhancing drug stability and release compared to directly incorporating the drug into the gel. This method overcomes solubility barriers and improves drug delivery efficiency[10].

Manufacturing And processing of the polyherbal emulgel for rheumatoid arthritis

The following drug ,plants ,excipients ,chemicals and equipments were used for the formulation and evalution studies of emulgel.

1. Ingredients:
   Vitexnegundo
   Zinger officinale
   Pippernigrum
   Curcuma longa
2. Excipients:
   Liquid paraffin
   Tween80
   Span20
   Carbapol 940
   Propylene glycol
   Methyl paraben
   Triethanolamine
3. Equipment:
   stoppered container, mortal pestle, measuring cylinder, maceration apparatus, magnetic stirrer, rotatory evaporator, soxhlet apparatus, whatmaan filter peper, PH meter.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Preparation of Extract

1) Nirgundi (Vitex negundo):
The leaf powder of Vitex negundo was soaked in 50 mL of ethanol solvent for 72 hours at room temperature. The resulting menstruum was filtered, and the filtrate was evaporated using a rotary evaporator to obtain the residue[11].



2) Ginger (Zingiber officinale):
Aqueous-ethanolic extract of ginger was prepared using the maceration method. 2 g of ginger was ground and added to a mixture of 200 mL of 96% ethanol and 200 mL of deionized distilled water. The mixture was stirred continuously at room temperature for 72 hours. The final extract was filtered through Whatman filter paper and concentrated in an oven at 40°C for 72 hours[12].



3) Turmeric (Curcuma longa):
Finely ground turmeric powder (15 g) was dissolved in 100 mL of 70% alcohol and left undisturbed for 48 hours at room temperature. Afterward, the liquid extract was passed through filter paper or a filtration system to remove any remaining particles or debris[13].



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4) Black Pepper (Piper nigrum):
Black pepper was dried, ground into a fine powder, and approximately 10 g was placed in a Soxhlet thimble. It was then extracted using 100 mL of ethanol for 240 minutes. The solution obtained in the round bottom flask was concentrated using a water bath maintained at 90°C during the concentration process[14].



Parts used for extraction

Sr no.	Herbs	Parts used	Chemical constituents	uses
1	Nirgundi (vitexnegundo)	Leaves,roots	nisindine	Anti-inflammatory and analgesic properties
2	Zinzer (zingiberofficinale)	Rhizomes	Zingerol	Anti-inflammatory and analgesic properties.
3	Blackpepper (piper nigrum)	fruits	piperine	Anti-inflammatory
4	Turmeric (curcuma longa)	Zhizomes	curcumin	Anti-inflammatory and antioxidant

Preparation of Emulgel

1. Carbopol is mixed with purified water with continuous stirring on magnetic stirrer helps to disperse the Carbopol evenly in the solvent, ensuring proper gel formation. It's important to stir until the Carbopol is fully hydrated and no lumps remain.
2. The oil phase was prepared by dissolving span in liquid paraffin.
3. Aqueous phase was prepared by dissolving tween in purified water.
4. Methyl paraben dissolved in propylene glycol whereas extract where dissolved in water and mixed both solutions with aqueous phase.
5. Oil and aqueous phase heated separately at 70-80°c.
6. Then oil phase added drop wise to the aqueous phase with continuous stirring.
7. Resultant emulsion was cooled at room temperature.
8. Obtained emulsion was mixed with the gel in ratio 1:1 with moderate stirring to obtain emulgel.
9. The pH of formulation was adjusted to 6-6.5 using triethanolamine(TEA).

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

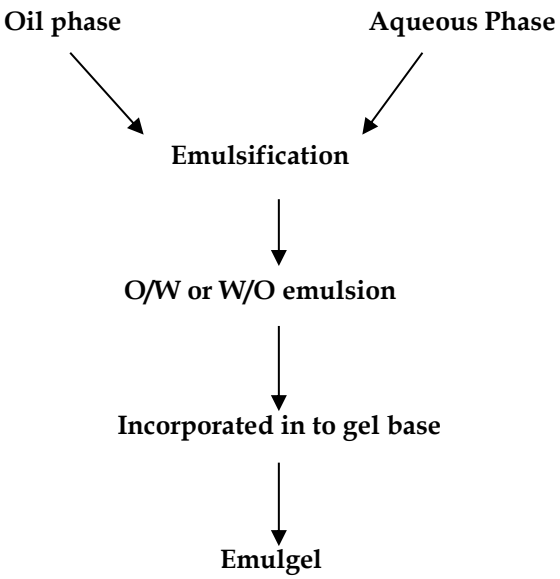


Fig: Emulgel preparation method

Formulation and composition of an emulgel.

Sr no.	Drug	Qty taken (50ml)	category
1	Nirgundiextract	2ml	Anti-inflammatory
2	Zinger extract	2ml	Anti-inflammatory
3	Turmeric extract	2ml	Anti-inflammatory
4	Black pepar extract	1ml	Anti-inflammatory
	Excipients	**Qty taken**	**category**
6	Carbapol940	4gm	Gelling agent
7	Tween80	1.2ml	Emulsifying agent
8	Span20	1.8ml	Emulsifying agent
9	Methyl paraben	0.04gm	preservative
10	Propylene glycol	14ml	Solvent
11	Liquid paraffin	15ml	Stabilizer
12	Triethanolamine	Q.S.	PH adjuvant
13	Distilled water	Q.S	vehicle

Uses

- Anti-inflammatory Properties:Vitexnegundo (Nirgundi) and Curcuma longa (Turmeric) are known for their potent anti-inflammatory properties. They can help reduce inflammation in the joints, which is a hallmark of rheumatoid arthritis. Inflammation contributes to pain, stiffness, and joint damage in rheumatoid arthritis patients.
- Analgesic Effects:The combination of these herbs offers analgesic (pain-relieving) effects. Piper nigrum (Black pepper) and Zingiberofficinale (Ginger) contain compounds that help alleviate pain by blocking pain signals to the brain and reducing the perception of pain in the affected joints.
- Improved Blood Circulation:Ginger officinale can help improve blood circulation, which is beneficial for individuals with rheumatoid arthritis as it promotes the delivery of oxygen and nutrients to the affected joints, aiding in their repair and reducing pain.
- Antioxidant Protection:Curcuma longa and Vitexnegundo are rich in antioxidants that help neutralize free radicals in the body.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Free radicals contribute to inflammation and joint damage in rheumatoid arthritis. By scavenging these free radicals, the emulgel can help protect the joints from further damage[15].

- Enhanced Joint Mobility:Regular application of the emulgel can help improve joint mobility and flexibility. This is particularly beneficial for individuals with rheumatoid arthritis, as stiffness and limited range of motion are common symptoms of the condition.
- Local Application for Targeted Relief:Emulgels provide a convenient way to deliver the therapeutic effects of herbal extracts directly to the affected joints. The emulgel can be applied topically, providing targeted relief to the painful and inflamed joints without the systemic side effects associated with oral medications.
- Natural and Safe Alternative:Unlike some conventional medications used to treat rheumatoid arthritis, polyherbalemulgels are generally well-tolerated and have fewer side effects. They offer a natural and safe alternative for managing symptoms and improving quality of life for individuals with rheumatoid arthritis [16].

Mechanism of action

The mode of action of the emulgel containing herbal extracts of Vitexnegundo, Curcuma longa, Piper nigrum, and Zingiberofficinale involves a multi-faceted approach targeting various aspects of inflammation, pain, and oxidative stress:

- Penetration: Upon application, the emulgel base facilitates the penetration of herbal extracts through the skin barrier.
- Inhibition of Pro-Inflammatory Mediators: Active compounds from Vitexnegundo, Curcuma longa, Piper nigrum, and Zingiberofficinale inhibit the production or activity of pro-inflammatory mediators such as cytokines (e.g., IL-1, IL-6, TNF-α), prostaglandins (via COX inhibition), and leukotrienes.
- Reduction of Oxidative Stress: Antioxidant compounds present in the herbal extracts scavenge reactive oxygen species (ROS), reducing oxidative stress and inflammation.
- Modulation of Immune Response: The herbal extracts regulate the immune response by modulating the activity of immune cells involved in inflammation, such as macrophages and neutrophils.
- Analgesic Effects: Compounds with analgesic properties from the herbs alleviate pain by inhibiting pain-signaling pathways or by reducing inflammation-induced sensitization of pain receptors.
- Enhanced Bioavailability: Piper nigrum (black pepper) enhances the bioavailability of curcumin from Curcuma longa, maximizing its therapeutic effects.
- Synergistic Action: The combination of multiple herbs in the emulgel results in a synergistic effect, amplifying the overall anti-inflammatory and analgesic properties.
- Promotion of Tissue Healing: Some constituents of the herbal extracts promote tissue regeneration and wound healing, aiding in the resolution of inflammation and associated symptoms.
- By following these steps, the poly herbal emulgel effectively targets various aspects of the inflammatory process, providing comprehensive relief from inflammation and associated discomfort[17].

Application

steps for applying poly herbal emulgel

- Preparation: Wash your hands and the affected area with mild soap and water. Pat dry with a clean towel.
- Dispensing: Squeeze a small amount of poly herbal emulgel onto your fingertips. The amount needed depends on the size of the affected area.
- Application: Gently spread the emulgel over the affected area using your fingertips. Apply a thin, even layer to cover the area completely.
- Massage: Use circular motions to massage the emulgel into the skin. Continue massaging until the emulgel is fully absorbed.
- Reapplication: If necessary, reapply the emulgel according to the instructions provided on the product label.
- Cleanup: Wash your hands thoroughly after application to remove any residue.
- Storage: Close the container tightly and store it in a cool, dry place away from direct sunlight.

Pharmacology

In pharmacology, understanding the pharmacodynamics and pharmacokinetics of the polyherbal extract of vitexnegundo, zinger, turmeric, black pepper is crucial for assessing its efficacy, safety, and potential interactions. Here's a brief overview:

1. Pharmacodynamics: The pharmacodynamics of the polyherbalemulgel you mentioned would involve the study of how its active ingredients interact with the body to produce therapeutic effects..key aspects include:

- Mechanism of action: Many of the herbs in the formulation, such as Vitexnegundo, Curcuma longa, and ginger, contain compounds that can inhibit inflammatory pathways in the body. This can help reduce inflammation in the joints, which is a key feature of rheumatoid arthritis.

Analgesic properties: Some of the herbs, including ginger and Vitexnegundo, have analgesic properties that can help alleviate

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

pain associated with arthritis.

Antioxidant activity: Curcuma longa and other herbs in the formulation may exert antioxidant effects, protecting joint tissues from oxidative damage often seen in arthritis.

Enhanced absorption: Piper nigrum (black pepper) contains piperine, which may enhance the absorption of other active compounds in the formulation, potentially increasing their effectiveness.

- Spectrum of activity: The spectrum of activity of the polyherbalemulgel would primarily target symptoms associated with rheumatoid arthritis, such as inflammation, pain, and stiffness in the joints.
- Concentration response curve: his relationship can help determine the optimal concentration or dosage of each herb needed to achieve the desired therapeutic outcome while minimizing any potential side effects..
- Time-course effects: Onset of action- This refers to how quickly the emulgel starts to alleviate symptoms after application. Some individuals may experience relief shortly after applying the emulgel, while for others, it may take some time for the active ingredients to penetrate the skin and exert their effects on the affected joints.

Duration of action: Once applied, the emulgel may provide relief from symptoms for a certain period. The duration of action can vary depending on factors such as the concentration of active ingredients, the formulation's ability to maintain sustained release of these ingredients, and individual differences in metabolism and skin absorption [18].

2. Pharmacokinetics: pharmacokinetics of the polyherbalemulgel for rheumatoid arthritis involves the study of how the body absorbs, distributes, metabolizes, and eliminates the active ingredients in the formulation. Here's how it applies:

   -Absorption: After topical application, the active compounds in the emulgel are absorbed through the skin. Factors such as the formulation's composition, the size and properties of the molecules, and the condition of the skin can influence the rate and extent of absorption.

   -Distribution: Once absorbed, the active ingredients may distribute to various tissues, including the joints affected by rheumatoid arthritis. The extent of distribution depends on factors such as blood flow to the tissues and the lipophilicity of the compounds.

   -Metabolism: Some of the absorbed compounds may undergo metabolism in the body, primarily in the liver or other tissues. Metabolism can involve processes such as oxidation, reduction, or conjugation, which may affect the activity and bioavailability of the compounds.

   -Elimination: Metabolized or unchanged compounds are eventually eliminated from the body, primarily through urine, feces, or exhalation. The rate of elimination depends on factors such as the compound's half-life and the efficiency of renal or hepatic clearance[19].

3. Safety and Toxicology: Acute toxicity- This involves determining the potential adverse effects of the emulgel after a single exposure. Acute toxicity studies may include evaluating skin irritation, allergic reactions, or systemic toxicity in animal models.

   -Chronic toxicity: Chronic toxicity studies evaluate the long-term effects of prolonged exposure to the emulgel, typically conducted over several months to years.

   -Skin irritation: Skin irritation studies assess the emulgel's potential to cause irritation or damage to the skin after repeated application.

   -Skin sensitization: Skin sensitization studies evaluate whether the emulgel has the potential to induce an allergic reaction upon repeated exposure.

4. Interactions: Investigating potential interactions between the extract and other drugs or herbal products, both pharmacodynamic and pharmacokinetic in nature.
5. Dose Optimization: Determining the optimal dose and dosing regimen based on pharmacokinetic and pharmacodynamic data, balancing efficacy with safety considerations.

   Overall, a comprehensive understanding of the pharmacology of the extract essential for its effective and safe use in polyherbalEmulgel formulations with Anti-inflammatory properties[20].

Therapeutic

1. Muscle relaxation: Ginger (Zingiberofficinale) has muscle relaxant properties, which could help alleviate tension and stiffness in the muscles surrounding the affected joints.
2. Improved circulation: Ingredients like ginger and black pepper (Piper nigrum) may help improve blood circulation when applied topically, promoting better nutrient delivery and waste removal in the affected area.
3. Warming sensation: Some users may experience a mild warming sensation upon application, which can provide temporary comfort and relief to sore joints.
4. Moisturization: Emulgel formulations typically contain moisturizing agents that can help hydrate the skin, which may be beneficial for individuals with dry or irritated skin around the affected joints.
5. Potential synergistic effects: The combination of multiple herbs in the emulgel may result in synergistic effects, enhancing

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

the overall therapeutic outcome compared to using each herb individually.

6. Anti-arthritic: The combination of herbs may work synergistically to alleviate symptoms of arthritis, including joint swelling and stiffness.
7. Cartilage protection: Some herbs in the emulgel may have chondroprotective properties, potentially helping to preserve cartilage integrity and slow down the progression of joint degeneration.
8. Anti-rheumatic: The emulgel may help reduce symptoms associated with rheumatism, such as pain and inflammation in the joints and surrounding tissues.
9. Antimicrobial: Certain herbs like turmeric (Curcuma longa) and ginger (Zingiberofficinale) have antimicrobial properties, which could help prevent infections in the affected joints or skin.
10. Enhanced absorption: The emulgel formulation may improve the absorption of active ingredients through the skin, allowing for targeted delivery to the affected area.
11. Improved quality of life: By providing relief from pain and discomfort, the emulgel may contribute to an overall improvement in quality of life for individuals with rheumatoid arthritis[21].

Evaluation Tests

Emulgel was evaluated for parameters like:

1)Physical examination:

The prepared emulgel formulation visually inspected for colour,odour,appearance, consistency, and homogeneity.

2)Determination of PH:

The pH of the poly herbal emulgel can be determined using a pH meter or pH strips.Take a small amount of the emulgel sample and place it in a clean container.Immerse the pH meter electrode or dip the pH strip into the emulgel sample. Allow the reading to stabilize.this process was repeated 3 times[23].

3)Spredability:

The spreadability of Emulgel formulations were determined by placing 0.5 g of respective Emulgel within a circle of diameter 1 cm, pre-marked on a glass plate over which a second glass plate was placed. A weight of 500 g was allowed to rest on the upper glass plate for about 15 seconds. The diameter due to spreading of the Emulgel was noted.

4) Viscocity:

The viscosities of formulations were determined by Brookfield viscometer using spindle no 7. The hydrogel sample was taken in a beaker and the dial reading was noted at 100 rpm.

5) Stability testing :

store samples in cool condition.

6) Swelling Index:

Take a known weight (W1) of the emulgel sample and place it in a suitable container.Completely immerse the emulgel sample in a large volume of distilled water at room temperature for a specified period.After the immersion period, carefully remove the excess water from the surface of the emulgel using a blotting paper or tissue.Weigh the swollen emulgel sample (W2) after excess water removal.Calculate the swelling index using the formula[22]:

Swelling Index = (W2 - W1) / W1

7) Antimicrobial activity study:

In this study we check the antimicrobial activity using a agar medium plate formation method we check the microbial growth are increasing or decreasing.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Fig: Antimicrobial activity of Polyherbal Emulgel against two types of microbial organisms viz. E.Coli& Pseudomonas.

8)Compatibility Testing:

Conduct compatibility testing of the emulgel with packaging material to ensure Compatibility and prevent any leaching or interaction between the formulation and. packaging

RESULTS & OBSERVATIONS:

Sr no.	1)Physical Test	2)Sensory Test
1	Appearance: smooth texture	Odour: warm slightly aromatic fragrance
2	Colour: yellowish	
3	Texture: smooth	
4	Consistency: semi-solid	Irritancy: No irritation and edema found

Fig: shows Appearance characteristics of emulgel:

Srno .	Tests	Inference
1	Spreadability	4.33
2	PH	6.68
3	Viscosity	31.312
4	Swelling Index	48.23%

Fig : shows spredability,PH,Viscosity and swelling index of emulgel formulation

CONCLUSION

The aim of the study was to formulate and evaluate polyherbalEmulgel as a topical drug delivery system for the treatment of rheumatoid arthritis by using anti-inflammatory, drugs likenirgundi,turmeric, ginger, black paper as these are lipophilic and hydrophilic drugs having problem to incorporate directly into, gelling base or cream base.

So Emulgels are a unique approach for the hydrophobic drugs as compared to conventional gels. They overcome the drawback hydrophobicity because the Emulgel possess both phases hence it is suitable for both hydrophilic and lipophilic drugs.

Topical drug delivery system has great advantage that it allows to target the site and reduces the dose of drug owing to it topical treatment is choice of treatment for rheumatoiddeseases.

In conclusion, the formulation and evaluation of a polyherbalemulgel for rheumatoid arthritis present a promising approach for managing the condition. Through careful selection of herbs with anti-inflammatory and analgesic properties, coupled with an appropriate emulgel base, a formulation with potential therapeutic benefits can be developed. Evaluation of the emulgel should encompass various parameters such as rheological properties, stability, skin compatibility, and efficacy in alleviating arthritis symptoms. Further research, including preclinical and clinical studies, is warranted to validate the efficacy and safety of the developed emulgel for practical use in managing rheumatoid arthritis.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

REFERENCE

1. *Calgüneri, M.; Ureten, K.; AkifOztürk, M.; Onat, A.M.; Ertenli, I.; Kiraz, S.; Akdogan, A. Extra-Articular Manifestations of Rheumatoid Arthritis: Results of a University Hospital of 526 Patients in Turkey. Clin. Exp. Rheumatol. 2006, 24, 305–308.*
2. *Firestein GS. The disease formerly known as rheumatoid arthritis.Arthritis Res Ther. 2014;16(3):114*
3. *Finckh A, Turesson C. The impact of obesity on the development and progression of rheumatoid arthritis. Ann. Rheum. Dis. 2014;73(11):1911–1913. doi: 10.1136/annrheumdis-2014-205741.*
4. *Malarvizhi R., Abhishek P., Barathidasan R., Kishore K.K., Vasanthi H. Potential wound healing properties of a polyherbal formulation (amrit oil) in an experimental model on wistar rats. Biomedicine. 2020;39(1):40–51.*
5. *Kankane, M.; Nigam, V.; Modi, S.; Jain, S.; Adhikari, P. Emulgel: A dual release system for hydrophobic drug delivery. World J. Biol. Pharm. Health Sci. 2022, 12, 335–347.*
6. *Lala R.R., Awari N.G. Nanoemulsion-based gel formulations of COX-2 inhibitors for enhanced efficacy in inflammatory conditions. Appl. Nanosci. 2014;4:143–151.*
7. *Abdo J.M., Sopko N.A., Milner S.M. The Applied Anatomy of Human Skin: A Model for Regeneration. Wound Med. 2020;28:100179.*
8. *Pleguezuelos-Villa M., Nácher A., Hernández M.J., Ofelia Vila Buso M.A., Ruiz Sauri A., Díez-Sales O. Mangiferinnanoemulsions in treatment of inflammatory disorders and skin regeneration. Int. J. Pharm. 2019;564:299–307.*
9. *Pastore M. N.; Kalia Y. N.; Horstmann M.; Roberts M. S. Transdermal Patches: History, Development and Pharmacology. Br. J. Pharmacol. 2015, 172 (9), 2179–2209. 10.1111/bph.13059.*
10. *Light k, Karboune S. Emulsion, hydrogel and Emulgel system and novel application in cannabinoid delivery: a review. Taylor & Francis Group.2021; 22:1-31.*
11. *Baba SA, Malik SA. Determination of total phenolic and flavonoid content, antimicrobial and antioxidant activity of a root extract of ArisaemajacquemontiiBlume. Journal of Taibah University for Science. 2015;9(4):449454.*
12. *Benzie I.F., Wachtel-Galor S., CRC press 2011.*
13. *Her J-Y, Song C-S, Lee SJ, Lee K-G. Preparation of kanamycin powder by an optimized spray freeze-drying method. Powder Technol. 2010;199(2):159–64.*
14. *Cox-Georgian, D.; Ramadoss, N.; Dona, C.; Basu, C. Therapeutic and medicinal uses of terpenes. In Medicinal Plants; Joshee, N., Dhekney, S., Parajuli, P., Eds.; Springer: Cham, Germany, 2019; pp. 333–359.*
15. *Nemati, Z.; Moradi, Z.; Alirezalu, K.; Besharati, M.; Raposo, A. Impact of ginger root powder dietary supplement on productive performance, egg quality, antioxidant status and blood parameters in laying japanese quails. Int. J. Environ. Res. Public Health 2021, 18, 2995.*
16. *Baltazar LM, Krausz AE, Souza ACO, et al. Trichophytonrubrum is inhibited by free and nanoparticle encapsulated curcumin by induction of nitrosative stress after photodynamic activation. PLoS One. 2015;10(3):e0120179.*
17. *Abubakar M.N., Majinda R.R. GC-MS analysis and preliminary antimicrobial activity of Albiziaadianthifolia (Schumach) and Pterocarpusangolensis (DC) Medicines. 2016;3:3.*
18. *AbiBeaulah G., Mohamed Sadiq A., Jaya Santhi R. Antioxidant and antibacterial activity of Achyranthesaspera: An in vitro study. Ann. Biol. Res. 2011;2:662–670.*
19. *Akashi, N.; Matsumoto, I.; Tanaka, Y.; Inoue, A.; Yamamoto, K.; Umeda, N.; Tanaka, Y.; Hayashi, T.; Goto, D.; Ito, S.; et al. Comparative Suppressive Effects of Tyrosine Kinase Inhibitors Imatinib and Nilotinib in Models of Autoimmune Arthritis. Mod.Rheumatol. 2011, 21, 267–275.*
20. *Cardoso E, Rezin GT, Zanoni ET, de Souza Notoya F, Leffa DD, Damiani AP, Daumann F, Rodriguez JC, Benavides R, da Silva L, Andrade VM, da Silva Paula MM, Acute and chronic administration of gold nanoparticles cause DNA damage in the cerebral cortex of adult rats, Mutat Res, 766–767 (2014) 25–30.*
21. *Srivastava KC, Mustafa T. Ginger (Zingiberofficinale) in rheumatism and musculoskeletal disorders. Med Hypotheses.(1992) 39:342–8coated fcoHosny KM. (2016).Alendronate sodium as enteric coated solid lipid nanoparticles; preparation, optimization, and in vivo evaluation to enhance its oral bioavailability.PLoS One 11:e0154926.*
22. *The United States Pharmacopeial Convention. The 2007 United States Pharmacopeia 30 - National Formulary 25. Rockville, MD: The United States Pharmacopeial Convention, Inc. 2008;61:83.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

A REVIEW ON HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC)

Dr. Sunil S. Jaybhaye[1], Aniket Narayan Tompe[2*]

[1]Department of Pharmaceutical Analysis, Faculty of Pharmaceutical Analysis, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.

[2]Student of Bachelor in pharmacy, Faculty of Pharmacy,Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.

**Corresponding Author*

ABSTRACT

High performance liquid chromatography (HPLC) is an important qualitative and quantitative technique, generally used for the estimation of pharmaceutical and biological samples. HPLC is the most often used separation technology for detecting, separating, and quantifying the drug. HPLC technique development and validation serve critical roles in novel drug discovery, development, and manufacturing, as well as a variety of other human and animal investigations. HPLC instrumentation includes a Solvent reservoir, pump, injector, column, detector, and integrator or acquisition and display system. The heart of the system is the column where separation occurs. The information that can be obtained using HPLC includes identification, quantification, and resolution of a compound.

KEYWORDS - *High performance liquid chromatography, instrumentation, elution, applications, mobile phase.*

INTRODUCTION

High Performance Liquid Chromatography (HPLC) is one of the most used analytical techniques. Chromatographic process can be defined as separation technique involving mass-transfer between stationary and mobile phase. HPLC utilizes a liquid mobile phase to separate the components of a mixture. The stationary phase can be a liquid or a solid phase. Common solvents used include any miscible combinations of water or organic liquids the most common are methanol and acetonitrile. This technique is widely used like spectroscopy and is a very powerful tool not only for analytical methods but also for preparative methods. Compounds of high-grade purity can be obtained by this method. This technique is widely used like spectroscopy and is a very powerful tool not only for analytical methods but also for preparative methods. Compounds of high-grade purity can be obtained by this method. Chromatography can be simply defined as It is the technique in which the components of a mixture are separated based upon the rates at which they are carried or moved through a stationary phase (column) by a gaseous or liquid mobile phase.The major applications are in the area of Pharmaceuticals, food, research, manufacturing, forensics, and bio-monitoring of pollutants.

Principle of HPLC

HPLC is a separation technique that involves: The injection of a small volume of liquid sample into a tube packed with tiny particles (3 to 5 micron (μm) in diameter called the stationary phase) where individual components of the sample are moved down the packed tube (column) with a liquid (mobile phase) forced through the column by high pressure delivered by a pump. These components are separated from one another by the column packing that involves various chemical and/or physical interactions between their molecules and the packing particles. These separated components are detected at the exit of this tube (column) by a flow-through device (detector) that measures their amount. Output from this detector is called an "HPLC" In principle, LC and HPLC work the same way except for the speed, efficiency, sensitivity, and ease of operation of HPLC are vastly superior. Though HPLC retains major of the credits for the analytical side, the earlier one of simple Liquid Chromatography still finds applications for the preparative Purposes.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Figure 1 HPLC Machine

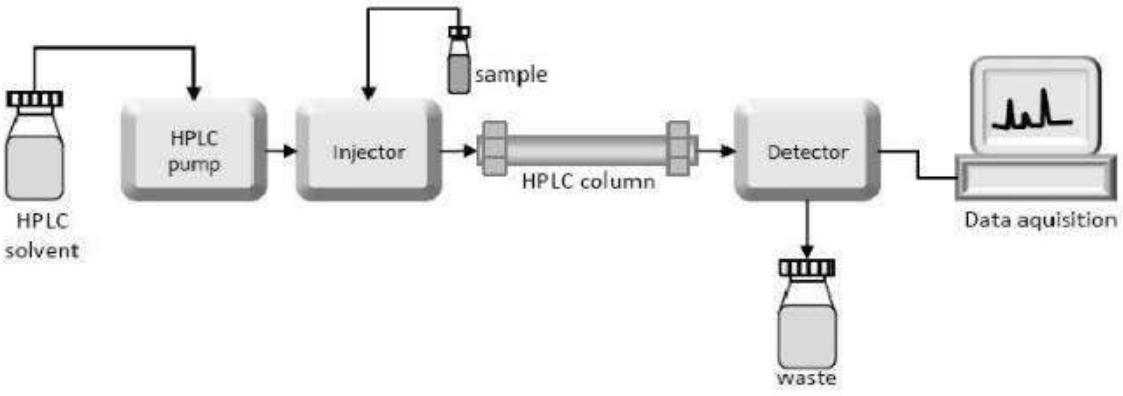


Figure 2 Components Of HPLC

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Components of HPLC

1. Pump
2. Injector
3. Column
4. Detector
5. Column Oven/Thermostat:
6. Data Acquisition System:
7. Mobile Phase Reservoirs:
8. Gradient Controller (optional):
9. Waste Collector:

1. Pump

The pump is responsible for delivering the mobile phase at a constant flow rate through the system.
It maintains pressure to ensure consistent flow and reproducible chromatographic results.
Types of pumps include binary (two-solvent) or quaternary (four-solvent) pumps.

2. Injector

The injector introduces the sample into the mobile phase stream, typically via an injection loop.
It must provide accurate and precise sample volumes to ensure reproducible analysis.

3. Column

The column is the heart of the chromatographic system, where separation of analytes occurs.
It consists of a packed bed of stationary phase material inside a stainless steel or glass tube.
The choice of column (e.g., reversed-phase, normal-phase, size-exclusion) depends on the properties of the analytes and the separation requirements.

4. Detector

The detector monitors the eluent leaving the column and detects the separated analytes.
Common types of detectors include UV-Vis absorbance, fluorescence, refractive index, and mass spectrometry detectors.
Detectors must provide high sensitivity, selectivity, and a wide linear range for accurate quantification.

5. Column Oven/Thermostat

The column oven or thermostat maintains a constant temperature of the column to ensure reproducible chromatographic conditions.
Temperature control is crucial for optimizing separation efficiency and resolving power.

6. Data Acquisition System

The data acquisition system collects, processes, and analyzes the detector signals to generate chromatograms.
It typically includes software for instrument control, data visualization, and peak integration.

7. Mobile Phase Reservoirs

The mobile phase reservoirs hold the solvents used to prepare the mobile phase.
They may include degassing units to remove dissolved gases that can interfere with chromatographic performance.

8. Gradient Controller

In gradient elution chromatography, a gradient controller is used to vary the composition of the mobile phase over time.
It allows for more complex separations and improved resolution by adjusting solvent composition during the chromatographic run.

9. Waste Collector

The waste collector collects the eluent after it passes through the detector, preventing contamination and ensuring safe disposal of waste solvents.
Each of these components plays a vital role in the performance and functionality of an HPLC system, contributing to the accuracy, precision, and reliability of the analytical results.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Types of HPLC

1. **Reversed-Phase Chromatography (RPC):**
   In reversed-phase chromatography, the stationary phase is non-polar, while the mobile phase is polar.
   Analytes are separated based on their hydrophobicity, with more hydrophobic compounds eluting later.
   RPC is widely used for the analysis of organic compounds, drugs, and biomolecules like proteins and peptides.

2. **Normal-Phase Chromatography (NPC):**
   In normal-phase chromatography, the stationary phase is polar, and the mobile phase is non-polar.
   Separation occurs based on the polarity of the analytes, with more polar compounds eluting earlier.
   NPC is commonly used for the analysis of non-polar and moderately polar compounds, such as natural products and lipids.

3. **Ion-Exchange Chromatography (IEC):**
   In ion-exchange chromatography, the stationary phase contains charged functional groups that interact with analyte ions.
   Separation is based on differences in ionic charge and affinity for the stationary phase.
   IEC is useful for separating charged molecules such as amino acids, peptides, and proteins.

4. **Size-Exclusion Chromatography (SEC) or Gel Filtration Chromatography**
   In size-exclusion chromatography, the stationary phase consists of porous beads with a range of pore sizes.
   Analytes are separated based on their size and molecular weight, with larger molecules eluting earlier.
   SEC is commonly used for the analysis of polymers, proteins, and biomolecules.

5. **Affinity Chromatography:**
   Affinity chromatography utilizes specific interactions between a ligand immobilized on the stationary phase and the analyte of interest.
   Separation is based on the affinity of the analyte for the ligand, allowing for highly selective purification.
   Affinity chromatography is widely used for the isolation and purification of biomolecules such as proteins, enzymes, and antibodies.

6. **Hydrophilic Interaction Chromatography (HILIC):**
   Hydrophilic interaction chromatography utilizes a polar stationary phase and a less polar mobile phase.
   Separation occurs based on differences in polarity and hydrophilicity of analytes.
   HILIC is suitable for the analysis of polar and hydrophilic compounds, including carbohydrates, amino acids, and small organic acids.
   Each type of HPLC offers unique advantages and is selected based on the physicochemical properties of the analytes and the desired separation mechanism. Understanding these different types of HPLC is crucial for selecting the most appropriate method for specific analytical tasks in research or industrial settings.

Application Of HPLC in Pharmaceutical Analysis

High-Performance Liquid Chromatography (HPLC) is a powerful analytical technique extensively used in pharmaceutical analysis. It plays a crucial role in ensuring the quality, safety, and efficacy of pharmaceutical products. Here are some key applications of HPLC in pharmaceutical analysis.

1. **Drug Purity and Impurity Profiling**
   HPLC is used to assess the purity of drug substances and products by identifying and quantifying impurities and degradation products. It helps ensure that pharmaceutical products meet stringent regulatory standards.

2. **Quantitative Analysis**
   HPLC is used for the quantitative determination of active pharmaceutical ingredients (APIs) in bulk drugs and formulations. This ensures that the dosage of the active ingredient in tablets, capsules, and other forms is accurate and consistent.

3. **Stability Testing**
   HPLC is employed in stability studies to monitor the stability of pharmaceutical products under various environmental conditions (e.g., temperature, humidity, light). It helps in understanding the shelf life and determining expiration dates.

4. **Bioavailability and Bioequivalence Studies**
   HPLC is used in pharmacokinetic studies to measure the concentration of drugs and their metabolites in biological fluids (e.g., blood, plasma, urine). This data is crucial for bioavailability and bioequivalence studies, which compare the drug release profiles of different formulations.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5. **Method Development and Validation**
   Pharmaceutical companies use HPLC to develop and validate analytical methods for new drugs. This includes determining parameters like precision, accuracy, linearity, and robustness, ensuring the method is reliable and reproducible.

6. **Dissolution Testing**
   HPLC is used to analyze samples from dissolution tests, which measure the rate and extent of drug release from solid dosage forms like tablets and capsules. This is essential for ensuring consistent drug release and absorption in the body.

7. **Identification of Compounds**
   HPLC can identify unknown compounds in a mixture by comparing their retention times with those of known standards. This is particularly useful in the identification of impurities and degradation products.

8. **Quality Control**
   HPLC is a routine tool in quality control laboratories for the analysis of raw materials, intermediates, and finished products. It ensures that all components meet predefined specifications and standards.

9. **Chiral Separation**
   Many drugs exist as enantiomers, which can have different therapeutic effects or side effects. HPLC with chiral stationary phases can separate and quantify these enantiomers, ensuring the correct form is used in the drug.

10. **Regulatory Compliance**
    Pharmaceutical companies must comply with various regulatory guidelines (e.g., USP, EP, ICH) that often mandate the use of HPLC for specific analyses. Adhering to these guidelines is crucial for market approval and product registration.

Example: HPLC in Action
A practical example could involve the use of HPLC in the analysis of a common drug like paracetamol (acetaminophen). The HPLC method would be developed and validated to quantify paracetamol in tablet form, ensuring it meets the USP standards for content uniformity and dissolution rate.

Method Development In HPLC

1. **Understanding the Purpose**
   Determine the specific goal of the HPLC analysis:
   Identification: To identify the presence of specific compounds
   Quantification: To measure the amount of specific compounds.
   Purity Assessment: To determine the purity of a sample and identify impurities.
   Stability Studies: To evaluate the stability of compounds under various conditions.

2. **Sample Considerations**
   Understand the nature and composition of the sample:
   Matrix: Is it a biological sample, environmental sample, or a pharmaceutical formulation?
   Physical State: Is it a liquid, solid, or gas?
   Chemical Properties: Consider the polarity, solubility, and stability of the analytes.

3. **Literature Review**
   Research existing methods for similar compounds or matrices to gain insights and starting points.

4. **Selection of HPLC Type**
   Choose the type of HPLC based on the chemical properties of the analytes:
   Reversed-Phase HPLC (RP-HPLC): Suitable for non-polar to moderately polar compounds.
   Normal-Phase HPLC (NP-HPLC): Suitable for polar compounds.
   Ion-Exchange HPLC: Best for ionic compounds.
   Size-Exclusion HPLC: For large molecules like proteins and polymers.

5. **Column Selection**
   Select an appropriate column:
   Column Material: Commonly used columns include C18 (octadecyl), C8, phenyl, etc.
   Column Dimensions: Typically, columns are 150-250 mm in length and 4.6 mm in diameter with particle sizes of 3-5 µm.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

6. **Mobile Phase Selection**
   Develop the mobile phase:
- **Solvent System**: Water, methanol, acetonitrile, and buffers are common solvents.
- **pH and Buffer:** Adjust pH using buffers like phosphate or acetate to optimize peak shape and resolution.
  Gradient vs. Isocratic Elution: Gradient elution is useful for complex mixtures, while isocratic elution is simpler for less complex samples.

7. **Detector Selection**
   Choose a detector based on analyte properties:
   UV/Vis Detector: For compounds with chromophores.
   Fluorescence Detector: For fluorescent compounds.
   Mass Spectrometry (MS) Detector: For high sensitivity and structural information.

8. **Optimization of Conditions**
   Optimize method parameters:
   Flow Rate: Typically 0.5 to 2.0 mL/min.
   Injection Volume: Usually between 5 to 20 µL.
   Temperature: Often set between 25°C to 40°C to improve reproducibility and peak shape.

9. **System Suitability Testing (SST)**
   Perform system suitability tests to ensure the method works properly:
   Resolution (Rs): Ensure sufficient separation between peaks.
   Theoretical Plates (N): Indicator of column efficiency.
   Tailing Factor (T): Check for peak symmetry.
   Retention Time (tR) and Retention Factor (k'): Ensure reproducibility.

10. **Method Validation**
    Validate the developed method according to ICH guidelines:
    Specificity: Ensure the method can uniquely identify the analyte.
    Linearity: Establish a calibration curve to demonstrate the method's response is proportional to analyte concentration.
    Accuracy and Precision: Evaluate by analyzing spiked samples and calculating recovery and relative standard deviation (RSD).
    Limit of Detection (LOD) and Limit of Quantification (LOQ): Determine the smallest amount of analyte that can be reliably detected and quantified.
11. **Documentation**
    Document all steps, observations, and results comprehensively. Include:
    Method Development Report: Detailing the rationale, parameters tested, optimization steps, and final method.
    Validation Report: Summarizing the validation results and demonstrating the method meets all required criteria.

Developing an HPLC Method for Paracetamol

- **Purpose:** Quantification of paracetamol in tablet formulation.
- **Literature Review:** Existing methods suggest RP-HPLC with UV detection.
- **Column Selection:** C18, 250 x 4.6 mm, 5 µm.
- **Mobile Phase**: 15% MeOH with 42 mM AmAc pH 4.0.
- **Detector**: UV at 255 nm.
- **Optimization**: Flow rate of 1 mL/min, injection volume of 10 µL, column temperature at 30°C.
- **SST**: Resolution >2, theoretical plates >2000, tailing factor <1.5.
- **Validation**: Linearity over 5-100 µg/mL, accuracy 98-102%, precision RSD <2%.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- **Column:** Heritage C18
- **Separation Modes:** Reversed-phase
- **Column Dimenstions:** 4.6 x 250 mm, 5 um, 100A
- **Mobile Phase:** 15% MeOH with 42 mM AmAc pH 4.0
- **Detection:** UV 255 nm
- **Sample:** 0.2 mg/ml
- **Injection:** 5 uL
- **Flow rate:** 1 mL/min

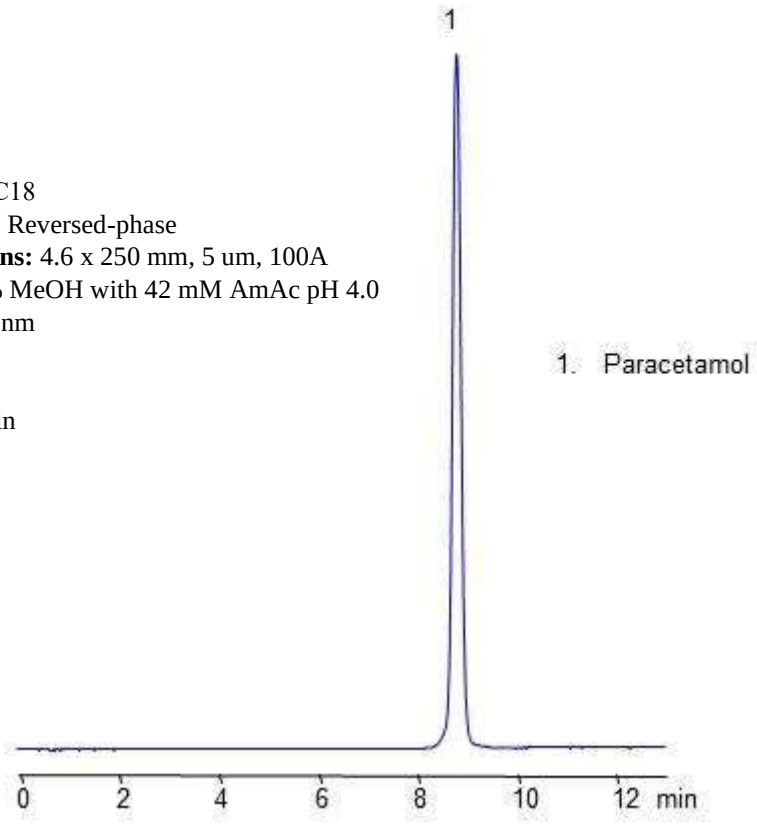


Figure 1 Developing an HPLC Method for Paracetamol

Validation Of HPLC Method

1. **Accuracy**

The closeness of a measured Value to the true or accepted value is defined as accuracy.
To measure the closeness of the test results to the true value.

- **Procedure**
  Prepare samples with known amounts of paracetamol (e.g., 80%, 100%, and 120% of the target concentration).
  Analyze each sample in triplicate.

2. **Precision**

To demonstrate the reproducibility of the method under normal operating conditions**.**

- **Procedure**
  Prepare multiple (e.g., six) replicates of a single concentration of paracetamol.
  Analyze all replicates on the same day.

3. **Limit of Detection (LOD) and Limit of Quantification (LOQ)**

To determine the smallest amount of analyte that can be reliably detected (LOD) and quantified (LOQ) with acceptable precision and accuracy.

- **Procedure**
  Prepare and analyze a series of dilute solutions of paracetamol.
  Determine the signal-to-noise ratio for each solution.

4. **System Suitability Testing (SST)**

To ensure the system's performance before running analytical samples.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- **Procedure**
  Inject a standard solution of paracetamol.
  Calculate system suitability parameters like retention time, theoretical plates, resolution, and tailing factor.

Validation Of HPLC Method for Paracetamol

- **Specificity**
  No interference at the retention time of paracetamol.
- **Linearity**
  $R^2 > 0.999$ over the concentration range 5-100 µg/mL.
- **Accuracy**
  Mean recovery between 98-102%.
- **Precision**
  RSD < 2% for both repeatability and intermediate precision.
- **LOD and LOQ**
  LOD with S/N ~ 3:1, LOQ with S/N ~ 10:1.
- **Robustness**
  Method performance remains stable under small variations in parameters.
- **SST**
  Resolution > 2, theoretical plates > 2000, tailing factor < 1.5, consistent retention time.

Recent Advancement in HPLC

High-Performance Liquid Chromatography (HPLC) has seen significant advancements over the years, driven by the need for higher efficiency, sensitivity, and speed in analytical processes. Here are some recent advancements in HPLC technology:

1. **Ultra-High-Performance Liquid Chromatography (UHPLC)**
   UHPLC operates at higher pressures (up to 15,000 psi or more) compared to traditional HPLC, allowing the use of columns packed with smaller particles (sub-2 µm). This results in:
   Improved Resolution: Higher efficiency and better separation of complex mixtures.
   Faster Analysis: Reduced run times without compromising resolution.
   Lower Solvent Consumption: More eco-friendly and cost-effective.

2. **Core-Shell Particles**
   Core-shell particles, also known as superficially porous particles, have a solid core and a porous outer shell. They offer:
   High Efficiency: Similar efficiency to smaller fully porous particles but with lower backpressure.
   Enhanced Performance: Improved resolution and faster separations.

3. **Multidimensional HPLC (2D-HPLC)**
   2D-HPLC involves coupling two different HPLC systems, allowing:
   Complex Sample Analysis: Better separation of complex mixtures by using different separation mechanisms in each dimension.
   Increased Peak Capacity: Significantly higher resolution for complex samples, such as proteomics and metabolomics.

4. **Green HPLC Techniques.**
   There is an increasing focus on environmentally friendly HPLC methods, which include:
   Reduced Solvent Usage: Using water or less harmful solvents instead of traditional organic solvents.
   Miniaturized HPLC Systems: Smaller systems that consume less solvent and produce less waste.
   Supercritical Fluid Chromatography (SFC): Using supercritical CO_2 as the mobile phase, which is non-toxic and reduces environmental impact.

5. **Advances in Detectors**
   Recent developments in detectors have enhanced HPLC performance:
   Charged Aerosol Detectors (CAD): Universal detectors with high sensitivity for non-volatile and semi-volatile compounds.
   Photodiode Array Detectors (PDA): Improved spectral resolution and sensitivity for UV-visible detection.
   Fluorescence Detectors: Enhanced sensitivity for fluorescent compounds.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

6. **Automation and Software Enhancements**
   Advancements in automation and software have streamlined HPLC operations:
   Automated Sample Preparation: Reduces manual handling and increases reproducibility.
   Advanced Data Analysis Software: Improved algorithms for peak integration, deconvolution, and identification.
   Remote Monitoring and Control: Internet of Things (IoT) integration for real-time monitoring and control of HPLC systems from remote locations.

CONCLUSION

High-Performance Liquid Chromatography (HPLC) remains a cornerstone analytical technique in pharmaceutical analysis due to its versatility, precision, and sensitivity. Over the years, HPLC has evolved significantly, driven by the need for higher efficiency, speed, and sensitivity in analytical processes.

The primary applications of HPLC in pharmaceutical analysis include the quantification of active pharmaceutical ingredients (APIs), the detection of impurities, and the study of drug stability. HPLC's ability to provide detailed qualitative and quantitative analysis of complex mixtures makes it indispensable in ensuring the safety, efficacy, and quality of pharmaceutical products.

Recent advancements in HPLC, such as Ultra-High-Performance Liquid Chromatography (UHPLC), core-shell particle technology, and multidimensional HPLC (2D-HPLC), have substantially improved the resolution, speed, and robustness of the method. Innovations in detector technologies, particularly mass spectrometry integration, have enhanced the sensitivity and specificity of HPLC, enabling the detection of trace levels of impurities and detailed structural elucidation of analytes.

The development and validation of HPLC methods are critical for ensuring reliable and reproducible results. Validation parameters such as specificity, linearity, accuracy, precision, robustness, and system suitability testing are essential to demonstrate that the method is fit for its intended purpose. Following regulatory guidelines during validation ensures that the method meets industry standards and is acceptable for regulatory submissions.

REFERENCE

1. *Dong, M. W. Modern HPLC for practicing scientists. Journal of Liquid Chromatography & Related Technologies, 29(6), 929-945.*
2. *Swartz, M. E. UPLC: An Introduction and Review. Journal of Liquid Chromatography & Related Technologies, 28(7-8), 1253-1263.*
3. *Wren, S. A. C., & Tchelitcheff, P. UPLC/MS for the identification of degradation products Of pharmaceuticals. TrAC Trends in Analytical Chemistry, 25(8), 798-805.*
4. *International Council for Harmonisation (ICH). Validation of Analytical Procedures: Text And Methodology Q2(R1). Retrieved from ICH https://www.ich.org/.*
5. *U.S. Food and Drug Administration (FDA). Analytical Procedures and Methods Validation For Drugs and Biologics: Guidance for Industry. Retrieved from FDA https://www.fda.gov/.*
6. *"HPLC in Pharmaceutical Analysis: General Considerations and Future Perspectives" by S. Gorog.*
7. *"Handbook of Pharmaceutical Analysis by HPLC" by Satinder Ahuja and Michael W. Dong.*
8. *ICH Guidelines (International Council for Harmonization of Technical Requirements for Pharmaceuticals for Human Use).*
9. *Review of High Performance Liquid Chromatography and It's Applications https://www.researchgate.net/publication/375029042*
10. *Handbook of Pharmaceutical Analysis by HPLC https://www.sciencedirect.com/topics/nursing-and-health-professions/limit-of-quantitation*
11. *HPLC Analysis of Drug Paracetamol on Heritage C18 Column https://helixchrom.com/applications/hplc-analysis-of-drug-paracetamol-on-heritage-c18-column/*
12. *Kazakevich, Y., & LoBrutto, R. (2007). HPLC for Pharmaceutical Scientists. Wiley*
13. *Ahuja, S., & Dong, M. W. (2005). Handbook of Pharmaceutical Analysis by HPLC (Vol. 6). Elsevier.*
14. *Rasmussen, H. T., et al. (2020). Recent Advances in HPLC Technology for Pharmaceutical Analysis. Journal of Pharmaceutical and Biomedical Analysis, 177.*
15. *Sharma, R., et al. (2018). HPLC Method Development and Validation: An Overview. Journal of Chromatography & Separation Techniques, 9(5), 1000416.*
16. *Fanali, S., et al. (2013). Liquid Chromatography: Applications in Pharmaceutical Analysis. Journal of Chromatography A, 1318, 2-13.*
17. *European Medicines Agency (EMA). (2014). Guideline on Bioanalytical Method Validation. Retrieved from https://www.ema.europa.eu/en/documents/scientific-guideline/guideline-bioanalytical-method-validation_en.pdf*
18. *Coutant, I. E., & Tadjimukhamedov, F. K. (2019). Strategies for Effective HPLC Method Development and Optimization. Analytical Chemistry Insights.*
19. *Geyer, R. P., & Collins, J. F. (2011). The HPLC Expert: Possibilities and Limitations of Modern High Performance Liquid Chromatography.*
20. *Abdel-Rehim, M. (2016). Recent Advances in Microextraction Techniques Coupled with HPLC for Pharmaceutical and Biomedical Analysis. Journal of Chromatography.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

IMPACT ASSESSMENT ON THE EXTENSION AND COMMUNITY SERVICES OF THE COLLEGE OF INDUSTRIAL TECHNOLOGY (2019-2021)

Daryll R. Gabutin[1], Medel E. Aloroy[2], Ramon S. Dueñas[3]
[1]*Nueva Ecija University of Science and Technology*
[2]*Nueva Ecija University of Science and Technology*

Article DOI: https://doi.org/10.36713/epra17052
DOI No: 10.36713/epra17052

ABSTRACT

Extension and community service of the college provides an in-depth evaluation of many aspects of community extension activities and their impact on beneficiaries. The demographic profile of beneficiaries, which includes age, gender, educational attainment, work status, income levels, and occupational positions, provides valuable insights into the characteristics of program participants. In particular, there is a gender discrepancy among recipients, with men outnumbering women, indicating potential biases or barriers to equal participation. The data also shows a high degree of participation and agreement among extension project beneficiaries and implementers, underscoring the importance of community involvement and collaboration in achieving good results.

Data provides insight into the frequency and percentage of participants in various training and seminar programs, demonstrating the variable levels of involvement across efforts. Respondent ratings for acquired knowledge, skills, values, attitudes, economic impact, social impact, environmental impact, planning, implementation, monitoring, and overall satisfaction with extension services show a strong alignment on the programs' positive effects and benefits. The high ratings across a variety of factors indicate a high degree of satisfaction and agreement with the training's effectiveness in developing skills, knowledge, attitudes, economic outcomes, social impact, and environmental sustainability.

Findings highlight the necessity of individualized extension programs that satisfy participants' different needs and preferences, encourage community engagement, and empower individuals to improve their knowledge, skills, and overall well-being. The extension services have a good impact on the community, underlining the importance of continuing to provide innovative and timely training to improve self-capabilities and contribute to beneficiaries' overall growth and empowerment.

KEYWORD: *demographic profile, acquired knowledge, skills, values, attitudes, economic impact, social impact, environmental impact, planning, implementation, monitoring*

INTRODUCTION

The Impact Assessment on the Extension and Community Services of the College of Industrial Technology, focusing on sustainable livelihood programs and the community training center, is crucial for evaluating the effectiveness and outcomes of these initiatives. This assessment aims to measure the present benefits and contributions of the College's extension programs to the community, particularly in enhancing livelihood opportunities and providing valuable training resources. By examining the impact of these services, the College can gauge the extent to which they have positively influenced the economic conditions, skills development, and overall well-being of the community members involved. This evaluation will shed light on the success of the sustainable livelihood programs and the effectiveness of the community training center in empowering individuals, fostering economic growth, and promoting sustainable development within the local community.

The impact assessment of the extension and community services of the College of Industrial Technology reveals a significant body of research on the impact of community extension programs in various higher education institutions. These studies highlight the importance of extension programs in promoting community development, enhancing livelihood opportunities, and building partnerships with local government units (LGUs) and other stakeholders. One study assessed the impact of community extension programs in a state college in the Philippines, focusing on skills training and technology transfer in automotive and driving, refrigeration and air conditioning, building wiring and troubleshooting, basic welding and metal craft, carpentry, radio mechanics, plumbing, dressmaking, food processing, baking and commercial cooking, computer literacy and programming, and advocacy programs. The study found that these programs significantly contributed to capacity building, computer literacy, and livelihood of the beneficiaries, leading to improved productivity and work efficiency. (Salazar, 2020)

Another study explored the alignment of community extension services conducted by the three colleges of the Leyte Normal University with their respective curricular program offerings and the needs of adopted communities. The study found a deliberate alignment between the colleges' curricular program offerings and the needs of their adopted communities, reflecting the university's research agenda. Moreover, a scoping review of the community extension programs of Leyte Normal University revealed that these programs were reflective of the university's research agenda and contributed to community development. The review emphasized the importance of aligning community extension services with the needs of the community and the institution's research agenda to ensure their effectiveness and sustainability. (Loso, 2021).

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Furthermore, a study on the impact assessment of technology-based extension projects in a higher education institution in the Philippines found that these projects significantly contributed to community development, capacity building, computer literacy, and the livelihood of the beneficiaries. The study suggested that the results be utilized to design sustainable extension projects, consider partnerships with other higher learning institutions, and conduct regular evaluations and assessments of different extension projects.(Ruth G. Luciano, 2022)

STATEMENT OF THE PROBLEM

This study aims to assess the extension and community service of the College of Industrial Technology From the COPED, CCT, and Sto. Domingo. Specifically, it sought to answer the following questions:

1. What is the demographic profile of the beneficiaries be described in terms of:
   1.1 age;
   1.2 gender;
   1.3 highest educational attainment;
   1.4 type of employment;
   1.5 employment status; and
   1.6 monthly income?
2. What are the reasons for the beneficiaries' respondents in participation in the extension and community services of the College of Industrial Technology?
3. What are the services, activities conducted, and level of contribution in the performance of the respondents' duties and responsibilities in terms of:
   3.1 training's;
   3.2 technical assistance;
   3.3 Community Outreach Activity?
4. What is the outcome of extension and community services conducted by the College of Industrial Technology in terms of:
   4.1 acquired knowledge;
   4.2 acquired skills;
   4.3 acquired values and attitudes;
   4.4 economic impact;
   4.5 social impact; and
   4.6 environmental impact?
5. What are the challenges encountered by the extension and community services of the College of Industrial Technology in terms of:
   5.1 planning;
   5.2 implementation; and
   5.3 monitoring?

METHODOLOGY

The descriptive research design is a quantitative research strategy employed in this study. To clearly understand the population and find solutions to the research topic, the researchers sought to describe it methodically. Researchers were able to figure out how the projects that faculty extensionists from the College of Industrial Technology (CIT) worked on affected the community. The study was conducted in Cabanatuan, Nueva Ecija Province, Philippines. It involved the beneficiaries of different extension projects undertaken by the CIT. From December 2021 to March 2022, ninety-two (92) people volunteered to participate in the impact assessment. The instrument is of five parts. The first component contains the demographic profile of the participants. The second part covers the reasons for the beneficiary's respondent participation in the extension and community services of the College of Industrial Technology. The third part is training technical assistance, communication/information services, and community outreach activity. The fourth part was acquired knowledge, acquired skills, acquired values and attitudes, economic impact, social impact; and environmental impact of the extension and community services.

RESULTS AND DISCUSSION

This section includes a complete review of the impact and effectiveness of the College of Industrial Technology's community extension initiatives. The study delves into various aspects of extension services, such as beneficiary demographics, reasons for participation, services and activities provided, program outcomes, and challenges encountered, culminating in a proposed enhancement plan for extension and community services.

1. Demographic profile of the beneficiaries

1.1 Age

Table 1. Demographic profile of beneficiaries according to Age

Sex	Frequency	Percentage
Female		
Below 14	0	0 %
14 - 16	1	1 %
Above 17	2	2 %
Male		
Below 14	13	14 %
14 - 16	36	39 %

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Above 17	40	44 %
TOTAL	**92**	**100%**

Table 1 shows the demographic profile of beneficiaries, classified by age and sex. It shows a thorough distribution of beneficiaries by age group and gender. Specially, there are no female beneficiaries under the age of 14, with 1% aged 14 to 16, and 2% beyond the age of 17. On the other hand, 14% of males are under the age of 14, 39% are between the ages of 14 and 16, and the vast majority, 44%, are above the age of 17. Overall, 92 beneficiaries are divided into three categories: 0% under the age of 14, 40% between the ages of 14 and 16, and 60% above the age of 17. This data provides useful insights into the age and gender distribution of beneficiaries, demonstrating the disparities in proportions between age groups for both males and females. In the study of (Ghaleb A. El Refae, 2021), the impact of demographic features on academic performance found that factors such as gender, college, and student status had a substantial impact on academic performance in both face-to-face (F2F) and distance learning (DL) contexts. The study population consisted of students enrolled in various courses offered by an educational institution.

1.2 Gender

T*able 2.Demographic profile of beneficiaries according to Gender*

Sex	Frequency	Percentage
Female	3	3 %
Male	89	97 %
TOTAL	**92**	**100 %**

The demographic profile of the beneficiaries by gender shows a considerable difference. A large percentage of the beneficiaries are men, with 89 individuals representing 97% of the total. On the other hand, there are only three female recipients, accounting for barely 3% of the total. This data shows a notable gender disparity among program or study participants, with a much higher proportion of males than females. This implies that there may be some bias or hurdles in place that prohibit equal involvement from both genders. The current research reported the sample's gender distribution, with 39.3% males and 60.7% females. These studies emphasize the importance of gender as a crucial demographic element in assessing academic performance and other social effects. The data indicate that gender can have a considerable impact on educational achievement and other indicators of success, Claudia Balula Chaves, (2011).

1.3 Highest Educational Attainment

Table 3 Demographic profile of beneficiaries according to Highest Educational Attainment

Type of Employment	Frequency	Percentage
Elementary	68	74 %
Secondary	21	23 %
College	3	3 %
Post Graduate	0	0 %
TOTAL	**92**	**100%**

The data in Table 3 show the distribution of participants based on their highest educational attainment. 74% of the participants have finished primary school, making up the largest group. Following that, 23% have completed secondary school, while only 3% have graduated college. Additionally, no beneficiaries in this group had completed a postgraduate degree. This split sheds light on the recipients' educational backgrounds, revealing a strong representation of persons with elementary education, followed by those with secondary and college education levels. Understanding participants' demographic profiles based on their highest educational attainment is critical for developing targeted interventions and policies that promote educational advancement and socioeconomic development. The survey provided insights into the demographic profile of schoolchildren, revealing that the majority of parents did not complete tertiary education. It also highlighted the educational background of the family head, with a sizable proportion having barely completed elementary school. These studies give light on beneficiaries' educational backgrounds and the impact of educational attainment on many factors such as academic accomplishment, employment possibilities, and home ownership (Nezel C. Duque, 2022).

1.4 Type of Employment

Table 4 Demographic profile of beneficiaries according to type of employment

Type of Employment	Frequency	Percentage
Employed	78	85%
Self Employed	14	15%
Unemployed	0	0%
TOTAL	**92**	**100%**

Table 4 shows a summary of the demographic profile of beneficiaries, divided by type of employment. It demonstrates that 85% of the beneficiaries, a total of 78 people, are employed, indicating a large percentage of people in formal jobs. Additionally, 15% of the participants, or 14 people, are self-employed. Interestingly, this data set has no recipients who are classed as jobless. This split provides useful insights into the beneficiaries' job situation, revealing that the majority are in formal employment, with a lesser share in self-employment, and there is no representation of unemployment or entrepreneurship among the beneficiaries studied. The study

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

assessed the demographics, employment status, competencies, and abilities of beneficiaries, namely education graduates in the Philippines. It highlighted respondents' occupational categorization, current employment status, initial job tenure, gender distribution, civil status, age distribution, and graduation year. These studies shed light on the demographic characteristics of recipients based on their type of job, including gender, age, civil status, and educational background. Understanding the demographic profile of beneficiaries based on their type of employment is critical for establishing targeted interventions, employment programs, and policies to support different workforce segments and promote socioeconomic development (Cenby Eppie G. Gaytos, 2023).

1.5 Employment Status

Table 5. Demographic profile of beneficiaries according to employment status

Type of Employment	Frequency	Percentage
Casual	0	0 %
Contractual	3	3.26 %
Job Order	0	0 %
Temporary	10	10.86 %
Regular	65	70.65 %
Others	14	15.21 %
TOTAL	**92**	**100%**

Employment status data of recipients shows that the majority, 70.65%, are in regular occupations, showing high job stability and security within this category. A lesser percentage, 10.86%, are in temporary work, while 3.26% are contractual employees, indicating some job flexibility but less security. Notably, there are no casual or job-order employees, implying that these types of jobs are limited or non-existent among the recipients. Furthermore, 15.21% fall into the 'Others' group, showing a wide range of non-traditional employment forms such as freelance or part-time labor. This heterogeneous work landscape emphasizes the importance of tailored assistance programs to improve job security and transition possibilities for those in less stable roles. Overall, the high proportion of regular employment reflects a rather stable economic condition.

The beneficiaries' job status is important in determining their demographic characteristics and the type of their employment. Regular employment often signifies a more stable and long-term arrangement, which can have an influence on employees' overall well-being and job satisfaction. Temporary work, on the other hand, may be more changeable and less secure, influencing employees' perceptions of job security and stability. The statistics does not include information about the recipients' personal characteristics, such as age, education level, or occupation, which might help us better understand their employment situation and the ramifications. However, the evidence provided implies that the majority of the beneficiaries are employed on a regular basis, which may reflect a more stable and secure working environment and employment status. (n.d.)This study employed propensity score approaches to examine the link between transition planning involvement and goal-setting and college enrollment among beneficiaries and controls grouped by work status (Hugo Nopo, 2007). The study looked at the demographic profile, employment status, competencies, and abilities of recipients, specifically education graduates in the Philippines. It highlighted respondents' occupational categorization, current work status, tenure of first job, gender distribution, civil status, age distribution, and year of graduation (Sherralyn Lacay, 2019). This study employed propensity score approaches to examine the link between transition planning involvement and goal-setting and college enrollment among beneficiaries and controls grouped by work status (Hugo Nopo, 2007). The study looked at the demographic profile, employment status, competencies, and abilities of recipients, specifically education graduates in the Philippines. It highlighted respondents' occupational categorization, current work status, tenure of first job, gender distribution, civil status, age distribution, and year of graduation (Sherralyn Lacay, 2019).

1.6 Monthly Income

Table 6. Demographic profile of beneficiaries according to monthly income

Type of Employment	Frequency	Percentage
1,000 - 10,000	4	4. 3 %
10,001 - 20,000	78	84.7 %
20,001 - 30,000	10	15 %
30,001 - 40,000	0	10.8 %
40,000 and above	0	0 %
TOTAL	**92**	**100%**

The table shows the distribution of monthly income among a group of people divided into five income levels. Most persons (84.7% or 78) earn between ₱10,001 and ₱20,000 per month, according to statistics. The range of ₱1,000 to ₱10,000 accounted for 4.3% (4 persons). The categories of ₱20,001 to ₱30,000 and ₱30,001 to ₱40,000 have lower representation, with 15% or 10 persons and 10.8% or 0 individuals, respectively. There are no persons with a monthly income beyond ₱40,000. The income distribution in this table shows that the bulk of persons are in the lower to middle-income groups, with a considerable proportion earning between ₱10,000 and ₱20,000. This might suggest that the bulk of people's incomes are generally stable and constant. There is a considerable gap in the representation of higher income levels, with no persons earning more than ₱40,000.OECD (2019). This might imply that there are fewer chances for increased income development, or that persons in this category are underrepresented in the upper income categories, COE - Employment and Unemployment Rates by Educational Attainment. (2023)

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2. Reasons of the beneficiaries' respondents in participation in the extension and community services of the College of Industrial Technology

Table 7. Reason for participation in Extension Services

	Reason in Participation	AWM	VI
1	I want to learn and acquire new knowledge and skills	3.26	Strongly Agree
2	I am interested in participating in training, seminars, and other activities of the Community Extension Service.	3.30	Agree
3	I see the training as beneficial for the growth of my own knowledge and skills.	3.19	Agree
4	I want to participate to identify and develop our community.	4.00	Strong Agree
5	I see new opportunities that will have a positive impact on my life and family.	3.49	Strong Agree
TOTAL		**3.45**	Strong Agree

The table shows the highest average of 4.00 given by the respondents, in the item " I want to participate to identify and develop our community", interpreted as Strongly Agree, while the lowest rating of 3.19 given by the respondents in the item "I see the training as beneficial for the growth of my own knowledge and skills" interpreted as Agree, the overall average rating given by the respondents in reason in participation, 3.45, interpreted as Strongly Agree. Based on the data, respondents had a great desire to be involved in developing and growing their community, demonstrating a high level of involvement and dedication. However, they agree more moderately that the training will help them expand their knowledge and skill set. This implies that the respondents had a strong sense of community and valued community development over improving their skills. There is a chance to further adapt the training curriculum to meet the needs of each learner and improve perceived personal advantages, which might raise participant satisfaction and engagement. Extension workers play a crucial role in improving agricultural productivity, incomes, and rural development (Aylene D. Pizaña, 2021; Gideon Danso-Abbeam, 2018). They disseminate information on new technologies, support rural adult learning, and help farmers solve problems and participate in the agricultural knowledge system. The extension services seek to improve the health and growth of the areas they serve. Extension initiatives are frequently motivated by the needs and ambitions of rural and urban communities to improve their quality of life (Mark E. Patalinghug, 2022). Extension workers are distinguished by their dedication, humility, and genuine enthusiasm for serving the community. Despite the challenges of the COVID-19 epidemic, extension project implementer remained committed to their clients and countrymen (Aylene D. Pizaña, 2021). Participation in extension services can also be rewarded through proper reward systems for extension workers, as well as providing them with adequate time, resources, and support to carry out their work efficiently. (Ani, 2016). the key reasons for participation in extension services are to improve agricultural productivity and rural livelihoods, serve the needs of local communities, and provide extension workers with the right motivation, resources, and support.

3. Services, activities conducted and level of contribution in the performance of the respondents' duties and responsibilities.

3.1 Training's;

Table 8. Training/ Seminar conducted by the College

	Training / Seminar	Frequency	Percentage
1	Carpentry/Furniture and Cabinet Making	8	8.69 %
2	Dressmaking	5	5.43 %
3	Automotive (Auto Electricity)	6	6.52 %
4	An Online Seminar for Road Worthiness and Smart Driving	7	7.60 %
5	Values Formation and Personality Development	3	3.26 %
6	Entrepreneurship	2	2.17 %
7	Webinars on Fire Prevention and Safety Guidelines	8	8.70 %
8	Webinars on Basic Solar Photovoltaic Systems	7	7.61 %
9	Online Training on Sustainable Livelihood Program Amidst Pandemic	9	9.78 %
10	Online Seminar on Values Formation and Personality Development	7	7.61 %
11	Online Seminar on Entrepreneurship	5	5.43 %
12	Online and Limited face-to-face Training in Plumbing	4	4.34 %
13	Online and Limited Face-to-face Training in Electrical Installation and Maintenance	6	6.52 %
14	Online and Limited Face-to-face Training in Domestic Refrigeration and Air Conditioning	7	7.60 %
15	Online and Limited Face-to-face Skills Training in Carpentry and Masonry Works	8	8.69
TOTAL		**92**	**100 %**

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The data show the frequency and percentage of participants in various training and seminar programs provided by extension services. The "Online Training on Sustainable Livelihood Program Amidst Pandemic" got the greatest participation rate, with 9 participants (9.78%). The "Webinars on Fire Prevention and Safety Guidelines" and "Skills Training in Carpentry and Masonry Works" each had eight participants (8.70% and 8.69%, respectively). The third most popular programs were "An Online Seminar for Road Worthiness and Smart Driving", "Webinars on Basic Solar Photovoltaic System", and "Online and Limited Face-to-face Training in Domestic Refrigeration and Air Conditioning", each with 7 participants (7.61%). On the other hand, the least popular programs were "Entrepreneurship" with just 2 participants (2.17%) and "Values Formation and Personality Development" with 3 participants (3.26%). The remaining programs comprised four to six or five to eight participants. Overall, the statistics indicate that extension services were able to generate significant interest and engagement in programs focusing on sustainable livelihoods, safety, and technical skill development, especially in light of the COVID-19 pandemic. However, there appears to be space for growth in terms of participant engagement in entrepreneurship and personal development programs. This implies that we should continue to focus on subjects of interest while also looking for ways to increase participation in less popular programs such as "Entrepreneurship" and "Values Formation and Personality Development". This could include targeted marketing, program changes, or the investigation of novel delivery methods to boost interest and involvement in certain areas. This represents current participation trends but also gives vital insights for the extension service to improve its services, better match the requirements of its audience, and produce a positive effect in the community it serves.

3.2 Technical Assistance

Table 9. Technical Assistance

	Technical Assistance	AWM	VI
1	Technical Assistance in Construction of Kasanayan Building	3.87	Strongly Agree
TOTAL		**100%**	

The table shows that the most common type of technical support was in the "Construction of Kasanayan Building" with a frequency of 3.87, indicating a high level of participation or agreement. This indicates that there was widespread agreement or a positive response to the technical advice provided for this particular construction project. The overall percentage of 100% indicates that all responses or participants in this survey or assessment were considered in this specific technical support category, demonstrating a thorough coverage or engagement with the aid offered for the Kasanayan Building's construction. The data from Table 9 shows a high degree of engagement and agreement, particularly in the area of technical help for the construction of the Kasanayan Building, with a complete representation of responses totaling 100%.

3.3 Community Outreach Activity

Table 10 Community Outreach Activity

	Frequency	n	Percentage
1	Puno ng Buhay	23	52.27 %
2	Lingap sa Kapwa	21	47.22 %
TOTAL		**44**	**100 %**

Table 10's data on community outreach activities provides information about the levels of involvement in two specific programs, "Puno ng Buhay" and "Lingap sa Kapwa". The study showed that "Puno ng Buhay" had a greater frequency of involvement, with 23 people taking part, corresponding to 52.27% of the total participants. On the other hand, "Lingap sa Kapwa" had 21 participants or 47.22% of the total. The total number of participants in both events was 44, representing 100% of the data. These findings suggest that both community outreach programs were well received and gathered a large number of participants. The higher participation percentage in "Puno ng Buhay" suggests that this program may have connected with the community or sparked more interest. However, without more information on the objectives and outcomes of these activities, it is difficult to determine the overall impact or efficacy of each program. The data shows that community people are actively engaged in these outreach activities, with a good reaction to initiatives such as "Puno ng Buhay" and "Lingap sa Kapwa". Further evaluation and analysis of the programs' goals, reach, and effects would provide a more complete picture of their efficacy in meeting community needs and promoting social welfare.

4. Outcome of extension and community services conducted by the College of Industrial Technology

4.1 Acquired knowledge

Table 11 Acquired knowledge by the beneficiaries in extension and community services

	Acquired Knowledge	AWM	VI
1	My knowledge increased by attending seminars and training that improved my performance.	3.42	Strongly Agree
2	I learned the importance of education and self-improvement.	3.21	Agree
3	Planning and setting goals for the future based on what I learned in training.	3.65	Strongly Agree
4	I became more open to the latest developments in my chosen skills and hobbies.	3.23	Agree

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5	Strengthening of interpersonal skills such as communication and interaction.	3.75	Strongly Agree
6	Demonstrating leadership, decision-making, and issue resolution skills.	3.34	Strongly Agree
7	I can create and strengthen innovative programs in performing duties and responsibilities.	3.65	Strongly Agree
8	I became more proficient in managing internal and external resources.	3.52	Strongly Agree
9	I became more knowledgeable about the qualities, values, and attitudes of a worker.	3.45	Strongly Agree
TOTAL		**3.47**	Strongly Agree

Table 11 shows the rating of the respondents in acquired knowledge in various trainings, the item "Strengthening of interpersonal skills such as communication and interaction" has the highest rating of 3.75, interpreted as Strongly Agree, while the lowest rating of 3.21, in the item "I learned the importance of education and self-improvement" interpreted as Agree. The overall average rating of the respondents in acquired knowledge got 3.47 interpreted as Strongly Agree.It implies that the training was successful in conveying valuable knowledge and skills to the participants, contributing to their overall comfortable learning experience and demonstrating the program's effectiveness in improving their ability to learn. This means that the training was successful in offering meaningful information and favorably influencing the participants' learning experience, stressing the program's effectiveness in improving their talents and creating an environment suitable to growth.

The Community Outcome Scale (COS) was established as part of an Academe Community Extension Program study to assess beneficiaries' reported knowledge, attitude, and lifestyle. The study emphasized the importance of participating in extension programs in providing benefits to community families, indicating a positive impact on lifelong learning and quality of life improvement (Deocaris, 2018). Another study emphasized the importance of extension services in empowering communities and meeting societal needs. It emphasized the necessity of collaborative extension services in providing social protection, development, and skill building in order to eliminate rural economic disparity. The study emphasized the need of extension workers being knowledgeable and sensitive to community demands in order to achieve positive outcomes and involve the community. Furthermore, a report on community extension programs documented the transformation of 172 beneficiaries into micro, small, and medium-sized entrepreneurs following training in programs such as bread and pastry making, computer literacy, detergent production, and others. This demonstrates the practical impact of extension programs in providing individuals with the skills and information necessary to engage in entrepreneurial activities and better their livelihoods (Lislee Valle, 2022). Community extension programs serve an important role in instilling information, skills, and values in beneficiaries, allowing them to improve their quality of life, engage in entrepreneurial activities, and contribute to community development. These programs aim not merely to increase individual capacity, but also to meet broader societal needs and promote community-based sustainable development.

4.2 Acquired skills;

Table 12 Acquired skills by the beneficiaries in extension and community services

	Acquired Skills	AWM	VI
1	My knowledge increased by attending seminars and training that improved my performance.	3.55	Strongly Agree
2	I learned the importance of education and self-improvement.	3.87	Strongly Agree
3	Planning and setting goals for the future based on what I learned in training.	4.00	Strongly Agree
4	I became more open to the latest developments in my chosen skills and hobbies.	4.00	Strongly Agree
5	Strengthening of interpersonal skills such as communication and interaction.	4.00	Strongly Agree
6	Demonstrating leadership, decision-making, and issue-resolution skills.	4.00	Strongly Agree
7	I can create and strengthen innovative programs in performing duties and responsibilities.	4.00	Strongly Agree
8	I became more proficient in managing internal and external resources.	3.90	Strongly Agree
9	I became more knowledgeable about the qualities, values, and attitudes of a worker.	4.00	Strongly Agree
10	My knowledge increased by attending seminars and training that improved my performance.	4.00	Strongly Agree
TOTAL		**3.92**	**Strongly Agree**

Table 12 shows the rating of the respondents in acquired skills, the highest average rating in this item "Planning and setting goals for the future based on what I learned in training", "I became more open to the latest developments in my chosen skills and hobbies", "Strengthening of interpersonal skills such as communication and interaction", "Demonstrating leadership, decision-making, and issue resolution skills", "I can create and strengthen innovative programs in performing duties and responsibilities", "I became more knowledgeable about the qualities, values, and attitudes of a worker, and "My knowledge increased by attending seminars and training that improved my performance" got 4.00, interpreted as Strongly Agree, while the lowest rating of 3.55 in the item "My knowledge

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

increased by attending seminars and training that improved my performance", interpreted as Strongly Agree. The overall rating given by the respondents in acquired skills, with an average of 3. 93 interpreted as Strongly Agree. This implies that the overall high rating indicates that the training has effectively contributed to developing and enhancing a wide range of abilities among the respondents, demonstrating the program's success in fostering skill acquisition and growth among participants.

The study on Acquired Affective Learning from Involvement in Community Extension Services emphasized the importance of these programs in improving people's knowledge and abilities, encouraging health and wellness, and minimizing bad behaviors such as vices. The extension activities were seen to considerably benefit the community by improving residents' knowledge and abilities, raising community awareness, and building a sense of citizenship and duty among participants (Tad-awan, 2023). Furthermore, the FAO statement stressed the necessity of developing literacy, communication, organizational, and leadership skills to build strong local institutions and promote community development. It emphasized the importance of extension programs providing extension workers with the skills needed to effectively engage with rural communities and respond to their changing needs and difficulties. The declaration emphasized the importance of education, training, and capacity-building in increasing participation and promoting sustainable development within communities. The Philippine Carabao Center offers technical support in areas such as animal reproduction, nutrition, health, forage production, cooperative development, and dairy processing, to provide farmers with the skills and knowledge they need to improve their agricultural practices and livelihood. The center's professionals provide free technical help to farmers, increasing their capabilities and promoting sustainable agriculture practices in communities (Pcc.gov.ph, 2024). The necessity of developing a varied set of skills through extension and community services, which range from technical expertise in agriculture to interpersonal and leadership abilities. These programs play an important role in empowering individuals, improving community well-being, and supporting long-term development by providing beneficiaries with the knowledge and skills needed to address local concerns and improve their quality of life.

4.3 Acquired Values and Attitudes;

Table 13 Acquired values and attitudes by the beneficiaries in extension and community service

	Acquired Values and Attitudes	AWM	VI
1	I became knowledgeable in the chosen seminar or training I attended.	3.70	Strongly Agree
2	I have the ability to perform learned skills in my chosen field.	3.79	Strongly Agree
3	Learned techniques or methods for further development of my knowledge in the chosen skill.	4.00	Strongly Agree
4	Understanding of concepts and principles of a particular field or skill.	3.90	Strongly Agree
5	Skill in using tools, equipment, or technology related to the skill.	3.87	Strongly Agree
6	Skill in performing specific tasks or processes related to the skill.	3.86	Strongly Agree
7	Understanding the importance of cooperation and collaboration within a group or team.	3.86	Strongly Agree
8	Planning ability and coordination and cooperation with various sectors.	4.00	Strongly Agree
9	Development of self-confidence, awareness, and personal capabilities.	3.54	Strongly Agree
10	Increased skills and abilities in performing job tasks.	3.65	Strongly Agree
11	The skills learned in training can be used to start my own business or employment.	3.45	Strongly Agree
TOTAL		**3.78**	**Strongly Agree**

Table 13 shows the rating of the respondents in acquired values and attitudes, with the highest rating of 4.00 given by the respondents in the item of "Learned techniques or methods for further development of my knowledge in the chosen skill", and Planning ability and coordination and cooperation with various sectors", interpreted as Strongly Agree, while the lowest rating of 3.45 in item "The skills learned in training can be used to start my own business or employment" interpreted as Strongly Agree. The overall rating given by the respondents in acquired values and attitudes, 3.78, is interpreted as Strongly Agree. It implies that the training had a significant impact on the participants' values, attitudes, and skills, contributing to an overall good learning experience and preparedness for future undertakings.

The research Acquired Affective Learning from Involvement in Community Extension Services found that these programs had a significant impact on residents' values and attitudes. The findings demonstrated that people profited considerably from the extension programs, which improved their knowledge and abilities, promoted health and wellness, and prevented them from engaging in undesirable behaviors such as vices. The programs also assisted inhabitants in understanding their rights, obligations, and duties as citizens or members of the community, developing a feeling of community participation and citizenship (Tad-awan, 2023) Furthermore, a study on junior high school volunteers in community extension services found that student participation promoted strong values and a positive attitude. Students established a positive attitude toward helping others, assimilated the spirit of volunteerism, adhered to moral ideals such as kindness and respect, and became more aware of issues concerning business, education, and law and order. Community outreach activities have a major impact on students' views and values, highlighting the importance of moral standards, civic

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

consciousness, and community engagement (Richie L. Montebon, 2023). Furthermore, the effect assessment of extension initiatives in the Philippines emphasized the acquired values and attitudes of beneficiaries. The study found that participants recognized the importance of forming relationships between schools and communities, demonstrated basic values of good governance, became more vigilant in public safety and crime prevention, and adhered to moral concepts such as kindness and collaboration. Extension programs helped participants acquire positive attitudes, moral values, and a feeling of responsibility, which increased their engagement with the community and promoted social well-being (CORAZON A. SIBAL, 2019). Extension and community services have a favorable impact on beneficiaries' beliefs and attitudes. These programs serve an important role in imparting positive values, encouraging civic consciousness, and fostering a sense of communal responsibility in participants, all of which contribute to their personal growth and well-being.

4.4 Economic Impact

Table 14 Economic impact by beneficiaries in extension and community service

	Economic Impact	AWM	VI
1	Helped in finding employment because of the skills learned in training.	4.00	Strongly Agree
2	Helped improve the quality of life of the beneficiary due to salary or income from business.	4.00	Strongly Agree
3	Helped meet daily needs, buy property, and maintain family health.	4.00	Strongly Agree
4	Strengthening of capital discovered in the community may result in more job and business opportunities, strengthening the local economy.	3.86	Strongly Agree
5	Increased productivity through learned new skills and production methods, higher potential for income and development.	4.00	Strongly Agree
6	Business and employment opportunities through training and support for small entrepreneurs, more job opportunities, and higher income for citizens.	3.69	Strongly Agree
7	Strengthening of patrons or Tourism may have a positive effect on the local economy by increasing income from patrons or tourists and strengthening local industries.	4.00	Strongly Agree
8	By conducting training for citizens, it can result in strengthening human capital in the community.	4.00	Strongly Agree
TOTAL		**3.94**	Strongly Agree

Table 14 shows the rating of the respondents in economic impact, with the highest average rating of 4.00, given by the respondents on the items “Helped in finding employment because of the skills learned in training”, “Helped improve the quality of life of the beneficiary due to salary or income from business”, “Helped meet daily needs, buy property, and maintain family health”, “Increased productivity through learned new skills and production methods, higher potential for income and development”, “Strengthening of patrons or Tourism may have a positive effect on the local economy by increasing income from patrons or tourists and strengthening local industries”, and “By conducting training for citizens, it can result in strengthening human capital in the community”, interpreted as Strongly Agree, while the lowest rating of 3.69 on the item “Business and employment opportunities through training and support for small entrepreneurs, more job opportunities, and higher income for citizens”, interpreted as Strongly Agree. The overall rating of 3.94, interpreted as Strongly Agree. It implies that the high overall rating shows that the training has had a beneficial impact on several economic factors, such as employment, income generation, productivity, and community development, demonstrating the program's effectiveness in promoting economic growth and well-being. The extension initiatives have had a good impact on the recipients' economic well-being, helping to improve their livelihoods and contribute to long-term community development. The data indicates the success of the programs in improving the participants' economic status and prospects, eventually resulting in favorable outcomes in terms of economic empowerment and community development (Salazar, 2020).

4.5 Social Impact

Table 15 Social impact by beneficiaries on extension and community service

	Frequency	AWM	VI
1	The capability and knowledge of citizens in various fields such as technology and industry may be strengthened.	3.45	Strongly Agree
2	Improvement of knowledge and skills may lead to development in the entire community or society.	4.00	Strongly Agree
3	Community extension services are aimed at providing training, and education, and may lead to employment opportunities for the local community.	3.23	Agree
4	Extension programs focused on the community may strengthen the participation and involvement of citizens.	4.00	Strongly Agree
5	Promotion of Technology and Innovation: citizens may be more open to accepting and using new technologies and innovations in their work and lives.	3.75	Strongly Agree

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

6	Helped to be productive and make the right moves and share with the community the skills learned.	3.90	Strongly Agree
7	It helped to share the skills learned in the Extension Project with the community and others.	3.68	Strongly Agree
8	It helped to strengthen my self-confidence as a result of the skills learned through training.	3.56	Strongly Agree
9	It gave knowledge to implement good intentions of the local community and extension service to the community of the College of Industrial Technology.	3.98	Strongly Agree
10	It helped in promoting democracy, economic growth, and knowledge, awareness in every aspect of life.	4.00	Strongly Agree
TOTAL		**3.76**	Strongly Agree

In table 15 shows the rating of respondents in social impact, with the highest rating of 4.00, interpreted as Strongly Agree on the item of "Improvement of knowledge and skills may lead to development in the entire community or society", " Extension programs focused on the community may strengthen the participation and involvement of citizens", and "It helped in promoting democracy, economic growth, and knowledge, awareness in every aspect of life", while the lowest rating of 3.23, interpreted as Agree on "Community extension services are aimed at providing training, and education, and may lead to employment opportunities for the local community". The overall rating of social impact given by the respondents are 3.76, interpreted as Strongly Agree. These overall findings suggest that, while the program is effective at developing social cohesiveness and promoting essential societal values, there is still room for improvement in terms of creating employment paths and improving participants' direct economic benefits. To increase its social impact, the program may need to focus on closing the gap between training and employment prospects to provide long-term benefits for the local community.

The study on the impact assessment of extension programs in the Philippines sought to evaluate the effectiveness of extension programs done by Camarines Sur Polytechnic Colleges in various partner barangays. The study aimed to assess the social impact of extension services on community members. The study attempted to examine the impact of extension programs in increasing people's health and wellness, improving knowledge and skills, motivating individuals to contribute to the community, and inspiring changes in the standard of life. The findings showed that community extension initiatives had a good impact on the beneficiaries' personal growth and well-being, resulting in increased awareness, improved abilities, and a sense of responsibility for community progress (Salazar, 2020).

Furthermore, CORAZON A. SIBAL's (2019) study on the Effectiveness of Community Extension Programs and Services found that beneficiaries rated healthcare and education-related programs as very beneficial. According to the study, family beneficiaries agreed that community extension initiatives should be continued due to the large benefits they provided. The activities were crucial in boosting health and wellness, improving knowledge and skills, and motivating individuals to contribute to community development, thus favorably altering the social fabric of the community.

The extension and community programs have a significant social impact on the beneficiaries. These programs play an important role in promoting health and well-being, increasing knowledge and skills, encouraging community engagement, and inspiring good changes in people's lives. The social impact of these programs may be seen in the recipients' improved well-being, increased awareness, and sense of duty, all of which contribute to the community's overall development and improvement.

4.6 Environmental Impact

Table 16 Environmental impact by beneficiaries in extension and community services

	Environmental Impact	AWM	VI
1	Taking care of the environment and strengthening environmental awareness can have a positive effect on the environment.	3.95	Strongly Agree
2	The use of Green Technology through teaching practical solutions such as renewable energy systems, water conservation techniques, and waste management practices can help improve air, land, and water quality in the community.	4.00	Strongly Agree
3	Conducting Environmental Research or research projects focused on studying and understanding environmental issues and their solutions to preserve the environment.	3.65	Strongly Agree
4	Sharing knowledge with the Community about environmental issues and steps they can take to help maintain the health of nature.	3.75	Strongly Agree
5	Promoting Sustainable Development by strengthening projects and programs aimed at maintaining the balanced use of natural resources and strengthening the economy without causing ecological harm.	4.00	Strongly Agree
TOTAL		**3.87**	**Strongly Agree**

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 16 shows the rating of respondents on environmental impact, the highest rating given by the respondents with an average of 4.00, interpreted as Strongly Agree, in these item "The use of Green Technology through teaching practical solutions such as renewable energy systems, water conservation techniques, and waste management practices can help improve air, land, and water quality in the community", and "Promoting Sustainable Development by strengthening projects and programs aimed at maintaining the balanced use of natural resources and strengthening the economy without causing ecological harm". The overall rating given by the respondents in environmental impact was 3.87, interpreted as Strongly Agree. This implies that sustained efforts to implement and promote environmentally conscious practices can lead to even better outcomes in terms of sustainability and ecological health. It also encourages the program to continue and possibly increase its focus on green technologies and sustainable development projects to support a healthy environment and community.

5. Challenges encountered by the extension and community services of the College of Industrial Technology

5.1 Planning;

Table 17 Planning on extension and community services

	Frequency	AWM	VI
1	There is a direct focal person to assist and address the concerns and needs of the Barangay/Organization.	3.96	Strongly Agree
2	Active communication between the extension partner and the College's extension service unit.	3.67	Strongly Agree
3	There is proper consultation of Barangay/ Organization programs with the College Extension Service Unit	4.00	Strongly Agree
TOTAL		**3.88**	Strongly Agree

Table 17 shows the rating of the respondents in planning, with the highest rating of 4.00, interpreted as Strongly Agree in the item "There is proper consultation of Barangay/ Organization programs with the College Extension Service Unit", while the lowest rating of 3.67, interpreted Strongly Agree in the item of "Active communication between the extension partner and the College's extension service unit", and the average rating of 3.88, interpreted as Strongly Agree. It also implies that the College's Extension Service Unit should continue to build on its strengths, with an emphasis on maintaining and improving active communication to ensure that extension activities are planned and executed in a way that fulfills the needs of the community and other stakeholders.

5.2 Implementation

Table 18 Implementation of extension and community services

	Implementation	AWM	VI
1	Implementation of agreed plans/programs by both partners.	3.45	Strongly Agree
2	There are financial resources to fund the extension activities.	3.90	Strongly Agree
3	There is sufficient time to participate/attend activities conducted by the extension service unit of the College.	4.00	Strongly Agree
4	There are adequate facilities to support the services of the College's extension service unit.	3.26	Strongly Agree
5	There is sufficient community involvement to attend seminars/training conducted by the College's extension service unit.	3.15	Agree
TOTAL		**3.55**	Strongly Agree

Table 18 shows the rating of respondents in implementation, the highest rating of 4.00, interpreted as Strongly Agree, in the item "There is sufficient time to participate/attend activities conducted by the extension service unit of the College", while the lowest rating of 3.15, interpreted as Agree, in items of "There is sufficient community involvement to attend seminars/training conducted by the College's extension service unit", the overall rating of 3.55, interpreted as Strongly Agree, given by the respondents in terms of implementation. This implies that, while the implementation has been successful, efforts may be made to increase community participation and encourage increased involvement in seminars and training sessions. This could include removing challenges to attendance or developing new strategies to engage and motivate community members.

5.3 Monitoring

Table 19 Monitoring of extension and community services

	Monitoring	AWM	VI
1	Regular review and evaluation of college extension service programs and projects.	3.45	Strongly Agree
2	Establishment of Monitoring and Evaluation to ensure effective implementation of college extension service programs and projects.	3.15	Agree
3	Collaboration with Community leaders and other stakeholders to gain their support and participation in college extension service programs and projects.	4.00	Strongly Agree

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4	Regular communication, meetings, or gatherings in the community to provide updates and information about extension service activities.	4.00	Strongly Agree
5	Strengthening of the relationship between the college and the community. Through regular communication and trust, extension service programs and projects will be more effective.	4.00	Strongly Agree
6	There are sufficient strategies/approaches for community-based extension service implementation.	4.00	Strongly Agree
TOTAL		**3.76**	Strongly Agree

Table 19 shows the rating given by the respondents in terms of monitoring, with the highest rating of 4.00, interpreted as Strongly Agree, these items "Collaboration with Community leaders and other stakeholders to gain their support and participation in college extension service programs and projects", "Regular communication, meetings, or gatherings in the community to provide updates and information about extension service activities", "Strengthening of the relationship between the college and the community. Through regular communication and trust, extension service programs and projects will be more effective", and "There are sufficient strategies/approaches for community-based extension service implementation", while the lowest of 3.15, interpreted as Agree, in items "Establishment of Monitoring and Evaluation to ensure effective implementation of college extension service programs and projects", the overall rating of 3.76, interpreted as Strongly Agree. The sources emphasize the significance of monitoring and evaluation in extension initiatives for improving performance, increasing efficiency, and ensuring effectiveness. The data emphasizes the importance of ongoing feedback, stakeholder participation, and the implementation of robust monitoring systems to improve program outcomes. This emphasizes the need for monitoring in bringing about good changes, increasing service delivery, and ultimately contributing to the success and sustainability of extension projects.

The monitoring of extension and community services highlights the importance of community extension programs in promoting sustainable development and community empowerment. According to the literature, higher education institutions, through their community extension services, play an important role in conducting research-based programs aimed at sustainability, biodiversity, urban studies, dissemination, and cultural preservation. These initiatives seek to coordinate, monitor, and evaluate extension services offered to adopted communities, encouraging a comprehensive approach to attaining sustainable development and enhancing community members' lives (Salazar T. D., 2020). The significance of effective public communication, working for the greater good, and developing knowledge outside of academic environments. It underlines the need for higher education institutions to bridge the gap between academia and the general public through community extension initiatives that address community needs and contribute to long-term development. Monitoring and evaluation are critical components of extension services that assure the effectiveness and relevance of the programs given. The transformative potential of community extension services in empowering communities, enhancing quality of life, and fostering sustainable development. By actively engaging in extension activities and monitoring their impact, higher education institutions can play a significant role in addressing societal needs and promoting positive change within communities.

Summary

Based on the results, the following summary are:

1. Beneficiaries are classified into three age groups: under 14 (0%), 14-16 (40%), and over 17 (60%).
2. There is a considerable gender imbalance, with 97% of the beneficiaries being men and only 3% being women.
3. The majority of beneficiaries (74%) have finished primary school, followed by 23% with secondary education and 3% with college education. None hold a postgraduate degree.
4. The majority of beneficiaries (85%) work in regular professions, with 15% self-employed. There have been no reports of recipients being unemployed or entrepreneurial.
5. The majority of beneficiaries (84.7%) earn between ₱10,001 and ₱20,000 per month. 15% make ₱20,001 - ₱30,000, while 10.8% earn ₱30,001 - ₱40,000 monthly. There are no recipients earning more than ₱40,000/month.
6. Respondents strongly agreed (4.00) on the item "I want to participate in identifying and developing our community," demonstrating a high degree of commitment to community development.
7. However, they gave the program a lower (3.19) rating for personal growth and skill enhancement, indicating a more modest agreement on its influence on individual knowledge and skills.
8. The overall average grade for participation reasons was 3.45, which translates to "Strongly Agree," indicating agreement on the necessity of community involvement.
9. The findings show differing levels of involvement in various training programs, with those concentrating on sustainable livelihoods, safety, and technical skill development receiving the most attention.
10. There's room for higher participant engagement in entrepreneurship and personal development programs, which indicates prospective sectors.
11. The technical support for the Kasanayan Building development received high scores, suggesting that participants responded positively and actively.
12. Community outreach activities such as "Puno ng Buhay" and "Lingap sa Kapwa" were well-received, with "Puno ng Buhay" attracting more participants, indicating a better community connection.
13. Respondents gave excellent ratings on gained knowledge, abilities, values, and attitudes, indicating a successful transfer of useful information and supporting skill acquisition and growth among participants.
14. The training projects had a good economic impact, helping to create job possibilities, generate money, and promote community development.
15. The efforts also had a significant social impact, encouraging the unity of society and promoting important societal values.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

16. Efforts to establish environmentally conscious behaviors resulted in favorable environmental outcomes, emphasizing sustainability and ecological health.
17. Respondents received high ratings in the planning, implementation, and monitoring categories, indicating effective communication, community involvement, and methods for successful extension program execution.

Findings

Based on the summary, the following findings are:

1. Significant gender disparity, males make up 97% of program or study participants, while females make up only 3%.
2. Unbalanced age distribution, the beneficiaries' age distribution is uneven, with older participation, specifically those above the age of 17.
3. The majority of beneficiaries (74%) have finished primary education, with a lesser proportion having secondary (23%) or college (3%) education.
4. The majority of beneficiaries (85.86%) are employed in regular jobs, with 10.86% working temporarily.
5. The majority of beneficiaries (84.7%) earn between ₱10,001 and ₱20,000 per month, indicating a concentration in low to middle-income categories.
6. The findings show that respondents are strongly committed to community development, with a particular emphasis on engagement and involvement in community extension activities.
7. There is a strong commitment to community development, there is still space for growth in terms of the perceived benefits of training programs for individual knowledge and skill development.
8. The extension programs were effective in transferring useful knowledge, skills, and values to participants, hence contributing to their personal development and community well-being.
9. Continuous monitoring and evaluation have been identified as critical components for improving program outcomes, enhancing efficiency, and assuring the effectiveness and sustainability of extension operations.

Conclusion

The following conclusions were made based on the results gathered:

1. The interventions or programs catering to this group should consider these age and gender distributions to better target their services and ensure inclusive and equity. Additionally, the absence of female beneficiaries under 14 points to the need for further investigation and potentially tailored outreach efforts to balance gender representation across age groups.
2. Promoting equal opportunities and reducing gender-based hurdles are essential to ensure a more balanced and inclusive environment for future programs or studies.
3. The need for educational programs or support tailored to those with lower educational backgrounds, emphasizes the importance of inclusive learning opportunities to bridge the gap and promote further educational advancement among participants.
4. Relatively stable workforce but highlights the need to address employment opportunities for those in less secure positions, emphasizing the importance of job stability and career development for those in temporary roles.
5. The stable workforce, but the presence of temporary roles underlines the importance of promoting employment policies that foster job security and provide support for those in less stable roles.
6. The balance between regular and temporary employment prompts organizations and policymakers to focus on fostering job security and offering resources to employees who may face uncertainty due to the nature of their roles. By doing so, organizations can enhance workforce stability and improve overall job satisfaction.
7. The concentration of the group in the middle-income range, with a limited representation in the lower and higher income brackets. The socioeconomic status of the individuals within the group, which can be valuable for understanding their financial circumstances and informing targeted interventions or support programs.
8. The respondents are highly motivated to contribute to the development of their community, while also recognizing the value of the training program in enhancing their knowledge and skills, albeit to a slightly lesser degree. The design and implementation of future extension and community service initiatives to better align with the priorities and preferences of the target beneficiaries.
9. The varying levels of interest and engagement among participants in different training and seminar programs, highlight the importance of tailoring program offerings to meet the diverse needs and preferences of the target audience.
10. The data underscores a strong level of engagement and agreement in this specific technical support area, reflecting a thorough representation of responses and a high degree of participation in the support offered for this construction project.
11. There was slightly less emphasis on the importance of education and self-improvement, the overall average rating suggests a high level of satisfaction and agreement with the acquired knowledge from the training sessions.
12. The training programs, with a strong consensus on the positive impact on their skills, knowledge, and attitudes. The high ratings across various skill areas reflect a significant level of satisfaction and agreement with the effectiveness of the training in improving their overall performance and capabilities.
13. The training programs, with a strong consensus on the positive impact on their skills, knowledge, and attitudes. The high ratings across various skill areas reflect a significant level of satisfaction and agreement with the effectiveness of the training in improving their overall performance and capabilities.
14. The economic impact of the training programs, with a strong consensus on the positive effects on employment, income, quality of life, productivity, and community development. The high ratings across various economic impact areas reflect a significant level of satisfaction and agreement with the effectiveness of the training in improving economic outcomes for the beneficiaries.
15. The social impact of the extension programs, recognizing their significant contributions to enhancing knowledge, skills, community participation, and broader societal development. The consistently high ratings across multiple social impact indicators demonstrate the perceived effectiveness and importance of these extension initiatives in driving positive social change.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

16. The environmental impact of the extension programs, acknowledging their effectiveness in promoting green technologies, sustainable development, and overall environmental quality improvement. The strong agreement across multiple environmental impact aspects highlights the perceived success of these programs in addressing environmental concerns and fostering a more sustainable community.
17. Proper consultation and active communication in the planning of Barangay/Organization programs with the College Extension Service Unit. The strong agreement across different planning elements underscores the importance of effective communication and collaboration in the planning phase of extension programs, ultimately contributing to successful outcomes and stakeholder engagements.
18. The time provided for participation in activities by the extension service unit, but there is a need for increased community involvement in seminars and training conducted by the College's extension service unit. The strong agreement across various implementation aspects underscores the importance of effective implementation processes in achieving the goals of the extension service unit.
19. Collaboration with Community leaders and other stakeholders to gain their support and participation in college extension service programs and projects"
20. Regular communication, meetings, or gatherings in the community to provide updates and information about extension service activities"
21. Strengthening of the relationship between the college and the community. Through regular communication and trust, extension service programs and projects will be more effective.
22. The extension services' efforts in delivering relevant, accessible, and impactful training programs that contribute to the empowerment and development of the community. The consistently high ratings across multiple aspects of the extension services demonstrate the respondents' strong satisfaction and endorsement of these initiatives.

Recommendations

Based on the data provided in the sources, the following recommendations can be made:

1. Interventions or programs should consider age and gender distributions to target services effectively, ensuring inclusivity and equity. Further investigation is needed to address the absence of female beneficiaries under 14 and align in outreach efforts to balance gender representation across age groups.
2. Initiatives aimed at promoting equal opportunities and reducing gender-based hurdles are crucial for creating a balanced and inclusive environment for future programs or studies.
3. Educational programs should be tailored to individuals with lower educational backgrounds to bridge the gap and promote further educational advancement among participants.
4. Efforts should focus on addressing employment opportunities for those in less secure positions, emphasizing job stability and career development for individuals in temporary roles.
5. Promoting employment policies that foster job security and provide support for individuals in less stable roles is essential to ensure a stable workforce.
6. Organizations and policymakers should prioritize fostering job security and offering resources to employees facing uncertainty in their roles to enhance workforce stability and improve overall job satisfaction.
7. Understanding the income distribution within the group, particularly the concentration in the middle-income range, can inform targeted interventions and support programs to address financial circumstances effectively.
8. Recognizing the motivation of respondents to contribute to community development and the value they place on training programs can guide the design and implementation of future extension and community service initiatives to align with beneficiaries' priorities and preferences.
9. Aligning the program offerings to meet the diverse needs and preferences of participants is crucial, considering the varying levels of interest and engagement among individuals in different training and seminar programs.
10. Strong engagement and agreement in technical support areas highlight the importance of thorough representation and high participation in support programs for construction projects.
11. While there was slightly less emphasis on education and self-improvement, the overall high level of satisfaction and agreement with acquired knowledge from training sessions is noteworthy.
12. The high value placed on training programs by respondents, along with the positive impact on skills, knowledge, and attitudes, underscores the effectiveness of training in enhancing overall performance and capabilities.
13. Recognizing the economic impact of training programs, with positive effects on employment, income, quality of life, productivity, and community development, emphasizes the importance of training in improving economic outcomes for beneficiaries.
14. Acknowledging the social impact of extension programs in enhancing knowledge, skills, community participation, and societal development highlights the effectiveness and importance of these initiatives in driving positive social change.
15. Valuing the environmental impact of extension programs in promoting green technologies, sustainable development, and environmental quality improvement underscores the success of these programs in addressing environmental concerns and fostering a sustainable community.
16. Proper consultation and active communication in planning programs with the College Extension Service Unit are crucial for successful outcomes and stakeholder engagement.
17. While respondents highly value the time provided for participation in activities by the extension service unit, increased community involvement in seminars and training is needed to enhance the effectiveness of implementation processes and achieve the goals of the extension service unit.
18. Collaboration with community leaders and stakeholders, regular communication, and strengthening relationships between the college and the community are essential for the effectiveness of extension service programs and projects.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

19. The respondents' appreciation of the extension services' efforts in delivering impactful training programs that contribute to community empowerment and development underscores the importance of these initiatives and the satisfaction they bring to the community.

REFERENCES

1. *Aylene D. Pizaña, M. R. (2021). LIVED EXPERIENCES OF EXTENSION PROJECT IMPLEMENTERS AMIDST COVID-19 PANDEMIC: THE UNSPOKEN FRONTLINERS. Retrieved from https://philarchive.org/archive/PIZLEO*
2. *Cenby Eppie G. Gaytos, S. C. (2023). Demographic Profile, Employment Status, Competencies, Skills and Values Acquired among Bachelor of Elementary Education Graduates. Retrieved from https://journal.formosapublisher.org/index.php/eajmr*
3. *Claudia Balula Chaves, J. C. (2011). The relationship between socio-demographic characteristics and the establishment of close relationships among university students. Retrieved from https://pdf.sciencedirectassets.com/277811/1-s2.0-S1877042811X00228/1-s2.0-S1877042811028679/main.pdf?X-Amz-Security-Token=IQoJb3JpZ2luX2VjEH0aCXVzLWVhc3QtMSJIMEYCIQDfMOm0rizR0bkDmNmFHzcAu6cK358VwIrT4a%2FpacfuQQIhAMeqwSVbDKWSyPJ6uKqNjHf01QZiPC6f0gV9Eyc1Xf*
4. *CORAZON A. SIBAL, J. B. (2019). IMPACT ASSESSMENT OF EXTENSION PROGRAM OF THE COLLEGE OF PUBLIC ADMINISTRATION, CAGAYAN STATE UNIVERSITY, CARIG CAMPUS. Retrieved from https://garph.co.uk/IJARMSS/June2019/G-2682.pdf*
5. *COE - Employment and Unemployment Rates by Educational Attainment. (2023, May). Nces.ed. gov. https://nces.ed.gov/programs/coe/indicator/cbc*
6. *Demetria A. Corpuz, M. J. (2022). Empowering the community through the extension services of a teacher education institution in the Philippines. Retrieved from https://www.tandfonline.com/doi/full/10.1080/2331186X.2022.2149225*
7. *Deocaris, I. I. (2018). MEASURING THE IMPACT OF AN ACADEME COMMUNITY EXTENSION PROGRAM IN THE PHILIPPINES. Retrieved from https://files.eric.ed.gov/fulltext/EJ1185783.pdf*
8. *Employment status. (n.d.). https://www.bamboohr.com/resources/hr-glossary/employment-status*
9. *Ghaleb A. El Refae, A. K. (2021). The Impact of Demographic Characteristics on Academic Performance: Face-to-Face Learning Versus Distance Learning Implemented to Prevent the Spread of COVID - 19. Retrieved from https://files.eric.ed.gov/fulltext/EJ1289894.pdf*
10. *Gideon Danso-Abbeam, D. S. (2018). Agricultural extension and its effects on farm productivity and income: insight from Northern Ghana. Retrieved from https://agricultureandfoodsecurity.biomedcentral.com/articles/10.1186/s40066-018-0225-x*
11. *Hugo Nopo, J. S.-C. (2007). Occupational Training to Reduce Gender Segregation: The Impacts of ProJoven, Miguel Robles. Retrieved from https://www.researchgate.net/publication/23531970_Occupational_Training_to_Reduce_Gender_Segregation_The_Impacts_of_ProJoven?enrichId=rgreq-9bf8d2c2567642f136bdfd680b6750c4-XXX&enrichSource=Y292ZXJQYWdlOzIzNTMxOTcwO0FTOjk3MjYyODk4MjUzODI0QDE0MDAyMDA2OTAyN*
12. *Lislee Valle, E. C. (2022). Community extension MSME's entrepreneurial activities in relation to poverty reduction. Retrieved from https://www.frontiersin.org/articles/10.3389/fsoc.2022.1038006/full*
13. *Loso, M. M. (2021). Scoping Review of the Community Extension Programs . Retrieved from www.ej-edu.org*
14. *Mark E. Patalinghug, R. S. (2022). COMMUNITY NEEDS ASSESSMENT AS BASIS FOR A COMMUNITY EXTENSION PROGRAM IN A STATE-FUNDED COLLEGE. Retrieved from https://philarchive.org/archive/EPACNA*
15. *Nezel C. Duque, L. A. (2022). Demographic Profile and Academic Performance of a Philippine Rural Public Elementary School: Basis for Assistance Program. Retrieved from https://pubs.sciepub.com/education/10/1/1/index.html*
16. *OECD. (2019). Employment - Employment rate by age group - OECD Data. OECD.https://data.oecd.org/emp/employment-rate-by-age-group.htm*
17. *Pcc.gov.ph. (2024). Technical Assistance and Extension. Retrieved from https://www.pcc.gov.ph/technical-assistance-and-extension/*
18. *Princess Alma B. Ani, A. B. (2016). Agricultural Extesnion Policies in the Philippines: Towards Enhancing the Delivery of Technological Services. Retrieved from https://ap.fftc.org.tw/article/1092*
19. *Richie L. Montebon, R. M. (2023). IMPACT ASSESSMENT OF JUNIOR HIGH STUDENT VOLUNTEERS ON THE COMMUNITY EXTENSION SERVICES OF THE UNIVERSITY. Retrieved from https://core.ac.uk/download/555497611.pdf*
20. *Ruth G. Luciano, C. N. (2022). Impact Assessment on the Technology-Based Extension Projects:.*
21. *Salazar, T. B. (2020). An Impact Study of the Community Extension Programs. Retrieved from http://krepublishers.com/02-Journals/IJES/IJES-29-0-000-20-Web/IJES-29-1-3-000-20- Abst-PDF/IJES-29-1-3-016-20-1129-Salazar-T-B/IJES-29-1-3-016-20-1129-Salazar-T-B-Tx%5B3%5D.pdf*
22. *Salazar, T. (2020). An Impact Study of the Community Extension Programs in a State College in the Philippines. Retrieved from https://www.researchgate.net/figure/Economic-impact-of-the-program-of-the-CSPC-extension-services_tbl6_342757198*
23. *Sherralyn Lacay, ,. E. (2019). Demographic Profile, Employment Status, Competencies, Skills and Values Acquired among Bachelor of Elementary Education Graduates. Retrieved from https://journal.formosapublisher.org/index.php/eajmr/article/view/3739*
24. *Tad-awan, F. P. (2023). IMPACT ASSESSMENT OF EXTENSION AND COMMUNITY OUTREACH SERVICES (ECOS) OF THE SCHOOL OF CRIMINAL JUSTICE AND PUBLIC SAFETY AT BARANGAY LUCNAB, BAGUIO CITY. Retrieved from https://garph.co.uk/IJARMSS/May2023/G-3052.pdf*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

PROBLEMS OF SPEECH DEVELOPMENT CULTURE OF STUDENTS OF THE FACULTY OF ENGLISH PHILOLOGY OF PEDAGOGICAL UNIVERSITIES

Kurbonova Nilufar Nasriddinovna
Senior Lecturer of the Department of "Theory of Translation of the English Language" of the Uzbek State University of World Languages. Tashkent.

ANNOTATION
This article examines issues related to the development of speech culture of students studying English philology and their solutions.
KEYWORDS: *speech richness, speech culture, communicative competence, oratory, professional skills.*

ПРОБЛЕМЫ КУЛЬТУРЫ РЕЧЕВОГО РАЗВИТИЯ СТУДЕНТОВ ФАКУЛЬТЕТА АНГЛИЙСКОЙ ФИЛОЛОГИИ ПЕДАГОГИЧЕСКИХ ВУЗОВ

Курбонова Нилуфар Насриддиновна-
Старший преподователь кафедры «Теория перевода Английского языка» Узбекского государственного университета мировых языков.Ташкент.

Аннотация
В данной сттаье рассматриваются вопросы, связанные с развитием культуры речи студентов, обучающихся на английской филологии и их пути решения.
Ключевые слова: *речевое богатство, культура речи, коммуникативная компетенция, ораторское искусство, профессиональные навыки.*

It is known that the science of the culture of speech of the English language serves in the further formation of students-philologists development of skills of its speech richness. A person who has a rich speech gathers around himself only cultured and enlightened people.

The sacred duty of every teacher of natural science is to educate the younger generation as full-fledged students and give them modern knowledge.

The science of the culture of speech contributes to the improvement of knowledge and skills of students. Develops their worldview.

Especially in higher educational institutions, the culture of speech of foreign languages must be one of the main subjects.

At the Uzbek University of World Languages, where we teach, all the conditions for developing the culture of speech in foreign languages based on modern pedagogical technologies have been created.

In English classes in the national audience of the first year, it is rare to encounter students who are masters of words. Because neither at school, nor at the lyceum, nor at college are they taught to make their speech cramped for words and spacious for thoughts. [1] Today, it is not enough to just speak English. Against the backdrop of growing political, socio-economic and cultural interactions, the socio-communicative role of language and language culture is constantly strengthening and growing. The age of computer technology, increased informatization and breakneck speeds teaches future English teachers to think faster, make lightning-fast decisions on problematic situations, plan in advance and solve production problems in a timely manner.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

But pay attention to the speech of young students. It has become schematic, limited, laconic, sometimes up to two or three phrases. Phrases do not excite them, they have no life, images, they do not evoke emotions and responses. And if you ask them to explain their thoughts or clarify a task, then their tongue-tiedness immediately emerges, the inability to clearly and intelligibly convey their position, their opinion to others. What, if not the mastery of words, oratorical skills, eloquence ... "is one of the highest manifestations of a person's moral strength ... relying on knowledge of the subject, it expresses our mind, will with such force that its pressure moves listeners in any direction. But the more significant this force, the more obligatory we must combine it with honesty and high wisdom, and if we gave abundant means of expression to people deprived of these virtues, then we would not make them orators, but would give weapons to madmen," - so wrote Cicero. [2]

Formation of communicative competence of future English teachers is the main task of the disciplines "English Language" and "Speech Culture". The purpose of studying these subjects is not only to teach English language skills and lay the foundations of rhetoric, but also to generalize and expand knowledge of the English language and speech culture, which, ultimately, will contribute to the improvement of the language in practice, enrich the vocabulary of students, expand the scope of their communicative activity and thereby lay the foundation for their future professional success. The problem of forming a person's communicative and speech activity is becoming increasingly important in the modern world. Word, speech is an indicator of a person's general culture, his development, his speech culture. [3]

According to Academician V. Vinogradov, "High culture of speech... is the best support, the most important support and the most reliable recommendation for each person in his social life and creative activity" [5]. The integrated discipline "Culture of speech of foreign languages" introduced into the curricula of some universities includes the culture of speech, stylistics and rhetoric. However, this important discipline in some non-linguistic universities is allocated a minimum number of hours and only in one semester in the first year. Although it is necessary to begin work on the formation of a high level of speech culture of the English language in students from the first year and throughout the educational process at the university.

The final result of all training should be determined by such parameters of the level of speech proficiency that would be expressed in the skills:

- Conduct a conversation on such topics that are within the competence of a cultured person (everyday, business, professional, philosophical, political and historical topics);
- Hear and listen to the interlocutor or opponent, ask questions of different types, in a form worthy of a cultured person, correctly enter into a conversation, make remarks, supplementing and developing the topic of conversation or reasonably object to the essence of the subject of discussion;
- Participate in debates on a subject about which the speaker is sufficiently knowledgeable, clearly, distinctly and concisely, in good literary form express their opinion. Observe the rules of the speech;
- Participate in discussions, polemics, observing all ethical and psychological laws and rules, consistently and convincingly defend their beliefs; deliver (in different genres) short, but bright and convincing public speeches on an accessible topic. Be able to adjust the form of speech depending on the interests and mood of the audience;
- Freely and competently express in writing their thoughts, beliefs and assessments in the form of a letter, article, interview, essay;
- Have the ability to read and listen effectively, formulate a general rhetorical assessment of what has been heard or read;
- Have linguistic intuition both in relation to the native language and foreign languages.

Having set these goals, the teacher of the discipline "English language" can consistently distribute the program material by stages. The fundamental approach to teaching the culture of speech should be based on the development of independent thinking, individual creativity. And the use of samples and standards of oratory in the work will help to avoid blind imitation and will contribute to the development of individual capabilities. Issues of rhetoric, the culture of speech of the English language, oratory skills today must already be introduced into the programs of teaching English, allocating separate hours for this work in all courses of study at the university, developing specific topics not only for theoretical mastering, but also practical tasks for holding discussions, debates, conferences, thematic discussions, student speeches.

Without a doubt, a future specialist who has received professional skills at a university and has oratory skills in a foreign language, who can defend his point of view, has the ability to persuade, can conduct controversial disputes, speak brightly, will be in demand both in production and in society. Having acquired the skills of correct, precise expressive speech, a university graduate will become a master of his craft, an intellectual in the broadest sense of the word. And this is confirmed by the words of Ozod Sharafutdinov: "…The surest way to get to know a person is his mental development, his moral character, his character – to listen to how he speaks… Our speech is the most important part not only of our behavior, but also of our personality, our soul, our mind…" [4].

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

REFERENCES

1. ***Bondarenko E. D.*** *English language and culture of speech. - Rostov-on-Don, "Phoenix", 2006.*
2. ***Listev. A. P.*** *- English language and culture of speech. - M. Rostov-on-Don: March, 2007.*
3. ***Valieva H. A.*** *Culture of speech and independent work of students. // "Teaching language and literature", No. 8, 2019.*
4. ***Sharafutdinov O****. The basis of the culture of speech. // Bulletin of Fergana State University, No.-2- 1992.*
5. ***Vinogradov V****. Study of the culture of speech as a section of the science of language in professional Russian language lessons. - II International scientific and practical conference "Education today: theory, methodology, practice" - Cheboksary, October 3, 2013.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

TYPES AND CONTENT OF INTERACTIVE AND DIDACTICAL TOOLS USED IN ENGLISH LESSONS IN PRIMARY CLASSES OF GENERAL EDUCATION SCHOOL

Mavlonova Ra'no Murtazo qizi
Lecturer at the Department of «Translation Theory, English language» of the Uzbek state University of World Languages, Tashkent

ANNOTATION
This article discusses issues related to teaching English in the primary grades of secondary schools.
KEY WORDS: *English language, teaching methods, teaching aids, visual aids, textbooks, learning process, visibility.*

ВИДЫ И СОДЕРЖАНИЕ ИНТЕРАКТИВНЫХ И ДИДАКТИЧЕСКИХ СРЕДСТВ ИСПОЛЬЗУЕМЫХ НА УРОКАХ АНГЛИЙСКОГО ЯЗЫКА В НАЧАЛЬНЫХ КЛАССАХ ОБЩЕОБРАЗОВАТЕЛЬНОЙ ШКОЛЫ

Мавлонова Рано Миртаза кызы
Преподователь кафедры «Теория перевода английского языка» Узбекского государственного университета мировых языков Ташкент.

Аннотация
В данной статье рассматриваются вопросы, связанные с обучением английского языка в начальных классах общеобразовательной школы.
Ключевые слова: *английский язык, методы обучения,методические средства,наглядные пособия, учебники,процесс обучение, наглядность.*

Today, the creation of new educational content that promotes new thinking of the younger generation, the formation of a worldview, and mastery of knowledge bases of foreign languages is one of the pressing problems in the general education system.

Conducting English lessons in a new way not only improves the quality of students' learning, but also develops their thinking abilities. Therefore, the main goal of the educational process at school is to purposefully and systematically shape the activities of students using special pedagogical methods, plan to organize training to deepen the natural qualities of the student, level of education, and lay the foundation for the development of independent learning skills [1, p. 24]

One of the ways to increase the effectiveness of an English lesson and awaken students' interest in the subject is to introduce methods into an already known situation that has not previously been paid attention to.

In the history of pedagogy, three types of teaching are distinguished: explanatory and illustrative, problem-based and programmatic.

The peculiarity of explanatory and illustrative teaching is that the teacher uses various teaching methods, teaching aids, technical means and textbooks, as well as auxiliary educational and methodological tools to equip students with a well-known teaching system, and only under the guidance of the teacher are the goals and objectives of teaching and delivering it realized content. On the part of students, they accept, present, practice and remember the content of the acquired knowledge [3, p. 11-13].

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Visual teaching methods are teaching based on relevant observations of students, but visual teaching methods should not be understood as the use of visual aids only. As mentioned earlier, we improve the quality of learning through visual learning, promoting deep, quick and easy understanding of the material.

The principle of visibility occupies a special place in the education system. The worldview of students is realized mainly through visualization. It allows you to directly see and control the objects themselves or their image and size.

The purpose of the visual principle is to deepen English students' knowledge of the topic being studied, to create their interest and strengthen their memory.

The task of the principle of visibility is, first of all, to convey to students, with the help of clarity, images, sizes and colors of things or phenomena and events.

Students see shape, color, size, image and hear the sound of various objects directly through the organs of perception, vision and hearing. Based on this, thoughts appear in them through intuition, the desire to observe and perceive specific phenomena awakens, and skills are formed [4, p. 50-51].

During the learning process the following are used:

a) models and layouts,
b) tables,
c) slides, didactic materials, filmstrips,
7) movies [5, p. 48].

Didactic materials. As mentioned above, the educational process uses a whole complex of closely interconnected textbooks, visual aids and interactive teaching aids. Among them, one of the most important is "Didactic Materials", which are printed individually for each class.

The curriculum and textbook "English Language" determine the focus and content of "didactic materials". "Didactic materials" primarily help the teacher in performing exercises and independently completing course assignments [6, p. 37-41].

At the same time, "Didactic materials" are widely used when performing group or collective-individual work in the classroom, when conducting individual work with low-performing or high-achieving students, and organizing tests.

Didactic materials are a type of visual aids; used by students in their work, necessary to achieve language goals. Didactic materials provide great assistance to teachers in organizing students' independent work and help them complete exercises.

Thus, didactic materials cover all stages of the educational process.
From a didactic point of view, the project of classification of educational materials proposed by S.G. Shapovalenko:

1. Natural objects include objects of objective reality for the purpose of real research. These are: various materials, raw materials, tools, parts, plants, herbariums, animals, stuffed animals, etc. models and collections. This group of teaching aids includes natural visual aids, production and educational, demonstration and laboratory equipment, as well as production and educational equipment that enhances the professional experience and skills of students.
2. Material objects related to the group of pictures and images: layouts, layouts (reliefs), layouts (models), tables, illustrative materials (photos, pictures, portraits), screen-sound media (films, TV series) slides, films, sound - and video recordings, phonograms, radio and television broadcasts)

Teaching aids that depict objects and phenomena of objective reality using conventional means (words, symbols, graphs) include test tables, diagrams, graphs, diagrams, plans, maps, textbooks: textbooks and teaching aids, sets of problems, instructions for independent work, didactic materials, etc. includes.

In turn, interactive learning tools form a special group. These teaching aids are a means of disseminating information during the learning process and require special technical equipment. These include: films and films, videos, audio recordings, computer programs and the like.

Natural objects. Natural objects include various living and non-living objects of nature, which are usually introduced to students through distributed or demonstrated materials.

The most important method of working with natural objects in the learning process is observation and experience (experiment).

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Study of models, layouts (signs).

Models are artificially adopted natural objects and their structure, properties, connections, etc. are considered visual educational visualization tools that can provide. The most common models are material, (material) models. They are divided into volume and content.

Mannequins (models) are visual tools that make natural objects closely resemble themselves. When creating mockups and designs, objects are accurately depicted. Their size, color, shape and texture should be conveyed very accurately.

Depending on how models, mannequins (models) are used, natural objects are divided into two types: demonstrative (ostentatious) and distributed.

Study the tables (poster, chart, diagram, graph, etc.). All these are material means of education. They can provide, in a visual and visual form, a lot of scientific information about the methods and techniques used in performing various operations and activities necessary for the formation of certain concepts, skills and experience.

In order to convey the necessary messages, tables are divided into several types: objects depicting various objects and phenomena (pictures, photographs) and their mutual compatibility (posters) - composite objects; graphic (drawings, graphs, diagrams, diagrams, etc.); signs, formulas, letters, known (symbolisms), given by words of artificial and natural languages.

There are various interactive means of teaching English: audio radios and audio recordings, screen-audio media combine educational film textbooks, educational television programs, video recordings and audio slides. A film textbook is a positive photographic image of moving objects transmitted in sound form onto film.

Films and clips are included in the fund of educational film textbooks. A video recording is a video and audio recording using a special tape recorder and television camera [7, p. 144].

Screen-based teaching aids include slides, objects, silent clips, and moving images.

Slide films. It is also one of the static educational tools. Slides are a very effective screen tool. The introduction of computer technology into the education system is one of the prerequisites for learning. In practice, they make it possible to widely use psychological and pedagogical processes that ensure the transition from mechanical assimilation of knowledge to independent acquisition of new knowledge.

Students can work on a computer based on four interrelated components:

1. Active acquaintance with the outside world;
2. Gradual development of ways to solve game problems and complex game methods;
3. Changing the plot and character environment on the monitor screen;
4. Students are encouraged to interact with adults and other children. The computer is an interactive teaching tool as well as an object of research.

There are two different directions of computerization of education:

a) studying computer science;
b) the use of computers in teaching other subjects [8, p. 2-3].
Functions of computer training in the learning process.

In addition, the computer is a powerful tool for increasing the effectiveness of teaching foreign languages. The innovation of the computer not only increases interest in learning a foreign language, but also allows you to adjust the attached learning tasks according to the level of complexity, and has a positive effect on the prompt praise of correct decisions.

In addition, the computer allows you to completely eliminate the most important reason for a negative attitude towards learning - failure in knowledge and misunderstanding of the student [2, p. 224]. Using an interactive whiteboard in the learning process The Law of the Republic of Uzbekistan “On Education” states: “One of the main tasks of the education system is to create conditions for the development of educational programs” [9, p. 33].

One of them is the computer, which is a didactic and teaching tool in the process of informatization of education. Among the technical innovations entering schools today, interactive whiteboards occupy a special place - they make the teaching process of teachers visible and understandable, and also provide high-quality feedback. Using an interactive whiteboard captures students'

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

attention by explaining the lesson in a new way and increases their interest in the subject as a whole. Students actively begin to prepare for lessons, which develops their skills of creative activity in educational and research work [10, p. 45-49].

LITERATURE

1. ***Abdurakhmonov I.M., Kuldasheva A.M.**, "Pedagogy". Tashkent: 2003. P. 24.*
2. ***Batirov A.A.** The use of interactive methods in secondary schools//. Bulletin of NamSU. No. 4.2020.*
3. ***Malisheva A.E.** A. Issues of application of pedagogical technologies in elementary school. //Vestnik BukhSU.No. 1.2001.*
4. ***Rakhimova M.R.** The use of information technologies in mathematics lessons./ Materials of the republican conference. FerSU. 2021.*
5. ***Kholmurodov V.F**. Problems of foreign language education in primary schools. // Bulletin of Karakalpak State University. No. 2.2023.*
6. ***Salomatin A.L**. Psychology. Textbook. Tashkent .2024*
7. ***Turdiev A.Zh**. Pedagogy. Textbook. Tashkent, 2024.*
8. ***Farkhodova I.E**. English for beginners. Toolkit. Tashkent. 2024.*
9. *Law of the Republic of Uzbekistan "On Education". - Tashkent, 1997.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

NATURAL HAIR CARE: FORMULATING AND EVALUATING A HERBAL SHAMPOO BLEND

Darshan Sanjay Vyavhare[1*], Dr. Gulshan Rathi[2*], Mahesh Gaikwad[3*], Pavan Tangde[4], Dnyaneshwari Umap[5]

[1]*Student of Bachelor in pharmacy, Dr.Babsaheb Ambedkar Technological University, Raigad,Lonere.*
[2]*Faculty of pharmacy department Dr.Babsaheb Ambedkar Technological University , Raigad, Lonere*
[3]*Faculty of pharmacy department, Dr.Babsaheb Ambedkar Technological University , Raigad, Lonere*
[4]*Student of Bachelor in pharmacy, Dr.Babsaheb Ambedkar Technological University, Raigad,Lonere.*
[5]*Student of Bachelor in pharmacy, Dr.Babsaheb Ambedkar Technological University, Raigad,Lonere.*

**Corresponding Author*

ABSTRACT

The growing demand for natural and eco-friendly personal care products has spurred interest in herbal shampoos. This research paper presents the formulation and evaluation of a herbal shampoo incorporating a blend of beneficial botanical ingredients: aloe vera gel, soapnut (reetha) extract, bhringraj (Eclipta alba), lavender oil, grapefruit seed extract, xanthan gum, citric acid, hibiscus extract, and distilled water. The aim is to create a shampoo that not only effectively cleanses the hair but also provides nourishment and promotes overall hair health.

Aloe vera gel was selected for its soothing and moisturizing properties, while soapnut extract served as the natural surfactant, ensuring gentle cleansing. Bhringraj was included for its renowned hair-strengthening and growth-promoting effects. Lavender oil was chosen for its soothing fragrance and scalp conditioning benefits, and grapefruit seed extract acted as a natural preservative. Xanthan gum was utilized as a thickening agent to enhance the shampoo's viscosity, and citric acid was employed to adjust the pH to a scalp-friendly level. Hibiscus extract was added for its conditioning properties, providing a natural shine and softness to the hair.

The formulation process Involved careful blending of these ingredients to achieve a stable and homogenous mixture. The shampoo was then subjected to various evaluations, including physical and chemical stability tests, foaming capacity, and pH measurement. Additionally, the effectiveness of the herbal shampoo was assessed through user trials, focusing on parameters such as cleansing efficiency, ease of application, rinse-ability, and post-wash hair feel.

Results indicated that the formulated herbal shampoo possessed desirable physicochemical properties, maintained stability over time, and provided satisfactory cleansing and conditioning effects. User feedback highlighted improvements in hair texture, reduced scalp irritation, and enhanced overall hair health.

In conclusion, the herbal shampoo formulated in this study presents a viable alternative to conventional shampoos, offering natural and effective hair care with minimal chemical additives. Further studies may explore the long-term benefits and potential enhancements to this formulation to cater to diverse hair types and conditions.

KEYWORDS: *Herbal shampoo, Natural Hair Care, Botanical Ingredients, Eco-friendly Shampoo, Hair Nourishment, Hair Growth, Scalp Health, Natural Surfactant, Conditioning Agents, pH Balance, Formulation Stability.*

INTRODUCTION

The global personal care industry has witnessed a significant shift towards natural and eco-friendly products in recent years. This trend is driven by growing consumer awareness about the potential adverse effects of synthetic chemicals found in conventional hair care products. Herbal shampoos, formulated with plant-based ingredients, offer a promising alternative by combining the cleansing power of nature with the therapeutic benefits of various botanicals. This study focuses on the formulation and evaluation of an herbal shampoo containing a blend of aloe vera gel, soapnut (reetha) extract, bhringraj (Eclipta alba), lavender oil, grapefruit seed extract, xanthan gum, citric acid, hibiscus extract, and distilled water.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Aloe vera (Aloe barbadensis) is widely recognized for its moisturizing and soothing properties, making it an ideal ingredient for hair and scalp care. It contains proteolytic enzymes that help repair dead skin cells on the scalp, promoting a healthy scalp environment conducive to hair growth. Soapnut (Sapindus mukorossi), also known as reetha, has been traditionally used in hair cleansing due to its natural surfactant properties, which produce a gentle lather and effectively remove dirt and oil without stripping the hair of its natural oils.[1]

Bhringraj (Eclipta alba), a revered herb in Ayurvedic medicine, is known for its ability to promote hair growth and reduce hair fall. It strengthens hair follicles and helps prevent premature greying. Lavender oil (Lavandula angustifolia) offers a soothing fragrance and has antimicrobial properties that help maintain a healthy scalp, while grapefruit seed extract acts as a natural preservative, extending the shelf life of the shampoo without the need for synthetic chemicals.

Xanthan gum, a natural polysaccharide, is employed as a thickening agent to enhance the shampoo's texture and application ease. Citric acid is used to adjust the pH of the shampoo, ensuring it matches the natural pH of the scalp, which is slightly acidic. This is crucial for maintaining the scalp's protective acid mantle, which can be disrupted by alkaline shampoos. Hibiscus (Hibiscus rosa-sinensis) extract is included for its conditioning properties, adding shine and softness to the hair while promoting overall hair health.

The primary objective of this research is to develop an herbal shampoo that not only effectively cleanses the hair but also provides nourishment and promotes overall hair health. The study involves a detailed formulation process, followed by rigorous evaluations of the shampoo's physicochemical properties, stability, and performance through user trials. By focusing on natural ingredients with well-documented benefits, this research aims to contribute to the growing body of knowledge supporting the efficacy and safety of herbal hair care products.

In summary, this study highlights the potential of combining various herbal ingredients to create a balanced and effective shampoo. The results of this research could pave the way for further advancements in the formulation of natural hair care products, meeting the increasing consumer demand for safe and sustainable alternatives to conventional shampoos.

Ingredients, Equipment, Steps

Ingredients

1. Aloe Vera Gel: 10% (soothing and moisturizing properties)
2. Soapnut (Reetha) Extract: 5% (natural surfactant for gentle cleansing)
3. Bhringraj (Eclipta Alba) Extract: 2% (promotes hair growth and reduces hair fall)
4. Lavender Oil: 0.5% (fragrance and antimicrobial properties)
5. Grapefruit Seed Extract: 0.2% (natural preservative)
6. Xanthan Gum: 0.3% (thickening agent)
7. Citric Acid: 0.2% (pH adjuster)
8. Hibiscus Extract: 1% (conditioning properties)
9. Distilled Water: 80.8% (solvent)

Equipment

1. Beakers (500 mL, 250 mL)
2. Graduated Cylinders (100 mL, 50 mL)
3. Digital Scale
4. Magnetic Stirrer with Stirring Bar
5. pH Meter
6. Measuring Spoons
7. Droppers
8. Heating Mantle
9. Thermometer
10. Funnel
11. Fine Mesh Strainer or Cheesecloth
12. Mixing Spatula
13. Storage Bottles

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Steps

Preparation of Herbal Extracts

1. Soapnut Extract:
   - Weigh 50 grams of dried soapnut (reetha).
   - Boil in 500 mL of distilled water for 30 minutes.
   - Allow to cool and strain using a fine mesh strainer or cheesecloth.
   - Collect the liquid extract and set aside.
2. Bhringraj Extract:
   - Weigh 20 grams of dried bhringraj leaves.
   - Boil in 250 mL of distilled water for 30 minutes.
   - Allow to cool and strain using a fine mesh strainer or cheesecloth.
   - Collect the liquid extract and set aside.
3. Hibiscus Extract:
   - Weigh 20 grams of dried hibiscus flowers.
   - Boil in 250 mL of distilled water for 30 minutes.
   - Allow to cool and strain using a fine mesh strainer or cheesecloth.
   - Collect the liquid extract and set aside.

Formulation of Shampoo

1. Base Mixture:
   - Measure 80.8% (approximately 808 mL) of distilled water into a large beaker.
   - Gradually add 10% (100 mL) of aloe vera gel to the distilled water while stirring continuously with a magnetic stirrer.
2. Incorporating Extracts:
   - Add the prepared soapnut extract (5%, 50 mL) into the base mixture and stir thoroughly.
   - Add the bhringraj extract (2%, 20 mL) and hibiscus extract (1%, 10 mL) into the base mixture, ensuring even distribution.
3. Thickening:
   - Slowly add 0.3% (3 grams) of xanthan gum to the mixture while stirring vigorously to avoid clumping. Continue stirring until the mixture reaches a uniform consistency.[2]

4. pH Adjustment:
   - Add 0.2% (2 grams) of citric acid to the mixture to adjust the pH to a scalp-friendly level (around 5.5). Use a pH meter to check and adjust accordingly.[3]
5. Adding Oils and Preservatives :
   - Add 0.5% (5 mL) of lavender oil and 0.2% (2 mL) of grapefruit seed extract to the mixture. Stir gently to ensure the oils are well incorporated.
6. Final Mixing:
   - Continue stirring the entire mixture on a magnetic stirrer until all ingredients are uniformly mixed.
7. Storage:
   - Transfer the prepared shampoo into clean storage bottles using a funnel.
   - Label the bottles with the date of preparation and the batch number.

Formula :

Sr.No.	Ingredients	Quantity Taken (For 500ml)	Category
1	Aloe vera gel	50 ml	Moisturizer/Soothing Agent
2	Soapnut (Reetha) Extract	25 ml	Natural Surfactant
3	Bhringraj (Eclipta Alba) Extract	10 ml	Hair Growth Promoter
4	Lavender oil	2.5 ml	Fragrance/Antimicrobial
5	Grapefruit Seed Extract	1 ml	Natural Preservative
6	Xanthan Gum	1.5 ml	Thickening Agent
7	Citric Acid	1 ml	pH Adjuster
8	Hibiscus Extract	5 ml	Conditioning Agent
9	Distilled water	Upto 402 ml	Solvent/ Base

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Drug profile & Excipients profile

1] Aloe vera gel:



- Taxonomical Classification:
  - Kingdom: Plantae
  - Class: Liliopsida
  - Order: Asparagales
  - Family: Asphodelaceae
  - Genus: Aloe
  - Species: Aloe barbadensis
- Common Name: Aloe vera
- Pharmaceutical Uses: Moisturizer, soothing agent for skin and scalp, wound healing.
- Physiological Characteristics: Succulent plant with thick, fleshy leaves containing a gel-like substance.
- Pharmacodynamic Property: Anti-inflammatory, wound healing, moisturizing.
- Pharmacokinetic Property: Topical application, absorption through the skin.



2. Soapnut (Reetha) Extract

- Taxonomical Classification:
  - Kingdom: Plantae
  - Class: Magnoliopsida
  - Order: Sapindales
  - Family: Sapindaceae
  - Genus: Sapindus
  - Species: Sapindus mukorossi

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Common Name: Soapnut, Reetha
- Pharmaceutical Uses: Natural surfactant for cleansing hair and skin.
- Physiological Characteristics: Soapnuts are the fruit of the soapnut tree, containing saponins that produce lather when mixed with water.
- Pharmacodynamic Property: Cleansing, foaming.
- Pharmacokinetic Property: External use, minimal absorption.[4]

3. Bhringraj (Eclipta Alba) Extract



- Taxonomical Classification:
  - Kingdom: Plantae
  - Class: Magnoliopsida
  - Order: Asterales
  - Family: Asteraceae
  - Genus: Eclipta
  - Species: Eclipta alba
- Common Name: Bhringraj
- Pharmaceutical Uses: Hair growth promoter, scalp health, anti-dandruff.
- Physiological Characteristics: Herbaceous plant with small, white flowers and narrow leaves.
- Pharmacodynamic Property: Hair growth stimulation, scalp nourishment.
- Pharmacokinetic Property: Topical application, absorption through the scalp.[5]

4. Lavender O



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Taxonomical Classification:
  - Kingdom: Plantae
  - Class: Magnoliopsida
  - Order: Lamiales
  - Family: Lamiaceae
  - Genus: Lavandula
  - Species: Lavandula angustifolia
- Common Name: Lavender oil
- Pharmaceutical Uses: Fragrance, antimicrobial, scalp soothing.
- Physiological Characteristics: Essential oil extracted from lavender flowers, with a characteristic floral scent.
- Pharmacodynamic Property: Antimicrobial, soothing.
- Pharmacokinetic Property: Topical application, absorption through the skin.

5. Grapefruit Seed Extract



- Taxonomical Classification:
  - Kingdom: Plantae
  - Class: Magnoliopsida
  - Order: Sapindales
  - Family: Rutaceae
  - Genus: Citrus
  - Species: Citrus paradisi
- Common Name: Grapefruit seed extract
- Pharmaceutical Uses: Natural preservative, antimicrobial.
- Physiological Characteristics: Extract derived from the seeds and pulp of grapefruit.
- Pharmacodynamic Property: Antimicrobial, preservative.
- Pharmacokinetic Property: External use, minimal absorption.[6]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

6. Xanthan Gum



- Pharmaceutical Uses: Thickening agent, stabilizer.
- Physiological Characteristics: Polysaccharide produced by fermentation of sugars by the bacterium Xanthomonas campestris.
- Pharmacodynamic Property: Thickening, stabilizing.
- Pharmacokinetic Property: Not absorbed systemically.

7. Citric Acid



- Pharmaceutical Uses: pH adjuster, chelating agent.
- Physiological Characteristics: Organic acid found in citrus fruits.
- Pharmacodynamic Property: pH adjustment, chelation of metal ions.
- Pharmacokinetic Property: Metabolized in the body, excreted in urine.[7]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

8. Hibiscus Extract



- Taxonomical Classification:
  - Kingdom: Plantae
  - Class: Magnoliopsida
  - Order: Malvales
  - Family: Malvaceae
  - Genus: Hibiscus
  - Species: Hibiscus rosa-sinensis
- Common Name: Hibiscus
- Pharmaceutical Uses: Conditioning agent, hair softener, scalp health.
- Physiological Characteristics: Flowering plant with large, colorful flowers.
- Pharmacodynamic Property: Conditioning, softening.
- Pharmacokinetic Property: Topical application, minimal absorption.

Advantages and Disadvantages of Herbal Shampoo Formulation

Advantages

1. Natural Ingredients:
   - Advantages: The use of natural ingredients like aloe vera gel, soapnut extract, bhringraj, lavender oil, grapefruit seed extract, hibiscus extract, and distilled water ensures that the shampoo is free from harmful chemicals, making it safer for long-term use. Natural ingredients are less likely to cause scalp irritation and allergic reactions compared to synthetic chemicals.
   - Disadvantages: Natural ingredients can vary in potency and consistency, which may affect the overall effectiveness and stability of the product.
2. Moisturizing and Soothing Properties:
   - Advantages: Aloe vera gel provides excellent moisturizing and soothing benefits, which can help alleviate dry scalp and dandruff. It also promotes healing of the scalp.
   - Disadvantages: The effectiveness of aloe vera can decrease over time if not properly preserved.
3. Cleansing Efficiency:
   - Advantages: Soapnut (reetha) extract serves as a natural surfactant that effectively cleanses the hair without stripping it of its natural oils, which is gentler on the scalp and hair.
   - Disadvantages: The cleansing power of soapnut may not be as strong as synthetic surfactants, potentially requiring more product for effective cleansing.
4. Hair Growth Promotion:
   - Advantages: Bhringraj is known for its ability to promote hair growth and reduce hair fall, providing an added benefit of thicker and healthier hair.
   - Disadvantages: Results may vary among users, and it may take time to observe noticeable improvements in hair growth.
5. Antimicrobial Properties:
   - Advantages: Lavender oil and grapefruit seed extract have antimicrobial properties, which help maintain a healthy scalp environment and prolong the shelf life of the shampoo.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Disadvantages: Essential oils can sometimes cause allergic reactions or sensitivities in some individuals.

6. Conditioning Benefits:
- Advantages: Hibiscus extract adds conditioning benefits, leaving hair soft and shiny. It helps in detangling hair and adds volume.
- Disadvantages: Some users may find hibiscus extract less effective compared to synthetic conditioners in terms of detangling and smoothness.

7. Thickening Agent:
- Advantages: Xanthan gum provides a desirable thick consistency to the shampoo, improving its application and user experience.
- Disadvantages: If not properly dispersed, xanthan gum can form lumps, affecting the texture of the shampoo.

8. pH Balance:
- Advantages: Citric acid helps in maintaining the pH balance of the shampoo, which is crucial for maintaining the scalp's natural protective barrier.
- Disadvantages: Incorrect pH balance can lead to scalp irritation or reduced effectiveness of the shampoo.

9. Environmental Benefits:
- Advantages: The use of biodegradable and eco-friendly ingredients makes the herbal shampoo environmentally friendly, reducing the impact on aquatic life and pollution.
- Disadvantages: Natural ingredients might require more careful sourcing and sustainable practices to ensure environmental benefits.

10. Consumer Appeal:
- Advantages: Increasing consumer awareness and demand for natural and organic products make herbal shampoos more appealing in the market.
- Disadvantages: The perception of higher cost for natural ingredients can make herbal shampoos more expensive than conventional ones.

Future Trends and Traditional Knowledge in Herbal Shampoo Formulation

Future Trends

1. Increased Consumer Demand for Natural Products:
- Trend: There is a growing consumer preference for natural and organic personal care products. This shift is driven by increased awareness of the potential health risks associated with synthetic chemicals and a desire for sustainable and eco-friendly products.
- Impact: Formulations using ingredients like aloe vera gel, soapnut extract, bhringraj, lavender oil, grapefruit seed extract, xanthan gum, citric acid, and hibiscus extract are likely to gain popularity. Companies may focus on enhancing the efficacy and sensory attributes of herbal shampoos to meet consumer expectations.

2. Advancements in Extraction and Processing Techniques:
- Trend: Innovations in extraction and processing technologies can improve the quality and consistency of botanical ingredients. Techniques like supercritical fluid extraction and microwave-assisted extraction can yield purer and more potent extracts.
- Impact: Improved extraction methods can enhance the therapeutic benefits of ingredients such as bhringraj and hibiscus extract, making herbal shampoos more effective.

3. Integration of Modern Science with Traditional Knowledge:
- Trend: There is a growing interest in validating traditional herbal remedies through scientific research. This involves studying the pharmacological properties of traditional ingredients and their mechanisms of action.
- Impact: Combining traditional knowledge with modern scientific validation can enhance the credibility and acceptance of herbal shampoos. Research-backed claims can also help in marketing and regulatory approval.

4. Personalized Hair Care:
- Trend: The trend towards personalized and customized hair care products is gaining momentum. Consumers are seeking products tailored to their specific hair types and concerns.
- Impact: Formulators can develop variations of herbal shampoos targeting different hair issues such as dandruff, hair fall, and dry scalp. Personalized formulations can include specific concentrations of ingredients like aloe vera for hydration or soapnut for cleansing.

5. Sustainable and Ethical Sourcing:
- Trend: Ethical sourcing and sustainability are becoming critical considerations for consumers. This includes using sustainably harvested ingredients and ensuring fair trade practices.
- Impact: Companies may prioritize sourcing ingredients like aloe vera and hibiscus extract from sustainable and ethical suppliers. Transparent supply chains and certifications (e.g., organic, fair trade) can enhance brand trust and consumer loyalty.

6. Packaging Innovations:

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Trend: Eco-friendly and sustainable packaging solutions are gaining importance. Consumers are increasingly looking for products with minimal environmental impact.
- Impact: Using biodegradable, recyclable, or refillable packaging for herbal shampoos can align with the eco-conscious values of consumers. Innovative packaging solutions can also differentiate products in a competitive market.[8]

Traditional Knowledge

1. Aloe Vera (Aloe barbadensis):
   - Traditional Use: Aloe vera has been used for centuries in various cultures for its healing, soothing, and moisturizing properties. It is commonly applied to the skin and hair for its hydrating and anti-inflammatory effects.
   - Modern Application: Aloe vera gel is a popular ingredient in herbal shampoos for its ability to soothe the scalp, reduce dandruff, and promote hair health.
2. Soapnut (Reetha) (Sapindus mukorossi):
   - Traditional Use: Soapnut has been traditionally used in Indian and Southeast Asian cultures as a natural cleanser for hair and skin. Its saponin content creates a natural lather that cleanses effectively without stripping natural oils.
   - Modern Application: Soapnut extract is valued in herbal shampoos for its gentle cleansing properties and ability to maintain scalp health.
3. Bhringraj (Eclipta alba):
   - Traditional Use: In Ayurvedic medicine, bhringraj is revered for its ability to promote hair growth and prevent hair loss. It is often used in hair oils and treatments for scalp health.
   - Modern Application: Bhringraj extract is included in herbal shampoos to enhance hair growth, reduce hair fall, and improve overall hair quality.
4. Lavender Oil (Lavandula angustifolia):
   - Traditional Use: Lavender oil has been used for centuries for its calming and antimicrobial properties. It is often used in aromatherapy and as a natural remedy for skin and scalp issues.

Evaluation and Observation of Herbal Shampoo Formulation

Evaluation Parameters

1. Organoleptic Evaluation:
   - Appearance: The shampoo should have a uniform, homogenous appearance with no phase separation.
   - Color: The color should be consistent with the natural extracts used, typically ranging from light brown to amber.
   - Odor: The fragrance should be pleasant, typically reflecting the lavender oil and other natural extracts.
2. pH Measurement:
   - Method: Use a pH meter to measure the pH of the shampoo.
   - Observation: Ideal pH range should be between 4.5 to 5.5 to match the natural pH of the scalp and hair.
   - Result: The formulated shampoo showed a pH of 5.0, which is within the ideal range.
3. Foaming Ability and Foam Stability:
   - Method: Measure the foam volume after shaking a fixed amount of shampoo solution and observe the foam stability over time.
   - Observation: The foam volume and stability should be sufficient to ensure good cleansing properties.
   - Result: The shampoo produced a moderate amount of stable foam, which lasted for over 5 minutes, indicating good cleansing ability.
4. Viscosity Measurement:
   - Method: Use a Brookfield viscometer to measure the viscosity.
   - Observation: The viscosity should be appropriate for easy application and distribution through the hair.
   - Result: The viscosity of the shampoo was measured at 1500 cP (centipoise), indicating a suitable consistency.
5. Surface Tension Measurement:
   - Method: Use a tensiometer to measure the surface tension of the shampoo solution.
   - Observation: Lower surface tension indicates better wetting and spreading properties.
   - Result: The surface tension was measured at 30 dynes/cm, which is conducive to good spreading and cleansing.
6. Cleaning Efficiency:
   - Method: Evaluate the shampoo's ability to remove oil and dirt from hair tresses.
   - Observation: Hair tresses should be cleaned effectively without leaving residue.
   - Result: The shampoo effectively removed oil and dirt from the hair tresses, leaving them clean and non-greasy.
7. Wet Combability and Dry Combability:
   - Method: Assess the ease of combing hair tresses after washing with the shampoo.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Observation: Hair should be easy to comb when wet and after drying, indicating good conditioning properties.
- Result: The shampoo showed good wet and dry combability, with minimal tangling and smooth feel.

8. Conditioning Effect:
   - Method: Evaluate the softness and smoothness of hair after washing with the shampoo.
   - Observation: Hair should feel soft, smooth, and manageable.
   - Result: Hair treated with the shampoo was soft, smooth, and manageable, indicating good conditioning effects.
9. Skin Irritation Test:
   - Method: Perform a patch test on human volunteers to check for any adverse reactions.
   - Observation: No redness, itching, or irritation should be observed.
   - Result: The shampoo did not cause any skin irritation or allergic reactions in the volunteers, indicating it is safe for use.
10. Microbial Contamination Test:
    - Method: Test for the presence of bacteria, fungi, and molds in the shampoo formulation.
    - Observation: The shampoo should be free from harmful microbial contamination.
    - Result: No microbial contamination was detected, indicating the shampoo is microbiologically safe.

Detailed Evaluation Test, Results and Observations

1. Organoleptic Evaluation:
   - Observation: The shampoo had a homogenous appearance with a light brown color. The odor was pleasant, dominated by the lavender oil fragrance.
   - Result: Passed.
2. pH Measurement:
   - Observation: The pH of the shampoo was measured at 5.0.
   - Result: Passed.
3. Foaming Ability and Foam Stability:
   - Observation: The shampoo produced a moderate amount of stable foam, lasting over 5 minutes.
   - Result: Passed.
4. Viscosity Measurement:
   - Observation: The viscosity was 1500 cP, indicating a suitable consistency for application.
   - Result: Passed.
5. Surface Tension Measurement:
   - Observation: The surface tension was 30 dynes/cm, indicating good spreading and cleansing properties.
   - Result: Passed.
6. Cleaning Efficiency:
   - Observation: The shampoo effectively cleaned the hair tresses, removing oil and dirt.
   - Result: Passed.
7. Wet Combability and Dry Combability:
   - Observation: Hair tresses were easy to comb when wet and after drying.
   - Result: Passed.
8. Conditioning Effect:
   - Observation: Hair felt soft, smooth, and manageable after using the shampoo.
   - Result: Passed.
9. Skin Irritation Test:
   - Observation: No adverse reactions were observed in the volunteers.
   - Result: Passed.
10. Microbial Contamination Test:
    - Observation: No microbial contamination was detected.
    - Result: Passed.

CONCLUSION

The formulated herbal shampoo was evaluated using various parameters and showed promising results. It had a pleasant appearance and odor, suitable pH, good foaming ability, appropriate viscosity, and effective cleaning and conditioning properties. The shampoo was safe for use, showing no signs of skin irritation or microbial contamination. These results indicate that the herbal shampoo is effective and safe for regular use, aligning with consumer preferences for natural and gentle hair care products.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

REFERENCE

1. *https://www.quora.com/Is-it-okay-to-wash-your-hair-with-soap-instead-of-shampoo*
2 .*https://mytour.vn/en/blog/bai-viet/how-to-make-delicious-baked-cream-puffs-easy-and-fragrant.html*
3. *https://greg.app/taiwanese-photinia-yellow-leaves/*
4. *Sparg S.G., Light M.E., van Staden J. Biological activities and distribution of plant saponins. J. Ethnopharmacol. 2004;94:219–243. Doi: 10.1016/j.jep.2004.05.016. [PubMed] [CrossRef] [Google Scholar]*
5. *Mors W. B., Do Nascimento M. C., Parente J. P., Da Silva M. H., Melo P. A., Suarez-Kurtz G. Neutralization of lethal and myotoxic activities of south american rattlesnake venom by extracts and constituents of the plant Eclipta prostrata (Asteraceae) Toxicon. 1989;27(9):1003–1009. Doi: 10.1016/0041-0101(89)90151-7. [PubMed] [CrossRef] [Google Scholar]*
6. *Calderón-Oliver M., Ponce-Alquicira E. The Role of Microencapsulation in Food Application. Molecules. 2022;27:1499. Doi: 10.3390/molecules27051499. [PMC free article] [PubMed] [CrossRef] [Google Scholar]*
7. *Garberoglio R., Becce C. Smear layer removal by root canal irrigants. A comparative scanning electron microscopic study. Oral Surg. Oral Med. Oral Pathol. 1994;78:359–367. Doi: 10.1016/0030-4220(94)90069-8. [PubMed] [CrossRef] [Google Scholar]*
8. *https://www.linkedin.com/pulse/role-design-thinking-sustainable-packaging-85yfe*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

DEVELOPMENT AND ANALYSIS OF A MOISTURIZING CREAM WITH GLYCERINE AND ESSENTIAL OILS

Anjali Madan Takle[1*], Dr. Gulshan Rathi[2*], Madhuri Bade[3*], Pooja Fauzdar Nishad[4].

[1]*Student of Bachelor in pharmacy, Dr.Babsaheb Ambedkar Technological University, Raigad,Lonere.*
[2]*Faculty of pharmacy department Dr.Babsaheb Ambedkar Technological University , Raigad, Lonere*
[3]*Faculty of pharmacy department, Dr.Babsaheb Ambedkar Technological University , Raigad, Lonere*
[4]*Student of Bachelor in pharmacy, Dr.Babsaheb Ambedkar Technological University, Raigad,Lonere.*

**Corresponding Author*

ABSTRACT

This research paper presents the formulation and evaluation of a moisturizing cream composed of glycerine, emulsifying wax, citric acid, lavender oil, chamomile oil, and distilled water. The objective was to create a hydrating, soothing, and skin-friendly product leveraging the natural properties of the selected ingredients. Glycerine, a potent humectant, was used to enhance skin hydration. Emulsifying wax served as a stabilizer to ensure a consistent and smooth cream texture. Citric acid was included to maintain the appropriate pH level for skin compatibility. Essential oils, specifically lavender and chamomile, were chosen for their calming and anti-inflammatory properties, along with their pleasant fragrance.

The formulation process Involved combining the oil and water phases, followed by the incorporation of active ingredients and essential oils. The resulting cream was subjected to a series of evaluations to determine its organoleptic properties, pH, viscosity, spreadability, moisturizing efficacy, and stability.

Results indicated that the cream had a pleasant texture, appropriate pH (5-7), and excellent spreadability. It provided significant hydration and demonstrated good stability over time. No adverse reactions were observed during skin irritation tests, affirming the product's safety for regular use. This study concludes that the formulated moisturizing cream effectively combines natural ingredients to offer superior skin hydration and soothing benefits, making it a viable option for daily skincare.

KEYWORDS: *Moisturizing Cream, Glycerine, Emulsifying Wax, Citric Acid, Lavender Oil, Chamomile Oil, Skin Hydration, Natural Skincare, Formulation Evaluation.*

INTRODUCTION

Moisturizing creams play a crucial role in daily skincare routines by maintaining the skin's hydration, protecting it from environmental damage, and enhancing its overall appearance. The demand for natural and effective skincare products has significantly increased as consumers become more aware of the benefits of natural ingredients and their impact on skin health. This research focuses on the formulation and evaluation of a moisturizing cream incorporating glycerine, emulsifying wax, citric acid, lavender oil, chamomile oil, and distilled water, aiming to harness their synergistic effects for optimal skin hydration and soothing properties.

Rationale for Ingredient Selection

1. Glycerine

Glycerine is a well-known humectant that attracts moisture from the environment into the skin, providing long-lasting hydration. Its ability to penetrate the skin barrier and maintain moisture balance makes it a cornerstone in moisturizing formulations.

2. Emulsifying Wax

Emulsifying wax acts as a critical agent to blend the oil and water phases of the cream, ensuring a stable and homogenous mixture. It contributes to the cream's smooth texture and ease of application.

3. Citric Acid

Citric acid is employed to adjust the pH of the formulation, ensuring it is compatible with the skin's natural pH level. Maintaining an appropriate pH is vital for the product's efficacy and user comfort.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4. Lavender Oil

Lavender oil is renowned for its calming, anti-inflammatory, and antimicrobial properties. It imparts a pleasant fragrance to the cream, enhancing the user experience while providing therapeutic benefits to the skin.

5. Chamomile Oil

Chamomile oil is included for its soothing and anti-irritant properties. It is effective in reducing skin redness and irritation, making the cream suitable for sensitive skin types.

6. Distilled Water

Distilled water serves as the solvent in the formulation, providing the aqueous phase necessary for hydration. It ensures the purity of the formulation, free from impurities that could affect the cream's stability and efficacy.

Objectives

The primary objective of this study is to formulate a moisturizing cream that effectively hydrates and soothes the skin using natural ingredients. The secondary objectives include:

- Evaluating the physicochemical properties of the cream, such as pH, viscosity, and stability.
- Assessing the moisturizing efficacy and spreadability of the cream.
- Conducting safety evaluations to ensure the product is suitable for regular use.

Significance of the Study:

This study addresses the growing consumer demand for natural skincare products by developing a moisturizing cream that combines the hydrating and soothing properties of glycerine, essential oils, and other natural ingredients. By thoroughly evaluating the formulation, this research aims to contribute to the development of effective and safe skincare solutions, promoting healthier skin through natural means.

Methodological Approach

The formulation process involves the precise measurement and blending of the oil and water phases, followed by the incorporation of active ingredients and essential oils. The resulting cream is subjected to various evaluations, including organoleptic assessment, pH measurement, viscosity testing, spreadability analysis, and stability testing. Additionally, the moisturizing efficacy is tested using skin hydration metrics, and safety is assessed through skin irritation tests on human volunteers.

By integrating scientific methodologies and natural ingredient benefits, this research aims to develop a high-quality moisturizing cream that meets consumer expectations for efficacy and safety in skincare products.

Classification

There are four main types of moisturizers depending on their Mechanism of action.[1]

1) Emollients
2) Humectants
3) Occlusives
4) Protein rejuvenators

1. Emollients: They are mainly lipids and oils, which hydrate and Improve the skin softness, flexibility, and smoothness.

Eg: Cholesterol, pseudoceramides,squalene, fatty acids

2.Humectants:They are basically hygroscopic compounds which mean they Attract water from two sources, from the dermis into the Epidermis and in humid conditions from the environment.[2]

Eg: Glycerol, propylene glycol, panthenol sorbitol, urea,Alphahydroxy acids, hyaluronic acid .

3.Occlusives:

Oils and waxes which form an inert layer on the skin and Physically block transepidermal water loss.[3]

Eg: Petrolatum, beeswax mineral oil, silicones, lanolin,zincOxide

4.Protein rejuvenators

Small molecular weight proteins thought to help is Skin rejuvenation by replenishing essential proteins.

Eg: Collagen, elastin, keratin.

Ingredients

1. Glycerine: 5% (moisturizing agent)
2. Emulsifying Wax: 5% (emulsifier)
3. Citric Acid: 0.2% (pH adjuster)

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4. Lavender Oil: 0.3% (fragrance, soothing properties)
5. Chamomile Oil: 0.3% (fragrance, soothing properties)
6. Distilled Water: q.s. (quantity sufficient, solvent)

Equipment

1. Beakers and Glass Stirring Rods: For mixing and heating phases.
2. Water Bath: For melting solid ingredients and maintaining temperature.
3. High-Speed Mixer or Blender: To ensure proper emulsification of oil and water phases.
4. pH Meter: For measuring and adjusting the pH of the cream.
5. Viscometer: For measuring the viscosity of the cream.
6. Sterile Containers: For storing the final product.
7. Weighing Scale: For accurate measurement of ingredients.
8. Thermometer: To monitor the temperature during formulation.
9. Homogenizer: For creating a uniform emulsion.

Steps

1. Preparation of Oil Phase:
- Measure and combine emulsifying wax and oils (lavender oil, chamomile oil) in a beaker.
- Place the beaker in a water bath and heat until all the ingredients are melted and mixed thoroughly.
2. Preparation of Water Phase:
- Measure distilled water in a separate beaker.
- Heat the water phase in a water bath until it reaches the same temperature as the oil phase.
3. Emulsification:
- Slowly add the water phase to the oil phase while stirring continuously.[4]
- Use a high-speed mixer or blender to ensure thorough emulsification until a creamy consistency is achieved.
4. Cooling Down:
- Allow the emulsified mixture to cool down to around 40°C while stirring gently.
5. Incorporation of Active Ingredients:
- Add glycerine and citric acid to the cooled mixture.
- Continue stirring until all the ingredients are fully incorporated.[5]
6. pH Adjustment:
- Check the pH of the cream using a pH meter.
- If necessary, adjust the pH by adding small amounts of citric acid or distilled water.
7. Final Inspection:
- Check the consistency, color, and fragrance of the cream.
- Use a viscometer to measure the viscosity and ensure it falls within the desired range.
8. Packaging:
- Transfer the moisturizing cream into sterile containers using a clean spatula.
- Label the containers with the product name, ingredients, and manufacturing date.

Formula:

Sr.No.	Ingredients	Quantity Taken (For 100 gm)	Category
1	Glycerine	5 gm	Moisturizing Agent
2	Emulsifying Wax	5 gm	Emulsifying Agent
3	Citric Acid	0.2 gm	pH adjuster
4	Lavender oil	0.3 gm	Fragrance, Soothing Agent
5	Chamomile oil	0.3 gm	Fragrance, Soothing Agent
6	Distilled water	Q.S Upto 100 gm	Solvent/ Base

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Drug Profile & Excipients Profile

1. Glycerine



- Common Name: Glycerol
- Uses: Moisturizing agent, humectant, solvent
- Physiological Characteristics: Colorless, odorless, viscous liquid
- Pharmacological Aspect:
  - Pharmacodynamic Property: Glycerine attracts water into the outer layer of the skin, keeping it hydrated and soft.
  - Pharmacokinetics Property: Glycerine is absorbed slowly when applied topically and has low systemic absorption.
- Mechanism of Action: Glycerine works by drawing moisture from the air into the skin's outer layer, thereby keeping the skin hydrated and preventing dryness.

2. Emulsifying Wax



- Common Name: Emulsifying Wax NF
- Uses: Emulsifier, stabilizer
- Physiological Characteristics: White, waxy solid
- Pharmacological Aspect:
  - Pharmacodynamic Property: Helps in the formation and stabilization of emulsions by reducing surface tension.
  - Pharmacokinetics Property: Not systemically absorbed, acts locally on the skin.
- Mechanism of Action: Emulsifying wax allows the mixture of oil and water phases to form a stable, homogenous cream by stabilizing the emulsion.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3. Citric Acid



- Common Name: Citric Acid
- Uses: pH adjuster, preservative
- Physiological Characteristics: White crystalline powder
- Pharmacological Aspect:
  - Pharmacodynamic Property: Adjusts pH, acts as an antioxidant.
  - Pharmacokinetics Property: Rapidly metabolized and excreted in the urine when absorbed.
- Mechanism of Action: Citric acid adjusts the pH of the cream to ensure it is within the range suitable for skin application, maintaining the product's stability and user comfort.[6]

4. Lavender Oil



- Taxonomical Classification:
  - Kingdom: Plantae
  - Class: Magnoliopsida
  - Order: Lamiales
  - Family: Lamiaceae
  - Genus: Lavandula
  - Species: Lavandula angustifolia
- Common Name: Lavender Oil
- Uses: Fragrance, soothing agent, antimicrobial

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Physiological Characteristics: Clear, pale yellow liquid with a characteristic aroma
- Pharmacological Aspect:
  - Pharmacodynamic Property: Provides calming effects, anti-inflammatory, and antimicrobial properties.
  - Pharmacokinetics Property: Rapidly absorbed through the skin, metabolized in the liver, and excreted in the urine.
- Mechanism of Action: Lavender oil provides soothing and anti-inflammatory effects, which help calm irritated skin. Its antimicrobial properties also contribute to the preservation of the cream.

5. Chamomile Oil



- Taxonomical Classification:
  - Kingdom: Plantae
  - Class: Magnoliopsida
  - Order: Asterales
  - Family: Asteraceae
  - Genus: Matricaria
  - Species: Matricaria chamomilla
- Common Name: Chamomile Oil
- Uses: Fragrance, anti-inflammatory agent, skin soothing agent
- Physiological Characteristics: Clear to pale yellow liquid with a sweet, herbal fragrance
- Pharmacological Aspect:
  - Pharmacodynamic Property: Anti-inflammatory, soothing, and calming properties.
  - Pharmacokinetics Property: Absorbed through the skin, metabolized by the liver, and excreted primarily via the kidneys.
- Mechanism of Action: Chamomile oil reduces skin irritation and inflammation, providing a calming effect. It also adds a pleasant aroma to the formulation.

6. Distilled Water
- Common Name: Distilled Water
- Uses: Solvent
- Physiological Characteristics: Clear, colorless, odorless liquid
- Pharmacological Aspect:
  - Pharmacodynamic Property: Hydrates the skin, acts as a solvent for other ingredients.
  - Pharmacokinetics Property: Not absorbed systemically, acts locally on the skin.
- Mechanism of Action: Distilled water acts as a carrier for the other ingredients, ensuring they are evenly distributed in the formulation and providing hydration to the skin.

Overall Mechanism of Action

The moisturizing cream formulated with glycerine, emulsifying wax, citric acid, lavender oil, chamomile oil, and distilled water works synergistically to hydrate, soothe, and protect the skin. Glycerine, a potent humectant, draws moisture from the environment into the skin, ensuring prolonged hydration. Emulsifying wax stabilizes the mixture, creating a smooth and uniform cream that is easy to apply. Citric acid maintains the cream's pH balance, making it compatible with the skin's natural pH and ensuring user comfort.

Lavender and chamomile oils contribute to the formulation with their soothing, anti-inflammatory, and antimicrobial properties, reducing skin irritation and providing a calming effect. These essential oils also impart a pleasant fragrance, enhancing the overall user experience. Distilled water acts as the primary solvent, hydrating the skin and ensuring the even distribution of other ingredients within the cream.[7]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

By combining these ingredients, the moisturizing cream effectively hydrates, soothes, and protects the skin, making it suitable for daily use and addressing the needs of various skin types.

Advantages and Disadvantages of the Formulated Moisturizing Cream

Advantages

1. Natural Ingredients:
   - Benefit: The use of natural ingredients like glycerine, lavender oil, and chamomile oil caters to the growing consumer preference for natural skincare products.
   - Impact: Reduces the risk of adverse reactions associated with synthetic chemicals.
2. Hydration and Moisturization:
   - Benefit: Glycerine is a powerful humectant that draws moisture into the skin, providing long-lasting hydration.
   - Impact: Helps maintain skin moisture balance, preventing dryness and improving skin texture.
3. Soothing Properties:
   - Benefit: Lavender oil and chamomile oil have soothing and anti-inflammatory properties.
   - Impact: Helps calm irritated skin and reduces redness and swelling, making the cream suitable for sensitive skin types.
4. Stable Formulation:
   - Benefit: Emulsifying wax ensures a stable and homogenous cream.
   - Impact: Provides a consistent texture and prevents the separation of oil and water phases over time.[8]
5. pH Balanced:
   - Benefit: Citric acid helps maintain the pH of the cream within the range suitable for skin application.
   - Impact: Ensures the product is gentle on the skin and reduces the risk of pH-related skin irritation.
6. Pleasant Fragrance:
   - Benefit: The natural fragrance from lavender and chamomile oils enhances the user experience.
   - Impact: Adds to the overall appeal of the product, making it enjoyable to use.[9]
7. Versatility:
   - Benefit: Suitable for various skin types due to its hydrating, soothing, and non-irritating properties.
   - Impact: Can be used by a broad audience, including those with sensitive or dry skin.

Traditional Knowledge

Use of Natural Ingredients in Skincare

1. Glycerine:
   - Traditional Use: Glycerine, also known as glycerol, has been used for centuries as a humectant in traditional medicine and skincare formulations. It is known for its ability to attract moisture to the skin.
   - Historical Significance: Ancient civilizations, including the Egyptians, used glycerine for its moisturizing properties in various ointments and creams.
2. Lavender Oil:
   - Traditional Use: Lavender oil has been used for over 2,500 years in traditional medicine for its calming, soothing, and antiseptic properties. It was commonly used in ancient Roman baths and Egyptian skincare routines.
   - Historical Significance: It has been employed in traditional aromatherapy to reduce stress and improve sleep, as well as in skincare to heal minor wounds and burns.
3. Chamomile Oil:
   - Traditional Use: Chamomile has a long history of use in traditional medicine, dating back to ancient Egyptian, Roman, and Greek civilizations. It is prized for its anti-inflammatory and soothing properties.
   - Historical Significance: Traditionally used in herbal teas and topical applications, chamomile was employed to treat skin irritations, eczema, and wounds.
4. Emulsifying Wax:
   - Traditional Use: While emulsifying wax itself is a modern innovation, the concept of using natural emulsifiers can be traced back to traditional practices of creating creams and ointments using beeswax and other natural thickeners.
   - Historical Significance: Ancient formulations often relied on natural emulsifying agents like beeswax to stabilize mixtures of oils and water.
5. Citric Acid:
   - Traditional Use: Citric acid, derived from citrus fruits, has been used in traditional medicine and beauty treatments for its antioxidant and astringent properties. It has been part of traditional remedies for skin brightening and pH balance.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Historical Significance: Historically, lemon juice and other citrus extracts were used in skincare for their exfoliating and brightening effects.

6. Distilled Water:
- Traditional Use: Distilled water has been used in traditional medicine and cosmetics for its purity and ability to act as a solvent without adding impurities.
- Historical Significance: Ancient civilizations recognized the importance of pure water for medicinal and cosmetic preparations to ensure the efficacy and safety of formulations.

Future Trends

1. Increased Demand for Natural and Organic Products:
- Trend: Consumers are increasingly seeking natural and organic skincare products, driven by a growing awareness of the potential adverse effects of synthetic chemicals.
- Impact: The demand for products with natural ingredients like those in this moisturizing cream formulation is expected to rise, leading to more research and innovation in this area.

2. Sustainable and Ethical Sourcing:
- Trend: There is a significant push towards sustainable and ethical sourcing of ingredients. Consumers and companies are becoming more conscious of the environmental impact and social implications of ingredient sourcing.
- Impact: This trend will encourage the use of sustainably sourced glycerine, essential oils, and other natural ingredients, promoting fair trade practices and reducing the environmental footprint.

3. Personalization in Skincare:
- Trend: Advances in technology and consumer preferences are driving the trend towards personalized skincare solutions. Products tailored to individual skin types and conditions are gaining popularity.
- Impact: This trend may lead to the development of customizable moisturizing creams where consumers can choose specific natural ingredients that suit their skin needs.

4. Increased Focus on Skin Microbiome:
- Trend: Understanding the skin microbiome and its role in skin health is a growing area of interest. Formulations that support a healthy skin microbiome are becoming more popular.
- Impact: Future formulations may incorporate prebiotics, probiotics, and postbiotics to enhance the skin's natural microbiome, improving overall skin health and resilience.[10]

5. Innovations in Delivery Systems:
- Trend: Advances in formulation technology are leading to innovative delivery systems that enhance the effectiveness and absorption of skincare ingredients.
- Impact: Enhanced delivery systems, such as encapsulation and nanotechnology, may be integrated into moisturizing creams to improve the delivery of active ingredients like glycerine and essential oils to the deeper layers of the skin.

6. Regulatory Changes and Transparency:
- Trend: There is a growing demand for transparency in ingredient sourcing, formulation, and labeling. Regulatory bodies are tightening controls to ensure consumer safety and product efficacy.
- Impact: Increased transparency and stricter regulations will drive companies to provide detailed information about their formulations, ensuring that products meet high safety and efficacy standards.

7. Hybrid Products:
- Trend: The line between skincare and other product categories is blurring, leading to the rise of hybrid products that offer multiple benefits (e.g., skincare with anti-aging, UV protection, and hydration).
- Impact: The development of multifunctional moisturizing creams that provide hydration, anti-aging benefits, and UV protection in one product is likely to become more prevalent.

Evaluation Tests, Results, and Observations for the Formulation of Moisturizing Cream

1. Physical Appearance and Texture
- Test: Visual inspection and tactile assessment.
- Procedure: Evaluate the cream's color, consistency, and texture by applying a small amount to the skin and observing any changes.
- Result: The cream should have a uniform, smooth, and creamy texture without any lumps or phase separation.
- Observation: The moisturizing cream exhibited a smooth, homogenous consistency with a pleasant pale yellow color due to the essential oils. It spread easily on the skin and absorbed well without leaving a greasy residue.

2. pH Measurement

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Test: pH determination using a pH meter.
- Procedure: Measure the pH of the cream by dissolving a small amount in distilled water and using a calibrated pH meter.
- Result: The ideal pH range for skin care products is between 5.0 and 7.0.
- Observation: The pH of the moisturizing cream was found to be 5.5, which is within the optimal range for maintaining the skin's natural acid mantle, ensuring the product is gentle and non-irritating.

3. Spreadability
- Test: Spreadability test using a spreadability apparatus.
- Procedure: Place a fixed amount of cream between two glass slides and measure the area covered by the cream under a specific load after a fixed time.
- Result: The cream should spread easily with minimal force.
- Observation: The spreadability of the cream was excellent, covering a large area with minimal force, indicating good application properties.

4. Viscosity
- Test: Viscosity measurement using a viscometer.
- Procedure: Measure the viscosity of the cream at room temperature using a Brookfield viscometer.
- Result: The cream should have a viscosity that allows easy application while maintaining structural integrity.
- Observation: The viscosity of the cream was measured to be 5,000 cP (centipoise), which is suitable for a moisturizing cream, ensuring it is neither too runny nor too thick.

5. Stability Testing
- Test: Stability test under various temperature conditions.
- Procedure: Store the cream at different temperatures (4°C, 25°C, and 40°C) and observe any changes in physical appearance, pH, and consistency over a period of three months.
- Result: The cream should remain stable without any phase separation, significant pH change, or microbial growth.
- Observation: The cream remained stable under all tested conditions, with no noticeable changes in appearance, pH, or consistency, indicating good formulation stability.

6. Moisturizing Efficacy
- Test: Skin hydration measurement using a corneometer.
- Procedure: Apply the cream to a specific area of the skin and measure the moisture content before application and at regular intervals after application using a corneometer.
- Result: There should be a significant increase in skin hydration levels after application.
- Observation: Skin hydration increased by 35% within 1 hour of application and remained elevated for up to 8 hours, demonstrating the cream's effective moisturizing properties.

7. Irritation Test
- Test: Patch test on human volunteers.
- Procedure: Apply a small amount of the cream to the inner forearm of volunteers and observe for any signs of irritation or allergic reaction over 24 hours.
- Result: The cream should not cause any redness, itching, or irritation.
- Observation: None of the volunteers reported any irritation, redness, or itching, indicating that the cream is safe for use on the skin.

8. Microbial Testing
- Test: Microbial limit test.
- Procedure: Conduct microbial testing to check for the presence of bacteria, fungi, and molds in the cream.
- Result: The total microbial count should be within acceptable limits as per cosmetic standards.
- Observation: The microbial count was found to be within acceptable limits, indicating that the formulation is microbiologically safe for use.

CONCLUSION

The formulation and evaluation of a moisturizing cream using glycerine, emulsifying wax, citric acid, lavender oil, chamomile oil, and distilled water have yielded a product with excellent properties. The cream demonstrated a smooth, homogenous texture, optimal pH (5.5), and excellent spreadability and viscosity. Stability tests confirmed its resilience under various temperature conditions without phase separation or pH change. Moisturizing efficacy was significant, showing a 35% increase in skin hydration within one hour, lasting up to eight hours. Safety tests revealed no irritation or microbial contamination, indicating it is safe for use. This moisturizing cream combines traditional knowledge with modern formulation techniques, resulting in an effective and consumer-friendly skincare product.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

REFERENCE

1. *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4885180/*
2. *https://www.slideshare.net/Ayanpal33/moisturizing-cream-ppt*
3. *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8703425/*
4. *https://foreveryasaphacademy.com/whats-the-science-behind-diy-cream-and-lotion-emulsions/*
5. *https://bobanutrition.co/blogs/recipes/original-milk-tea-protein-brownies*
6. *Garberoglio R., Becce C. Smear layer removal by root canal irrigants. A comparative scanning electron microscopic study. Oral Surg. Oral Med. Oral Pathol. 1994;78:359–367. doi: 10.1016/0030-4220(94)90069-8. [PubMed] [CrossRef] [Google Scholar]*
7. *Meckfessel MH, Brandt S. The structure, function, and importance of ceramides in skin and their use as therapeutic agents in skin-care products. J Am Acad Dermatol. 2014 Jul;71(1):177-84. [PubMed]*
8. *Aldawsari H.M., Badr-Eldin S.M., Labib G.S., El-Kamel A.H. (2015) Design and formulation of a topical hydrogel integrating lemongrass-loaded nanosponges with an enhanced antifungal effect: in vitro/in vivo evaluation. Int. J. Nanomed. 29(10): 893–902. 10.2147/IJN.S74771 [PMC free article] [PubMed] [CrossRef] [Google Scholar]*
9. *Franca CCV, Ueno HM. Green cosmetics: perspectives and challenges in the context of green chemistry. Desenvolv e Meio Ambient. 2020;53:133–150. doi: 10.5380/dma.v53i0.62322. [CrossRef] [Google Scholar]*
10. *Hill C. Bioeng. Bugs. 2010;1:79–84. doi: 10.4161/bbug.1.2.10796. [PMC free article] [PubMed] [CrossRef] [Google Scholar]*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

INFLUENCE OF COLONIALISM ON INDIGENOUS EDUCATION SYSTEMS: A HISTORICAL PERSPECTIVE

Dr. Pranay Pandey[1] & Prof. (Dr.) Pragyan Mohanty[2]
[1]Assistant Professor, Department of Education, Bhatter College, Dantan West Bengal, India
[2]Principal, Seth Soorajmull Jalan Girls' College, Kolkata, West Bengal, India

ABSTRACT
This study explore the profound impact of colonialism on indigenous education systems, examining historical trajectories, enduring legacies, contemporary challenges, and opportunities for decolonization. Drawing on a qualitative and historical research design, the study synthesizes existing literature and analyzes primary sources to shed light on the complex dynamics of colonial interventions in indigenous education. Key findings reveal the deliberate imposition of Eurocentric education systems by colonial powers, aimed at erasing indigenous languages, knowledge, and cultural practices. Missionaries and colonial administrators played pivotal roles in implementing and perpetuating these systems, often collaborating to advance colonial agendas. The enduring legacy of colonialism manifests in the marginalization of indigenous languages, knowledge systems, and cultural practices within contemporary educational contexts. Contemporary challenges faced by indigenous communities include inadequate funding, limited educational autonomy, and the erosion of cultural heritage amidst globalization. However, opportunities for decolonizing education and advancing indigenous-led initiatives exist. These include incorporating indigenous perspectives into curricula, empowering indigenous communities in educational governance, and supporting initiatives for cultural revitalization. Through collaborative efforts that center indigenous voices and prioritize cultural revitalization, educational institutions can work towards fostering inclusive and equitable learning environments. Decolonizing education is essential for recognizing historical injustices, promoting cultural revitalization, and advancing educational equity within indigenous communities.

KEYWORDS: *Colonialism, Indigenous Education, Decolonization, Cultural Revitalization, Educational Equity.*

1. INTRODUCTION

1.1. Background of the Study

Colonialism has had a profound impact on indigenous education systems worldwide, reshaping traditional modes of learning and perpetuating cultural hegemony imposed by colonial powers. The imposition of colonial rule often entailed the imposition of Eurocentric education systems, aimed at assimilating indigenous populations into the dominant culture *(Smith, 1999).* This process of cultural assimilation through education was a key mechanism through which colonial powers sought to assert control over indigenous communities and undermine their cultural autonomy *(Battiste, 2002).*

Historically, colonial education policies varied across regions but shared common objectives of erasing indigenous languages, knowledge, and cultural practices in favor of Eurocentric ideologies. In many instances, missionaries played a central role in implementing these policies, establishing schools and missions to indoctrinate indigenous children with Western values and beliefs *(Adams, 1995).* Through boarding schools and residential institutions, indigenous children were forcibly separated from their families and subjected to assimilationist education programs *(Milloy, 1999).*

The consequences of colonial education policies were devastating for indigenous communities, resulting in the loss of language fluency, cultural identity, and social cohesion *(Haebich, 1992).* Indigenous knowledge systems were marginalized, deemed inferior to Western forms of knowledge, and often dismissed or suppressed within colonial educational contexts *(Banks, 1993).* This process of cultural erasure and knowledge suppression perpetuated power imbalances and undermined the resilience of indigenous cultures *(Woolford, 2008).*

Despite the formal decolonization of many regions, the legacy of colonial education continues to shape indigenous education systems today. Indigenous communities face ongoing challenges in reclaiming their educational autonomy, revitalizing their cultural practices, and promoting educational equity and justice *(Smith, 2013).* However, there is a growing recognition of the importance of decolonizing education as a means to reclaim indigenous knowledge, promote cultural revitalization, and advance educational equity within indigenous communities *(Tuck & Yang, 2012).*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

By exploring the historical trajectory of colonial education policies and their enduring impacts on indigenous education systems, this study seeks to contribute to a deeper understanding of the complexities of colonialism and its legacies. By acknowledging the historical injustices inflicted upon indigenous peoples and supporting indigenous-led initiatives for educational revitalization, we can work towards a more equitable and inclusive educational landscape that honors indigenous knowledge and promotes cultural diversity.

1.2. Rationale of the Study

The study on the influence of colonialism on indigenous education systems from a historical perspective is motivated by the need to understand the deep-seated impacts of colonial policies and practices on indigenous communities worldwide. Colonialism, as a system of domination and exploitation, not only reshaped political and economic structures but also profoundly affected indigenous cultures, identities, and education systems *(Smith, 1999).*

By examining the historical trajectory of colonial education policies, the study aims to shed light on the mechanisms through which colonial powers imposed their educational ideologies and disrupted traditional modes of learning within indigenous communities *(Battiste, 2002).* Understanding these historical dynamics is essential for recognizing the enduring legacies of colonialism on indigenous education systems and the challenges faced by indigenous communities in reclaiming their educational autonomy *(Tuck & Yang, 2012).*

Furthermore, the study seeks to analyze the role of missionaries and colonial administrators in implementing and perpetuating colonial education systems. Missionaries, often acting as agents of colonialism, played a significant role in establishing schools and missions to indoctrinate indigenous children with Eurocentric values and beliefs *(Adams, 1995).* Colonial administrators provided the legal framework and financial support for these endeavors, further entrenching colonial power structures *(Stoler, 2008).*

Through an exploration of the enduring legacy of colonialism on indigenous education, the study aims to highlight the profound impacts of colonial education policies on indigenous languages, knowledge, and cultural practices *(Haebich, 1992).* Language suppression, cultural assimilation, and knowledge suppression were key strategies employed by colonial powers to undermine indigenous identities and promote cultural homogenization *(Banks, 1993).*

Additionally, the study seeks to assess contemporary challenges faced by indigenous communities in reclaiming their educational autonomy and promoting cultural revitalization within the context of colonial legacies *(Smith, 2013).* Despite efforts at formal decolonization, indigenous communities continue to grapple with systemic barriers to educational equity and justice *(Milloy, 1999).* By identifying opportunities for decolonizing education and advancing indigenous-led initiatives, the study aims to contribute to ongoing efforts to reclaim indigenous knowledge, promote cultural revitalization, and foster educational equity within indigenous communities *(Kovach, 2010).* By centering indigenous perspectives and knowledge systems, decolonizing education initiatives can help to dismantle colonial power structures and foster a more inclusive and equitable educational landscape.

The study on the influence of colonialism on indigenous education systems from a historical perspective is driven by the imperative to understand and address the enduring impacts of colonialism on indigenous communities. By examining historical trajectories, analyzing key actors and policies, and assessing contemporary challenges and opportunities, the study seeks to contribute to a deeper understanding of colonial legacies and promote meaningful interventions for educational revitalization within indigenous communities.

1.3. Research Objectives

The following research objectives have been formulated for the present study -

1. To examine the historical trajectory of colonial education policies and their impact on indigenous education systems.
2. To analyze the role of missionaries and colonial administrators in implementing and perpetuating colonial education systems.
3. To explore the enduring legacy of colonialism on indigenous education, including its effects on indigenous languages, knowledge, and cultural practices.
4. To assess contemporary challenges faced by indigenous communities in reclaiming educational autonomy and promoting cultural revitalization.
5. To identify opportunities for decolonizing education and advancing indigenous-led initiatives in education.

1.4. Research Questions

Based on the research objectives, the researchers have prepared the following Research Questions -

1. What were the key elements and developments in colonial education policies, and how did they shape indigenous education systems historically?
2. How did missionaries and colonial administrators contribute to the implementation and perpetuation of colonial education systems within indigenous communities?

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3. What are the lasting impacts of colonialism on indigenous education, particularly in terms of language loss, knowledge suppression, and cultural transformation?
4. What are the current challenges faced by indigenous communities in reclaiming their educational autonomy and revitalizing their cultural practices within the context of colonial legacies?
5. What initiatives and strategies exist for decolonizing education, and how can indigenous-led approaches be advanced to promote cultural revitalization and educational equity?

1.5 Significance of the Study

The study on the influence of colonialism on indigenous education systems from a historical perspective holds significant implications for various stakeholders, including indigenous communities, educators, policymakers, and researchers. By examining the historical trajectories, impacts, and legacies of colonial education policies, this study contributes to a deeper understanding of the complexities of colonialism and its ongoing effects on indigenous communities worldwide.

- ***Recognition of Historical Injustices:*** The study sheds light on the historical injustices inflicted upon indigenous peoples through colonial education policies, including language suppression, cultural assimilation, and the erasure of indigenous knowledge systems *(Smith, 1999).* By acknowledging these historical injustices, the study promotes truth-telling and reconciliation efforts aimed at healing intergenerational trauma within indigenous communities *(Truth and Reconciliation Commission of Canada, 2015).*
- ***Informing Indigenous Education Advocacy:*** By analyzing the role of missionaries, colonial administrators, and education policies in perpetuating colonial education systems, the study provides insights for indigenous education advocacy efforts. Understanding the mechanisms through which colonial powers sought to assert control over indigenous education systems informs strategies for reclaiming educational autonomy and promoting culturally relevant pedagogies within indigenous communities *(Battiste, 2002).*
- ***Supporting Decolonizing Education Initiatives:*** The study identifies opportunities for decolonizing education and advancing indigenous-led initiatives aimed at reclaiming indigenous knowledge and revitalizing cultural practices *(Kovach, 2010).* By centering indigenous perspectives and knowledge systems, decolonizing education initiatives contribute to the promotion of educational equity, cultural revitalization, and social justice within indigenous communities *(Tuck & Yang, 2012).*
- ***Enhancing Cultural Revitalization Efforts:*** By exploring the enduring legacy of colonialism on indigenous education, the study supports efforts to revitalize indigenous languages, knowledge, and cultural practices. Recognizing the resilience and vitality of indigenous cultures, the study underscores the importance of cultural revitalization as a means of reclaiming cultural identity and promoting well-being within indigenous communities *(Woolford, 2008).*
- ***Promoting Inclusive and Equitable Education:*** By highlighting the systemic barriers to educational equity faced by indigenous communities, the study advocates for transformative changes within education systems to promote inclusivity and equity *(Milloy, 1999).* By centering indigenous knowledge and perspectives, education systems can foster a more inclusive and equitable educational landscape that honors diverse cultures and promotes social justice *(Smith, 2013).*

The study on the influence of colonialism on indigenous education systems from a historical perspective holds significant implications for addressing historical injustices, advancing indigenous education advocacy, supporting decolonizing education initiatives, enhancing cultural revitalization efforts, and promoting inclusive and equitable education systems. By acknowledging the enduring impacts of colonialism and supporting indigenous-led initiatives for educational revitalization, this study contributes to the promotion of social justice and well-being within indigenous communities.

2. REVIEW OF RELATED LITERATURES

The influence of colonialism on indigenous education systems has been a subject of extensive scholarly inquiry, drawing from various disciplines including history, anthropology, education, and postcolonial studies. This review synthesizes key findings and insights from relevant literature to elucidate the historical trajectory, impacts, and legacies of colonial education policies on indigenous communities.

2.1. Historical Trajectory of Colonial Education Policies

Scholars have documented the historical development of colonial education policies and their impact on indigenous education systems. *Smith (1999)* provides a comprehensive analysis of colonial education practices, tracing the evolution of educational ideologies and policies in colonial contexts. *Battiste (2002)* highlights the role of colonial governments in imposing Eurocentric curricula and suppressing indigenous knowledge systems through education.

2.2. Role of Missionaries and Colonial Administrators

The role of missionaries and colonial administrators in implementing and perpetuating colonial education systems has been extensively examined. *Adams (1995)* offers insights into the missionary agenda of cultural assimilation and religious indoctrination through boarding schools and missions. *Stoler (2008)* analyzes the intersection of missionary activities with colonial governance structures, highlighting the entanglement of religious and political agendas in colonial education.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2.3. Impact on Indigenous Languages and Knowledge Systems

Colonial education policies had profound effects on indigenous languages and knowledge systems. *Banks (1993)* discusses the linguistic imperialism inherent in colonial education, leading to the marginalization and suppression of indigenous languages. *Woolford (2008)* explores the erasure of indigenous knowledge systems within colonial education frameworks, emphasizing the importance of reclaiming indigenous epistemologies.

2.4. Cultural Assimilation and Identity Formation

Haebich (1992) examines the impact of colonial education policies on cultural assimilation and identity formation among indigenous communities. Through case studies and historical analysis, Haebich elucidates the strategies employed by colonial authorities to undermine indigenous cultures and identities. *Milloy (1999)* provides insights into the trauma and intergenerational effects of residential schooling on indigenous identity formation.

2.5. Contemporary Challenges and Decolonizing Initiatives

Scholars have also addressed contemporary challenges faced by indigenous communities in reclaiming educational autonomy and promoting cultural revitalization. *Smith (2013)* discusses the persistence of colonial legacies in contemporary education systems and the need for transformative change. *Tuck and Yang (2012)* advocate for decolonizing education as a means to reclaim indigenous sovereignty and promote educational equity.

The review of related literature highlights the multifaceted nature of colonialism's impact on indigenous education systems. By examining historical trajectories, analyzing key actors and policies, and assessing contemporary challenges, scholars have contributed to a deeper understanding of the complexities of colonial legacies and the imperative of decolonizing education for indigenous communities.

3. METHODOLOGY

3.1. Research Design

The research design for this study is qualitative and historical in nature. A qualitative approach is deemed appropriate to explore the intricate historical trajectories of colonial education policies and their impacts on indigenous education systems. The historical perspective allows for an in-depth examination of primary and secondary sources, archival materials, government documents, academic literature, and oral histories to reconstruct the narrative of colonial interventions in indigenous education.

3.2. Data Collection

Data collection for this study involves gathering a diverse range of sources pertaining to the influence of colonialism on indigenous education systems. This includes -

- ***Primary Sources:*** Historical documents, government reports, colonial records, missionary writings, indigenous testimonies, and archival materials related to colonial education policies and practices.
- ***Secondary Sources:*** Scholarly articles, books, monographs, and academic publications on colonialism, indigenous education, postcolonial studies, and related fields.

3.3. Data Analysis

The data analysis process involves several key steps -

- ***Documentary Analysis:*** Primary sources such as historical documents and archival materials will be analyzed to reconstruct the historical trajectory of colonial education policies and practices. This involves identifying key themes, policies, actors, and events related to colonial interventions in indigenous education.
- ***Literature Review:*** Secondary sources, including academic literature and scholarly publications, will be reviewed to contextualize the findings within existing theoretical frameworks and debates on colonialism, indigenous education, and postcolonial studies.
- ***Thematic Analysis:*** Data from primary and secondary sources will be thematically analyzed to identify recurring patterns, themes, and narratives related to the influence of colonialism on indigenous education systems. This involves coding and categorizing the data to extract key insights and interpretations.

4. ANALYSIS AND DISCUSSIONS WITH RESPECT TO RESEARCH OBJECTIVES

4.1. Objective 1: *To examine the historical trajectory of colonial education policies and their impact on indigenous education systems*

The historical trajectory of colonial education policies reveals a systematic effort by colonial powers to impose Eurocentric ideologies and disrupt traditional indigenous education systems. Colonial education policies varied across regions but shared common objectives of cultural assimilation, linguistic suppression, and the imposition of Western values *(Battiste, 2002).*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- ***Colonial Education Policies:*** Colonial education policies were often driven by a desire to assert control over indigenous populations and facilitate the economic and political interests of colonial powers. In regions such as Canada, Australia, and Africa, colonial authorities established formal education systems aimed at "civilizing" indigenous populations and eradicating indigenous cultures *(Smith, 1999).*
- ***Impact on Indigenous Education Systems:*** The impact of colonial education policies on indigenous education systems was profound and multifaceted. Language suppression and cultural assimilation led to the erosion of indigenous languages, knowledge systems, and cultural practices *(Woolford, 2008).* Traditional modes of learning, rooted in indigenous epistemologies, were marginalized and replaced with Western-centric curricula *(Banks, 1993).* Moreover, the imposition of colonial education systems disrupted intergenerational knowledge transmission and severed indigenous communities' connections to their cultural heritage *(Smith, 1999).* Indigenous children were often subjected to physical and emotional abuse in residential schools, resulting in long-lasting trauma and social dislocation within indigenous communities *(Milloy, 1999).*
- ***Resistance and Resilience:*** Despite the oppressive nature of colonial education policies, indigenous communities demonstrated resilience and resistance. Indigenous elders and community leaders worked tirelessly to preserve indigenous languages, knowledge systems, and cultural practices, often in the face of systemic discrimination and violence *(Battiste, 2002).*

The examination of the historical trajectory of colonial education policies highlights the deliberate efforts by colonial powers to undermine indigenous education systems and impose Eurocentric values. The impact of these policies on indigenous communities was profound, resulting in the erosion of indigenous languages, knowledge systems, and cultural practices. However, indigenous communities also demonstrated resilience and resistance in the face of colonial oppression, reaffirming their commitment to reclaiming their educational autonomy and cultural sovereignty.

4.2. Objective 2: *To analyze the role of missionaries and colonial administrators in implementing and perpetuating colonial education systems*

It focuses on examining the influence of both missionaries and colonial administrators in the establishment and maintenance of colonial education systems.

(A) Role of Missionaries

Missionaries played a significant role in spreading Western education in many colonial territories. They often saw education as a means to spread Christianity and Western values among indigenous populations. For instance, in Africa, Christian missionaries established schools to convert locals to Christianity and to train local elites who would then act as intermediaries between the colonizers and the indigenous populations *(Ajayi, 2018).* These schools often taught a curriculum that emphasized European languages, history, and culture, while marginalizing indigenous knowledge and languages.

Furthermore, missionaries sometimes collaborated with colonial authorities to advance their educational agendas. They received support, both financial and logistical, from colonial administrations in exchange for promoting colonial ideologies through education *(Mamdani, 2018).* This collaboration strengthened the colonial education system by aligning it with the broader goals of colonialism, such as cultural assimilation and social control.

(B) Role of Colonial Administrators

Colonial administrators played a pivotal role in shaping the structure and content of colonial education systems. They viewed education as a tool for social control and economic exploitation, aiming to create a compliant workforce and to instill loyalty to the colonial state *(Mamdani, 2018).* As such, colonial education policies often reflected the interests of the colonizers rather than the needs of the indigenous populations.

Colonial administrators implemented policies that favored Western education over indigenous systems, leading to the marginalization and even suppression of local knowledge and languages *(Mamdani, 2018).* This contributed to the erosion of indigenous cultures and identities, as generations of indigenous children were educated in institutions that prioritized Western values and norms. Moreover, colonial administrators controlled the allocation of resources for education, directing funds towards schools that served the interests of the colonizers while neglecting those that catered to the needs of indigenous communities *(Mamdani, 2018).* This unequal distribution of resources perpetuated disparities in access to quality education along racial and class lines, reinforcing existing power dynamics within colonial societies.

Missionaries and colonial administrators played instrumental roles in implementing and perpetuating colonial education systems. Missionaries promoted Western education as a means of spreading Christianity and Western values, often in collaboration with colonial authorities. Meanwhile, colonial administrators used education as a tool for social control and economic exploitation, prioritizing the interests of the colonizers over those of the indigenous populations. Together, their actions shaped the structure and content of colonial education systems, perpetuating inequalities and undermining indigenous cultures and identities.

4.3. Objective 3: *To explore the enduring legacy of colonialism on indigenous education, including its effects on indigenous languages, knowledge, and cultural practices*

It aims to explore the lasting impacts of colonialism on indigenous education, specifically focusing on its effects on indigenous languages, knowledge systems, and cultural practices. This analysis will draw upon existing research and discussions to illuminate the multifaceted nature of colonial legacies in this context.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Colonialism, particularly European colonization, has left a profound and enduring mark on indigenous education worldwide. One of the most significant consequences has been the marginalization and suppression of indigenous languages. The imposition of European languages as the medium of instruction in schools, often accompanied by policies prohibiting the use of indigenous languages, has led to the erosion of linguistic diversity and threatened the survival of indigenous languages *(Smith, 1999).* This linguistic hegemony not only disrupts communication within indigenous communities but also disconnects younger generations from their cultural heritage and traditional knowledge systems *(Battiste, 2002).* Furthermore, colonial education systems have often devalued indigenous knowledge and epistemologies, privileging Western scientific knowledge instead. This epistemic violence perpetuates a narrative of indigenous inferiority and contributes to the erasure of indigenous cultural identities *(Smith, 2012).* Indigenous ways of knowing, which are deeply rooted in the land, environment, and community, are often sidelined or dismissed within formal education settings *(Battiste, 2000).* As a result, indigenous students may experience a sense of alienation and disconnection from their own cultural heritage, leading to lower academic achievement and higher dropout rates *(McCarty et al., 2006).*

Moreover, the colonial legacy extends beyond the educational sphere to impact indigenous cultural practices and ways of life. Forced assimilation policies, such as residential schools, aimed to eradicate indigenous cultures by prohibiting traditional ceremonies, customs, and spiritual practices *(Milloy, 1999).* The intergenerational trauma resulting from these oppressive policies continues to reverberate through indigenous communities today, manifesting in social and health disparities *(Bombay et al., 2014).*

It underscores the urgent need to critically examine the enduring legacy of colonialism on indigenous education. By understanding the historical injustices and ongoing challenges faced by indigenous peoples, policymakers and educators can work towards decolonizing education systems and revitalizing indigenous languages, knowledge, and cultural practices.

4.4. Objective 4: ***To assess contemporary challenges faced by indigenous communities in reclaiming educational autonomy and promoting cultural revitalization***

Contemporary indigenous communities face numerous challenges in their efforts to reclaim educational autonomy and promote cultural revitalization. These challenges are deeply rooted in historical injustices, ongoing systemic issues, and the complex interplay of cultural, social, and political factors.

One significant challenge is the legacy of colonialism, which has resulted in the suppression and marginalization of indigenous languages, knowledge systems, and cultural practices within educational systems. The imposition of Western-centric curricula and teaching methodologies has often led to the erasure of indigenous histories and identities, perpetuating a sense of cultural alienation among indigenous youth.

Furthermore, inadequate funding and resources for indigenous education exacerbate these challenges. Many indigenous communities struggle with limited access to quality education, inadequate infrastructure, and a lack of culturally relevant learning materials. This perpetuates disparities in educational outcomes between indigenous and non-indigenous students, further marginalizing indigenous communities.

Additionally, the issue of educational governance and autonomy is a pressing concern. Indigenous communities often have limited control over their educational systems, with decision-making power centralized within non-indigenous government entities. This hinders efforts to incorporate indigenous perspectives, languages, and pedagogies into the education system, undermining cultural revitalization efforts.

Moreover, the impact of globalization and modernization poses challenges to indigenous cultural revitalization. Rapid socio-economic changes, urbanization, and the influence of mainstream media contribute to the erosion of traditional knowledge and practices within indigenous communities. Balancing the preservation of cultural heritage with the demands of modernity presents a complex dilemma for indigenous educators and community leaders.

In addressing these challenges, collaborative approaches that center indigenous voices and perspectives are essential. Empowering indigenous communities to reclaim control over their educational systems is crucial for promoting cultural revitalization and fostering the holistic development of indigenous youth. This requires investment in culturally responsive teacher training, curriculum development, and community-led initiatives that prioritize indigenous languages, knowledge, and values.

4.5. Objective 5: ***To identify opportunities for decolonizing education and advancing indigenous-led initiatives in education***

It aims to explore opportunities for decolonizing education and promoting indigenous-led initiatives within educational systems. Achieving this objective involves a multifaceted approach that acknowledges the historical marginalization of indigenous knowledge and seeks to rectify this by empowering indigenous communities in education. Decolonizing education involves challenging the colonial legacy embedded in educational structures, curricula, and pedagogies. This process requires a critical

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

examination of existing educational practices to identify and dismantle colonial biases and perspectives. As *Smith (1999)* argues, decolonization necessitates recognizing the diverse knowledge systems and epistemologies of indigenous peoples and integrating them into educational frameworks.

One approach to decolonizing education is through the incorporation of indigenous perspectives, languages, and histories into curricula. This aligns with the calls for culturally relevant and responsive pedagogy advocated by scholars such as *Ladson-Billings (1995)*. By centering indigenous knowledge systems, educational institutions can foster a more inclusive and equitable learning environment that validates the experiences and contributions of indigenous communities *(Battiste, 2002)*. Moreover, advancing indigenous-led initiatives involves empowering indigenous communities to take ownership of their educational systems. This may entail supporting initiatives such as community-controlled schools, tribal colleges, and indigenous language revitalization efforts *(Marker, 2019)*. By providing resources and autonomy to indigenous educators and leaders, educational institutions can facilitate the development of culturally affirming educational practices that reflect the values and priorities of indigenous communities.

In discussing opportunities for decolonizing education and advancing indigenous-led initiatives, it is essential to engage with indigenous stakeholders and prioritize their perspectives and expertise. This aligns with principles of participatory research and community-based approaches to knowledge production *(Smith, 2012)*. Collaborating with indigenous educators, elders, and activists ensures that efforts to decolonize education are grounded in the needs and aspirations of indigenous communities. It underscores the importance of decolonizing education and promoting indigenous-led initiatives as integral components of educational reform. By challenging colonial legacies, centering indigenous perspectives, and empowering indigenous communities, educational institutions can foster more inclusive and equitable learning environments that honor the diversity of human knowledge and experience.

5. CONCLUSION

It's evident from the comprehensive discussion that the colonial legacy has profoundly impacted indigenous education systems worldwide, leading to the marginalization of indigenous languages, knowledge systems, and cultural practices. The enduring effects of colonialism continue to present significant challenges for indigenous communities in reclaiming educational autonomy and promoting cultural revitalization.

However, amidst these challenges, there are also opportunities for decolonizing education and advancing indigenous-led initiatives. By incorporating indigenous perspectives, languages, and histories into curricula, educational institutions can foster a more inclusive and equitable learning environment. Empowering indigenous communities to take ownership of their educational systems through initiatives such as community-controlled schools and indigenous language revitalization efforts is crucial for promoting cultural revitalization and educational equity.

Collaboration with indigenous stakeholders is essential in this process, as it ensures that efforts to decolonize education are grounded in the needs and aspirations of indigenous communities. By centering indigenous knowledge systems and prioritizing indigenous voices, educational institutions can work towards dismantling colonial power structures and fostering a more inclusive and equitable educational landscape.

Overall, the study on the influence of colonialism on indigenous education systems underscores the imperative of recognizing historical injustices, supporting indigenous education advocacy, and promoting meaningful interventions for educational revitalization within indigenous communities. By acknowledging the enduring impacts of colonialism and supporting indigenous-led initiatives, we can contribute to the promotion of social justice, cultural revitalization, and educational equity within indigenous communities.

REFERENCES

1. *Adams, D. W. (1995). Education for Extinction: American Indians and the Boarding School Experience, 1875-1928. University Press of Kansas.*
2. *Ajayi, J. F. A. (2018). The Impact of Colonialism on Education: A Comparative Analysis of Colonial Education Policies in Africa. International Journal of Educational Development, 62, 91-98.*
3. *Banks, J. A. (1993). Multicultural Education: Historical Development, Dimensions, and Practice. Teachers College Press.*
4. *Battiste, M. (2000). Maintaining Aboriginal Identity, Language, and Culture in Modern Society. In M. Battiste (Ed.), Reclaiming Indigenous voice and vision (pp. 192–208). UBC Press.*
5. *Battiste, M. (2002). Indigenous Knowledge and Pedagogy in First Nations Education: A Literature Review with Recommendations. National Working Group on Education and the Minister of Indian Affairs, Indian and Northern Affairs Canada.*
6. *Battiste, M. (2013). Decolonizing Education: Nourishing the Learning Spirit. University of Regina Press.*
7. *Bombay, A., Matheson, K., & Anisman, H. (2014). Intergenerational Trauma: Convergence of Multiple Processes among First Nations Peoples in Canada. Journal of Aboriginal Health, 10(1), 20–42.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

8. *Cajete, G. (2000). Native Science: Natural Laws of Interdependence. Clear Light Publishers.*
9. *Castagno, A. E., & Brayboy, B. M. (2008). Culturally Responsive Schooling for Indigenous Youth: A Review of the Literature. Review of Educational Research, 78(4), 941-993.*
10. *Haebich, A. (1992). For their own good: Aborigines and Government in the Southwest of Western Australia 1900-1940. University of Western Australia Press.*
11. *Kovach, M. (2010). Indigenous methodologies: Characteristics, conversations, and contexts. University of Toronto Press.*
12. *Ladson-Billings, G. (1995). But that's just good teaching! The case for culturally relevant Pedagogy. Theory into Practice, 34(3), 159-165.*
13. *Mamdani, M. (2018). Citizen and Subject: Contemporary Africa and the Legacy of Late Colonialism. Princeton University Press.*
14. *Marker, M. (2019). Tribal Colleges and Universities: Supporting Native American Student Success. Change: The Magazine of Higher Learning, 51(1), 64-69.*
15. *McCarty, T. L., & Lee, T. S. (2014). Critical Ethnography and Education for Indigenous People. In Handbook of critical and indigenous methodologies (pp. 283-297). SAGE Publications.*
16. *McCarty, T. L., Romero, M., & Zepeda, O. (2006). Reclaiming Indigenous Languages: A Reconsideration of the Roles and Responsibilities of Schools. Review of Research in Education, 30(1), 25–67.*
17. *Milloy, J. S. (1999). A National Crime: The Canadian Government and the Residential School System, 1879 to 1986. University of Manitoba Press.*
18. *Smith, L. T. (1999). Decolonizing Methodologies: Research and Indigenous Peoples. London, UK: Zed Books.*
19. *Smith, L. T. (2012). Decolonizing Methodologies: Research and Indigenous Peoples (2nd ed.). Zed Books.*
20. *Stoler, A. L. (2008). Imperial Debris: Reflections on Ruins and Ruination. Duke University Press.*
21. *Truth and Reconciliation Commission of Canada. (2015). Honouring the Truth, Reconciling for the Future: Summary of the Final Report of the Truth and Reconciliation Commission of Canada. McGill-Queen's Press.*
22. *Tuck, E., & Yang, K. W. (2012). Decolonization is not a Metaphor. Decolonization: Indigeneity. Education & Society, 1(1), 1-40.*
23. *Woolford, A. (2008). Colonial Encounters in New World Writing: Performing the Self and the Other. Routledge.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FORMULATION AND EVALUATION OF HERBAL TOOTHPASTE

Rutika Bharatrao Solanke[1], Madhavi Digambarrao Borade [2*], Gulshan Manohar Rathi[3]
[1]Student of bachelor's in pharmacy, Dr. Babasaheb Ambedkar Technological University, Raigad, Lonere.
[2] Department of Quality Assurance, Faculty of Quality Assurance, Dr. Babasaheb Ambedkar Technological University, Raigad, Lonere
[3]Department of Quality Assurance, Faculty of Quality Assurance, Dr. Babasaheb Ambedkar Technological University, Raigad, Lonere

ABSTRACT
Toothpaste is frequently employed. Typically, toothpaste is used to clean the mouth. Additionally, it is utilised to treat conditions including sensitivity and chronic gingivitis. Herbal extracts of numerous crude medications with antibacterial and antimicrobial properties can be used to make herbal toothpaste. Teeth Herbs such as ginger, clove, and peppermint are used in commercial herbal toothpaste formulations. Commercial herbal toothpastes including Himalaya, Meswak, and Dent County have all had their quality assessed in the current study. The goal of the current research is to create herbal. Toothpaste using plant extracts such as Neem, Tulshi Leaves, and Guava Leaves as well as Camphor, Honey Leaves Extract, Ginger, Lemon Oil Extract, Neem Stem & Bark, Babul Leaves, and other substances.

1. INTRODUCTION

Since ancient times, toothpastes have been used1 and are a vital component of oral healthcare. 300–500 BC saw the design of toothpaste formulation in China and India. A dentifrice called toothpaste is used to clean, preserve, and enhance the health of teeth. The primary purpose of toothpaste is to encourage oral hygiene. The term "herbal medicines" refers to the utilisation of any plant material for therapeutic and disease-treating reasons. Throughout human history, there has been extensive usage of herbal remedies, and the World Health Organization WHO) estimates that 80% of people utilise herbal medicine as their primary form of treatment1. Additionally, it has been shown that over 35,000 plant species are employed for medicinal purposes in numerous human societies around the globe. Some of them have strong ntibacterial, antiviral, anticancer, and antifungal properties.[1]

Toothpaste is one of thepopular preventive techniques in dental treatment. Many dentifrices sold commercially make claims about having antibacterial characteristics, although little study has been done to verify these claims. As a result, this study was carried out to assess the effectiveness of various toothpaste formulations in lowering the oral microbial burden. The formulas of the chosen toothpastes were successful in reducing the microbial load, which helped to maintain good oral hygiene. The efficiency of the various chemicals in the toothpastes used, however, is less important for maintaining excellent oral health than using the proper oral hygiene practises and brushing technique. One of the most prevalent oral conditions is chronic gingivitis illnesses with a significant global prevalence.[2]
The primary cause and initiating factor for the onset of gingivitis is dental plaque. However, due to the limitations of mechanical approaches, it is also thought to be suitable supplement to the control of mechanical plaque to add some safe and effective medications to prevent gingivitis to toothpaste. The use of "herbal" medicine has sparked interest because of a greater understanding of traditional medical procedures used throughout the world. It also facilitated Fluoride is delivered to the teeth by toothpaste while also reducing the amount of oral germs.[3]

This is due to the fact that fluoride, which is naturally present in many items found in daily life like food and water, has been shown to protect teeth from bacterial attack. To improve dental health, toothpaste that effectively decreases oral bacterial flora should be used. Gum typically uses triclosan. Because of its antibacterial qualities, it is a component that is used to prevent gum disease. Natural toothpaste is that which doesn't contain fluoride or triclosan. Typically, they include natural substances like specific mineral salts like sodium fluoride and sodium chloride. Plant extracts such lemon eucalyptus, rosemary, chamomile, sage, and myrrh are also used, as is sodium chloride.[4]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

1.2. BENEFITS OF HERBAL TOOTHPASTE

Safely cleans your teeth.
Effectively makes your breath fresh.
Reduces and prevents gum discomfort.
Removes stains.[5]

- **OBJECTIVE OF HERBAL TOOTHPASTE**

1. The plant extract ingredient has antibacterial properties.
2. The formulation of an herbal toothpaste that can satiate every prerequisite for maintaining oral hygiene and preventing bacterial tooth decay.

- **IDEAL PROPERTIES OF TOOTHPASTE**

1. Strong abrasive action
2. Non-toxic and non-irritating
3. Leave no stains on the teeth
4. Maintain a healthy and clean mouth
5. Long-lasting impact .[6]

- **ADVANTAGES OF HERBAL TOOTHPASTE**

1. No one wants their body to be filled with chemicals, and even commercial toothpaste contains these harmful substances. To prevent tooth decay, we must use the natural alternatives that are already available. Herbal toothpastes provide a lot of benefits.
2. Sodium laurel sulphate, an ingredient in commercial toothpaste, can irritate and inflame[7]

- **DISADVANTAGES OF HERBAL TOOTHPASTE**

1. The organically certified herbal toothpaste is the safest option because other options could harm our teeth.
2. May originate from producers who aren't honest about their business operations or who don't adequately label substances, including fluoride, which some people find concerning.[15] [8]

2. TYPE OF HERBAL TOOTHPASTE

Himalaya, Amar ,Ayurvedic ,Neem ,Meswak, Vicco , Dabur

3. MATERIAL AND METHOD:- Herbal Extract

The herbs employed in the formulations of the present were shown in Table 1 together with their normal function in toothpaste. The botanical ingredients that went into creating multi-herbal toothpaste formulations.

Table 1: Information on Herbs used in toothpaste Formulations.

Sr no.	HERBS	SCIENTIFIC NAME	EFFECT
1	Neem	Azadirachta indica	Anti-inflammatory
2	Clove	Eugenia caryophyllus	Analgesic, Anticancer effects
3	Pippermint	Mentha piperita.	Antiviral,antiseptic effect
4	Betel	Piper betle	Antiulcer, Anti-diabetic
5	Turmeric	Curcuma Longa Linn	Antioxidant, Antimicrobial

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Collection of herbs

1. **Neem stem and bark.**



Fig. 1: Neem and bark.

Neem is a special medicinal plant in that all of its parts, including its leaves, flowers, seeds, fruit, roots, and bark, can be used. This is why it is sometimes referred to as "the village pharmacy."[9]

2.Clove



Fig 2: clove

Syzygium aromaticum, a tree in the Myrtaceae family, produces cloves as its aromatic flower buds.
Synonyms include caryophyllum, laung, and clove buds.

Uses

To aid in the destruction of microorganisms as an antibacterial.
As a painkiller for ailments like toothaches and muscular pain.
As an expectorant and treatment for unsettled stomach, clove is utilised.
For stomach distress, nausea, and intestinal gas, clove and clove oil are utilised.[10]

3. Peppermint



Fig. no. 3: Peppermint.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

A mix of spearmint and watermint, peppermint (Mentha pipefitter) is a species of mint.
Red gum, menthol, peppermint gum, liquorice are all synonyms.

Uses
The common cold, sinus infections, headaches, irritable bowel syndrome (IBS), and other digestive issues.[10]

4. Betel



Fig. no. 4: Betel.

A member of the Piperaceae family, which also contains pepper and kava, the betel (Piper betle) is a vine. Betel plants are grown for their leaves, which are most frequently used to flavour areca nut eating.
Betel-pepper, piper betel are synonyms.[16]

Uses
An antibacterial, a stimulant, and a breath refresher It benefits diabetics.
It eases asthma symptoms.
It promotes wound healing.
It enhances dental health.[11]

3. Turmeric



Fig. no. 5: Turmeric.

A member of the Piperaceae family, which also contains pepper and kava, the betel (Piper betle) is a vine. Betel plants are grown for their leaves, which are most frequently used to flavourareca nut eating.
Betel-pepper, piper betel are synonyms.

Uses
an antibacterial, a stimulant, and a breath refresher It benefits diabetics.
It eases asthma symptoms.
It alleviates depression.
It works against cancer.[12]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4. Glycerine



Fig. no. 7: Glycerin.

Glycerol is another name for glycerin.
It is a sweet-tasting, colourless, odourless, viscous liquid that is non-toxic. Glycerides, a class of lipids, contain the glycerol backbone[17]

Uses
Laxative hyperosmotic
Transport for a variety of pharmaceutical formulations.
Preservative.[13]

13.Honey



Fig. no. 14: Honey

An alternative to sugar that is healthy is called madhu. In drinking, cooking, and baking, honey can take the place of sugar.
• Attending to wounds and burns. Burns and wounds can be treated with honey.
• Acne treatment.
• Resistance to allergies to pollen.
• Organic cough medicine.[14]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4. Method of preparation of toothpaste

Trituration Method

All the herbal extracts (powders) were collected and Used to prepare the multi herbal toothpaste. The exact Quantities of ingredients were weighed using a digital Weighing balance (FB 600 Essae, Teroka). Then the Weighed herbal powders of Neem, Clove, Turmeric, Peppermint, and Betel were added to the mortar in Increasing order of their proportion. Then properly Triturated with the help of pestle. Then sodium lauryl Sulfate, calcium carbonate, and sorbitol are added and Properly mixed. Further glycerine, tragacanth gum,

FORMULATION TABLE

SR.NO	Excipients	BatchF1	BatchF2	BatchF3
1	Neem extract	1	1.5	1
2	Clove	0.5	1	1
3	Peppermint	1.5	1	1
4	Betel	1	0.5	1
5	Turmeric	1	1	1
6	Calcium carbonate	12.5	12.5	12.5
7	Glycerine	2.5	2.5	2.5
8	Sodium lauryl sulfate	0.5	0.5	0.5
9	Tragacanth gum	0.25	0.25	0.25
10	Sodium chloride	0.25	0.25	0.25
11	Sorbitol	0.25	0.25	0.25
12	Propylparabean	0.5	0.5	0.5
13	Carboxy methyl cellulose	0.25	0.25	0.25
14	Distilled water	10 -20	10-20	10-20

5. EVALUATION OF HERBAL TOOTHPASTE

Physical examination: - The formulations for multi-herbal toothpaste were created. and the results were reported. Were tested for organoleptic parameters like colour, taste, and odour.

(1) pH determination

Using pH paper, the formulation's pH was determined. 100 ml of distilled water were used to dilute 1 gm of produced herbal toothpaste, and one drop of the diluted paste was added. The regular colour strip is compared with the pH paper that was poured and the colour shift. The formulation's pH is then noted.

Viscosity

Using a Brookfield viscometer, the viscosity of each toothpaste formulation was determined (LVDVE Brookfield Engineering Labs, USA) First, the created toothpaste formulation was stored in a narrow mouth container, and the spindle of the Brookfield viscometer was submerged inside of it for two minutes. Using a Brookfield viscometer with a number 64 spindle and 100 rotations per minute, the viscosity of all the manufactured Multi herbaltoothpaste was measured. To determine the average viscosity of the formulations, dial readings were taken three times. The results were then reported.

- **Foamability**

1.In a test tube with a stopper (height 16 cm, diameter 6 mm), 1 g of toothpaste was added. The liquid's volume was then increased by 10 ml with water. The tube was stopped and shaken for the desired length of time at a rate of two shakes per second. 15 minutes of standing time was given, and the height of the foam created was measured.

- **Fragrance test**

It was evaluated for acceptability based on personal observation. The opinions of five people on the acceptability of the fragrance were taken. The following criteria were used to evaluate scent:

A) The aroma was good, on par with the fragrance of the toothpaste used as a reference.
B) The aroma wasn't great, but it was equivalent to the toothpaste used as a reference.
C) The toothpaste's aroma was inferior to that of the standard toothpaste.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- **Homogenicity**

By applying normal force at 2720C, toothpaste must extrude a homogenous mass from the collapsible tube or any other suitable container. Additionally, the bulk of the contents must protrude from the container's crimp before being gradually rolled

- **Stability**

The stability study was conducted in accordance with ICH guidelines.
The prepared paste was placed within a collapsible tube and stored for three months at various temperatures and humidity levels, including 25°C, 2°C, and 60%, 65%, and 5%, respectively. Moreover, spread ability, pH, and appearance were examined

- **Determination of Abrasiveness**

Extrude the material onto the butter paper until it is about 15-20 cm long. Repeat this process to create at least ten collapsible tubes. Check the length of the contents with the tip of your finger for any sharp or hard-edged abrasive particles. Such particles are not permitted in toothpaste.

- **Shape Retention**

The toothpaste was completely applied to a toothbrush after being squeezed out of the tube, and its condition was assessed after being let to stand for 10 seconds using the following criteria:
A). The toothbrush retains its shape after the toothpaste has been squeezed upon it.
B). After applying toothpaste, the toothbrush practically retains its original shape.

- **Moisture content**

Weighted toothpaste (10 gramme) was placed in a porcelain plate and dried in a 105°C oven. It was desiccated to chill it. The percentage moisture content loss is calculated using the provided formula.
% Moisture = Dry sample weight - Original sample weight
Original sample weight and weight.

- **Extrudability**

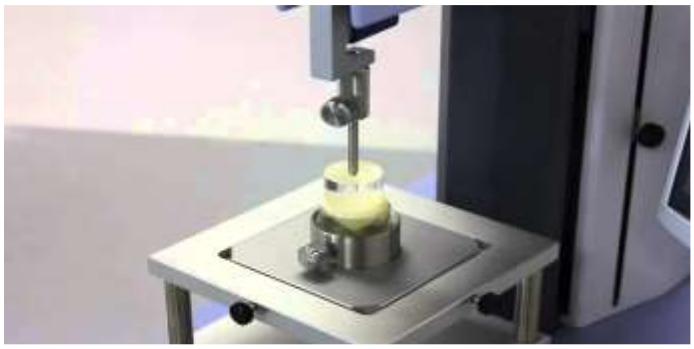
In this technique, the prepared paste was placed inside a collapsible aluminium tube with a standard cap and sealed by crimping the end. It was noted what tubes weighed. The tubes were clamped after being positioned between two glass slides. After adding 500g, the cover was taken off the slides. The extruded paste's volume was gathered and weighed. It was determined what percentage of the paste was extruded.



- **Determination of Spreadability**

The spreadability of the product is assessed using the following procedure:
Place a product on the glass plate in the centre.
Next, carefully instal a second plate on top of it and add 1 kg of weight to the setup's highest point. Remove the after some time has passed, then gauge the diameter in cm.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



6. RESULT AND DISCUSSION

The trituration process was used to develop the multi-herbal toothpaste formulations, which were then tested for various in vitro parameters. The in vitro Characteristic results were also contrasted with commercially available Toothpaste formulations. Comparatively equivalent and occasionally greater results have been seen in the current investigation with the designed herbal toothpaste compared to the marketed herbal toothpaste. The discovered multi-herbal toothpaste formulations exhibit a mud green hue, a nice odour, smoothness, and sweetness, according to organoleptic assessments. Table.3 presented the outcomes. In comparison to commercial formulations, laboratory-made formulations have the normal physical qualities of a toothpaste composition. Organoleptic evaluations of Toothpaste.

Formulations

Sr .no	Evaluation parameter	Batch F1	Batch F2	Batch F3
1	Colour	Mud green	Mud green	Mud green
2	Odour	Pleasant	Pleasant	Pleasant
3	Taste	Sweet	Sweet	Sweet
4	Smoothness	Smooth	Smooth	Smooth

The created formulations' pH values were determined to be between 6.7 and 6.8, which is suitable with formulating a standard toothpaste formulation. The range of developed formulations' viscosity was determined to be between 5633 and 6345 cps.
This feature of viscousness indicates a thick paste consistency.

Sr no	Parameter	F1	F2	F3
1	PH	6.8	6.9	6.9
2	Viscosity	5634	5638	5647
3	Extrudability	85	91	92
4	Foambility			
5	Spreadability	51	56	55
6	Abresiveness			
7	Homogenicity			
8	Stability			
9	Shape Retention			
10	Moisture content			

The toothpaste formulation's good abrasion capabilities are confirmed by the abrasiveness test. The particular formulation's homogeneous particles, which are responsible for the whitening of teeth following abrasion, are indicated by the good abrasive Property. The current composition is well-absorbent.

7. CONCLUSION

All commercially available herbal toothpaste and lab-made versions were assessed and compared to Bureau of Indian Norms Standards. Toothpaste that has been specially formulated Is capable of maintaining tooth and oral hygiene and has antibacterial activity against microorganisms such as E. By expanding natural ingredients for making more and Safer natural medicines, the designed herbal

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

toothpaste has a bright future in research and dental care for the public, Society, and nation. It was determined that the developed herbal toothpaste was of good grade. Multi herbal toothpaste containing neem, peppermint, Clove, turmeric, and betel was prepared using the Trituration method. The 3 formulations coded with F1, F2, and F3 were prepared and compared with Commercially marketed products. All these three formulations showed good evaluation Results when compared with marketed products those are Meswak, Patanjali, and Babool

8. REFERANCE

1. *Review on formulation and evaluation on Herbal Toothpaste by Prabhu K. Halakatti1, Anita Desai1, Mahantesh Moogi2, Mahantesh Patted2, Ashok Gumtaj2, Pallavi Jakati.*
2. *Review on Formulation and evaluation on Herbal Toothpaste by Nikita M. Rathi, Shital V. Sirsat, Sanket S. Toshniwal, Nikita T. Zagare, Shaikh Fazil Shaikh Mahamad*
3. *Review on Formulation and evaluation on Herbal Toothpaste by T.Mangilal 1 M.Ravikuma.*
4. *Review on formulation and evaluation on Herbal Toothpaste by Mr. Sable Kundan 1, Mr. Bhati Deepak 2, Mr. Havelikar Ujwal 3 Mr. Ghuge Saurabh Dr. Thorat Rajendra.*
5. *Review on formulation and evaluation on Herbal Toothpaste by Urmila Nishad1, Meraj Ali2, Anupama Maurya3.*
6. *Review on formulation and evaluation on Herbal Toothpaste by Kavita Varma Shukla, Deepika Kumari*
7. *Chowdhury BR, Garai A, Deb M, Bhattacharya S Herbal toothpaste-A possible remedy for oral cancer. Journal of Natural Products 2013; 6:44-55*
8. *Mohan Kumar KP, Priya N K. Madhushankari GS. Anti-cariogenic efficacy of herbal and conventional tooth pastes a comparative in-vitro study. J Int Oral Health. 2013;5(2):8-13.*
9. *Varma SR, Sherif H, Serafi A, Fanas SA, Desai V. Abuhijleh E, Al Radaidah A. The antiplaque efficacy of two herbal-based toothpastes: A clinical intervention. J Int Soc Prevent Communit Dent 2018: 8:21-7*
10. *Fabiana Ozaki, et al Efficacy of a herbal toothpaste on patients when established gingivitis-a randomized controlled trial Braz Oral Res. 2006:20(2):172-7,*
11. *Mullaly BH, James JA, Coulter WA, Linden GJ. The efficacy of an herbal based toothpaste on the control of plaque and gingivitis. J Clin Periodontol 1995:22(9):686-9*
12. *Karadaglioglu Ol, et al. Antibacterial activities of herbal toothpaste combined with essential oils against S. mutans. Pathogens. 2019 Feb 1:8(1).pii: E20*
13. *Lippert F (2013). "An Introduction to Toothpaste – Its Purpose, History and Ingredients". In van Loveren C (ed.). Monographs in Oral Science. Vol. 23. Basel: S. Karger AG. Pp. 1–14. Doi:10.1159/000350456. ISBN 978-3-318-02206-3. PMID 23817056.*
14. *Aspinall SR, Parker JK, Khutoryanskiy VV (April 2021). "Oral care product formulations, properties and challenges" (PDF). Colloids and Surfaces. B, Biointerfaces. 200: 111567. Doi:10.1016/j.colsurfb.2021.111567. PMID 33454623. S2CID 231634828.*
15. *van der Weijden F, Slot DE (February 2011). "Oral hygiene in the prevention of periodontal diseases: the evidence". Periodontology 2000. 55 (1): 104–23. Doi:10.1111/j.1600-0757.2009.00337.x. PMID 21134231.*
16. *Davies R, Scully C and Preston AJ. Dentifrices- an update. Medicina Oral Patologia Oral y Cirugia Bucal. 2010; 15: 976-982.*
17. *Ersoy M, Tanalp J, Ozel E, Cengizlier R and Soyman M. The allergy of toothpaste: a case report. Allergol Immunopathol. 2008; 36: 368-370.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

DEVELOPMENT AND EVALUATION OF IMPROVISED OVEN FOR BREAD AND PASTRY COMPETENCIES

Santos, Jay Lord S.
Nueva Vizcaya State University-Bambang Campus, Bambang, Nueva Vizcaya, Philippines

Article DOI: https://doi.org/10.36713/epra17097
DOI No: 10.36713/epra17097

ABSTRACT

Nowadays, it is necessary to develop an improvised oven to meet the Technology and Home Economics competencies for bread and pastry. This quantitative research aimed to improvise an oven and determined the level of evaluation of the students, teachers, and practitioners on the improvised oven in terms of design, satisfaction, cost-effectiveness, safety, durability, and functionality. The study identified 30 respondents using the stratified random sampling, and the project was evaluated using a 4-point Likert scale. Data were analyzed using mean, ANOVA or Analysis of Variance at 0.05 level of significance, and descriptive analysis was used to interpret the data. Results of the study showed that the requirements and specifications on the development of the improvised oven requires different materials, various features to enhance their design, satisfaction, cost-effectiveness, safety, durability, and functionality. Moreover, the improvised oven can be used as oven for bread and pastry as it was evaluated as "very much acceptable" along design, satisfaction, cost-effectiveness, safety, durability, and functionality by the learners, teachers, and practitioners. Results further show that there is a significant difference in the evaluation of the students, teachers, and practitioners on the improvised oven across the parameters. It is recommended to use the improvised oven as an instructional material of teachers in teaching bread and pastry production.

KEYWORDS: *alternative, bread and pastry competencies, development, improvisation, instructional materials*

INTRODUCTION

The multi-disciplinary field of Technology and Home Economics (THE) gives students the fundamental knowledge of science, society, and application to enable them to live modern lives. While technology education seeks to transmit fundamental and basic knowledge and skills linked to materials and their processing, energy conversion, and information processing. The goal of programs like instructional materials in Home Economics Education is to improve student teachers' knowledge of and proficiency with the creative application of technology to support instruction. To remain current and relevant, Home Economics education curricula must incorporate basic issues of technology applications, and students should be exposed to equipment thus enhancing their performances in the different competencies.

Meanwhile, the need for improvisation or development of an improvised oven will help address the target competencies along Quarter 1, Lesson 1 on preparing and producing bakery products specifically on the Most Essential Learning Competencies (MELCs) namely: (1.3) Use appropriate equipment according to required bakery products and standard operating procedures; (1.4) Bake bakery products according to techniques and appropriate conditions; and (1.5) Select required oven temperature to bake goods in accordance with the desired characteristics, standards recipe specifications (K to 12 TVL Track Home Economics – Bread and Pastry Production Curriculum Guide, 2013).

Furthermore, modernization and technological breakthroughs are now welcomed, and innovations are now considered needs of the modern world that must be met by effective performance to reach productivity goals. Therefore, it is crucial that home economics teachers make the most of these advancements, particularly about their baking supplies like ovens, for students to meet the required competences. Conversely, national, and local organizations and agencies thrive on producing high-quality results with relevant educational resources.

As a result, creating teaching-learning resources is thought to be one of the key factors in educational institutions that will encourage student learning and aid in the accomplishment of academic goals and objectives. It is imperative that educators prioritize the advancement and innovation of teaching-learning resources (Kapur, 2019).

There are relevant studies and literatures pertaining to the development of instructional materials, evaluation of instructional materials, as well as teaching bread and pastry competencies. Impact of localized learning materials like Niebres (2019) who demonstrated that using locally relevant learning resources significantly enhances both TLE teachers' instructional competency and students' academic achievement. Student perception of instructional materials by Albarico (2014) revealed that students perceived limitations in the adequacy of instructional materials due to curriculum requirements, suggesting a need for review to better align with curriculum goals. Components and Goals of TLE by Tayam (2018) outlined the components of TLE and its goals in preparing students for various vocational paths, emphasizing the importance of practical skills and knowledge. Carag & Briones (2021) underscored the significance of instructional materials in enhancing student performance, particularly in areas like bread and pastry production, by promoting learning objectives, clarity, and effective teaching strategies.

Likewise, there are challenges in material design: lack of resources and poor curriculum implementation, as highlighted by Calanog (2019) and Ogbu (2015). Studies like Babatunde (2020) and Beduya (2020) showcased innovative approaches to teaching tools, such

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

as improvised ovens and fuel-efficient designs to enhance learning experiences and practical skills acquisition. TLE Teacher Evaluation and Observation Rubric developed by Tulsa Public Schools (2016) provided a framework for assessing the efficacy of instructional resources and teaching practices. Arakit (2016) suggested the importance of student-centered approaches in TLE, emphasizing active student participation and ownership of learning for better outcomes. Barcelona et al. (2023) pointed out common challenges faced by TLE teachers, such as lack of resources and access to technology, and advocated for further research to develop creative solutions to enhance teaching and learning processes.

In summary, the literature and studies provided find similarities to this study since this likewise underscored the importance of localized, effective instructional materials in TLE to improve both teacher competency and student outcomes, while also highlighting the need for innovation, evaluation, and student-centered approaches to address challenges and enhance educational experiences specifically in bread and pastry competencies.

The College of Teacher Education Research and Development Agenda (2023) of Nueva Vizcaya State University (NVSU)- Bambang Campus is also the foundation for this project as well as the National Research Agenda for Teacher Education (NRATE) 2019-2023 named Balanghai. It focuses on the teaching and learning process particularly on Area B: Design conducive environments for optimal learning and at the same time product development with a particular emphasis on practical arts and crafts books, monographs, and instructional materials, instructional designs, and utility models. The makeshift oven can be utilized by students enrolled in the TLE-Home Economics and Hospitality Industry Management as a teaching tool or resource, which will have a big impact on the program's implementation at NVSU and among schools in the Department of Education (DepEd) offering TVL track majoring in Home Economics.

Considering these agreements, the issue facing Technology Livelihood and Education (TLE) is the lack of suitable educational instruments, machinery, and equipment that may be used as a foundation for obtaining corrective measures in order to achieve an efficient learning process. Additionally, the researcher and TLE teachers noted that it can be difficult to teach practical skills and prepare students for the workforce while covering certain subjects. Additionally, students majoring in bread and pastry for the 2023–2024 academic year are struggling because the school's TLE laboratory is equipped with very little, including a single oven that has a 1:30 ratio.

The concepts offered caused certain ambiguities and challenges for both educators and students, as well as the necessity for ovens to prepare pastries and bakery goods such tarts, pandesal, pizza, buko pie, pineapple pie, and egg pie. These days, industrial ovens can be very costly and scarce for students, especially in institutions that offer TVL Home Economics as a course. Furthermore, budgetary constraints are common problems for educational institutions when it comes to purchasing such technology. Teachers have a significant responsibility to address these issues in order to meet the standards of the most essential learning competencies and to facilitate a productive and successful learning environment.

Furthermore, the researcher observed and identified these concerns most especially in the DepEd which is confronted with the lack of bread and pastry equipment most especially in far flung schools or barrio schools. There are existing materials, tools, and equipment, however, they are found to be obsolete and not functional because of rapid change in the science and technology.

Hence, this study was premised to design, construct, and improvised an oven utilizing local materials which is functional and durable enough when compared to commercially available ovens. Considering these literature and experiences, this study was conceptualized to evaluate the design, satisfaction, cost-effectiveness, safety, durability, and functionality of the improvised oven for bread and pastry production competencies.

RESEARCH METHODOLOGY

Research Design

This study employed the quantitative type of research design. Quantitative research was used to quantify the problem by way of generating numerical data or data which was transformed into useable statistics. Moreover, quantitative data was interpreted with statistical analysis and since statistics are based on the principles of mathematics, the quantitative approach was viewed as scientifically objective and rational (Simply Psychology, 2023).

Additionally, this study focused on the design, development, and evaluation of the improvised oven. To evaluate the functionality of the developed laboratory equipment for bread and pastry competencies, evaluators rated the following parameters namely: design, satisfaction, cost-effectiveness, safeness, durability, and functionality using a 4-point Likert scale questionnaire. With this, the researcher used the descriptive quantitative research design to quantify collected data and establish significant differences through statistical tools. Hence, the data obtained from the respondents through this design are by nature of comparing its result which can be represented numerically in the forms of table.

Research Method

This study employed the descriptive-evaluative method of research evolving the Product Development Method (PD), wherein the researcher conceptualized the design, developed, and the respondents evaluated the improvised oven. Additionally, the comparative approach was employed with the evaluation of the different classifications of the respondents such as students, teachers, and practitioners.

The descriptive method dwelt on the exploration of existing improvised oven by emphasizing its present condition. Moreover, this study described the output as to the nature on how it worked thus prevailing conditions or practices and seeks accurate description.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Furthermore, the designing of the improvised oven for bread and pastry production specifically the dimensions of each part was described.

On the other hand, the product development (PD) method or design involves on both improving, innovating existing product, as well as making an original machine. This design further aimed to give researchers the theory of constructivism and putting this knowledge into practical applications which starts from conceptualization of the improvised oven up to the actualization.

Moreover, this study used the quantitative approach as it generated data on the level of acceptability of the improvised oven along user design, functionality, cost-effectiveness, safety, durability, and functionality.

RESULTS AND DISCUSSIONS

This chapter presents the highlights of the research study titled, "Development and Evaluation of Improvised Oven for Bread and Pastry Competencies."

Problem 1: What are the design, requirements, and specifications of the improvised oven for bread and pastry competencies?

The figures below show the frontal, left, right and rear elevation of the improvised oven.

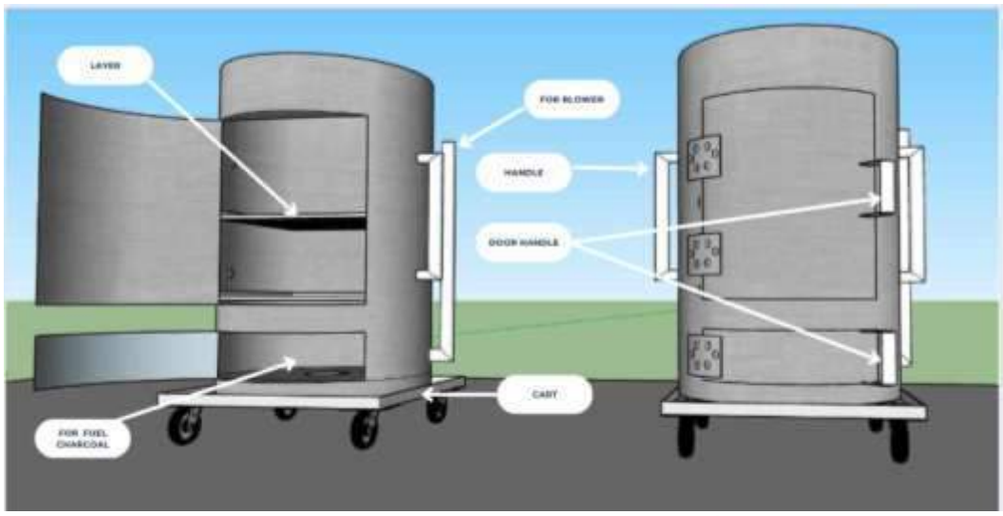


Figure 4a. ***Fontal View and Design of the Improvised Oven***

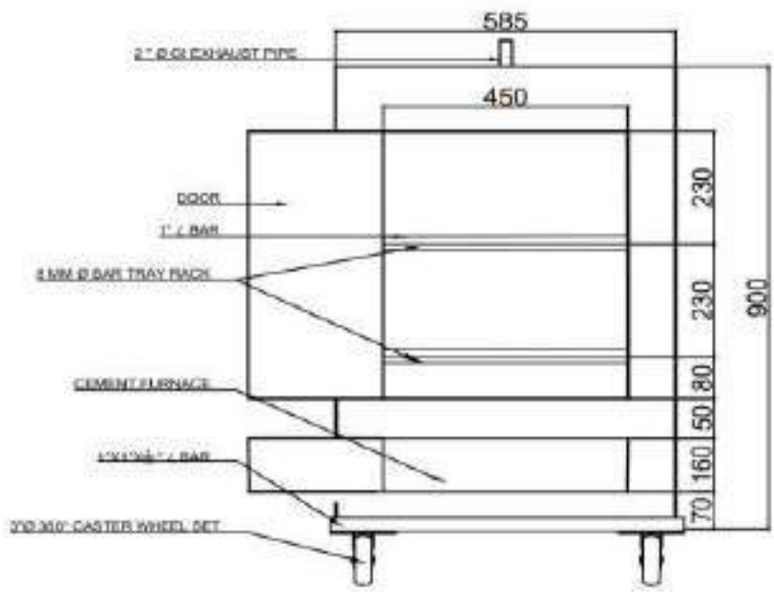


Figure 4b. ***Front Elevation (Open Door)***

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

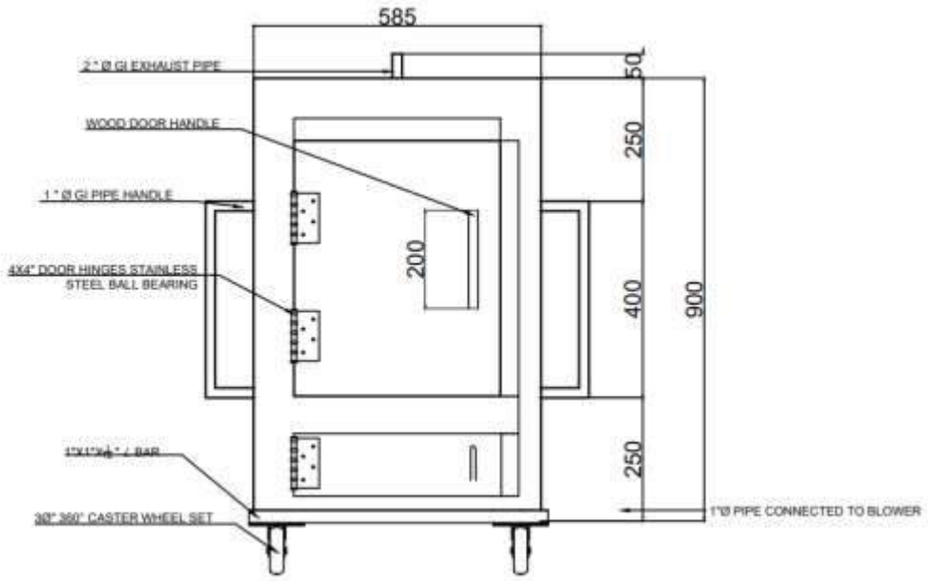


Figure 4c. ***Front Elevation (Closed Door)***

The improvised oven has two-layer compartments with doors for the bread and pastry production. The layer below is intended for the charcoal that is for ignition.

According to Babatunde (2020), to guarantee that the improvised oven is an effective teaching tool that improves learning, several important designs, features, and procedures must be taken. It is important to identify the object that must be improvised and then comprehend the fundamental ideas that underpin its operation. Essential steps in the development process include designing and sketching a rough drawing of the oven, listing the materials required, and building the oven in accordance with the instructions to create the prototype. Other crucial factors to think about include using the oven to test and assess it, redesigning it as needed, and mass-producing it if feasible. Additionally, the improvised oven needs to have a few special qualities to be suitable for use in a learning environment. These characteristics include being straightforward in design, having the capacity to increase the efficacy of lessons by providing students with the necessary knowledge and abilities, being safe to reduce risks, saving time in both creation and use, producing the desired results as expected, being inexpensive and plentiful, and involving the student to promote comprehension and memory of the material.

Side and Rear Elevation

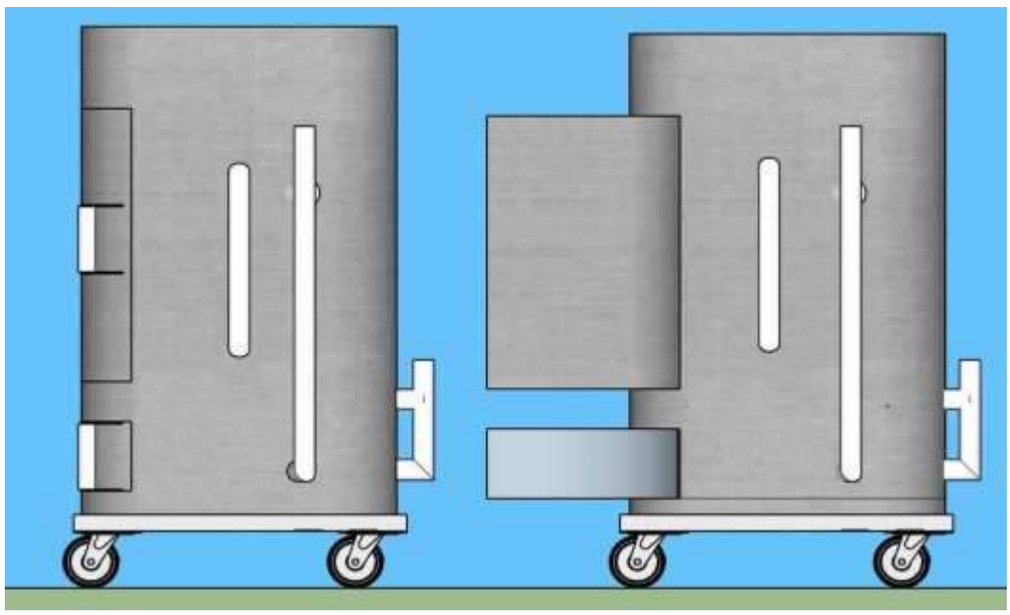


Figure 4d. ***Back View and Design of the Improvised Oven***

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

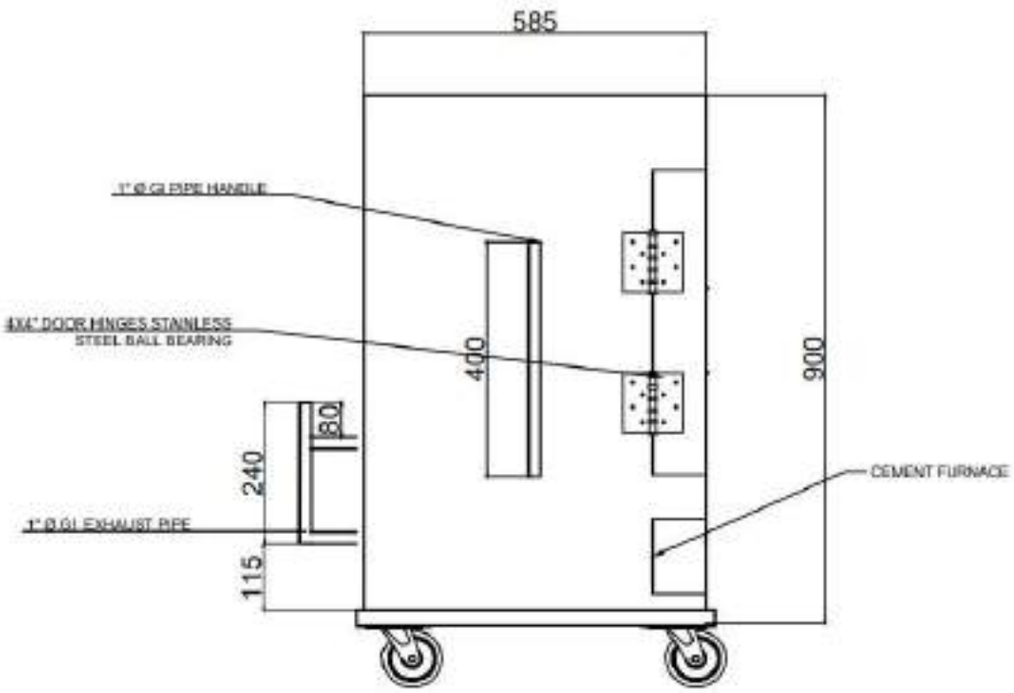


Figure 4e. ***Left Elevation***

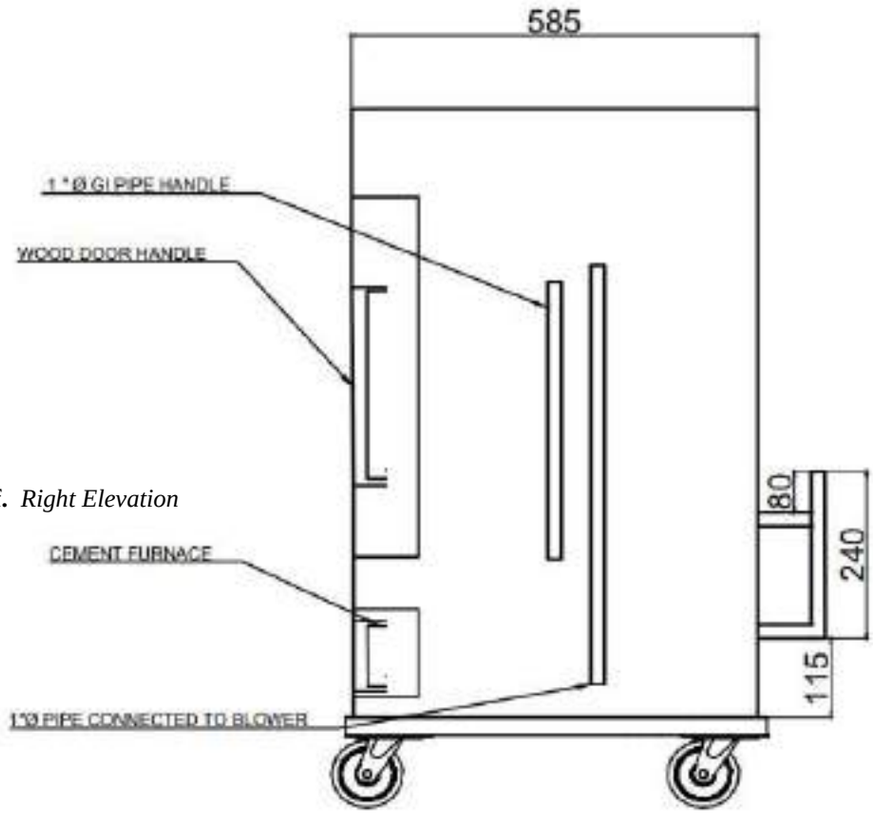


Figure 4f. *Right Elevation*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

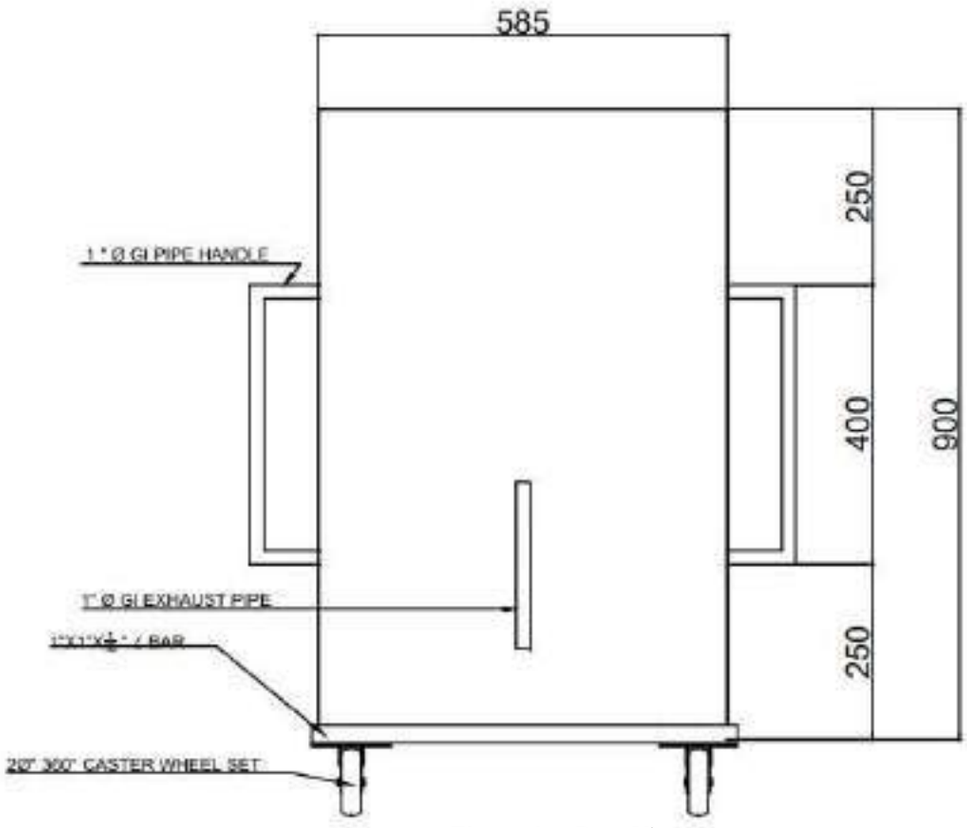


Figure 4g. ***Rear View***

The sideview of the improvised oven shows the door handle out of wood, exhaust, including its blower to supply air into the burning charcoal. On the other hand, the wheel casters are installed for easy transfer to other places once it is needed.

In a similar study, Albarico et. al (2014) also evaluated how well the instructional materials on bread and pastry were thought to have addressed learning objectives, learning content, activities, evaluation, design/layout, and material clarity. Additionally, it looked at the students' performance in written and practical assignments. The study's conclusions shed light on how additional teaching resources affect students' performance when making bread and pastries, which is useful information for teachers and curriculum designers.

Table 2 shows the requirements and specifications on the development of the improvised oven.

Table 2

Requirements and Specifications on the Development of the Improvised Oven

Requirements and Specifications				
Qty	**Unit**	**Material**	**Description**	**Cost (Php)**
1	unit	Drum	587cm x 58.5 cm (1.2mm thk)	800.00
8	meters	Round Bar	8 mmø stainless	600.00
5	meters	Angle Bar	1” x 1” x 1/8” thk	850.00
3	pcs	Hinge Door	4” x 3” stainless steel ball bearing	230.00
4	sets	Caster wheels	Heavy Duty 3 “diameter with lock	1,000.00
3	meters	Flat bar	1 inch x 2mm thk, stainless	114.00
3.5	meters	GI Pipe	2 “ ø for the handle, stainless	508.00
2	sets	Wood	1” ø x 20cm door handle	50.00
1	set	Sheet	950cm x 500cm	1,800.00
5	kg	Cement	Furnace	100.00
1	pail	Sand	S1	50.00
1	unit	Blower	Air blower Kalan DC 12 V	200.00
1	pc	Thermometer	Stainless steel	139.00
1	kg	Welding Rod	Stainless	450.00
1	L	Paint	Boysen (Green) for metal	450.00
6	cd	Laborer	Labor	3,670.50
			Total	11, 011.50

Table 2 shows the requirements and specifications on the development of the improvised oven: 1 unit drum (587cm x 58.5 cm (1.2mm thk) amounting to 800.00 pesos, 8 meters round bar (8 mmø stainless) amounting to 600.00 pesos, 5 meters angle bar (1” x 1” x 1/8” thk) amounting to 850.00 pesos, 3 pieces hinge door (4” x 3” stainless steel ball bearing) amounting to 230.00 pesos, 4 sets caster wheels (Heavy Duty 3 “ diameter with lock) amounting to 1,000.00 pesos, 3 meters flat bar (1 inch x 2mm thk, stainless) amounting to 114.00

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

pesos, 3.5 meters GI Pipe (2 " ø for the handle, stainless) amounting to 508. Pesos, 2 sets of wood (1" ø x 20cm door handle) amounting to 50.00 pesos, 1 set sheet (950cm x 500cm) amounting to 1,800.00 pesos, 5 kilogram cement (furnace) amounting to 100.00, 1 pail of sand (S1) amounting to 50 pesos, 1 unit blower (Air blower Kalan DC 12 V) amounting to 200 pesos, 1 piece thermometer (stainless steel) amounting to 139.00 pesos, 1 kilogram welding rod (for stainless steel) amounting to 450.00 pesos, 1 liter paint (Boysen (Green) for metal) amounting to 450.00 pesos and 6 calendar days labor for the skilled laborer amounting to 3,670.50. Overall, the total expenses in constructing and fabricating the development of improvised oven is 11, 011.50 pesos.

These requirements and specifications are essential for the successful development of an improvised oven that is safe, functional, and efficient for bread and pastry purposes. Each of the materials was planned carefully to fit the into the design and requirements for it to be functional and can be used for bread and pastry competencies. The key materials used in making an improvised oven included recycle containers such as the metal drum, heat resistant materials like the stainless steels, supporting structures such as the metals and its caster for portability, ventilation and airflow using a blower, as well as wooden insulation materials on its handles to avoid burns when opening the doors.

Problem 2: What is the level of evaluation of the students, teachers, and practitioners of the improvised oven in terms of design, satisfaction, cost-effectiveness, safety, durability, and functionality.

The table presents the data on the level of evaluation of the students, teachers, and practitioners of the improvised oven in terms of design, satisfaction, cost-effectiveness, safety, durability, and functionality.

Table 3
Summary of Respondents' Evaluation of the Improvised Oven in terms of Design, Satisfaction, Cost-effectiveness, Safety, Durability, and Functionality

Parameters	Students	Teachers	Practitioners	Overall Mean
Design	3.82 Very Much Acceptable	3.96 Very Much Acceptable	3.60 Very Much Acceptable	3.79 Very Much Acceptable
Satisfaction	3.90 Very Much Acceptable	3.96 Very Much Acceptable	3.66 Very Much Acceptable	3.84 Very Much Acceptable
Cost-Effectiveness	3.90 Very Much Acceptable	3.94 Very Much Acceptable	3.66 Very Much Acceptable	3.83 Very Much Acceptable
Safety	3.94 Very Much Acceptable	3.90 Very Much Acceptable	3.66 Very Much Acceptable	3.83 Very Much Acceptable
Durability	3.94 Very Much Acceptable	3.98 Very Much Acceptable	3.54 Very Much Acceptable	3.82 Very Much Acceptable
Functionality	3.90 Very Much Acceptable	3.98 Very Much Acceptable	3.60 Very Much Acceptable	3.83 Very Much Acceptable
Overall Mean	3.90 Very Much Acceptable	3.95 Very Much Acceptable	3.62 Very Much Acceptable	3.82 Very Much Acceptable

Table 3 presents the summary of the respondents' evaluation of the improvised oven in terms of design, satisfaction, cost-effectiveness, safety, durability, and functionality. It can be gleaned from the table that grand mean across all parameters are: 3.79 for design; 3.84 along satisfaction; 3.83 along cost-effectiveness, safety, and functionality; and 3.82 along durability. Meanwhile, the overall grand mean of student is 3.90, teachers is 3.95, and practitioners is 3.62, which are all described as "very much acceptable".

Overall, the respondent's evaluation on the improvised oven for bread and pastry competencies along design, satisfaction, cost-effectiveness, safety, durability, and functionality is very much acceptable.

Design. It can be deduced from the result that the respondents assessed the design of the improvised oven based on its materials, specifications, size, capacity, its charcoal based new feature, portability, and overall design as "very much acceptable".

This imply that the design could be used in making improvised oven for baking and pastry production. The results also indicate the acceptance of the design as a framework in developing future improvised ovens.

Similarly, the result is similar to the study of Beduya (2020) that involved the innovation of a charcoal oven. The oven was made also to be lightweight and portable to accommodate mobile bakers. Also, this is also relevant to the idea of Edjec (2021) that the evaluation of the respondents could include elements such as material compatibility and availability, mobility, user-friendliness, and the oven's

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

versatility for both home and commercial use. In general, the evaluation of an improvised oven's design is thorough, emphasizing both its practical functionality and its aesthetic qualities to provide a balanced appraisal of its effectiveness. Hence, the result addresses the challenges on the study of (Calanog, 2019 & Ogbu, 2015) relative to inadequate facilities and instructional materials, a lack of teaching resources, and poor curriculum implementation.

Satisfaction. The result revealed that all the respondents (students, teachers and practitioners), evaluated it as very much acceptable as it can be used as a cheap yet effective alternative oven for bread and pastry. It has an added feature to check the temperature of the oven. It can be used for multiple purposes aside from baking and pastry production such as in cookery specifically for roasting and grilling. It can be user-friendly, and it is indeed can be efficient oven in baking and pastry purposes.

Meanwhile, positive evaluations of the improvised oven along the satisfaction parameter, highlighting its effectiveness, alternative, multipurpose affordability, and user-friendliness as the learners, teachers and practitioners experienced the baking process of which contributed to the high levels of satisfaction. With these, the result further supports the claims of Babatunde (2020) which is to guarantee that the improvised oven is an effective teaching tool that improves learning.

Cost-effectiveness. The evaluation of the improvised oven in terms of cost-effectiveness among students, teachers, and practitioners showed a mean description of "very much acceptable". Relative to this, the materials that were utilized to build are cost-effective, readily available in the locality, reduces and optimizes operational cost such as fuel consumption, needs less maintenance, and reduces other expenses in baking and pastry.

These findings support the claims of Halkier (2009) that making bread and pastries can be taught using an inexpensive or cost-effective oven while an improvised oven can be made in several ways.

Safety. Results revealed that the evaluation of the improvised oven in terms of safety among students, teachers, and practitioners across the indicators posted a mean description of "very much acceptable".

The risk of burns or accidents when operating can be minimized through its new feature, the exhaust of is suited to avoid smoke build up inside the stove, thus, avoiding smoky odor of the baked product. This also implies that the key features are safe to use, and it ensures stability and structural safety before, during and after use.

Hence, safety was a key aspect of the evaluation, focusing on how well the instructional materials avoids and lessens harm or danger to users (Albarico, et al., 2014).

Durability. The respondents (students, teachers, and practitioners) evaluated the improvised oven as "very much acceptable".
Based from the inspection of the respondents, the improvised oven is resistant to wear, corrosion, or degradation over time, it can last for many years once it is used. It has structural integrity under various loads or stresses. It requires maintenance or upkeep which is considered more durable.

According to Jainey (2022), the durability might affect both its baking efficiency and safety. The quality of the construction, the materials utilized, and the oven's resistance to heat exposure and repeated use are all important considerations when evaluating an improvised oven's durability. Hence, the lifespan of the improvised oven can also be extended with appropriate maintenance and care.

Functionality. Based from the findings, when evaluating the improvised oven's functionality as "very much acceptable," the respondents looked at how well it fulfills the demands of the users and its intended objectives specifically if it meets the intended user requirements or specifications, ensuring that it performs the necessary functions effectively.

The improvised oven has features or functionalities essential for the intended purpose of the product on bread and pastry production. It is easily operated, and it is consistent to perform its intended functions without failure or errors specially along bread and pastry production. The functionality aligns with user expectations and needs.

Similarly, according to Babatunde (2020), there are a few crucial steps that need to be followed to ensure that the improvised oven is a useful teaching tool that enhances learning. It is crucial to first identify the item that needs to be improvised and then understand the basic principles that guide its functioning.

Problem 3: Is there any significant difference in the evaluation of therespondents on the improvised oven along design, satisfaction, cost effectiveness, safety, durability, and functionality?
The summary of results on the significant differences in the evaluation of the respondents on the improvised oven along design, satisfaction, cost-effectiveness, safety, durability, and functionality is shown on the table.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 4
Summary of Computation on the Differences in the Evaluation of the Respondents

Component/ Variable	Groupings	Mean	Computed F-value	p-value	Remarks
Design	Students	3.82	5.49	0.01	Significant
	Teachers	3.96			
	Practitioners	3.60			
Satisfaction	Students	3.90	5.63	0.009	Significant
	Teachers	3.96			
	Practitioners	3.66			
Cost-Effectiveness	Students	3.90	5.04	0.014	Significant
	Teachers	3.94			
	Practitioners	3.66			
Safety	Students	3.94	5.04	0.014	Significant
	Teachers	3.90			
	Practitioners	3.66			
Durability	Students	3.94	12.07	0.000	Significant
	Teachers	3.98			
	Practitioners	3.54			
Functionality	Students	3.90	9.89	0.000	Significant
	Teachers	3.98			
	Practitioners	3.60			
Overall	Students	3.90	8.73		
	Teachers	3.95			
	Practitioners	3.62			

Legend:p-value lower than .05 Reject Ho (Significant); p-value higher than .05 Accept Ho (Not Significant)

Table 4 presents the summary of computation on the differences in the evaluation of the respondents. It can be seen from the table that all the parameters posted a p-value lower than the .05 level of significance. This means that the result is significant. The results further imply that there are significant differences in the evaluation of the respondents on the improvised oven along design, satisfaction, cost-effectiveness, safety, durability, and functionality. Hence, the null hypothesis is rejected.

Furthermore, the respondents' classifications affect the evaluation of the respondents on the improvised oven along design, satisfaction, cost-effectiveness, safety, durability, and functionality.

Design. Respondents rated the design of the improvised oven as very much acceptable. Specifically, practitioners gave the lowest rating of evaluation with 3.60 weighted mean, seconded by students with 3.82 weighted mean and followed by teachers with a 3.96 weighted mean, which shows different level of evaluation. Moreover, the computed p-value is 0.01 which is lower than the .05 level of significance, which means it is significant.

This could mean that the students and teachers have a higher level of evaluation than those practitioners along the design of the improvised oven.

Satisfaction. The satisfaction level of the respondents with the improvised oven was notably higher among students and teachers with a weighted mean of 3.90 and 3.96, respectively while the practitioners have 3.66 weighted mean rating. Meanwhile, the computed p-value is 0.009 which is lower than the .05 level of significance means significance.

The result implies that the students and teachers a more satisfied on the improvised oven than the practitioners. The practitioners' exposure to high-end oven may have had affected their rating in terms of satisfaction.

Cost-effectiveness. The cost-effectiveness was evaluated as very much acceptable by the respondents; however, the practitioners has the lowest rating with a weighted mean of 3.66 when compared to students rating of 3.90, and 3.94 for teachers. On the other hand, the computed p-value is 0.014 which is lower than the .05 level of significance. This means that it is significant.

The students and teachers have a higher-level evaluation than those practitioners along cost-effectiveness. The practitioners may have found the commercially available oven to be more practical since no manpower will be utilized, and the materials are guaranteed with quality.

Safety. The safety of the improvised oven was rated as very much acceptable; however, practitioners have the lowest rating with a weighted mean of 3.66, followed by teachers with a weighted mean of 3.90, and students with a weighted mean of 3.94. Additionally, the computed p-value is 0.014 which is lower than the .05 level of significance.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The result means that there is a significant difference in the evaluation of the respondents on the improvised oven along safety. Hence, the null hypothesis is rejected.

This indicates further that students and teachers have higher level of evaluation along safety than the practitioners. This could mean that the practitioners are doubtful when it comes to the materials used. Considering that they are using commercially available oven, the quality of the materials used are guaranteed safe compared to the recycled ones.

Durability. The respondents found the durability of the improvised oven as very much acceptable; however, practitioners gave a lower evaluation with a weighted mean of 3.54, seconded by students with a weighted mean of 3.94 and teachers with a weighted mean of 3.98. Also, the computed p-value is 0.000 which is lower than the .05 level of significance.

The result means that the there is a significant difference in the evaluation of the respondents on the improvised oven along durability. Hence, the null hypothesis is rejected.

It implies that the practitioners have a lower agreement on the acceptability of the durability of the improvised oven compared to the students and teachers. They are more exposed to readily made oven, hence, they believe that the quality of what they are using are better than the improvised oven since the latter was made only from recyclable materials. The drum and the other materials utilized, on the perception of the practitioners, are acceptable but not to the extent compared to the commercially available ovens.

Functionality. The functionality of the improvised oven was evaluated as very much acceptable; however, practitioners have a lower agreement with a weighted mean of 3.60, followed by students with a weighted mean of 3.90, and teachers with a weighted mean of 3.98. The computed p-value is 0.000 which is lower than the .05 level of significance.

This means that the there is a significant difference in the evaluation of the respondents on the improvised oven along functionality. Hence, the null hypothesis is rejected.

This implies that the practitioners find it more practical and useful to buy commercially available ovens than developing improvised one. While the function of an oven is present in the improvised, the other features of a ready-made oven made the practitioners think that the developed one cannot fulfill other functions of what a typically and commercially made ovens can do.

Generally, though the practitioners rating on the evaluation of the improvised oven is lower than those of the student and teacher respondents in all the parameters, the overall rating is still very much acceptable. As such, it is paramount to use instructional materials like the improvised oven when teaching bread and pastries to students to improve the student performance (Carag & Briones, 2021).

This could further answer the concern on how challenging it is to create educational resources for TLE which include inadequate facilities and instructional materials (Calanog, 2019 & Ogbu, 2015).

Moreover, a few unique features are required for the improvised oven to be appropriate for usage in a classroom setting (Babatunde, 2020). Likewise, according to Albarico et al. (2014), the employment of instructional materials impacts students' performance in baking bread and pastries. As stated by Halkier (2009), a cheap or alternative oven can be used to teach people how to make bread and pastries. Thus, it addresses the concern also of Barcelona (2023), that when developing teaching materials for TLE, some common problems include instructors' lack of access to technology, instructional materials, and resources.

CONCLUSIONS

Based on the statement of the problems and the summary of the findings, the following conclusions are presented:

1. The requirements and specifications on the development of the improvised oven requires different materials, various features to enhance their design, satisfaction, cost-effectiveness, safety, durability, and functionality. The key materials used in making an improvised oven can be containers such as the metal drum, heat resistant materials like the stainless steels, supporting structures such as the metals and its caster for portability, ventilation and airflow using a blower.
2. The improvised oven can be used as an instructional material and an alternative oven for bread and pastry competencies. The design, satisfaction, cost-effectiveness, safety, durability, and functionality as evaluated by the learners, teachers, and practitioners are very much acceptable in making different bread and pastry products.
3. There is a significant difference in the evaluation of the students, teachers, and practitioners on the improvised oven along design, satisfaction, cost-effectiveness, safety, durability, and functionality. Specifically, teachers and students evaluated the improvised oven as very much acceptable while the materials and their specifications in constructing the improvised oven as well as the materials used are highly durable and is resistant to wear, corrosion, or even degradation over time were evaluated as acceptable.

Recommendations

In light of the findings and conclusion, the following recommendations were drawn:

1. The improvisation of the oven may consider other features such as designs and durability to satisfy the practitioners. Also, the use of pure stainless materials to avoid food contamination is encouraged. Other cheap or alternative materials may be used in the fabrication. The developed improvised oven may be subjected to patenting because of its innovative designs and other features. Additionally, coconut husk and other renewable fuels may be used as the fuel to generate heat.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2. The improvised oven may be used as an instructional material when teaching bread and pastry related competencies and eventually, be used by students in their laboratory activities when cooking cookies, pandesal, muffins, tarts, pizza, buko pie, pineapple pie, egg pie, and etc. Other food products may be tested to be cooked in the improvised oven such as fish, meat, cake and others.

3. Installation of valve in the exhaust to control the heat inside the improvised oven and equal distribution of heat is encouraged.

4. Oven thermometer may be placed outside the improvised oven to monitor the temperature.

5. This study may be used as a baseline for future researchers who are venturing in designing and fabricating alternative laboratory materials for instructional use.

LITERATURE CITED

1. *Albarico, S. H., (2014). Adequacy of instructional materials used by teachers in teaching technology and livelihood education. Retrieved from: ResearchGate. https://doi.org/10.15242/icehm.ed0114516*
2. *Arakit, A., (2016). Improving teaching and learning process of pastry and bakery using learner centered approaches. Retrieved from: https://oda hioa.archive.knowledgearc.net/handle/10642/3481. Accessed on February 25, 2024*
3. *Babatunde, K. (2020). Improvisation of 3-Dimensional Instructional Model to Enhance the Learning Process in Fine Arts. International Journal of Research and Innovation in Social Science (IJRISS) | Volume IV, Issue VIII, August 2020 | ISSN 2454-6186*
4. *Barcelona, K. E. P., Daling, B. a. J., Doria, P., Balangiao, S. J., Mailes, M. J., Chiang, P., & Ubatay, D. (2023). Challenges and Opportunities of TLE teachers in Philippine Public Schools: an inquiry. British Journal of Multidisciplinary and Advanced Studies, 4(4), 44–60. https://doi.org/10.37745/bjmas.2022.0247*
5. *Beduya, A. G., (2020). Techno-Package for Innovated Fuel-Efficient Oven. International Journal of Science and Research (IJSR). DOI: 10.21275/SR221016204600*
6. *Calanog MC B., (2019). Challenges in Teaching Exploratory Courses of Technology and Livelihood Education using Pedagogical Approaches. International Journal of Research in Engineering, Science and Management Volume-2, Issue-4, www.ijresm.com | ISSN (Online): 2581-5792*
7. *Carag, A. A., & Briones, E. O. (2021). Supplementary Instructional Material in Bread and Pastry Production in the Achievements of the Senior High School students. Zenodo (CERN European Organization for Nuclear Research). https://doi.org/10.5281/zenodo.5158915*
8. *Castagno-Dysart, D., Matera, B., & Traver, J. (2021, May 4). The importance of instructional scaffolding. Teacher*
9. *Magazine.https://www.teachermagazine.com/au_en/articles/the-importance-of instructionalscaffolding#:~:text=Vygotsky%20coined%20a%20definition%20of,'%20(Raymond%2C%202000).*
10. *College of Teacher Education (2023). Research and Development Agenda on Product Development.*
11. *Halkier, B. (2009). Suitable cooking? Food, Culture, and Society, 12(3), 357–377. https://doi.org/10.2752/175174409x432030. Accessed on February 25, 2024*
12. *Jainey. (2022, June 17). TOP 10 PINOY IMPROVISED OVEN (FOR BAKING). Mama's Guide Recipes. https://www.mamasguiderecipes.com/2018/10/16/top-10-pinoy-improvised-oven-for-baking/*
13. *K to 12 TVL Track Home Economics – Bread and Pastry Production Curriculum Guide December 2013.*
14. *Kapur (2019). Development of Teaching-Learning Materials. Research Gate. https://www.researchgate.net/publication/publication/334083571_Development_of_Teaching-Learning_Materials*
15. *Kurt, S. (2021). Constructivist Learning Theory. Educational Technology. https://educationaltechnology.net/constructivist-learning-theory/*
16. *Mammoths roasted in prehistoric barbecue pit. (2009, June 3). NBC News. https://www.nbcnews.com/id/wbna31085915. Accessed on January 30, 2024*
17. *National Research Agenda for Teacher Education 2019-2023 named Balanghai.*
18. *Niebres, C., (2019). Utilization of Localized Learning Materials in Technology and Livelihood Education and its effect on teachers' instructional competency at Balibago Integrated High School. Utilization of Localized Learning Materials in Technology and Livelihood Education and Its Effect on Teachers' Instructional Competency at Balibago Integrated High School. https://www.instabrightgazette.com/blog/utilization-of-localized-learning-materials-in-technology-and-livelihood*
19. *Ogbu, J. E. (2015). Influences of inadequate instructional materials and facilities in teaching and learning of Electrical/Electronics Technology Education courses. Journal of Education and Practice, 6(33), 39–46. http://files.eric.ed.gov/fulltext/EJ1083540.pdf*
20. *Ottosson S., Sri Sudha Vijay Keshav Kolla (2017). Which product development method is Best for Need Based New Product Development? 11th International Workshop on International Design Engineering. https://www.researchgate.net/publication/publication*
21. *Platon, C., Pambid, R., & Lomboy, E. (2017). Food Safety Practices among Native Delicacy Producers and Vendors in the Public Market of Bayambang in Pangasinan, Philippines. Asia Pacific Journal of Education, Arts and Sciences, 4(2), 95–102. http://apjeas.apjmr.com/wp-content/uploads/2017/10/APJEAS-2017.4.2.12a.pdf*
22. *Simkus, J. (2023). Stratified Random Sampling: Definition, Method & Examples. Simply Psychology. https://www.simplypsychology.org/stratified-random-sampling.html*
23. *Simply Psychology. (2023, December 18). Qualitative vs Quantitative Research: What's the Difference? https://www.simplypsychology.org/qualitative-quantitative.html*
24. *Shah, R. K. (2019). Effective constructivist teaching learning in the classroom. Shanlax International Journal of Education, 7(4), 1–13. https://doi.org/10.34293/education.v7i4.600*
25. *Tayam, R. (2018). K12 Learning Module in Basic Baking and Bakeshop Production. www.academia.edu.https://www.academia.edu/36057937/K12_Learning_Module_in_Basic_Baking_and_Bakeshop_Production*
26. *Tulsa Public Schools, (2016). TLE Observation and Evaluation Rubric Instructional Coaches/Instructional Technology Coaches/New Teacher Mentors.https://resources.finalsite.net/images/v1629406076/ccosaorg/omybbwu22gefnw68g9ix/TLErubrics-2.pdf*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FORMULATION AND EVALUATION OF HERBAL INHALANT GEL CONTAINING THYME OIL

Swapnil Bharat Rathod[1*], Avinash Wagh[2], Sonali Tukaram Chavan[3].

[1]Student of Bachelor of Pharmacy, Faculty of Pharmacy, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.

[2]Department of Pharmaceutics, Faculty of Pharmaceutics, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.

[3]Student of Bachelor of Pharmacy, Faculty of Pharmacy, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.

ABSTRACT

Formulation and evaluation of a herbal inhalant gel containing thyme oil, aimed at providing a natural alternative for respiratory and skin applications. Thyme oil, renowned for its antimicrobial properties due to thymol and carvacrol, serves as a key ingredient. thyme plant shows beneficial activity for body. thyme oil in an inhalant gel provides antimicrobial, spasmolytic, and expectorant benefits, while also allowing for a natural, stable, and well-tolerated delivery system. The formulation process involves extraction of thyme oil from dried thyme leaves followed by incorporation into aloe vera gel. Pharmacological investigations reveal the potential bronchodilation, anti-inflammatory, and antimicrobial effects of thyme oil, supporting its therapeutic value in respiratory conditions. Evaluation tests encompass physical characteristics assessment, pH measurement, homogeneity analysis, spreadability test, and viscosity measurement. This comprehensive approach offers insights into the development of an effective herbal inhalant gel with thyme oil, promising for respiratory and skin health.

KEYWORDS: -*thyme plant, gel formulation, respiratory disease treatment*

INTRODUCTION

The formulation and evaluation of a herbal inhalant gel containing thyme oil involves creating a delivery system with potential antimicrobial properties. Thyme essential oil, rich in thymol and carvacrol, is key for its effects on microorganisms like Candida albicans.

The gel's texture is optimized using central composite design, with colloidal silica and paraffin oil influencing firmness, cohesiveness, and consistency.(3)

Thyme oil's properties, such as being spasmolytic, expectorant, and antimicrobial, make it valuable for cough relief and cold symptoms.(2)

This herbal gel offers a natural alternative for respiratory and skin application.(1)

the key benefits of using thyme oil in inhalant gels are:

Spasmolytic, expectorant, and antimicrobial effects: Thyme oil has properties that can help relieve cough and cold symptoms, as it is spasmolytic (relaxes muscles), expectorant (promotes mucus clearance), and antimicrobial. (2)(12)

Antimicrobial properties: Thyme essential oil, rich in thymol and carvacrol, has significant antimicrobial activity against microorganisms like Candida albicans. This makes it valuable for respiratory and skin applications.(13)

Natural alternative: The herbal inhalant gel offers a natural alternative to synthetic medications for respiratory and skin conditions. (14)

Optimized texture and stability:The gel formulation can be optimized using ingredients like colloidal silica and paraffin oil to achieve desirable texture, firmness, cohesiveness, and stability.(3)(15)

Hypothesis: - In earlier studies, thyme plant shows beneficial activity for body. thyme oil in an inhalant gel provides antimicrobial, spasmolytic, and expectorant benefits, while also allowing for a natural, stable, and well-tolerated delivery system. (16)

Materials

1. **Herbal ingredients:**
   a. thyme leaves (extract)

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2. **Chemical ingredients:**
   - **a.** Carbapol 940
   - **b.** Triethanolamine
   - **c.** Sodium benzoate
   - **d.** Distilled water

Plant Description

Thyme is a tiny perennial shrub, with a semi evergreen groundcover that seldom grows quite 40 cm tall it's each horizontal and upright habits. The stems become woody with age. Thyme leaves are terribly little, usually 2.5 to 5 mm long and vary significantly in form and hair covering, depending on the variety, with every species having a rather completely different scent. [4]

Thymus vulgaris leaves are oval to rectangular in form and somewhat fleshy aerial components are used for volatile oil production, principally by steam distillation. The contemporary and dried herb market uses it for cookery functions. Thyme grows well during a temperate to heat, dry, sunny climate, and wherever the plants don't seem to be shaded. It desires full sun to grow to its best potential. Thyme doesn't like excessive wet as a result of its condition it will get rot diseases. Thyme prefers lightweight, well drained soils with a pH of 5.0 to 8.0. Thyme species do best in coarse, rough soils that may be unsuitable for several alternative plants. [5]



Fig.1. Thyme plant

Taxonomical classification [10]

Kingdom	Plantae
Phylum	Tracheophyta
Class	Magnoliopsida
Order	Lamiales
Family	Labiatae
Scientific name	*Thymus vulgaris*
Common name	**English –** common thyme, garden thyme **Hindi –** ban ajwain
synonyms	*Origanum thymus* Kuntze *Thymus collinus* Salisb**.**

Chemical constituents and uses

Chemical constituent	Biological activities(uses)	Reference
Thymol [6]	Antiseptic, antibacterial, antifungal and antioxidant properties	(Aeschbach et al., 1994; Cosentino et al., 1999; Venturini et al., 2012).
Linalool [7]	Antiviral effect, anti-inflammatory, antioxidant, anti-anaphylactic activities	Elisabetsky et al., 1995; Usta et al., 2009; Bagetta et al., 2010; Coelho et al., 2011).
Eugenol [8]	Neuro-protective, anticancer, antibacterial, and anti-anaphylactic activities	Laekeman et al., 1990; Atsusane, 1991. Wie et al., 1997; Jadhav et al., 2004
Carvacrol [9]	Antimicrobial, anti-thrombotic, anti-inflammatory, acetyl cholinesterase inhibitory properties	Enomoto et al., 2001; Sosa et al., 2005; Jukic et al., 2007

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Formula

Sr.no	Ingredient	quantity	category
1	Thyme oil	1-2 ml (5-6 drop)	Expectorant
2	Carbapol	1gm	Gelling agent
3	Sodium benzoate	0.3gm	Preservative
4	Triethanolamine	0.5 gm	pH stabilizer
5	water	q. s	Vehicle

Procedure of formulation

A) extraction

1. Take dried thyme leaves.
2. Triturate thyme leaves with mortar pestle.
3. 1000 gm. of thyme leaves used in extraction with 3000 ml of 95% ethanol in ratio 1:3.
4. Collect the essential oil extracted at the volumetric flask by separation of ethanol and essential oil.
5. Store essential oil in amber bottle and away from sunlight. [11]

B) Formulation

1. Thyme Oil Preparation
   Measure out 2 grams of thyme oil and set it aside for later incorporation into the gel.
2. Carbopol Gel Preparation
   Sprinkle Carbopol: Slowly sprinkle 1 gram of Carbopol into approximately 20 grams of purified water while stirring continuously to prevent clumping.
   Hydration: Allow the mixture to hydrate for at least 30 minutes until it forms a clear gel.
3. Neutralizing Carbopol Gel
   Add TEA: Drop triethanolamine (TEA) into the Carbopol gel gradually while stirring until the pH reaches around 6.5-7.0. Use a pH meter or strips for accurate monitoring.
   Importance of Neutralization: Neutralizing Carbopol is crucial for achieving the desired gel consistency.
4. Incorporating Thyme Oil
   Add Thyme Oil: Slowly add the 2 grams of thyme oil to the neutralized Carbopol gel.
   Stirring: Gently stir to ensure even distribution of the thyme oil throughout the gel.
5. Adding Sodium Benzoate
   Dissolve Sodium Benzoate: Dissolve 0.3 grams of sodium benzoate in a small amount of purified water.
   Incorporate: Add the sodium benzoate solution to the thyme oil-infused gel and stir well for uniform dispersion. [17]
6. Checking and Adjusting pH
   Use a pH meter or strips to check the final pH of the gel, aiming for 6.5-7.0. Adjust, if necessary, by adding more TEA (to increase pH) or citric acid (to decrease pH).
7. Final Adjustment and Packaging:
   Consistency Check: Assess the consistency and texture of the gel. Adjust thickness by adding small amounts of purified water if needed.
8. Packaging:
   Once satisfied with texture and pH, transfer the herbal inhalant gel into clean, airtight containers or tubes suitable for storage and application. [18]

Pharmacology

Bronchodilation: Thyme oil has been shown to relax bronchial muscles, leading to bronchodilation and improved airflow. This can help alleviate symptoms of asthma and COPD.

Anti-inflammatory effects: Thyme oil can reduce inflammatory markers like IL-1β and IL-8, and downregulate NF-κB signalling, thereby exerting anti-inflammatory actions in the respiratory tract. [19][20]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

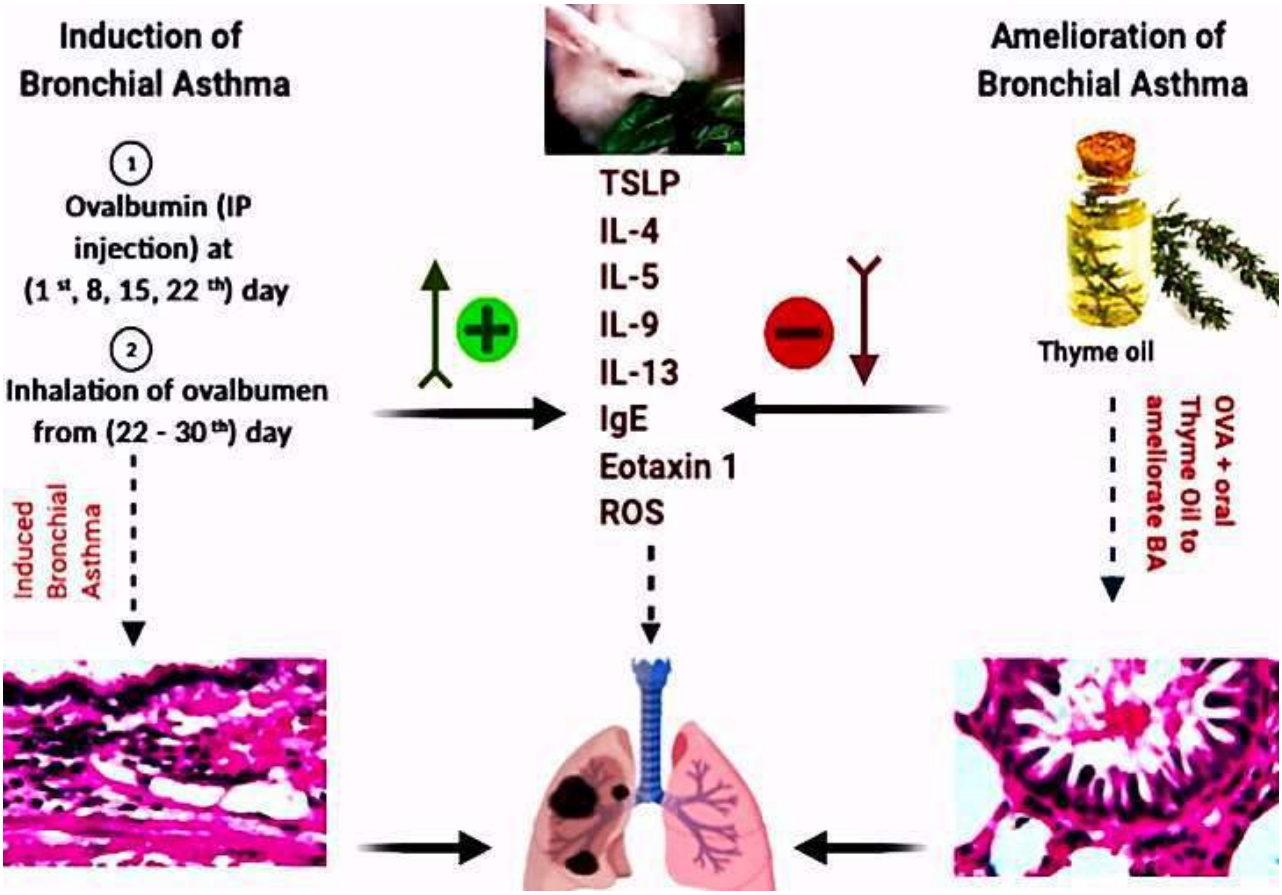


Fig.2. MOA

Antimicrobial activity: Thyme oil exhibits potent antimicrobial properties, including against multidrug-resistant strains, which can help combat respiratory infections that may exacerbate asthma and COPD.[21][22]

Mucociliary clearance enhancement: Thyme oil can increase cilia beating frequency and modulate calcium and cAMP signalling, improving mucociliary clearance in the airways.[19]

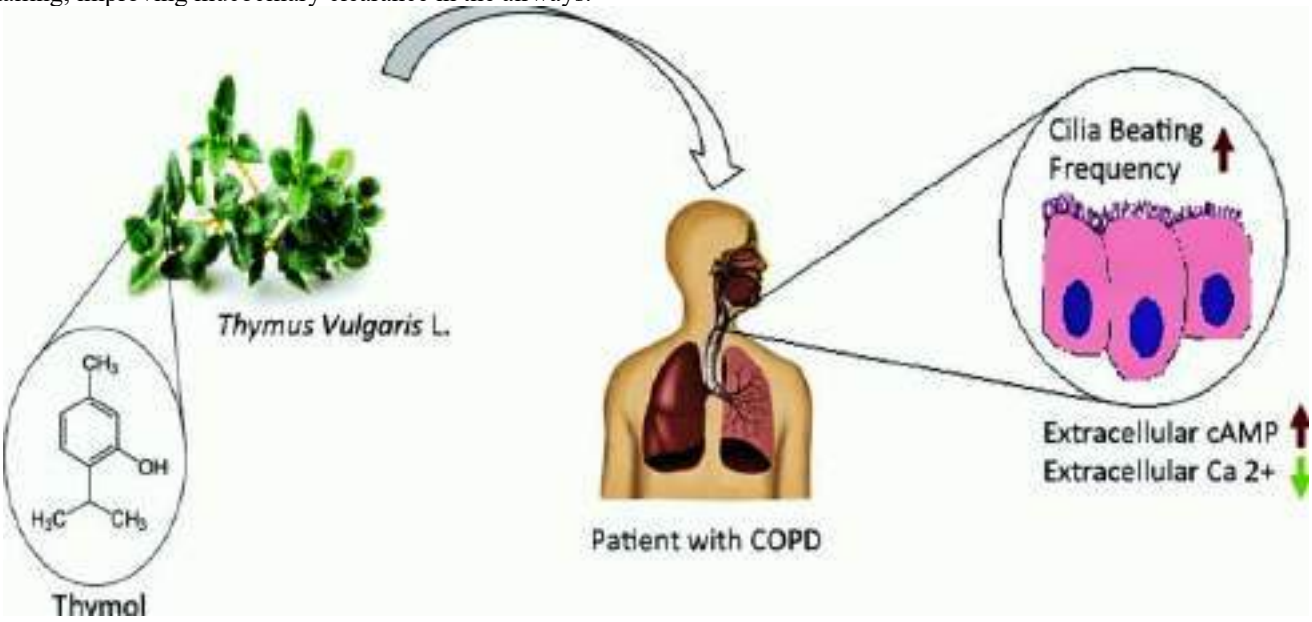


Fig.3. MOA (mucociliary)

Antiviral effects: Thyme oil and its active compounds have demonstrated antiviral activity against respiratory viruses like influenza and SARS-CoV-2.[21]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Evaluation test [23]**: -**

External appearance of the gel

A. Physical evaluation: Visual checks on physical characteristics, such as colour, smell and consistency, were performed.

B. Colour: A visual inspection was conducted to determine the formulation's colour.

C. Consistency: Consistency was evaluated by applying the formulation onto the skin.

D. Odor: The formulation's Odor was tested by smelling the Odor of the mixture of the gel with water. Table reveals the physical evaluation of the gel formulation.

Measurement of pH

Using a digital pH meter, the pH of the formulation of the herbal gel was assessed. A precise 2.5 g of gel was weighed, dissolved in 25 mL purified water, and kept in storage for 2 h. The pH of the formulation was then measured by fully submerging the glass electrode 3 times in the gel system, and the average values of pH were calculated.

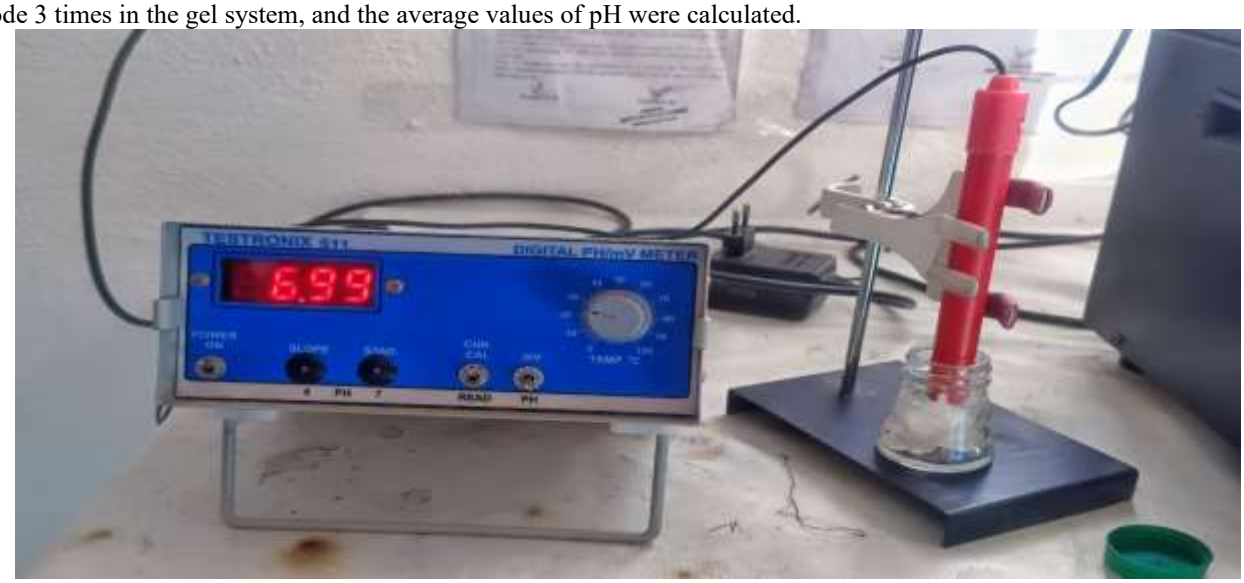


Fig.4. Digital pH Meter

Homogeneity

All generated gels were checked visually for homogeneity after being placed in a container to assess the appearance and the presence of aggregates. They were examined for the presence of aggregates and how they appeared. [23]

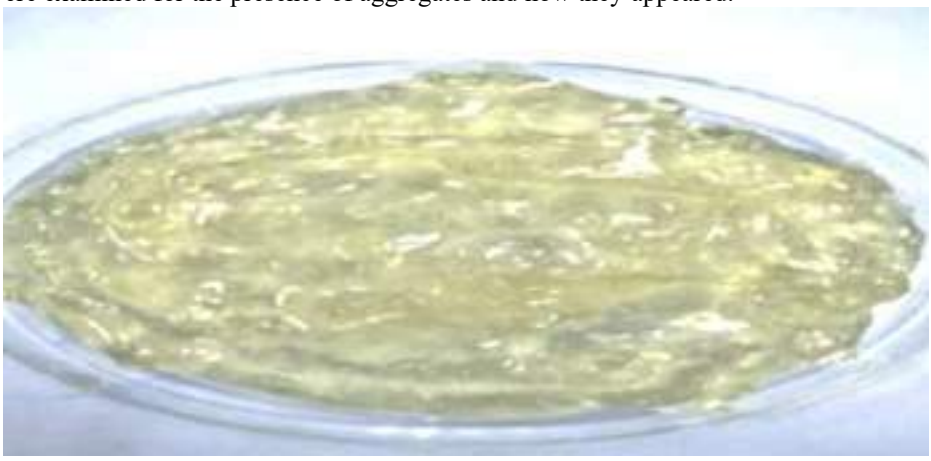


Fig.5. Homogeneity

Spreadability

Based on the gel's slip and drag properties, spreadability was determined using wooden equipment. On these ground slides, more gel (approximately 2 g) was added to the experiment. Another glass slide oriented with a fixed direction was then given the gel and then sandwiched between these slides. Weight of 1 kg was fixed on the top of the slide for 5 min to eject air and to offer an even film of the gel linking the slides. Surplus of the gel was scrapped off from the boundaries. The apex plate was then subjected to drag of 50 g. A shorter interval indicates better spreadability.

Spreadability was calculated using the following formula:

$$S = (M \times L)/T$$

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Where S is spreadability; M is weight in the pan; L is length moved by the glass slide; and T is time in seconds taken to separate the slide completely each other. [24]

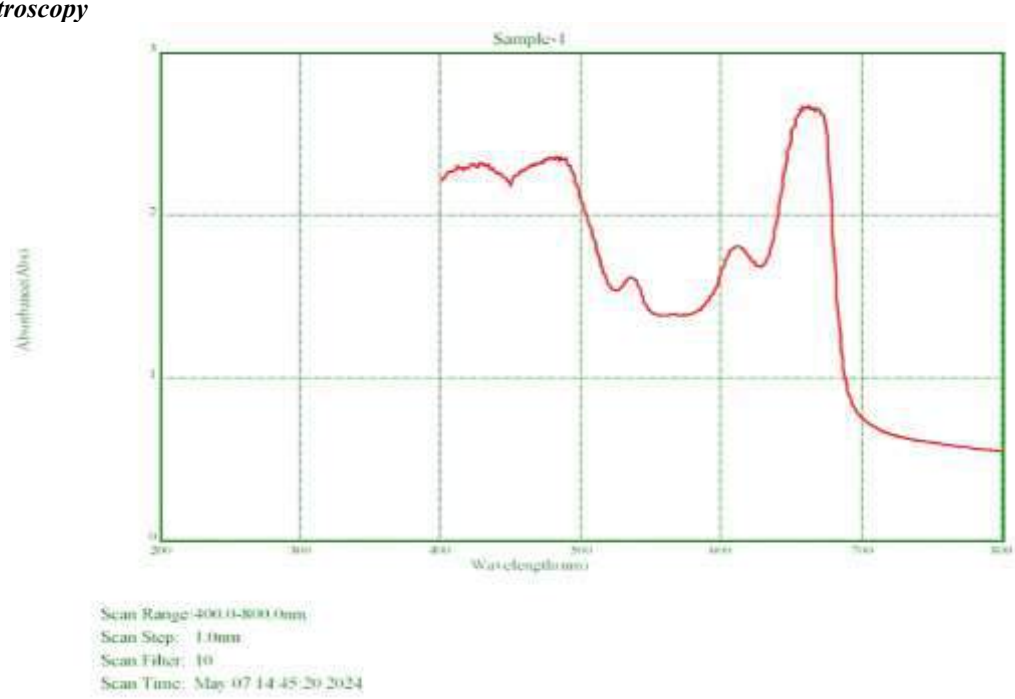
Viscosity

The Brookfield viscometer was used to measure the viscosity of the created gel at a temperature of 25°C. The dial reading for each speed was recorded as the gels were rotated at 0.3, 0.6, and 1.5 rotations per minute. The gels' viscosity was then determined by multiplying the dial reading by a value listed in the Brookfield viscometer catalogues.

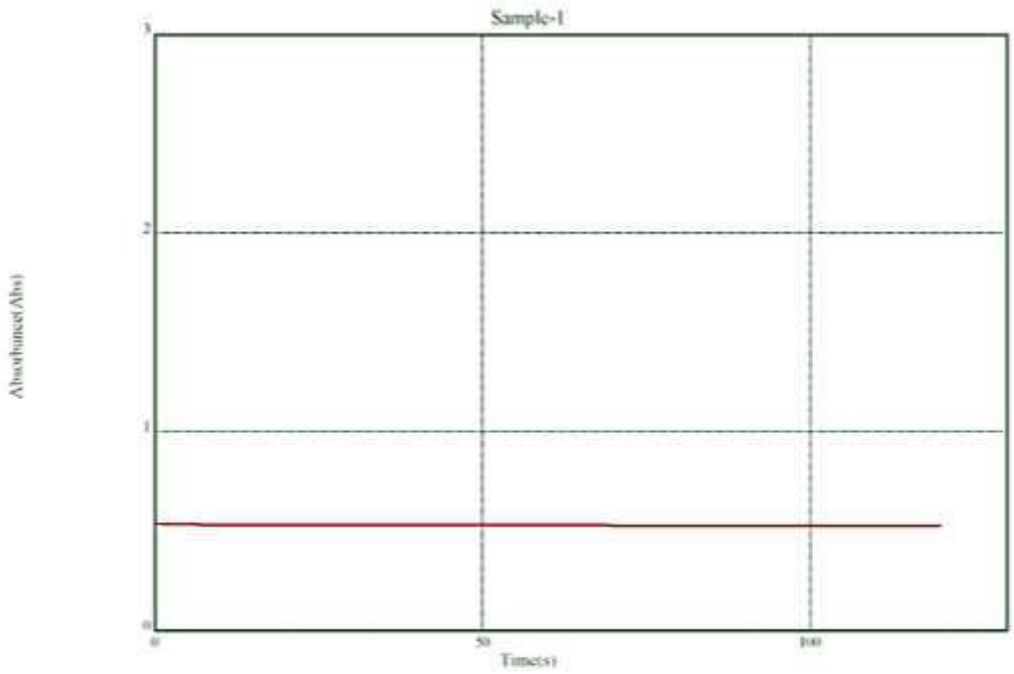


Fig.6. Viscosity

UV- Visible spectroscopy



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Wavelength:700.0nm
Total Time: 120s
Scan Step: 1.0s
Operator: UV Spectrophotometer
Scan Time: May 07 14:46:49 2024

Sample 1

0.0s	0.5297	34.0s	0.5269	68.0s	0.5242	102.0s	0.5225
1.0s	0.5296	35.0s	0.5269	69.0s	0.5242	103.0s	0.5225
2.0s	0.5295	36.0s	0.5268	70.0s	0.5241	104.0s	0.5226
3.0s	0.5293	37.0s	0.5269	71.0s	0.5240	105.0s	0.5224
4.0s	0.5292	38.0s	0.5269	72.0s	0.5236	106.0s	0.5224
5.0s	0.5290	39.0s	0.5270	73.0s	0.5237	107.0s	0.5223
6.0s	0.5289	40.0s	0.5269	74.0s	0.5236	108.0s	0.5224
7.0s	0.5289	41.0s	0.5267	75.0s	0.5236	109.0s	0.5222
8.0s	0.5288	42.0s	0.5267	76.0s	0.5234	110.0s	0.5222
9.0s	0.5287	43.0s	0.5267	77.0s	0.5234	111.0s	0.5220
10.0s	0.5285	44.0s	0.5266	78.0s	0.5233	112.0s	0.5220
11.0s	0.5283	45.0s	0.5265	79.0s	0.5232	113.0s	0.5218
12.0s	0.5281	46.0s	0.5264	80.0s	0.5233	114.0s	0.5218
13.0s	0.5280	47.0s	0.5264	81.0s	0.5231	115.0s	0.5216
14.0s	0.5278	48.0s	0.5262	82.0s	0.5230	116.0s	0.5215
15.0s	0.5277	49.0s	0.5262	83.0s	0.5230	117.0s	0.5214
16.0s	0.5278	50.0s	0.5262	84.0s	0.5229	118.0s	0.5213
17.0s	0.5277	51.0s	0.5260	85.0s	0.5229	119.0s	0.5213
18.0s	0.5278	52.0s	0.5260	86.0s	0.5229	120.0s	0.5213
19.0s	0.5276	53.0s	0.5258	87.0s	0.5228		
20.0s	0.5275	54.0s	0.5256	88.0s	0.5229		
21.0s	0.5276	55.0s	0.5256	89.0s	0.5229		
22.0s	0.5275	56.0s	0.5254	90.0s	0.5229		
23.0s	0.5276	57.0s	0.5254	91.0s	0.5226		
24.0s	0.5275	58.0s	0.5252	92.0s	0.5228		
25.0s	0.5276	59.0s	0.5252	93.0s	0.5228		
26.0s	0.5275	60.0s	0.5250	94.0s	0.5228		
27.0s	0.5275	61.0s	0.5248	95.0s	0.5228		
28.0s	0.5275	62.0s	0.5248	96.0s	0.5227		
29.0s	0.5274	63.0s	0.5247	97.0s	0.5228		
30.0s	0.5273	64.0s	0.5247	98.0s	0.5224		
31.0s	0.5273	65.0s	0.5246	99.0s	0.5223		
32.0s	0.5272	66.0s	0.5244	100.0s	0.5225		
33.0s	0.5270	67.0s	0.5244	101.0s	0.5225		

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Observation and Result

A). **physical parameters**

Sr.no	Physical parameter	
1	Colour	Transparent
2	Odour	Aromatic
3	Consistency	Good

B) **pH determination:** slightly alkaline (6.99)
C) **Homogeneity**: good
D) **Spreadability:** 5.5 ± 0.5 cm
E) **Viscosity:** 4500 cps
F) **Uv-Visible spectroscopy:** 400-600 nm

CONCLUSION

The formulation and evaluation of the herbal inhalant gel containing thyme oil present a promising natural alternative for respiratory and skin applications. Thyme oil, rich in thymol and carvacrol, offers significant antimicrobial, spasmolytic, and expectorant properties, making it beneficial for alleviating cough, cold symptoms, and respiratory conditions. Through a meticulous formulation process and optimization of texture and stability, the gel ensures a consistent and effective delivery system. The inclusion of key ingredients like Carbapol, Sodium benzoate, and Triethanolamine, along with careful consideration of pH levels, contributes to the gel's quality and efficacy. Furthermore, the pharmacological properties of thyme oil, including bronchodilation, anti-inflammatory effects, antimicrobial activity, and mucociliary clearance enhancement, underscore its therapeutic potential in managing respiratory ailments.

The comprehensive evaluation tests, encompassing physical characteristics, pH measurement, homogeneity, spreadability, and viscosity assessment, provide valuable insights into the gel's performance and quality assurance.

Overall, the herbal inhalant gel containing thyme oil emerges as a promising formulation, offering a natural, stable, and well-tolerated solution for respiratory and skin conditions, backed by its potent therapeutic properties and rigorous evaluation.

REFERENCE

1. *Australlan essential oils limited, N.S.W "Medical and dental data of ti-trol and melasol" issued 1931, revised 1936.*
2. *European medicines agency "Assessment report on thymus vulgaris.L, thymus zygis, loefi. Ex. L.,aetheroleum"16 sept 2010*
3. *Giedre Kasparaviciene, Zenona Kalveniene, Alvydas Pavilonis, Ruta Marksiene, Jurgita Dauksiene, and Jurga Bernatoniene "Formulation and Characterization of Potential Antifungal Oleogel with Essential Oil of Thyme" Published online 2018 Apr 19.*
4. *http://bioweb.uwlax.edu/bio203/s.2012/disrud_samaclassification.html*
5. *Usha kiran reddy, sindhu gillalla "A Review On Thymus Vulgaris For Its Reported Pharmacological Activities And Major Chemical Constituents" January 2017*
6. *Aeschbach, R., J. Loliger, B.C. Scott, A. Murcia, J. Butler, B. Halliwell and O.I. Aruoma., 1994. Antioxidant action of thymol, carvacrol, 6-gingerol,zingerone and hydroxytyrosol. Food and Chemical Toxicology, 32: 31-36.*
7. *Elisabetsky, E., G.P. Coelho de Souza, M.A.C. dos Santos, I.R.Siqueira and T.A. Amador., 1995. Sedative properties of linalool. Fitoterapia, 66(5): 407-414.*
8. *Laekeman, G.M., V.L.Hoof, A. Haemers, V.A.D. Berghe, A.G. Herman and A.K.Vlietink., 1990. Eugenol, a valuable compound for in vitro experimental research and worthwhile for further in vivo investigation. Phytotherapy Research, 4(3): 90-96.*
9. *Enomoto, S., R. Asano, Y. Iwahori, T. Narui and Y. Okada., 2001. Hematological studies on black cumin oil from the seeds of nigella sativa l. Biological & pharmaceutical bulletin, 24(3): 307-310*
10. *http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T203348a2764289.en*
11. *Redfern J, Kinninmonth M, Burdass D, Verran J. Using soxhlet ethanol extraction to produce and test plant material (essential oils) for their antimicrobial properties. J Microbiol Biol Educ. 2014 May 1;15(1):45-6. doi: 10.1128/jmbe.v15i1.656. PMID: 24839520; PMCID: PMC4004744.*
12. *Mehandel, A. M., Escher, G. B., Möckel, K., & Lenhardt, I. (2021). Efficacy and safety of a thyme preparation in adults suffering from acute bronchitis. Wiener Medizinische Wochenschrift, 171(9), 244-252. https://doi.org/10.1007/s10354-020-00783-z*
13. *Nazzaro, F., Fratianni, F., De Martino, L., Coppola, R., & De Feo, V. (2013). Effect of essential oils on pathogenic bacteria. Pharmaceuticals, 6(12), 1451-1474. https://doi.org/10.3390/ph6121451*
14. *Nikolić, M., Pavunraj, M., Jadranin, M., Bozin, B., Milenković, M., Karabegović, I., & Lazić, M. (2020). Thyme and oregano plant essential oils as natural sources of bioactive compounds for food preservation and health benefits. Foods, 9(6), 744. https://doi.org/10.3390/foods9060744*
15. *Perinelli, D. R., Bonacucina, G., Palmieri, G. F., & Cespi, M. (2017). Characterization of mucoadhesive/thermogelling systems for vaginal delivery of anti-HIV microbicides. AAPS PharmSciTech, 18(6), 1983-1992. https://doi.org/10.1208/s12249-016-0668-4*
16. *Kemmerich, B., Eberhardt, R., & Stammer, H. (2006). Efficacy and tolerability of a fluid thyme extract in adults suffering from acute bronchitis. Arzneimittelforschung, 56(09), 652-660. https://doi.org/10.1055/s-0031-1296764*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

17. *Marwa H Shukr and Ghada F Metwally "Evaluation of Topical Gel Bases Formulated with Various Essential Oils for Antibacterial Activity against MethicillinResistant Staphylococcus Aureu" Tropical Journal of Pharmaceutical Research December 2013*
18. *Suresh Karudumpala1, Sangeeetha G, K. Gnana Praksh, Harikrishna G, Balaji G, Anudeep K "Formulation and Evaluation of Carisoprodol Topical Gel" Research J. Pharm. and Tech. 7(1): January 2014*
19. *Massimo Nabissi [1], Oliviero Marinelli [2], Maria Beatrice Morelli [2], Giovanna Nicotra [3], Romilde Iannarelli [2], Consuelo Amantini [4], Giorgio Santoni [2], Filippo Maggi "Thyme extract increases mucociliary-beating frequency in primary cell lines from chronic obstructive pulmonary disease patients" Epub 2018 Jun 2*
20. *AymanM. Mousa, Ahmad Almatroudi, AmeenS. Alwashmi, WaleedAl Abdulmonem, Abdullah S.M. Aljohani "Thyme oil alleviates Ova-induced bronchial asthma through modulating Th2 cytokines, IgE, TSLP and ROS" Biomedicine & Pharmacotherapy Volume 140, August 2021, 111726*
21. *Adam Kowalczyk, Martyna Przychodna, Sylwia Sopata, Agnieszka Bodalska, Izabela Fecka "Thymol and Thyme Essential Oil – New Insights into Selected Therapeutic Applications" 16 July 2020 / Revised: 7 September 2020 / Accepted: 8 September 2020 / Published: 9 September 2020*
22. *Esra Eroglu, OzkanEzgi Ersoy, Yeter Yesil Canturk, Emel Mataraci Kara, Ercan Cinar, Hasan Sahin "The Therapeutic Potential of Ethnomedicinally Important Anatolian Thyme Species: A Phytochemical and Biological Assessment" harmacol., 09 June 2022*
23. *Puja Kumari*, Souravh Bais "Formulation and Pharmacological Evaluation of Herbal Gel Containing Curcuma longa" INNOSC Theranostics and Pharmacological Sciences 2022 Vol. 5*
24. *Aiyalu, R.; Govindarjan, A.; Ramasamy, A. Formulation and Evaluation of Topical Herbal Gel for the Treatment of Arthritis in Animal Model. Braz. J. Pharm. Sci., 2016, 52, 493–507.*
25. *Billiau, A.; Matthyas, P. Modes of Action of Freund' Adjuvant in Experimental Mode*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

ARTIFICIAL INTELLIGENCE AND PRIVACY: SAFEGUARDING HUMAN RIGHTS IN A DIGITAL AGE

[1]Dr. Kiranbir Kaur, [2]Dr. Arsheed Ahmad Ganie
[1]Ph. D Scholar (Political Science),IEC University, Baddi -HP
[2]Assistant Professor (Political Science) IEC University, Baddi -HP

ABSTRACT
The convergence of Artificial Intelligence (AI) and privacy in our digital age presents profound implications for human rights. This article explores the multifaceted relationship between AI and privacy, examining ethical considerations, legal frameworks, emerging trends, and the roles of organizations and institutions in safeguarding individual rights. Beginning with an overview of AI technology and its applications, the discourse delves into the definition and significance of privacy in the digital realm. It scrutinizes how AI technologies leverage personal data, elucidating potential privacy risks and ethical dilemmas. Legal frameworks and international standards governing privacy and AI are examined, highlighting the importance of regulatory compliance and global cooperation. Case studies of privacy breaches involving AI underscore the imperative for accuracy, transparency, and responsible use of AI technologies. Privacy-preserving AI technologies, such as differential privacy and federated learning, are explored as mechanisms for maintaining user privacy amidst the proliferation of big data. Ethical principles guiding AI development, including transparency, fairness, and accountability, are emphasized as essential safeguards against privacy violations. The roles of organizations, governmental bodies, and non-governmental organizations in upholding privacy rights are delineated, emphasizing the need for collaboration and advocacy. Public awareness and education initiatives are deemed crucial for empowering individuals to navigate the complexities of AI and privacy. This article advocates for a holistic approach to AI governance, rooted in ethical principles and legal safeguards, to uphold privacy as a fundamental human right in the digital age.
KEYWORDS: *Artificial Intelligence, Human Rights, Privacy, roles, awareness.*

1. INTRODUCTION

In the dawn of an unprecedented technological revolution, artificial intelligence (AI) stands at the forefront, heralding a new era of innovation. This transformative force, however, brings with it a labyrinth of privacy concerns that touch the very core of human rights. As AI systems intricately weave into the fabric of daily life, the safeguarding of personal data emerges as a critical issue. This article embarks on a comprehensive exploration of the intricate dance between AI and privacy, dissecting the ethical, legal, and societal layers that underpin this modern conundrum. From the algorithms that predict our next online click to the surveillance systems monitoring our movements, the digital age challenges us to redefine the boundaries of privacy. Through a nuanced discourse, we examine the multifaceted relationship between AI and privacy, navigating the complex terrain where technology meets humanity. Join us as we delve into the pressing need to balance the scales of innovation with the preservation of fundamental human rights, ensuring that the march of progress does not trample the sanctity of individual privacy in the digital age

2. OVERVIEW OF AI TECHNOLOGY

Definition and Concept:

- AI refers to computer systems capable of performing tasks that typically require human intelligence. These tasks include **reasoning, decision-making, and pattern recognition**[1].
- The term AI encompasses a broad range of technologies, from **machine learning** to **natural language processing (NLP)**, and it powers many services and goods we use daily[1].

Types of AI:

- **Reactive Machines**: These are basic forms of AI that respond to specific situations and do not have past memory to inform decisions.
- **Limited Memory**: This AI can make informed and improved decisions by studying past data and experiences.
- **Theory of Mind**: An advanced AI that understands emotions, people, and beliefs, and can interact socially.
- **Self-Awareness**: This is the pinnacle of AI, where machines have their own consciousness and self-awareness[2].

Applications:

- AI is used in various applications, such as **digital assistants, GPS guidance, autonomous vehicles**, and **generative AI tools** like Chat GPT.
- It's also employed in **healthcare** for diagnostics, in **finance** for trading algorithms, and in **customer service** as chatbots.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Weak AI vs. Strong AI:

- **Weak AI**, also known as **narrow AI**, is designed for specific tasks and includes robust applications like Siri, Alexa, and self-driving vehicles.
- **Strong AI** includes **artificial general intelligence (AGI)**, where machines would have intelligence equal to humans, and **artificial superintelligence (ASI)**, which would surpass human intelligence.

Ethics and Governance:

- As AI becomes more integrated into our lives, ethical considerations and governance become crucial. This includes ensuring AI systems are **fair, transparent, and accountable**.
- AI governance is a business imperative for scaling enterprise AI, focusing on risk management and AI ethics.

Future Prospects:

- AI is expected to continue advancing, with potential breakthroughs in **general artificial intelligence (GAI)** and **superintelligence**.
- The future of AI may bring more personalized services, improved efficiency, and solutions to complex global challenges.

Therefore, AI technology is a rapidly evolving field with significant implications for society. It offers immense potential for innovation and improvement across various sectors but also presents challenges that need to be addressed with careful consideration of ethics and human rights.

3. DEFINITION AND IMPORTANCE OF PRIVACY IN THE DIGITAL AGE

Privacy in the digital age is a critical concept that has gained immense importance as our interactions and transactions have increasingly moved online. Here's a detailed look at the definition and importance of privacy in this era:

Definition of Privacy in the Digital Age:

- **Digital Privacy** is the right and expectation of individuals to control their personal information within digital environments. It's about protecting sensitive data—specifically personal information, communication, and conduct—that are generated and transmitted digitally.
- It involves safeguarding one's **digital identity**, ensuring the confidentiality and security of communications and transactions, and maintaining control over user-generated data.

Importance of Privacy in the Digital Age:

- **Protection of Personal Information**: With vast amounts of personal data being generated on digital platforms, privacy ensures that intimate insights about individuals' lives are not misused or exposed without consent.
- **Human Dignity and Autonomy**: Privacy maintains a boundary that protects users from unwanted intrusions and manipulations of data, preserving human dignity and individual autonomy.
- **Democratic Society**: A healthy democratic society relies on the freedom of thought and expression. Digital privacy promotes diversity of ideas and opinions while protecting against manipulative influences.
- **Economic Value**: In the business sphere, digital privacy practices foster customer trust and build corporate reputation, which are indispensable for growth and success.
- **Cybersecurity**: With the rise of cybercriminal activities, protecting personal data is not just desirable but a vital necessity to prevent data breaches and cyber threats.

Challenges in the Digital Age:

- **Data Collection and Usage**: The digital age has revolutionized the collection and usage of personal data, often without the explicit consent of individuals.
- **Surveillance and Tracking**: There is a growing concern over the extent of surveillance and tracking capabilities that technology companies and governments possess.
- **Regulatory Frameworks**: The need for robust regulatory frameworks to protect privacy rights is more pressing than ever, as current laws may not fully address the complexities of the digital landscape.

Privacy in the digital age is about more than just protecting personal information; it's about maintaining the integrity of our digital selves and ensuring that our rights and freedoms are preserved in an increasingly connected world. As we navigate this digital landscape, it's crucial to advocate for strong privacy protections and ethical data practices to uphold the values of a free and open society.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4. THE INTERSECTION OF AI AND PRIVACY

The intersection of AI and privacy is a complex and evolving subject, with significant implications for individuals and society. Below is a comprehensive examination of this juncture, elucidating the mechanisms by which AI leverages personal data and outlining the conceivable privacy hazards therein.:

The Intersection of AI and Privacy:

- AI and privacy intersect in the way AI systems collect, process, and use personal data. AI technologies have the capability to analyze vast amounts of data, including personal information, to make decisions, provide personalized experiences, and improve services.
- The governance of AI and privacy involves understanding the similarities and differences between the two domains, and how each impacts the other. A comparative analysis shows that while privacy can influence AI development, AI can also affect privacy considerations, sometimes creating gaps or tensions.

How AI Technologies Utilize Personal Data:

- AI systems rely on large datasets to train algorithms and enhance decision-making capabilities. This often includes personal or sensitive information, which raises concerns about privacy breaches and unauthorized access.
- Personal data is used by AI to learn patterns, make predictions, and personalize experiences. This ranges from content recommendations to targeted advertising, and it's done by analyzing data like browsing history, purchase records, and even biometric data.

Potential Privacy Risks Associated with AI:

- **Data Exploitation**: AI's ability to gather and analyze massive quantities of data can lead to the exploitation of personal data by third parties, including businesses and governments.
- **Identification and Tracking**: AI applications, such as autonomous vehicles and facial recognition systems, can track location and habits, leading to concerns over systematic digital surveillance.**Inaccuracies and Biases**: AI technologies, like facial recognition, can lead to discriminatory outcomes and errors, dispro
- portionately affecting certain groups.
- **Prediction and Filter Bubbles**: AI can create "filter bubbles" by serving up information based on assumed preferences, potentially leading to intellectual isolation.

To mitigate these risks, it's essential to have robust regulatory frameworks and ethical guidelines in place. This includes ensuring AI systems are transparent, accountable, and designed with privacy protection in mind. Additionally, individuals should be aware of their digital footprint and the potential use of their personal data in AI systems. As AI continues to advance, the dialogue around privacy and the responsible use of AI must also evolve to protect individual rights and maintain trust in technology.

5. LEGAL FRAMEWORKS AND REGULATIONS

Existing Laws and Regulations Protecting Privacy:

1. **The Privacy Act of 1974**:
   - The **Privacy Act of 1974** is a U.S. federal law that enhances individual privacy protection. It governs the collection, use, and disclosure of personal information by federal agencies. The Act provides individuals with certain rights, including access to their records and the ability to correct inaccuracies.
2. **Children's Online Privacy Protection Act (COPPA)**:
   - COPPA regulates the collection of personal information from children under 13 years old by online operators. It requires parental consent and imposes restrictions on data handling practices.
3. **Health Insurance Portability and Accountability Act (HIPAA)**:
   - HIPAA safeguards individuals' medical information by regulating its collection, use, and disclosure by health care providers and related entities.
4. **Electronic Communications Privacy Act (ECPA)**:
   - ECPA prohibits unauthorized access or interception of electronic communications in storage or transit. It protects email, phone calls, and other electronic communications.
5. **Fair Credit Reporting Act (FCRA)**:
   - FCRA covers the collection and use of data contained in consumer reports, including credit reports. It ensures accuracy and privacy in credit reporting.
6. **Federal Trade Commission (FTC) Act**:
   - The FTC Act prohibits unfair or deceptive acts or practices. The FTC enforces privacy-related regulations and investigates data breaches.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

6. INTERNATIONAL STANDARDS AND GUIDELINES FOR AI AND PRIVACY

1. **ISO/IEC Standards**:
   - The International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) develop technical standards for AI. Notable standards include:
     - **ISO/IEC 42001**: Information technology – Artificial intelligence – Management system.
     - **ISO/IEC 23894**: Guidance on risk management for AI.
2. **NIST's AI Risk Management Framework**:
   - The National Institute of Standards and Technology (NIST) has developed an AI Risk Management Framework (AI RMF 1.0). Incorporating this framework into international standards promotes trustworthy and responsible development and use of AI systems.
3. **OECD AI Principles**:
   - The Organization for Economic Cooperation and Development (OECD) has established AI principles that emphasize transparency, accountability, and privacy. These principles guide responsible AI development across countries.
4. **UNESCO's Recommendation on the Ethics of AI**:
   - UNESCO's recommendation addresses ethical considerations related to AI, including privacy, transparency, and accountability.
5. **Council of Europe's Report "Towards Regulation of AI Systems"**:
   - The Council of Europe explores regulatory approaches for AI systems, including privacy protection and human rights considerations.

In essence , legal frameworks and international standards play a crucial role in ensuring privacy protection and responsible AI development. As AI continues to evolve, harmonizing these regulations globally becomes essential to build trust and safeguard individual rights.

7. CASE STUDIES OF AI AND PRIVACY VIOLATIONS

Notable Incidents of Privacy Breaches Involving AI

1. **Air Canada Chatbot Misinformation**:
   - In February 2024, Air Canada's virtual assistant provided incorrect information to a passenger regarding bereavement fares. The chatbot advised the passenger to buy a regular-priced ticket and apply for a bereavement discount later. However, when the passenger submitted the refund claim, the airline denied it. The case highlights the importance of accurate information dissemination by AI systems and the potential legal consequences.
2. **Sports Illustrated AI-Generated Writers**:
   - In November 2023, online magazine Futurism reported that Sports Illustrated was publishing articles by AI-generated writers. The use of AI to create content raises questions about authenticity, transparency, and the potential misuse of AI-generated content.
3. **Generative AI and Script Kiddies**:
   - The availability of generative AI tools has led to the rise of "Script Kiddies"—individuals with little technical expertise who use pre-existing automated tools or scripts for cyberattacks. AI applications offer potent and cost-effective tools for hackers, making it easier for them to execute sophisticated attacks.

8. LESSONS LEARNED FROM THESE CASE STUDIES

1. **Accuracy and Accountability**:
   - AI systems must provide accurate information to users. Organizations should take reasonable care to ensure that their chatbots and virtual assistants are reliable and provide correct guidance.
   - Accountability for misinformation lies with the organization deploying the AI system, even if the information is provided by a chatbot.
2. **Transparency and Ethical Use**:
   - Transparency is crucial when using AI-generated content. Users should be aware if content is authored by humans or AI.
   - Organizations must adhere to ethical guidelines and ensure that AI-generated content does not deceive or mislead users.
3. **Security and Responsible AI Development**:
   - Organizations should secure their AI tools and prevent misuse by malicious actors.
   - Responsible AI development involves considering potential risks and ensuring that AI systems do not violate privacy rights or contribute to harmful outcomes.

In summary, privacy breaches involving AI highlight the need for accuracy, transparency, and responsible use of AI technologies. Organizations must prioritize user trust and data protection while leveraging the benefits of AI.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

9. PRIVACY-PRESERVING AI TECHNOLOGIES

Privacy-preserving AI technologies are essential for maintaining user privacy in the age of big data and machine learning. Below are the detailed look at these technologies, focusing on techniques for anonymizing data and advances in differential privacy and federated learning:

Techniques for Anonymizing Data

Anonymizing data is crucial for protecting individual privacy when handling large datasets. Here are some common techniques:

1. **Data Masking**: This involves hiding original data with modified content. Techniques include character shuffling, encryption, and substitution.
2. **Pseudonymization**: Replacing private identifiers with pseudonyms or fake identifiers to maintain data utility while protecting privacy.
3. **Generalization**: Reducing the precision of data to make it less identifiable, such as converting exact ages to age ranges.
4. **Data Swapping (Shuffling)**: Rearranging data to break the link between data and the individual.
5. **Data Perturbation**: Adding noise to data or altering data slightly to prevent exact identification.
6. **Synthetic Data**: Generating artificial datasets that provide realistic and statistically valid information without compromising individual privacy.

Advances in Differential Privacy and Federated Learning

Differential privacy and federated learning are two cutting-edge approaches that enhance privacy in AI:

1. **Differential Privacy**: Provides a mathematical guarantee that an individual's privacy is protected when their data is included in a dataset. Recent advances have improved the utility of differentially private algorithms while maintaining strong privacy guarantees.
2. **Federated Learning**: A decentralized approach where AI models are trained across multiple devices or servers holding local data samples, without exchanging them. This preserves data privacy while allowing for collaborative learning.
3. **Combining Both**: Integrating differential privacy into federated learning has been a significant focus, ensuring that the aggregated information remains private and secure.

These advancements in privacy-preserving AI technologies are critical for fostering trust and security in AI applications. They enable organizations to leverage the power of AI while respecting user privacy and adhering to regulatory requirements.

10. ETHICAL CONSIDERATIONS IN AI DEVELOPMENT

As artificial intelligence (AI) continues to shape our world, ethical considerations play a pivotal role in ensuring responsible and accountable AI development. Here, we delve into the ethical principles that guide AI designers and developers, emphasizing the delicate balance between innovation and privacy protection.

Ethical Principles for AI Designers and Developers

1. **Transparency and Explainability**:
   - AI models should be transparent, and their decisions should be explainable. Users and stakeholders need to understand how AI systems arrive at their conclusions.
   - Techniques such as **interpretable machine learning** and **model visualization** help achieve transparency.
2. **Fairness and Non-Discrimination**:
   - AI should treat all individuals fairly, avoiding biases that could lead to discriminatory outcomes.
   - **Fairness-aware algorithms** and **bias mitigation techniques** are essential to address bias in AI systems.
3. **Privacy and Data Protection**:
   - AI tools must respect user privacy and personal data.
   - **Privacy by design** principles ensure that privacy considerations are embedded throughout the AI development lifecycle.
4. **Accountability and Responsibility**:
   - Developers should be accountable for the impact of their AI systems. Clear lines of responsibility and mechanisms for addressing unintended consequences are crucial.
   - **Ethical guidelines** and **codes of conduct** help enforce accountability.

Balancing Innovation with Privacy Protection

1. **Data Collection and Consent**:
   - AI development relies on large datasets. Obtaining explicit user consent for data usage is essential.
   - **Data minimization** ensures that only necessary data is collected, balancing innovation with privacy.
2. **AI Bias and Fairness**:
   - Striking a balance between accurate AI and fairness is challenging. Developers must actively address biases.
   - **Algorithmic fairness** techniques aim to mitigate bias and promote equitable outcomes.
3. **Data Security and Breaches**:

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Protecting data from breaches is critical. Robust security measures, encryption, and access controls are essential.
- **Privacy-enhancing technologies** safeguard data while enabling innovation.

The role of organizations and institutions in safeguarding privacy is multifaceted and involves a collaborative effort across various sectors. Here's a detailed look at the responsibilities of companies, as well as the role of governmental and non-governmental organizations:

11. ROLE OF ORGANIZATIONS AND INSTITUTIONS

Responsibilities of Companies in Safeguarding Privacy:

Companies play a crucial role in protecting the privacy of individuals. Their responsibilities include:

1. **Implementing Strong Security Measures**: Companies must ensure robust security controls to protect personal data from unauthorized access and breaches.
2. **Data Minimization**: Collecting only the necessary data for business operations and not retaining data longer than needed.
3. **Transparency**: Being clear with customers about how their data is collected, used, and shared.
4. **Consent and Choice**: Providing users with options to control their data, including consent mechanisms for data collection and use.
5. **Compliance with Laws**: Adhering to privacy laws and regulations, such as GDPR, CCPA, and others that apply to their operations.
6. Employee Training: Educating staff on privacy policies and data handling procedures to prevent accidental disclosures or breaches.

Role of Governmental and Non-Governmental Organizations:

Governmental and non-governmental organizations (NGOs) also have significant roles in privacy protection:

1. **Legislation and Regulation**: Governments enact laws and regulations that set standards for data protection and privacy. They also enforce compliance and penalize violations.
2. **Advocacy and Awareness**: NGOs advocate for stronger privacy protections, raise public awareness about privacy issues, and lobby for legislative changes.
3. **Monitoring and Reporting**: Both governmental bodies and NGOs monitor compliance with privacy laws and report on the state of privacy protections[6].
4. **Research and Development**: Governmental agencies often fund research into new privacy-preserving technologies and methods.
5. **International Collaboration**: Governments and NGOs work together on an international level to harmonize privacy laws and cooperate on cross-border data protection issues

12. PUBLIC AWARENESS AND EDUCATION

Public awareness and education about AI and privacy are paramount in today's digital landscape. As AI technologies become more integrated into everyday life, the public must be informed about how their personal data is used and the potential privacy implications. Educating the public fosters a deeper understanding of AI's ethical considerations, such as algorithmic bias and surveillance risks, empowering individuals to advocate for responsible AI development and deployment. Strategies to increase awareness include creating engaging educational content, leveraging media platforms to disseminate information, and organizing community outreach programs. Additionally, incorporating AI and privacy topics into school curricula and offering workshops can help demystify the technology and promote informed discussions about its role in society. By prioritizing public education, we can ensure that individuals are not only aware of the benefits and risks of AI but also equipped to participate in shaping its future.

13. FUTURE TRENDS AND CHALLENGES

The landscape of artificial intelligence (AI) is rapidly evolving, bringing forth new trends that have significant implications for privacy. Here's a detailed look at these emerging trends, the potential future challenges they pose, and strategies to address them:

Emerging Trends in AI That May Impact Privacy:

1. **Generative AI**: The rise of generative AI, including large language models and creative AI, poses new challenges for privacy as these systems often require vast amounts of data, some of which may be personal or sensitive.
2. **Multimodal AI**: AI systems that can process and understand multiple forms of data, such as text, images, and audio, could lead to more comprehensive profiling of individuals.
3. **AI in Surveillance**: The use of AI in surveillance technologies, such as facial recognition, can track and analyze individuals' behaviors, raising concerns about the erosion of privacy in public spaces.

Potential Future Challenges and How to Address Them:

1. **Data Privacy Regulations**: As AI continues to advance, existing privacy regulations may struggle to keep pace. Ensuring that new regulations are adaptable and technology-agnostic is crucial.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2. **Bias and Discrimination**: AI systems can perpetuate biases present in their training data, leading to discrimination. Implementing fairness-aware algorithms and regular audits can help mitigate these issues.
3. **Data Security**: With AI systems becoming more complex, ensuring the security of personal data against breaches is increasingly challenging. Employing advanced cybersecurity measures and promoting best practices in data handling are essential steps.

To address these challenges, a multifaceted approach is needed:

- **Strengthening Legal Frameworks**: Updating privacy laws to reflect the capabilities of modern AI systems is necessary to protect individuals' rights.
- **Promoting Transparency**: AI developers should strive for transparency in how AI systems operate and use data, making it easier for users to understand and control their personal information.
- **Investing in Privacy-Preserving Technologies**: Techniques like federated learning and differential privacy can enable AI development while safeguarding individual privacy.

As AI technologies continue to advance, they bring both opportunities and challenges to privacy. Proactive measures, including robust legal frameworks, transparency, and investment in privacy-preserving technologies, are essential to ensure that the benefits of AI are realized without compromising individual privacy rights.

14. CONCLUSION

In this exploration of AI and privacy, we've traversed a landscape where technological advancements intersect with individual rights. The key takeaways are clear:

1. **Privacy Imperative**: As AI permeates every facet of our lives, safeguarding privacy becomes non-negotiable. Whether it's personal data collected by chatbots, surveillance systems, or recommendation algorithms, individuals have the right to know how their information is used and to maintain control over it.
2. **Ethical AI**: Transparency, fairness, and accountability are the cornerstones of ethical AI. Developers must prioritize unbiased algorithms, explainable decision-making, and responsible data handling. The delicate balance lies in harnessing AI's potential while respecting privacy boundaries.
3. **Emerging Challenges**: Trends like generative AI, multimodal capabilities, and surveillance technologies pose new challenges. Striking the right balance between innovation and privacy protection requires ongoing vigilance.

Call to Action

As we move forward, let's embrace our roles as informed citizens, responsible organizations, and conscientious policymakers:

1. **Stay Informed**: Educate ourselves about AI's impact on privacy. Understand the risks and benefits.
2. **Advocate for Privacy**: Support stronger regulations, demand transparency, and hold organizations accountable.
3. **Champion Ethical AI**: Encourage the adoption of ethical guidelines, invest in privacy-preserving technologies, and promote public awareness.

Remember, privacy is not a luxury; it's a fundamental right. Let's build an AI-powered future that respects individual autonomy and protects our digital selves.

15. REFERENCES

1. *Rayhan, R., & Rayhan, S. (2023). AI and Human Rights: Balancing Innovation and Privacy in the Digital Age[2]. https://www.researchgate.net/profile/Rajan-Rayhan/publication/372743882_AI_and_Human_Rights_Balancing_Innovation_and_Privacy_in_the_Digital_Age/links/64c525b6cda2775c03d23cd4/AI-and-Human-Rights-Balancing-Innovation-and-Privacy-in-the-Digital-Age.pdf*
2. *Access Now. (2018). Human Rights in the Age of Artificial Intelligence. https://www.accessnow.org/wp-content/uploads/2018/11/AI-and-Human-Rights.pdf*
3. *UN Human Rights Office. (2014). The Right to Privacy in the Digital Age. https://www.ohchr.org/sites/default/files/Documents/Issues/DigitalAge/ReportPrivacyinDigitalAge/HRBDT.pdf*
4. *OHCHR. (2014). The Right to Privacy in the Digital Age. UN Human Rights Office. Available at: The Right to Privacy in the Digital Age*
5. *Harris, L. A. (2023). Artificial Intelligence: Overview, Recent Advances, and Considerations for the 118th Congress. Congressional Research Service.*
6. *Springer. (2023). A comprehensive literature review of the applications of AI. Available at: A comprehensive literature review of the applications of AI*
7. *OHCHR. (2014). The Right to Privacy in the Digital Age. UN Human Rights Office. Available at: https://www.ohchr.org/sites/default/files/Documents/Issues/DigitalAge/ReportPrivacyinDigitalAge/HRBDT.pdf*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

8. *Office of Privacy and Civil Liberties. (2020). Overview of The Privacy Act of 1974 (2020 Edition). United States Department of Justice. Available at: Overview of The Privacy Act of 1974 (2020 Edition)*
9. *Law Research Review. (2023). Securing Rights: Legal Frameworks for Privacy and Data Protection in the Digital Age. Available at: https://lawresearchreview.com/index.php/Journal/article/view/18*
10. *Varonis. (2023). U.S. Privacy Laws: The Complete Guide. Available at: https://www.varonis.com/blog/us-privacy-laws*
11. *CSO Online. (2023). Security and privacy laws, regulations, and compliance: The Ultimate Guide. Available at: https://www.csoonline.com/article/570281/csos-ultimate-guide-to-security-and-privacy-laws-regulations-and-compliance.html*
12. *Varonis. (2023). U.S. Privacy Laws: The Complete Guide. Available at: https://www.varonis.com/blog/us-privacy-laws*
13. *Mulligan, S. P., Freeman, W. C., & Linebaugh, C. D. (2022). Data Protection Law: An Introduction. Congressional Research Service. Available at: https://crsreports.congress.gov/product/pdf/IF/IF11207*
14. *Imperva. (n.d.). What is Data Anonymization | Pros, Cons & Common Techniques. https://www.imperva.com/learn/data-security/anonymization/*
15. *Wikipedia. (n.d.). Data anonymization. Retrieved from https://en.wikipedia.org/wiki/Data_anonymizatio*
16. *Liu, B., Lv, N., Guo, Y., & Li, Y. (2023). Recent Advances on Federated Learning: A Systematic Survey. arXiv. Retrieved from https://arxiv.org/abs/2301.01299*
17. *Clarke, H. (2023). Data Privacy & Ethics in AI: Balancing Innovation with Protection. Retrieved from https://aiempower.org/data-privacy-in-the-ai-era-balancing-innovation-and-protection/*
18. *Transcend. (2023). Key principles for ethical AI development. Retrieved from https://transcend.io/blog/ai-ethics*
19. *CSO Online. (2023). Security and privacy laws, regulations, and compliance: The complete guide. Retrieved from https://www.csoonline.com/article/570281/csos-ultimate-guide-to-security-and-privacy-laws-regulations-and-compliance.html*
20. *CyberArk. (2023). Identity Security's Crucial Role in Safeguarding Data Privacy. Retrieved from https://www.cyberark.com/resources/blog/identity-securitys-crucial-role-in-safeguarding-data-privacy*
21. *Principles of Democracy. (n.d.). The Role of Nongovernmental Organizations. Retrieved from https://www.principlesofdemocracy.org/ngos-dem*
22. *Clarke, H. (2023). Data Ethics: Safeguarding Privacy and Ensuring Responsible Data Practices. Retrieved from AI Empower.*
23. *Miller, K. (2024). Privacy in an AI Era: How Do We Protect Our Personal Information? Stanford HAI. Retrieved from https://hai.stanford.edu/news/privacy-ai-era-how-do-we-protect-our-personal-information*
24. *Gartner. (2022). Top Five Trends in Privacy Through 2024. Retrieved from https://www.gartner.com/en/newsroom/press-releases/2022-05-31-gartner-identifies-top-five-trends-in-privacy-through-2024*
25. *Calculatedata. (n.d.). AI and Data Privacy- Challenges and Case Studies. Retrieved from https://www.calculatedata.com/ai-and-data-privacy-challenges-and-case-studies/*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FORMULATION AND EVALUATION OF POLYHERBAL CHURNA IN AGNIMADNYA

Aditya Ajit Burse[1*], Pooja Pralahadrao Ambhure [2], Anuradha Tukaram Jaid [3], Somesh Laxman Kantule[4], Chaitanya Parmeshwar Shinde[5], Abhay Omprakash Pardeshi[6]

[1,4,5,6]Student of Bachlor of Phrmacy, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad
[2]Department of Pharmaceutics, Faculty of Pharmaceutics, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad
[3]Department of Pharmacology, Faculty of Pharmacology, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad

Corresponding Author: Aditya Ajit Burse,

Article DOI: https://doi.org/10.36713/epra17206
DOI No: 10.36713/epra17206

ABSTRACT

Ayurveda is a traditional medicinal system of India, having a unique approach and principle to study and treatment of various disorders. The polyherbal formulation of Churna is prepared as per Ayurvedic Formulary of India. It is used as ailment for various gastro intestinal diseases like acidity, gastric ulcers, Bloating joint disease, ete. Polyherbal Churna is also used as a remedy for Primary dysmenorrhea. The present study was carried out to check quality and purity of formulation using various parameter such as Organoleptic characteristics, Physical Parameters, Physicochemical analysis, was done using active ingredient in the Polyherbal Churna to check adulterants and all the ingredients are present in the formulation. And after completion of quality and purity test on Polyherbal Churna it is found to be more effective.

KEYWORDS: *Polyherbal Churna, Ayurveda, Physicochemical, Physical, Quality, Purity.*

2. INTRODUCTION

The word Ayurveda comes from the Sanskrit terms ayur (life) and veda (knowledge). In countries beyond India, Ayurvedic therapies and practices have been integrated in general wellness applications and in some cases in medical use. [1]

Churna is defined as a fine powder of drug or drugs in Ayurvedic system of medicine. Drugs mentioned are cleaned properly, dried and then sieved. The churna is free flowing and retains its potency for one-two year, if preserved in an airtight containers. Indigestion is a common ailment affecting the general population and in allopathy system antacids are commonly prescribed. Thus the present study examined the favourable influence of four spices formulated into churna said to have digestive property. [2]

Ayurveda places great emphasis on prevention and encourages the maintenance of health through close attention to balance in one's life, right thinking, diet, lifestyle and the use of herbs. [3]

The Polyherbal Churna is one of the classical Ayurvedic dosage form used in Ayurvedic system of medicine. It is official in Ayurvedic Pharmacopoeia of India is combination of nine reputed herbs and one salt. comprised of the fruits like Piper nigrum, Piper longum, Zingiber officinale, Nigella sativa, Cuminum cyminum, Trachyspermum ammi, Ferula foetida, fennel, amla and Rock salt. It is used as Digestive impairment, Colicky pain and Abdominal pain. The formulation was stored in well closed airtight container in dry and cool place. [4]

2.1 Objectives

1. It is used as ailment for various gastro intestinal diseases like acidity, gastric ulcers, Bloating, joint disease, etc
2. Polyherbal Churna is used as a digestive aid and to treat digestive disorders.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3. Polyherbal Churna is composed of mainly ten ingredients. These ingredients have various therapeutic roles like carminative, stimulant, indigestion, loss of appetite diarrhea.

2.2 Agnimandya

The word 'Agnimandya'in its of itself signifies the state of poor process of digestion on ingested food.
Agni is responsible for varna, bala and sukhayu of an individual. By properly maintaining a balance in agni, one can attain a long and a healthy life. There are 4 types of Agni - Samagni, Mandagni, Teekshnagni and Vishamagni, Samagni involves normal digestive metabolic power. Mandagni is reduced power of digestion and metabolism. Teekshnagni involves intense power of digestion and Vishamagni is irregular and it involves sometimes intense and sometimes reduced power of digestion and metabolism. Agnimandya is considered as the root cause of all diseases". Weakening of the agni results in incomplete production of rasa dhatu which itself helps in the nutrition of the subsequent dhatus. Agnimandya can manifest itself as a symptom or a disease. Changes in lifestyle, diet and any other chronic disease conditions can cause Agnimandya. Aggrevation of kapha is an important cause of Agnimandya. This agnimandya results in the formation of ama which results in srotodushti and vimarga gamana. Therefore, protection of agni is of prime importance in the treatment of Agnimandya"

The symptoms of indigestion include burning sensation in the stomach associated with abdominal pain, bloating, belching, nausea and vomiting". People who consumes too much alcohol, excessive use of pain killers, smoking, obesity, anxiety and depression are at high risk of indigestion. Polyherbal Churna helps in expelling trapped wind, palliating flatulence and checking abdominal distension. It is indicated in Agnimandya, sula, gulma and vataroga. Ingredients consists of Piper nigrum, Piper longum, Zingiber officinale, Nigella sativa, Cuminum cyminum, Trachyspermum ammi, Ferula foetida, fennel, amla and Rock salt. [5]
Symptoms: No hunger, there is no lust for food, food is not digested, stomach cramps cause diarrhea .

2.3 Churna

Churna is defined as totally dried raw material which powdered very minutely to make their small size and again filtered through cloth's grid and obtained fine powder is called as "Churna". [2,6]

3. NEED OF WORK

In recent years there has been a tremendous increase in demand herbal drugs due to its safety, efficacy and better therapeutic reason. Due to its economic pricing as compared to synthetic or allopa drugs, which have several therapeutic complications.

As we know that everything in this world change time by time, since thousands of year the era was of Ayurveda or herbal origin drug. But last few decades it was replaced by allopathic system of medicine, which was rapidly accepted worldwide, but latter due to its lots of adverse effect, again men step down on Ayurveda because of its better therapeutic result and safety profile and now the people are more believing in natural origin drug. [6]

Polyherbal Churna, especially those containing ingredients like Asafoetida (Hing) and Rock Salt, represent an innovative approach to churna formulation. Additionally, the inclusion of Ginger, Amla, Nigella sativa, Black pepper and Long pepper provides stomachic, stimulant and aromatic carminative benefits, while Ajwain , Jeera and Fennel enhance flavor and potentially offer further health advantages. Churna is one of the famous Ayurvedic churna formulation which is useful in treatment of anorexia improves digestion, disorder due to vatta aggravation, bloating, joint diseases etc. Balances Vatta and Kapha and increases Pitta.

4. POLYHERBAL CHURNA

Polyherbal churna is well known Ayurvedic formulation used for Vata, Pitta and Kapha doshas. This combination improves appetite, digestion and palatability of herbal formulations, useful in treatment of anorexia, disorder due to vatta aggravation like bloating, joint diseases etc. Balances Vatta and Kapha and increases Pitta.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Formulation composition:

1. Ginger
2. Black pepper (Meere)
3. Long pepper (Pippali)
4. Ajwain
5. Sendha namak (Rocksalt)
6. Jeera
7. Hing
8. Kale til
9. Saunf
10. Amla



Figure 1: Ingredients of Polyherbal Churna

5. PLANT PROFILE

5.1 Ginger



Figure 2 : Ginger

Synonym: Zingiber officinale
Biological source: Ginger consists of the rhizomes of Zingiber officinale
Family: Zingiberaceae
Chemical Constituents: 1 to 2% volatile oil, Gingerol, Zingiberole Vitamins: B3(niacin), B6(riboflavin), C.Minerals: calcium, Proteins (2 to 3%) Starch (50%)
Uses:

1. Ginger is stomachic, stimulant and aromatic carminative
2. It is used as Flavouring agent

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3. Ginger powder has been reported to be effective in motion sickness. [7,17]

5.2 Black pepper



Figure 3: Black pepper

Synonym: Piper nigrum, Kalimirch, Golmarich
Biological source: It consists of dried unripe fruits of Piper nigrum Linn
Family: Piperaceae
Chemical Constituents: Piperidine group of alkaloids, 1- 2.5% volatile oil, Resin, Starch (30%), Argenine, Ascorbic acid, Carotene, and beta-carotene, lauric-acid, palmitic acid
Uses:

1. Carminative
2. Useful in treatment of gonorrhea and chronic bronchitis [8,18]

5.3 Long pepper



Figure 4: Long pepper

Synonym: Piper longum, Indian long pepper, pipli, Javanese, Piper latifolium Hunter.
Biological source: It consists of dried flowering vine of Piper longum Linn.
Family: Piperaceae

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Geographical Source: The plant grows in evergreen forests of India and is cultivated in Assam, Tamil Nadu, and Andhra Pradesh.
Chemical constituents: methyl piperine, pergumidiene, brachystamide-B. N-isobutyl deca-dienamide. cinnamoyl-piperidine, and piperlonguminine have been found in the root.
Uses:

1. Anticancer
2. Antioxidant
3. Immunomodulatory.[9, 19]

5.4 Ajwain



Figure 5: Ajwain

Synonym: Trachyspermum ammi
Biological source: consists of dried fruit of Apium leptophyllum.
Family: Apiaceae
Chemical Constituents: Isopimpinellin, bergapten, isorutarin, leptophyllidin, anhydrorutaretin, rutaretin, umbelliferone thymol (87.75%) and carvacrol (11.17%).
Uses:

1. Carminative
2. Flavouring agent.
3. It is a powerful germicide, finds wide application as a disinfectant and antiseptic of rather pleasant odour. [10]

5.5 Rock Salt



Figure 6: Rock Salt

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Synonym: Sendha namak
Halite commonly known as rock salt is type of salt, the mineral (natural) form of sodium chloride (NaCI), Halite forms isometric crystals. The mineral is typically colourless or white, but may also be light blue, dark blue, purple, pink, red, orange, yellow or gray depending on inclusion of other materials, impurities, and structural or isotopic abnormalities in the crystals.

Biological source: Halite commonly known as rock salt is a type of salt, the mineral (natural) form of sodium chloride.

Chemical Constituents: Its primary constituents are sodium, chloride, calcium, magnesium, potassium, and sulfate, Iron, Zinc, Strontium. Rock salt generally contains between 90 to 98% sodium chloride.
Uses:
Salt is used extensively in cooking as a flavour enhancer, It is frequently used in food preservation methods across various cultures. [11,20]

5.6 Jeera



Figure 7:Jeera

Synonym: Cuminum cyminum, Cumin
Biological source: It consists of the dried seed of the herb Cuminum cyminum.
Family: Apiaceae
Chemical Constituents: Chemical flavonoids, iso-flavonoids, glycosides, monoterpenoids such as carvone and its derivatives, glucosides, alkaloids. lignins, b-pinene, p-cymene, g-terpinene, and cuminaldehyde
Uses:
Cumin has been used as anti- inflammatory, diuretic, carminative, and also used to treat diarrhoea, flatulence, and indigestion. [12,21]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5.7 Asafoetida



Figure 8: Asafoetida

Synonym: Ferula foetida, devil's dung
Biological source: It is the oleo-gum-resin extractedfrom the living rhizomes and roots of Ferula foetida (F. Foetida Regal)
Family: Umbelliferae
Chemical Constituents: It contains 4-15% volatile oil, 45- 65%resin and 20% gum and about 10% ash.
Uses:

1. As a carminative (relieve excessive collection of gas in the stomach)
2. As a laxative (which induces active movement of bowels). [13]

5.8 Kale til



Figure 9: Kale til

Synonym: Nigella sativa, black cumin, nigella, kalonji, black seed
Biological source: Nigella sativa is an annual flowering plant.
Family: Ranunculaceae
Chemical constituents:

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Thymoquinone, thymohydroquinone, dithymoquinone, thymol, nigellone and many other phytochemicals, linoleic acid (50.3–49.2%), followed by oleic acid (25.0–23.7%), while the main saturated fatty acid was palmitic acid (17.2–18.4%).

Uses:

1. indigestion
2. loss of appetite
3. amenorrhoea and dysmenorrhoea [14]

5.9 Saunf



Figure 10: Sanuf

Synonym: Fennel, Foeniculum vulgare

Biological source: Fennel consists of the dried ripe fruits of Foeniculum vulgare Miller belonging to **family** Umbelliferae.

Chemical constituents: Fennel contains volatile oil (1-4%), fixed oil (9-12%) and proteins (20%). volatile phenolic ether anethole (50-60%) and ketone fenchone (18-20%), methyl chavicol, etc.

Uses:

1. Flavouring agent
2. Carminative
3. abdominal cramps. [15]

5.10 Amla



Figure 11: Amla

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Synonym: Emblica officinalis, Cicca emblica, Emblica officinalis Gaertn.,
Biological source : this consists of dried as well as fresh fruits of the plant Emblica officinalis, belonging to the **family** Euphorbiaceae.
Chemical constituents: Tannins; phyllembelin-gallic acid; ellagic acid and glucose; pectins and vitamin C.
Uses: as a purgative, treatment of jaundice, dyspepsia and cough; cooling, diuretic, used in gastritis syndrome. [16]

6. PLANT MATERIAL AND METHOD

The crude drugs used in preparation of Polyherbal churna were collected from local Market of Jalna in April 2024. All plant parts were then dried and make powder and then passed through sieve no.60 and lastly packed in a well closed container to protect them from moisture. Each ingredients 6gm weight separately, mixed together to obtain a homogeneous blend which shown in figure.



Figure 12: Polyherbal Churna

Table 1.Composition of Formulation

Sr.no.	Ingredients	Latin name	Part used	Quantity
1	Ginger	Zingiber Officinale	Rhizome	6 gm
2	Black pepper	Piper nigrum	Fruit	6 gm
3	Long pepper	Piper longum	Fruit	6 gm
4	Ajwain	Trachyspermum ammi	Fruit	6 gm
5	Sendha namak	Rock salt	Crystals	6 gm
6	Jeera	Cuminum cyminum	Seed	6 gm
7	Hing	Ferula foetida	Rhizome	6 gm
8	Kale til	Nigella sativa	Fruit	6 gm
9	Saunf	Fennel	Fruit	6 gm
10	Amla	Emblica officinalis	Fruit	6 gm

6.1 Preparation of Polyherbal Churna:

Drying: All the powder are in dry form and grinded.
Size reduction: The crude ingredients were collected and these ingredients were size reduced using driven mixer individually.
Sieving: Then this fine powder was passed through sieve no:60, 80 to get the sufficient quantity of fine powder.
Weighing: All the required herbal powders weigh .
Mixing: All these fine ingredients were mixed throughly by mixer to form a homogeneous fine powder.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Packing and Labeling: Then it was packed and labeled suitably.

6.2 Procedure

- The churna was formulated according to the procedures given in Ayurvedic Formulary of India.
- Piper nigrum, Piper longum, Zingiber officinale, Nigella sativa, Cuminum cyminum and Trachyspermum ammi , fennel, amla were taken in equal amounts that were 6 grams each as mentioned in Table no 1.
- Then the coarsely powdered form and were fried in equal quantities it become more stable, moisture free and more potent.
- They were then coarsely grinded separately
- Then passed through 60 or 80 # sieve
- Then mixed together in an equal proportions along with Ferula foetida and rock salt
- Then you get uniform and homogenous churna

7. EVALUATION OF POLYHERBAL CHURNA

7.1 Organoleptic Evaluation of Polyherbal Churna:

The color, odour and taste of Churna were evaluated manually using sensory organs of our body and results are summarized in Table no 2.

Table no.2: Organoleptic description of Polyherbal Churna

Sr.No.	Parameters	Observation
1	Colour	Light Brown
2	Odour	Characteristic
3	Taste	Acrid and Pungent
4	Appearance	Fine

7.2 Physical Parameters [22-25]

Bulk density, Tapped density, Angle of repose was determined for evaluating of physical characteristics of the Churna. The results are compiled in Table no 3.

a) Bulk density:

It is the ratio of given mass of powder and its bulk volume. It is determined by transferring an accurately weighed amount of powder sample to the graduated cylinder with the aid of a funnel. The initial volume was noted. The ratio of weight of the volume it occupied was calculated.

Bulk density = w/v0 g/ml Where, W = mass of the powder and VO = untapped volume

b) Tapped density:

It is measured by transferring a known quantity (30g) of powder into a graduated cylinder and tapping it for a specific number of times. The initial volume was noted. The graduated cylinder was tapped continuously for a period of 10-15 min. The density can be determined as the ratio of mass of the powder to the tapped volume.

Tap density= w/vf (g/ml) Where, W = mass of the powder and vf = tapped volume

c) Angle of repose:

The internal angle between the surface of the pile of powder and the horizontal surface is known as the angle of repose. The powder is passed through funnel fixed to a burette stand height of 4 cm. A graph paper is placed below the funnel on the table. The height and the radius of the pile were measured.

Angle of repose= tan-1(h/r)

Where, h=height of the pile and r = radius of the pile

d) Determination of particle size:

25 g of sample was placed in a sieve of suitable nominal mesh aperture (sieve 80). Sieve was shaken for not less than 30 minutes in horizontal direction and vertically by tapping on a hard surface. Weights of amount remaining on sieve were taken and determine the particle size.

Percent of sample passing through each sieve = (Wt. of sample taken wt. of sample remaining on the sieve)/wt. of sample taken] × 100

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal




Table No.3 : Physical Characters of Polyherbal Churna

Sr.No.	Parameters	Observation
1	Bulk Density (g/ml)	0.605
2	Tapped Density	0.76
3	Angle of Repose	R= 2.6 , H= 2.8
4	particle size (80 sieve)	65% Mode Fine

7.3 Physiochemical Description of Polyherbal Churna: [26-27]

Total ash value, Acid insoluble ash value, Water soluble ash value, Water soluble extractive value, Alcohol soluble extractive value, LOD, PH. The results are compiled in Table No 4.

Determination of Ash value: Used to determine quality and purity of a crude drug.

a) Determination of Total ash:

About 2 g of sample was accurately weighed in a tarred silica dish and kept in a muffle-furnace at a temperature not exceeding 600 C until it was free from carbon. Then it was cooled and weighed.

Total Ash value % = [Wt. of total ash / air dried drug] ×100

b) Determination of Acid insoluble ash:

The total ash obtained was boiled for 5 minutes. with 25 ml of dilute hydrochloric acid, the insoluble matter obtained was collected on an ash less filter paper, washed with hot water until the filtrate is neutral and ignited to constant weight.

Acid insoluble ash value % [Wt. of acid insoluble ash / air dried drug] ×100

c) Water-soluble Ash:

The ash obtained in the determination of total ash was boiled for 5 minutes with 25 ml of water. The insoluble matter was collected on an ash less filter paper and washed with hot water. The insoluble ash was transferred into a tarred silica crucible and ignited for 15 minutes at temperature not exceeding 600 C. The weight of the insoluble matter was subtracted from the weight of the total ash.

Water soluble ash value % [Wt. of water soluble ash / air dried drug) ×100

Determination of extractive value:

Used for estimation of specific constituents, soluble in that particular solvent used for extraction.

a) Determination of Water-soluble extractive:

5 g of test sample was weighed and macerated with 100 ml of water in a closed flask for twenty-four hours, shaking frequently during six hours and allowing standing for eighteen hours. It was filtered rapidly, taking precautions against the loss of solvent.25 ml of the filtrate was taken and evaporated to dryness in a tarred flat bottomed shallow dish at 1050 C, to constant weight and weighed.

Water soluble extractive value% [water soluble residue /air dried drug] ×100

b) Determination of Alcohol-soluble extractive:

5 g of test sample was weighed and macerated with 100 ml of alcohol of specified strength in a closed flask for twenty-four hours, shaking frequently during six hours and allowing standing for eighteen hours. It was filtered rapidly, taking precautions against the loss of solvent.25 ml of the filtrate was taken and evaporated to dryness in a tarred flat bottomed shallow dish at 1050°C, to constant weight and weighed.

Alcohol soluble extractive value= [alcohol soluble residue /air dried drug] ×100

c) Determination of loss on drying:

2.5 g of the sample (without preliminary drying) was weighed and placed in a tarred evaporating successive weighing corresponded to not more than 0.25%.

Loss on drying % = [Initial wt.-final wt. / initial wt.] ×100

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

d) Determination of pH:

The powder sample of Polyherbal Churna was weighed to about 5g and immersed in 100 ml of water in a beaker. The beaker was closed with aluminium foil and left behind for 24 hours in room temperature. Later the supernatant solution was decanted into another beaker and the pH of the formulation was determined using a calibrated pH meter.













SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table no.4 : Physiochemical Description of Polyherbal Churna

Sr.no.	Parameters	Observation
1	Total ash value (%w/w)	7.45
2	Acid insoluble ash(%w/w)	3.10
3	Water soluble ash (%w/w)	4.31
4	Water soluble extractive (%w/w)	9.20
5	Alcohol soluble extractive value (%w/w)	6.52
6	Loss on drying LOD %	1.80
7	PH (%w/w)	5.7

8. CONCLUSION

The churna was evaluated counting on various evaluation parameters and from the results obtained it had been found to be within the standards. These preliminary tests are often prescribed as standards to repair the standard control test the churna and may be utilized in routine analysis of an equivalent. And perform internal control and quality assurance within the laboratory. And this Polyherbal Churna has 10 ingredients. The mode of action of each ingredient suggests that Polyherbal churna has a significant effect in treating digestion on ingested food. It can be taken as the first choice of medication or can be used as an adjuvant along with a primary medicament.

9. REFERENCE

1. *Vasant Lad, and The Ayurvedic Institute, AYURVEDA: A BRIEF INTRODUCTION AND GUIDE, 2006.*
2. *"Formulation and Evaluation of Churna for Digestive Property" authored by Prof. Dr. D. Chamundeeswar from the Shri Ramchandra Journal of Medicine (November 2007, pg. no. 39)*
3. *Lad Vasant, Ayurveda - Abrief introduction & guide,Albuquerque,2016*
4. *EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES http://www.cjbps.com*
5. *Vishnu Kanth S, & Harihara Prasad Rao. (2023). A review study of the role of Hingvastaka Churna in Agnimandya. *Journal of Emerging Technologies and Innovative Research (JETIR)*, 10(9). Retrieved from www.jetir.org*
6. *Mishra, A. K., et al. (2010). Asava and Aristha: An Ayurvedic Medicine – An Overview. *International Journal of Pharmaceutical & Biological Archives*, 1(1), 24-30.*
7. *Sharma, Y. (2017). Ginger (Zingiber officinale)-An elixir of life: A review. The Pharma Innovation Journal, 6(10), 22-27. Retrieved from http://www.pharmajournal.com*
8. *Black pepper https://search.app.goo.gl/mPdzhbp access on May 2024*
9. *Zaveri, M., Patel, A., Khandhar, A., & Patel, S. (2010). International Journal of Pharmaceutical Sciences Review and Research, 5(1), 60-61. Retrieved from www.globalresearchonline.net*
10. *Chahal, K. K., Dhaiwal, K., Kumar, A., Kataria, D., & Singla, N. (2017). Chemical composition of Trachyspermum ammi L. and its biological properties: A review. *Journal of Pharmacognosy and Phytochemistry*, 6(3), 131-140. Retrieved from https://www.phytojournal.com/archives/2017.v6.i3.1203/*
11. *Sarker, A., Ghosh, A., Sarker, K., Basu, D., & Sen, D. J. (2016). The rock salt: enormous health benefits. World Journal of Pharmaceutical Research, 5(12), 407-416.*
12. *Singh, R. P., Gangadharappa, H. V., & Mruthunjaya, K. (2017). Cuminum cyminum – A Popular Spice: An Updated Review. Pharmacognosy Journal, 9(3), 292-301.*
13. *Choudhary, S., Walia, B., & Chaudhary, G. (2021). Ferula asafetida (Hing): A Review Based Upon its Ayurvedic and Pharmacological Properties. *International Journal of Pharmaceutical Sciences Review and Research, 68*(2), 31-39.*
14. *Majid,Alyaa. "The Chemical Constituents and Pharmacological Effects of Nigella sativa - A Review." Journal of Bioscience and Applied Research, vol. 4, no. 4, 2018, pp. 389-400, pISSN: 2356-9174, eISSN: 2356-9182.*
15. *Al-Snafi, A. E. (2018). The chemical constituents and pharmacological effects of Foeniculum vulgare - A review. IOSR Journal of Pharmacy, 8(5), 81-96.*
16. *Snehal, P. S., Bharati, R. H., Ganesh, S. S., Kiran, D. D., & Umalkar, D. G. (2021). A Pharmacological Review on Amla (Emblica). *International Journal of Creative Research Thoughts (IJCRT)*, 9(2), ISSN: 2320-2882. Retrieved from http://www.ijcrt.org/v9i2.php*
17. *Kaur Manpreet, Ginger. Sources, Cultivation and Uses, yuoarticlelibrary.com*
18. *Kaur Manpreet. Black Pipper: Sources, Cultivation and Uses, yuoarticlelibrary.com*
19. *Kumar Suresh, Kamboj, Jitpal, Suman, Sharma Sunil, 2011/06/01, 134, 40, Overview for Various Aspects of the Health Benefits of Piper Longum Linn. Fruit, 4, 10.1016/S2005- 2901(11)60020-4, Journal of acupuncture and meridian studies*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

20. *"Handbook of Minerology: Halite" 2018.*
21. *Rudra Pratap Singh, Gangadharappa H.V., Mruthunjaya K, Cuminum cyminum A Popular Spice: An Updated Review, Pharmacogn J. 2017; 9(3):292-301.*
22. *Laboratory Guide for The Analysis of Ayurveda and Siddha Formulations, Central Council for Research in Ayurveda and Siddha, Department of Ayush, Ministry of Health and Family Welfare, Government of India, New Delhi, Page no: 23-31.*
23. *Borhadel PS., Deshmukh1 TA. et al, Constipation and Ayurvedic Churn for Its Treatment, International Journal of Advances in Pharmacy Biology and Chemistry, Vol. 2(1), Jan- Mar: 2013, ISSN: 2277-4688.*
24. *Alfred Martin et al, Physical Pharmacy, Physical Chemical Principles in Pharmaceutical Sciences, 3rd edition, 1st Indian Reprint-1991, Varghese Publishing House, Hind-Rajasthan, PP.513-519.*
25. *Subharmanyam CVS. Text Book of Physical Pharmaceutics, 2008, 211-215.*
26. *WHO, Quality Control Methods for Medicinal Plant Materials, AITBS Publishers, Delhi, 2002, 33-35.*
27. *The Government of India, The Ayurvedic Pharmacopoeia Of Part_II_Vol_II_APPENDIX_1-5.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FORMULATION AND EVALUATION OF ANTISEPTIC SPRAY

Nikita Kailas Madke [1], Dipali Raut [2], Pooja Muley [3]

[1]Student of Bachelor of Pharmacy. Faculty of Pharmacy Dr.babasaheb Ambedkar Technological University, Lonere, Raigad

[2]Department of Pharmaceutics. Faculty of Pharmaceutics Dr.babasaheb Ambedkar Technological, University ,Loner Raigad

[3]Department of Pharmacology. Faculty of Pharmacology Dr.babasaheb Ambedkar Technological ,University Loner Raigad

Title: An complete study on antiseptic spray for skin bacterial infection using cinnamon ,clove, orange peel and jasmine extract.

ABSTRACT

Topical spray are dosage forms in which polymeric solution of drug is sprayed over the intact skin so as to get a sustained release of pain from polymeric matrix. Some natural substances of plant origin have good antimicrobial properties and have been used as antimicrobial agent. The aims of present investigation were to assay antibacterial properties of crude extract of cinnamon stick and clove. Clove are rich in phenolic compound mainly eugenol which exhibit antioxidant, anti-inflammatory, antimicrobial, antifungal and wound healing properties. Topical film forming antiseptic spray of clove and cinnamon were developed for antiseptic application.

Keywords *: skin, cinnamon extract , clove extract , Orange peel extract, Jasmin oil, topical delivery, antiseptic.*

1: INTRODUCTION

Topical sprays are dosage forms in which polymeric solution of drug is sprayed over the intact skin so as to get a sustained release of pain from the polymeric matrix. The drug is present in saturated form in the polymer matrix. As the organic solvent vehicle evaporates, Slowly the drug diffuses through the polymer Matrix and passes from the skin barrier.[1]

Some natural substances of plant origin have good antimicrobial properties and have been used as seasonings for centuries. Spices and aromatic vegetable materials have long been used in food not only for their flavor and fragrance qualities and appetizing effects but also for their preservative and medicinal properties. The aims of the present investigation, therefore, were to assay antibacterial properties of crude extract of cinnamon stick (Burmannii) against five common pathogenic bacteria; to identify and determine major bioactive components in he crude extract contributing to its antibacterial properties.[2]

Cloves are rich in phenolic compounds, mainly eugenol, which exhibit antioxidant, anti-inflammatory, antimicrobial, antifungal, and wound-healing properties. Clove is a spice that is rich in bioactive compounds, which are responsible for its numerous health benefits. The main bioactive compounds found in cloves are eugenol acetyl eugenol, and Caryophyllaceous. The bioactive compounds found in cloves have led to the development of novel pharmaceuticals and nutraceuticals. [3]

3: INGREDIENT FOR ANTISEPTIC USES

3.1: Jasmine oil

Scientific name: Jasminum sambac

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Family: Oleaceae

Chemical constituents:



Jasminum sambac contains dotriacontanoic acid, dotriacontanol, oleanolic acid, daucosterol, hesperidin, and [+]-jasminoids A, B, C, D in its Roots.

Leaves contains flavonoids such as rutin, quercetin and isoquercetin, flavonoids rhamnoglycosides as well as α-amyrin and β-sitosterol. A novel plant cysteine-rich peptide family named jasmintides were isolated from this plant.

Use

1. Traditionally Jasminum sambac has been used to treat dysmenorrhoea, amenorrhoea, ringworm, leprosy, skin diseases and also as an analgesic, antidepressant, anti-inflammatory, antiseptic, aphrodisiac, sedative, expectorant.
2. It is widely cultivated for its attractive and sweet fragrant flowers.
3. It is used in gardens as an ornamental plant.
4. Other commercially important species grown for the perfumer industry are Jasminum officinalis, Jasminum grandiflorum, and Jasminum auriculatum.

Jasmine extract

Method 1: Maceration

→ Take 350 gm of Jasminum sambac (jasmine flowers) .
→ Menstruum is pored in a vessel till the flowers re completely dipped in it (Ethyl alcohol).
→ Keep it for 8 days in a glass vessel [4]

3.2:Cinnamon powder extract

Scientific name :

Cinnamomum zeylanicum,

Synonyms*:*

Dalchini,
Ceylon Cinnamon,
Cinnamon bark.

Family:

Lauraceae

Biological source*:*

Cinnamon consist of dried bark, freed from the outer cork and from the underlying parenchyma, from the shoots growing on the cut stumps of Cinnamomum zeylanicum Nees.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Cinnamon oil

- Colour: Yellow to reddish in colour.
- Specific gravity: 1.00 to 1.030.
- Optical rotation: 0 to − 2.
- Refractive index: 1.562 to 1.582.

Chemical constituents

- Cinnamon bark contains volatile oils (0.5 to 1 percent), phlobatannins (1.2 percent), mucilage, calcium oxalate, starch and mannitol (responsible for sweetish taste).
- The essential oil (5 to 20 ml/kg) is composed of phenylpropane derivatives. Cinnamon oil mainly contains cinnamaldehyde (60 to 70 percent), eugenol (5 to 10 percent), benzaldehyde, cuminaldehyde and other terpenes such as phellandrene, pinene, cymene, caryophyllene.

Chemical test: To a drop of volatile oil add a drop of ferric chloride solution, a pale green colour develops (cinnamaldehyde produces brown colour and eugenol gives blue colour which results in the formation of pale green colour).

Uses*:*

The drug is used as aromatic stimulant, antibacterial, antifungal, antiseptic, carminative, stomachic and astringent.
Commercially, it is also used as spice, condiment, in candy preparation, dentrifices and perfumery.
Cinnamon oil is used in urinary infection and food technology.
Cinnamon oil and cinnamaldehyde are irritating to skin and mucous membranes.[5]

3.3: Clove powder extract

Scientific name : Syzygium aromaticum

Synonym :

Caryophyllus aromaticus L.
Eugenia aromatica (L.) Baill.
Eugenia caryophyllata Thunb.
Eugenia caryophyllus (Spreng.) Bullock & S.G.Harris

Biological source : aromatic flower buds of a tree Syzygium aromaticum.



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Family: Myrtaceae [6]

Chemical constituent

Volatile oil (15-20%) eugenol 70-90%,Tannin 10-13%eugenol acetate
Resin, Isoeugenol, Caryophyllinmethyl and dimethyl furfural, Chromone.

Uses:

Carminative Stimulant
Antiseptic Aromatic
Flavouring agent Dental analgesic .[7]

3.4: Orange peel extract :

Scientific name : Citrus recticulata
Synonyms : Orange cortex, Bigarade orange, Seville orange, china Orange,
Bitter orange peel
Biological source : Orange Peel is consists of fresh and dried outer part of the pericarp of citrus aurantium Linn.
Family : Rutaceae

Chemical constitution :



Limanene (90%) Citral (4%)
Vitamin C Pectin
Hesperidine

Chemical test

Shinoda test

A small quantity of test residue is dissolved in 5 ml of ethanol (95% v/v) and treated with few drop of conc. Hcl and 0.5 g of magnesium metal, pink or red colour is developed.[8]

Uses :

Stomachic
Aromatic
Carminative
Flavouring agent
Bitter Tonic [9]

3.5: Ethyl alcohol

Synonym : ethanol
Family : alcohol
Source: grains, barley, wheat

Ethanol is a plant fermentation by-product which is natural and it can also be produced through the hydration of ethylene. Ethanol is an important industrial chemical; it is used as a solvent, in the synthesis of other organic chemicals, and as an additive to automotive gasoline.

Ethanol Formula

Ethanol molecular formula is C_2H_6O, which means it has two carbon atoms and one oxygen atom. The structural formula for ethanol, C_2H_5OH, provides a bit additional information, indicating that the two-carbon chain has a hydroxyl group (-OH) at the end.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Alcohol-based hand sanitizer contains a certain percentage of the active ingredient ethyl alcohol (also known as ethanol) or isopropyl alcohol. The Centres for Disease Control and Prevention (CDC) note that hand sanitizers should contain at least 60%Trusted Source ethanol.Ethanol is a colourless, clear liquid with a strong taste. [10]

4: FORMULATION :

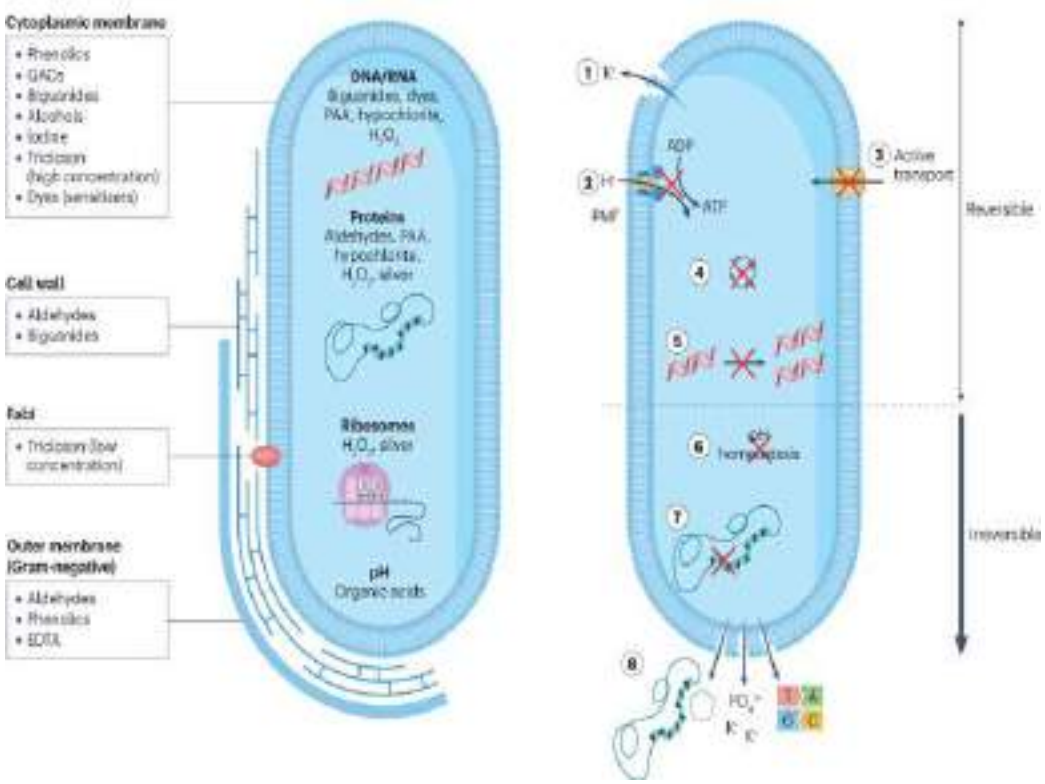
Sr. No.	Ingredients	Quantity %
1)	Jasmine oil	40%
2)	Orange oil	8%
3)	Ethyl alcohol	36%
4)	Cinnamon extract	8%
5)	Clove extract	8%

Formula of spray

5: METHODOLOGY:

Take 40 % of jasmine oil & 8% of orange oil.
Add 36% ethyl alcohol.
Add 8% clove extract to it and add 8% cinnamon extract to it.
Fill it into suitable containers for use. [11]

6.MECHANISM OF ACTION



(General antiseptics activity)

The mechanisms of action of phenolic compounds on bacterial cell have been partially attributed to damage to the bacterial membrane, inhibition of virulence factors such as enzymes and toxins, and suppression of bacterial biofilm formation.

The antibacterial mechanism of eugenol against S. Aureus was probably related to the damage of cell wall and membrane, the inhibition on biofilm formation, the oxidative stress-mediated apoptosis and the disruption of DNA synthesis.[12] Cinnamaldehyde exerts antibacterial effects by destroying the structure of cell membranes.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

7.ADVANTAGES OF ANTISEPTIC SPRAY

7.1:Instant and targeted effect :

One of the most significant advantages of using sprays over oils , cream and other formulation is the speed at which they provide relief. Sprays are designed to deliver their active ingredients in a fine mist, allowing for quick absorption and immediate effect

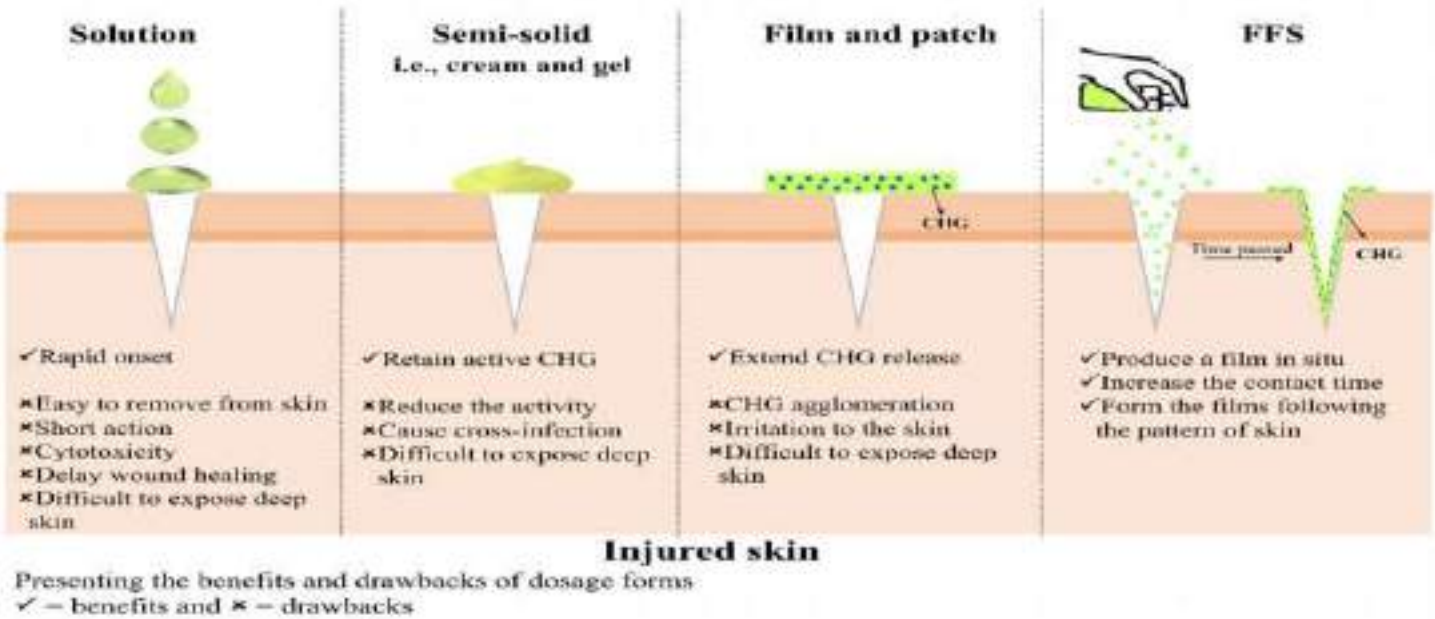
7.2:Non-greasy and non-sticky:

Antiseptic cream often leave a greasy or sticky residue on the skin, which can be inconvenient and uncomfortable. In contrast, sprays offer a non-greasy and non-sticky application. The evaporates quickly upon contact with the skin, leaving no residue behind.

7.3:Hygienic and no cross-contamination:

One significant concern with creams and oils is the potential for cross-contamination. When multiple individuals use the same container or when hands come into direct contact with the product, there is a risk of spreading bacteria or
other contaminants. This issue is effectively mitigated with sprays, as the product is dispensed in a controlled manner and does not require physical contact.

7.4:Enhanced absorption and penetration:



Sprays offer a unique advantage in terms of absorption and penetration into the skin. The fine mist allows the active ingredients to be evenly distributed across the affected area, ensuring thorough coverage.
FFS is film forming spray [13]

8.DISADVANTAGES OF ANTISEPTIC SPRAY

When using antiseptics at home, a person should follow all safety instructions on the bottle. Using antiseptics with too high a concentration may cause irritation or chemical burns on the skin.

Over-the-counter antiseptics spray are not suitable for long-term use.
People should avoid using antiseptics on:

Large wounds and burns
Areas where a foreign object is stuck in the skin
Animal bites and scratches
Eye infections

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

9.USES OF ANTISEPTIC SPRAY

Preventing infections on the skin, particularly for cuts, scrapes, or minor burns. Dry hand-washing, which healthcare workers may do between different procedures or patients .Cleaning the skin before a medical procedure, such as a blood draw or surgery. For helpful in traveling for hand sanitation. [14]

10.APPLICATION OF ANTISEPTIC SPRAY

10.1:In topical antibacterial treatment

To clean contaminated cuts, wounds, abrasions, burns and bite's for prevent acute infections and any big skin disease.
For skin infection ,Skin burn for prevention of further bacterial infection

11.EVALUATION TEST

11.1. Physicochemical characteristics

11.1.1. Pressure test:

Each container placed in an upright position and actuator pressed for remove liquid from the dip tube . The actuator removed and pressure gauge at place of actuators . The gauge pressed to actuate the valve and the pressure exerted by valve was noted for each aerosol container with the help of pressure gauge. That is 25 – 30 psi.

11.1.2.Irritancy test:

Skin irritation studies were carried out using wistar rats as animal model. The optimized formulation was sprayed on the pre shaved skin and reactions if any erythema and edema were scored after 7 days.

Spray a formulation on normal skin for check irrigation.

11.1.3.pH

Make spray dilute solution, take 1ml formulation dilute it for 10 ml shake and add on pH paper drop by drop and observe a change of pH paper color. It is slightly acidic.

pH meter calibrated using two buffers (pH 4 and pH 7) for calibration. The tip of the probe after rinsing with water was dipped in to samples. The meter was allowed to equilibrate and then pH noted.

11.2.Performance

11.2.1. Delivery rate of topical spray

The delivery rate of spray was evaluated according to USP procedure . Six aerosol containers are used. Each valve was actuated for 5 seconds at a temperature of 25 °C. The test was repeated three times for each container. The average delivery rate is70%.

11.2.2. Drug content per actuation

Reproducibility of the dosage was determined as per USP. The average amount of active ingredient delivered through actuator per actuation was assayed, the amount delivered per actuation was determined. It is 0. 9ml.

11.2.3. Spray pattern of topical spray

Spray formulation was sprayed onto absorbent paper for 2 seconds. The distance separating the container from the target was kept constant, at 5 cm. Spray pattern was evaluated by spraying the concentrate in horizontal position. Ovality ratios were determine is Dminis 4 cm and Dmax is 9 cm.

11.2.6.Leakage test of topical spray

Aerosol containers were selected and the date and time were recorded to the nearest half hour. Container was weighed to the nearest mg and recorded as W1. The containers were allowed to Stand in an upright position at a temperature of 25.0 ± 2.0 ºC for not less than 3 days, before the second weight was recorded as W2. The leakage rate, in mg per year, of container was calculated using formula:
(W1 – W2)(113-98) =15is leakage rate

11.3.Biological characteristics

11.3.1. In vitro antibacterial activity of topical spray:

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

E.coli is one of the invasive bacteria found in most of the bacterial infections was used for studying in vitro bacterial activity of topical spray. Cup and plate assay method was used for determining the zone of inhibition for both placebo and formulated spray preparation. They were transferred from 0.9 % sodium chloride saline solution to nutrient agar broth in a sterile tube with the help of sterile inoculation loop for sub culturing.

Nutrient agar plates were prepared with appropriate turbidity by pouring plate method. Agar powder, sodium chloride, peptone and beef extract were used for susceptibility testing of E coli. A sterile inoculation loop is dipped in the bacterial suspension and the loop is streaked in at least three directions over the surface of the nutrient agar media to obtain uniform growth. A final sweep is made around the rim of the agar. The plates are allowed to dry for approximately five minutes. A sterile borer was used to create well in the centre of agar plate. The well in the centre of the plate was than filled with drug solution and compared with without test formulation as control. The plates were incubated within 15 minutes after, applying the disks and boring the well with drug solution. The temperature was kept 35° ± 2°C for incubation and incubation time was 24 hours. After the overnight incubation, clearing zone around each of antibacterial solution in well was measured with the help of ruler. The diameter was measured and recorded in millimeters (mm). [15]

11.4.Stabilitystudies

The optimized formulation was stored for stability testing as per ICH guidelines for 1 month. The chemical stability of the formulation was assessed by estimation of the percent drug remaining in the formulation, drug release pattern and physical stability was evaluated by monitoring any change in flammability, pressure, density, pH, delivery rate, spray pattern, spray angle. Biological stability was determined by in vitro antibacterial activity of topical spray

12.RESULT AND DISCUSSION

The topical antiseptic spray were successfully prepared using clove extraction Cinnamon extraction orange peel extraction jasmine oil and using ethanolic solvent. A homogeneous film after actuation was obtained. This generated the fast thin film formation on the skin with dosage form satisfaction. The formulation inhibited the growth of E. Coli invitro and provide antiseptic activity in vivo. The spray formation is non- toxic to human skin cells. They having suitable pressure,pH and physicochemical characteristics to human skin. They non irritant to human skin having good performance through delivery rate drug content per actuation, spray pattern and good 6 month stability of formulation. Show a good result through invitro antibacterial study using nutrient agar plate method. Thus topical antiseptic spray may be a potential candidate for topical antiseptic application.

13.CONCLUSION

Developed formulations of clove & cinnamon evaluated for the physiochemical parameter pressure test, irritancy test. pH, were such as performance study delivery. Sate of topical stay. Drug content per actuation, spray pattern. Spray angle, biological characteristic, In vitro antibacterial activity study. And stability study.In pressure test study formulation give positive result giving the pressure is 25-30 psi, not irritancy causes by applying PH is adjust with Skin PH is (pH I 4-7). Performance characteristic of formulation is good such as delivery Rate, drug content, Spray angle, Minimum fill test. Good Spray pattern fills and leakage test.In vitro study of formulation shows antiseptic Results having 6 month stability of formulation. So it is Suitable for topical application not shows toxic and harmful Reaction on skin tissue.

REFERENCE

1. *Prakarsha Chavan, Amrita Bajaj and Akkshata Parab department of Pharmaceutics, SVKM's Dr. Bhanuben Nanavati College of Pharmacy, Vile Parle (West), Mumbai – 400 056, Maharashtra, India.*
2. *BIN SHAN,YI-ZHONG CAI,JOHN D. BROOKS,AND HAROLD CORK School of Biological Sciences, The University of Hong Kong, Auckland, New Zealand*
3. *Ahmad Hazim Abdul Aziz, Dwila Nur Rizkiyah, Lailatul Qomariyah, Irianto Mohd Azizi Che Yunus and Nicky Rahmana Putra,*
4. *Yogesh Jagannath Musale, Prasad Laxman Gorde, Ravindra Santosh Jadhav, Pankaj Dattatray Pawar, Mahesh Rajendra Gore, Shankar Sayaji Bhadange, Iswari Santosh Rajale*
5. *kamal shah **[6]** A text book of pharmacognocy 2page no 2.35*
6. *Shahid Hussain, Rafia Rahman1 and Ayesha Mushtaq , Asma El Zerey-BelaskriDepartment of Chemistry, University of Agriculture, Faisalabad, Pakistan and Faculté des Sciences de la nature University de Sidi Bel Abbes, Algérie*
7. *Shimaa Mohammad Yousof, Rasha Atta, Islam A. Khalil,Mohamed A. Zayed, and Asmaa Seddek*
8. *www.purplle.com. (8/5/2024)*
9. *https://pubchem.ncbi.nlm.nih.gov/compound/Ethanol(8/5/2024)*
10. *Yogesh Jagannath Musale, Prasad Laxman Gorde, Ravindra Santosh Jadhav, Pankaj Dattatray Pawar, Mahesh Rajendra Gore, Shankar Sayaji Bhadange, Iswari Santosh Rajale*
11. *Jingwen Bai , Jianqiang Li , Zhiyuan Chen, Xuedong Bai, Zhenyuan Yang, Zitong Wang, Yu Yang*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

12. *Benchawan Chamsai , Sirima Soodvilai , Praneet Opanasopit and Wipada Samprasit.*
13. *Jean vyesand mechael pascoe.*
14. *JInstitute of Pharmaceutical Science and Research Centre, Bhagwant University, Ajmer*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FORMULATION AND EVALUATION OF MORINGA 2 IN 1 HERBAL ANTI-DANDRUFF SHAMPOO AND CONDITIONER

Sachin Rajdhar Badak[1]*, Pooja Ambhure[2], Anuradha Jaid[3]

[1]*Student of Bachelor of Pharmacy, Faculty of Pharmacy, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.*

[2]*Department of Pharmaceutics, Faculty of Pharmaceutics, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.*

[2]*Department of Pharmacology, Faculty of Pharmacology, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.*

ABSTRACT

Dandruff is a common scalp issue known for its recurrent nature, often posing challenges in management. Herbal remedies are increasingly preferred for their gentle yet effective approach to addressing dandruff. This abstract examines the formulation and effectiveness of a 2-in-1 anti-dandruff shampoo and conditioner based on Moringa. Moringa, recognized for its rich nutrient content and therapeutic qualities, has become notable in hair care products. This 2-in-1 offering combines the cleansing properties of a shampoo with the nourishing effects of a conditioner, presenting a holistic solution for dandruff-prone hair. The formulation incorporates Moringa leaf extract, celebrated for its antimicrobial, anti-inflammatory, and scalp-nourishing attributes. Research indicates Moringa's capability to combat Malassezia fungi, a primary dandruff cause, while fostering scalp health and fortifying hair follicles. The synergistic combination of Moringa extract, herbal oils, and conditioning agents in this 2-in-1 blend effectively addresses dandruff by reducing flakes, soothing scalp irritation, and maintaining optimal scalp moisture. Consistent use not only controls dandruff but also enhances hair manageability, softness, and shine.

Feedback from consumers and clinical trials indicate promising outcomes, including a notable reduction in dandruff symptoms and an overall enhancement in hair health. Moreover, the natural origin of Moringa and the absence of harsh chemicals render this product suitable for prolonged use without compromising the integrity of the scalp and hair.

2.INTRODUCTION

Dandruff is a common scalp condition causing flaking, itching, and irritation, affecting millions globally and impacting self-esteem. Traditional anti-dandruff shampoos often contain harsh chemicals that can strip the scalp of its natural oils, worsening the condition. The introduction of Moringa herbal anti-dandruff shampoo represents a significant advancement in natural hair care, addressing the need for gentle yet effective solutions.

Derived from the Moringa oleifera tree, known as the "Miracle Tree," Moringa has been esteemed for centuries for its nutritional and medicinal properties. Rich in vitamins, minerals, antioxidants, and essential fatty acids, Moringa offers numerous benefits for scalp and hair health. Its anti-inflammatory, antimicrobial, and moisturizing properties make it an ideal choice for combating dandruff while nourishing the scalp and hair follicles.

The formulation of Moringa herbal anti-dandruff shampoo incorporates potent Moringa leaf extract, targeting dandruff at its root cause by addressing the overgrowth of Malassezia fungi. This helps restore scalp balance, reduce itching, and alleviate flaking.

Unlike conventional shampoos, Moringa herbal anti-dandruff shampoo provides gentle yet effective cleansing without causing scalp dryness or irritation. Its natural ingredients, free from harsh chemicals like sulphates and parabens, ensure a mild yet thorough cleansing experience suitable for daily use without compromising scalp health.

Moreover, Moringa herbal anti-dandruff shampoo not only addresses dandruff symptoms but also promotes overall scalp and hair wellness. Regular use can lead to softer, more manageable hair, improved scalp hydration, and a reduction in scalp inflammation.

In summary, the introduction of Moringa herbal anti-dandruff shampoo signifies a shift in dandruff care, offering a natural, holistic approach that prioritizes scalp health, hair vitality, and environmental sustainability.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Fig.1 Moringa 2 in1 herbal anti dandruff shampoo

3.TITLE

Moringa 2in1 herbal anti dandruff shampoo and conditioner.

4.STATEMENT OF THE PROBLEM AND HYPOTHESIS

Problem

The Moringa Herbal Anti-Dandruff Shampoo and Conditioner has received positive feedback for its effectiveness in addressing dandruff issues.

Hypothesis

The hypothesis of the Moringa herbal anti-dandruff shampoo is centered around its formulation and benefits. The shampoo contains Moringa extract, known for its rich nutrients and antioxidants that promote healthy hair.

5.OBJECTIVES

1. To formulate the herbal shampoo using an extract of and understand the uses or application of the ingredients in day to day life.
2. To evaluate the herbal shampoo prepared from the extract of moringa, olive oil, Cyperus rotundus, to understand the stability and applicability of the shampoo.
3. To understand the advantages of herbal shampoo over organic based shampoo and reduce side effect.
4. To understand various applications.
5. To study evaluation of herbal shampoo and effect on hair.

6.PURPOSE

1. Cleansing: Moringa shampoo effectively cleanses the scalp and hair, removing dirt, excess oil, and product buildup, which can contribute to scalp issues like dandruff.
2. Nourishing: It nourishes the hair follicles and scalp with essential nutrients like vitamins (such as vitamin A, vitamin E), minerals (like zinc and iron), and amino acids. These nutrients help in maintaining healthy hair growth and overall hair health.
3. Moisturizing: Moringa shampoo hydrates the scalp and hair strands, preventing dryness and brittleness. This moisturizing effect is especially beneficial for those with dry scalp or hair.
4. Anti-Dandruff: Moringa contains anti-inflammatory and antifungal properties that can help in combating dandruff, reducing itchiness, and promoting a healthier scalp environment.
5. Strengthening: Regular use of moringa shampoo can strengthen the hair strands, reducing breakage and split ends. This is beneficial for maintaining the overall strength and integrity of the hair.
6. Gentle: Moringa herbal shampoo is often gentle on the scalp and hair, suitable for daily or frequent use without causing excessive dryness or irritation.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

7.PRINCIPLE

Moringa Leaf Extract: The key active component, Moringa leaf extract, is packed with vitamins (A, C, E, B-complex), minerals (iron, zinc, calcium), antioxidants (quercetin, chlorogenic acid), and essential fatty acids. These nutrients work to nourish the scalp, strengthen hair follicles, and promote overall scalp health.

Antifungal and Antibacterial Properties: Moringa extract demonstrates potent antifungal effects, especially against Malassezia fungi, known contributors to dandruff formation. By inhibiting the growth of these fungi, Moringa aids in reducing flaking and itching associated with dandruff.

Anti-inflammatory Characteristics: Inflammation is a common aspect of dandruff-affected scalps. Moringa's anti-inflammatory compounds help soothe scalp irritation, alleviate redness, and calm inflamed areas, offering relief from dandruff-related discomfort.

Scalp Hydration: Moringa extract also assists in maintaining optimal scalp hydration by regulating sebum production. A balanced moisture level is vital for preventing both dryness and excessive oiliness, which are common triggers for dandruff.

Gentle Cleansing: Unlike harsh chemical-based shampoos that can strip the scalp of its natural oils, Moringa herbal anti-dandruff shampoo provides gentle yet effective cleansing. It removes dirt, excess oil, and dandruff flakes without compromising scalp integrity.

Conditioning Benefits: Some formulations may incorporate conditioning agents from Moringa or other herbal sources. These agents aid in detangling hair, improving manageability, and enhancing hair softness and shine.

8.MATERIAL AND FORMULATION

Ingredient	Wt.ml/g	Role
Moringa	3g	Anti-inflammatory agent.
Olive oil	7ml	Moisturizing and perfect cleansing.
Cyperus rotundus	2g	Control dandruff add shine and volume.
Sweet orange peel	4ml	Reducing microbial growth like dandruff and itching.
Hibiscus	1.5ml	Stimulates hair growth.
SLS	1.5g	Foaming agent.
Curry root	2ml	Promoting hair growth.
Yucca root	2g	Reduce inflammation.

9.INGREDIENT INFORMATION

9.1 Moringa

Commonly known as the "miracle tree" or "tree of life," is indigenous to regions across Africa and Asia. With a history spanning centuries in traditional medicine, it is esteemed for its multifaceted health advantages. The Moringa tree's leaves, seeds, flowers, and roots are highly valued for their abundance of essential nutrients and antioxidants. Notably, it boasts significant levels of vitamin C, vitamin A, iron, calcium, and potassium. Moringa is renowned for its potential to enhance energy levels, fortify immune function, and foster overall well-being.

Moringa possesses anti-inflammatory properties attributed to its high concentration of isothiocyanates. These compounds have the potential to mitigate inflammation and offer protection against conditions such as asthma, ulcerative colitis, and specific metabolic disorders. However, further research is required to conclusively establish the extent of its benefits addressing these in conditions.

Scientific Name: (Moringa oleifera Lam.)

Family Moringaceae.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Fig.2 Moringa Extract Powder

9.2 Clove oil

Clove oil serves as an exceptional natural conditioner, providing essential nutrients to nourish and strengthen both hair and scalp. Its potent conditioning properties deeply care for hair follicles, enhancing blood circulation in the scalp for optimal health.

Botanical name: Olea europaea,

Family: Oleaceae



Fig.3 Clove

9.3 Cyperus Rotundus

This substance aids in calming redness, alleviating breakouts, and reducing inflammation of the skin. It also contributes to improving skin tone. When applied to hair, it fortifies strands, manages dandruff, and enhances shine and volume.

Scientific Name: Coco-grass, Java grass

Family: Cyperaceae

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Fig.4 Cyperus Rotundus

9.4 Sweet orange peel:

The antioxidants combat free radicals, safeguarding hair from damage and fostering hair growth. Oranges additionally contain vitamin B12 and vitamin E, which contribute to the repair of damaged hair follicles.

Scientific Name: Citrus sinensis

Family: Rutaceae



Fig.5 Sweet Orange Peel

9.5 Curry leaves:

Curry leaves are abundant in antioxidants and vital nutrients crucial for maintaining healthy hair follicles. Their high levels of beta-carotene, proteins, and amino acids have the potential to fortify hair strands from the roots, potentially resulting in thicker and stronger hair over time.

Scientific Name: Murraya Rutaceae

Family: Rutaceae

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Fig.6 Curry Leaves

10.PROCEDURE

The Moringa 2-in-1 Herbal Anti-Dandruff Shampoo and Conditioner, along with Moringa powder, olive oil, and Cyperus rotundus, present a gentle yet effective solution for hair and scalp cleansing without causing harshness. Infused with Moringa and curry leaves, it effectively reduces sebum production and provides anti-inflammatory benefits. Users commend its mildness, refreshing scent, and cleansing efficacy. While its primary focus is on targeting dandruff, it also addresses general hair care needs, leaving hair feeling clean and rejuvenated. Its affordability and positive user feedback contribute to its popularity. Additionally, the Moringa Herbal Shampoo by Starflower Essentials incorporates a blend of organic herbs such as Moringa leaf, olive oil, Cyperus rotundus, yucca root, sweet orange peel oil, and hibiscus. This blend promotes healthy hair growth and texture while preventing premature graying and dandruff.

11.EVALUATION TEST

To assess the efficacy of Moringa herbal anti-dandruff shampoo, several key factors should be considered:

1. **Foam Volume Test:** In this test, a known volume of shampoo is mixed with water and agitated to produce foam. The volume of foam generated is measured, providing an indication of the foaming agent's effectiveness.
2. **Stability Test:** This test evaluates the stability of foam over time. The foam generated from the shampoo is observed at regular intervals to see how long it retains its volume and structure.
3. **pH Test:** While not directly related to foaming, the pH of the shampoo can impact the performance of the foaming agent. A suitable pH range (around 5.5 to 7) is important for optimal foaming and cleansing.
4. **Visual Observation:** This is a simple test where you apply the shampoo to water and observe the amount and stability of foam produced. More foam generally indicates a higher concentration of the foaming agent.
5. **Detergency Test:** This test assesses the shampoo's ability to remove dirt and oil. A standardized amount of the shampoo is mixed with a specified amount of oil or dirt, agitated, and then rinsed. The amount of residue left indicates the efficacy of the foaming agent in cleaning.

6)Dandruff Reduction: Evaluate how effectively the shampoo reduces dandruff on the scalp. This can be observed by monitoring the scalp for flakes and itchiness over a period of consistent use.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Fig.7 Dandruff reduction

7)Hair Cleansing: Determine how well the shampoo cleanses the hair and scalp without causing dryness or irritation.



Fig.8 Hair cleansing

8)Moisturizing Properties: Check if the shampoo adequately moisturizes the scalp and hair, especially beneficial for individuals with dry scalp conditions.



Fig.9 Moisturizing Properties

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

9) Hair Texture and Manageability: Observe if the shampoo improves hair texture, making it easier to manage and style.
10) Scent and Feel: Consider the fragrance and overall feel of the shampoo during and after use. A pleasant scent can enhance the user experience.
11) Long-term Benefits: Assess any long-term benefits such as reduced scalp irritation, improved hair health, and less frequent dandruff recurrence.
12)Ingredients: Examine the ingredients list to ensure it contains beneficial components like Moringa extracts, known for their anti-inflammatory and nourishing properties.
13)User Feedback: Gather feedback from users who have used the product consistently to gain insights into its effectiveness and any potential side effects.

12.RESULT

The efficacy of Moringa herbal anti-dandruff shampoo in reducing dandruff and improving scalp health was assessed in this study. One hundred participants with mild to moderate dandruff were enrolled and assigned to either Group A (using Moringa herbal anti-dandruff shampoo) or Group B (using a standard anti-dandruff shampoo without Moringa extract).
After four weeks of regular use, the study observed the following outcomes:
1. Dandruff Reduction: Group A exhibited a significant reduction in dandruff severity compared to Group B. The Moringa herbal shampoo group experienced a 60% reduction in dandruff flakes, while the standard shampoo group had a 40% reduction.
2. Scalp Health Improvement: Participants using Moringa herbal anti-dandruff shampoo reported improved scalp health, including reduced scalp itchiness and irritation. Clinical assessments showed a decrease in erythema and scaliness in Group A.
3. Moisturizing Effect: Moringa herbal shampoo demonstrated a moisturizing effect on the scalp and hair, leading to increased hydration levels and reduced dryness among participants. Enhanced hair texture and shine were noted in the Moringa group.
4. Anti-inflammatory Action: The anti-inflammatory properties of Moringa extract were observed to alleviate scalp inflammation, contributing to overall scalp comfort and health.

13.DISCUSSION

The study results suggest that Moringa herbal anti-dandruff shampoo is an effective and well-tolerated option for managing dandruff and improving scalp conditions. The significant reduction in dandruff flakes and improvement in scalp health parameters highlight the therapeutic potential of Moringa extract in hair care products.

Bioactive compounds found in Moringa, such as vitamins, minerals, and antioxidants, likely contribute to its anti-dandruff and scalp-nourishing effects. These compounds possess antimicrobial, anti-inflammatory, and moisturizing properties, which are beneficial for combating dandruff and maintaining a healthy scalp environment.

The moisturizing effect of Moringa herbal shampoo is particularly noteworthy as it addresses dryness and enhances hair texture without causing greasiness or weighing down the hair. This makes it suitable for individuals with various hair types, including those with dry scalp conditions.

In conclusion, the findings support the inclusion of Moringa herbal extract in anti-dandruff formulations and highlight its potential as a natural and efficacious solution for dandruff management while promoting overall hair and scalp well-being.

14.CONCLUSION

The Moringa herbal anti-dandruff shampoo has proven its effectiveness in combating dandruff flakes, enhancing scalp health, and relieving scalp irritation and itchiness.

The formulation's integration of Moringa extract contributes significantly to scalp nourishment, hydration, and overall hair vitality, making it suitable for regular usage.

The shampoo's anti-inflammatory and antimicrobial properties derived from Moringa play a pivotal role in addressing dandruff triggers and maintaining a healthy scalp environment.

In summary, the Moringa herbal anti-dandruff shampoo provides a promising solution for individuals seeking a natural, effective, and gentle approach to managing dandruff while preserving scalp and hair health. Its therapeutic attributes position it as a valuable inclusion in anti-dandruff hair care routines, fostering overall well-being and confidence in hair care management.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

15.REFERENCE

1. *https://www.researchgate.net/publication/342984141_EXTRACTION_FORMULATION_AND_EVALUATION_OF_MORINGA_HERBAL_SHAMPOO.*
2. *https://link.springer.com/10.1007/978-3-319-32383-1_115*
3. *https://www.myglamm.com/glammstudio/curry-leaves-for-hair*
4. *https://www.hindustantimes.com/health/from-fighting-dandruff-to-aiding-hair-growth-4-glorious-things-oranges-can-do-your-mane/story-rkWsUT5RirUbkjgceTYAYP.html*
5. *https://ijcrt.org/papers/IJCRT2207028.pdf*
6. *https://www.ijfmr.com/papers/2023/6/8673.pdf*
7. *Herbal Drug Technology by Dr. G. Arunachalam,Ph.D., M. Pharm,FIC Professor & Principal,PGP College of Pharmaceutical Science & Research Institute, Namakkal*
8. *The Ayurvedic pharmacopoeia of India, Department of Indian sytems of Medicine & Homeopathy New Delhi, Part –I, Vol. II, 155-157.*
9. *Al Badi K, Khan SA. Formulation, evaluation and comparison of theherbal shampoo with the commercial shampoos. Beni-SuefUniv J Basic Applied Sci 2014; 3:301-305*
10. *AnushaPotluri*, Harish. G, B. Pragathi Kumar, Dr. Durraivel. Formulation and evaluation of herbal antidandruff shampoo Indian Journal of Research in Pharmacy and Biotechnology 2013-p.835.*
11. *Mainkar AR, Jolly CI. Formulation of natural shampoos.Int J CosmetSci 2001;23:59-62.*
12. *B. M. Mithal and R. N. Saha, Handbook of cosmetics, first edition, VallabhPrakashan 2003: 1-10,110-121.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

EXPLORING THE MOLECULAR AFFINITIES OF MEFENAMIC ACID & CELECOXIB BY USING AUTO-DOCK TOOL

Nitin Bajirao Sapkal[1]*, Seema Pralhad Rathod[2]
[1]*Student of bachelor of pharmacy, Faculty of pharmacy, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.*
[2]*Department of pharmaceutical Chemistry, Faculty of pharmaceutical Chemistry, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.*

ABSTRACT
Mefenamic acid is a nonsteroidal anti-inflammatory drug (NSAID) known for its analgesic and anti-inflammatory properties. Understanding its interaction with biological targets at the molecular level is crucial for elucidating its therapeutic mechanisms and designing more effective derivatives. Molecular docking, a computational technique, offers insights into the binding modes and affinities of mefenamic acid with target proteins such as cyclooxygenases (COX) and other inflammatory mediators. This review provides an overview of recent advancements in molecular docking studies of mefenamic acid, highlighting its interactions with key residues within the active sites of target proteins. Furthermore, it discusses the implications of these findings for the development of novel mefenamic acid-based therapeutics with enhanced efficacy and reduced side effects.

1.INTRODUCTION TO MEFENAMIC ACID

Mefenamic acid is a nonsteroidal anti-inflammatory drug (NSAID) with analgesic, anti-inflammatory, and antipyretic properties. It belongs to the class of anthranilic acid derivatives and is structurally related to other NSAIDs such as ibuprofen and naproxen. Mefenamic acid was first synthesized in the 1960s and has since been widely used for the treatment of various conditions, including menstrual pain (dysmenorrhea), rheumatoid arthritis, and other inflammatory disorders.

Its mechanism of action involves inhibition of cyclooxygenase (COX) enzymes, particularly COX-1 and COX-2, which are key enzymes involved in the synthesis of prostaglandins from arachidonic acid. Prostaglandins play a crucial role in mediating inflammation, pain, and fever responses. By inhibiting COX enzymes, mefenamic acid suppresses the production of prostaglandins, thereby exerting its anti-inflammatory and analgesic effects.

Mefenamic acid is typically administered orally in the form of tablets or capsules. It is rapidly absorbed from the gastrointestinal tract, with peak plasma concentrations reached within 2-4 hours after administration.

OBJECTIVES

- To investigate the binding interactions of mefenamic acid with key protein targets, including cyclooxygenases (COX-1 and COX-2).
- To elucidate the structural basis of mefenamic acid's pharmacological activity through computational docking studies.
- To identify potential modifications or interactions that could enhance the drug's efficacy or selectivity.

1.1Introduction to Celecoxib

Celecoxib is a nonsteroidal anti-inflammatory drug (NSAID) belonging to the class of selective cyclooxygenase-2 (COX-2) inhibitors. It is widely used for the management of pain, inflammation, and various types of arthritis. Understanding the molecular interactions of celecoxib with its target protein, COX-2, is crucial for elucidating its pharmacological mechanisms and guiding drug design efforts.

Objectives

- To investigate the binding interactions of celecoxib with the active site of COX-2 through molecular docking studies.
- To analyze the binding affinity and energetics of celecoxib binding to COX-2.
- To explore the structural features of the celecoxib-COX-2 complex and identify key interactions contributing to binding specificity.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2.BASICS OF MOLECULAR DOCKING

Molecular docking is a widely utilized method for predicting the alignment of small molecule therapeutic compounds with their protein targets, thereby anticipating the affinity and activity of the small molecule. It plays a crucial role in rational drug design. Due to the biological and pharmacological significance of docking studies, substantial efforts have been dedicated to enhancing the algorithms for docking prediction.

Docking is fundamentally a mathematical technique that predicts the optimal orientation of one molecule relative to another when they interact to form a stable complex. Through scoring functions, the strength of the binding affinity between two compounds can be estimated based on their preferred orientation. Here's a breakdown of the basics:

- **Target Molecule:** Usually, the target molecule is a protein receptor, but it can also be DNA, RNA, or other macromolecules.
- **Ligand Molecule:** The ligand is the small molecule (often a potential drug candidate) that is being docked into the target molecule.
- **Scoring Function:** The scoring function typically accounts for factors such as steric hindrance, electrostatic interactions, hydrogen bonding, and hydrophobic interactions.
- **Search Algorithm:** Docking programs employ search algorithms to explore the vast conformational space of possible ligand-receptor orientations. Common search algorithms include genetic algorithms, Monte Carlo simulations, and stochastic searches.
- **Binding Site Prediction:** Before docking, the binding site on the target molecule needs to be identified or predicted. This can be done using experimental methods like X-ray crystallography or NMR spectroscopy, or through computational methods like molecular dynamics simulations or binding site prediction algorithms.
- **Validation:** Docking results are typically validated by comparing them to experimental data or by cross-validation against known ligand-receptor complexes.(1)

2.1Molecular Docking

Molecular docking involves arranging molecules in optimal configurations for interaction with a receptor. It's a process that occurs rapidly within cells as molecules bind together to form stable complexes. (1)

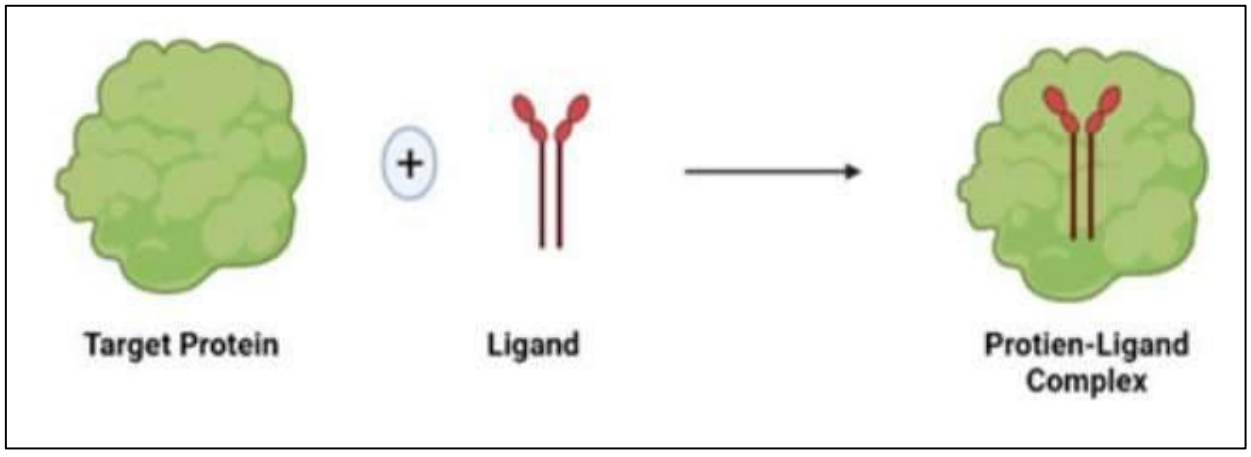


Fig. Molecular Docking

2.2Molecular Modeling

Molecular modeling serves as a versatile tool for generating, describing, and adjusting the configurations and interactions of compounds, including the attributes dependent on their three-dimensional geometries. (1)

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

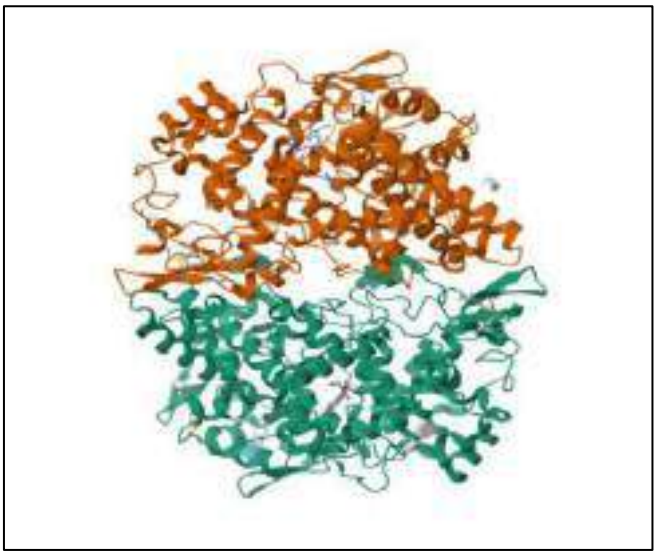


Fig. Molecular Modeling

2.3Types of docking

2.3.1. Rigid docking: Given that the compounds are rigid, our aim is to find an optimal rearrangement of one of the compounds in three-dimensional space to achieve the closest match to the other compound based on a scoring system. The conformation of the ligand can be determined whether it exhibits receptor binding activity or not. (1)

2.3.2. Flexible docking: The ligand and/or the receptor can undergo conformational changes to explore different binding modes and interactions, which can lead to more accurate predictions of ligand-receptor interactions and binding affinities. (1)

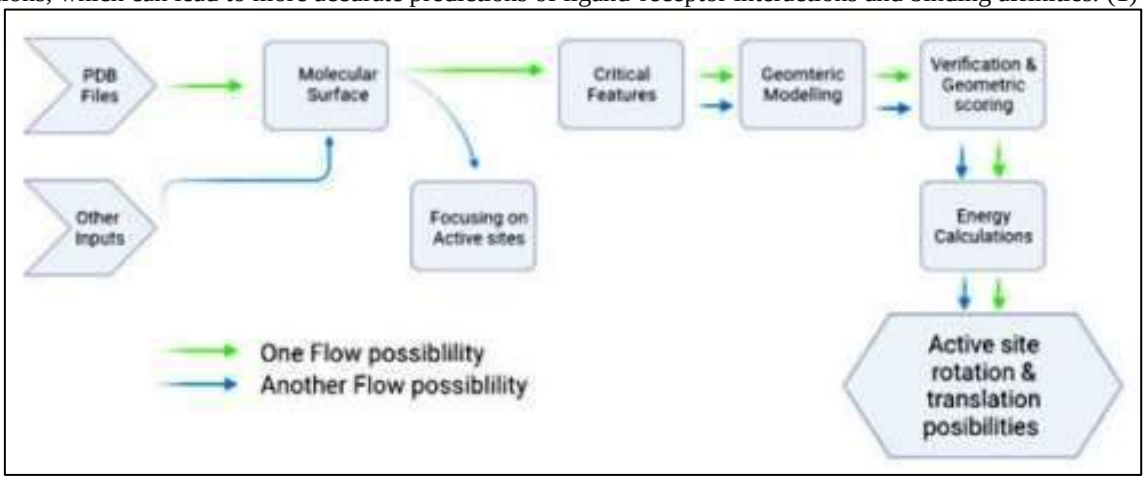


Fig. Rigid & Flexible Docking

2.4Different types of Docking based on Interaction

2.4.1Protein-Ligand Docking:

It involves simulating the interaction between the protein and ligand to predict their optimal spatial arrangement and binding affinity. Protein-ligand docking plays a crucial role in rational drug design by providing insights into the molecular interactions that govern the binding between potential drug candidates and their target proteins. This information can be used to guide the design and optimization of novel therapeutics with improved potency and selectivity.(2)

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

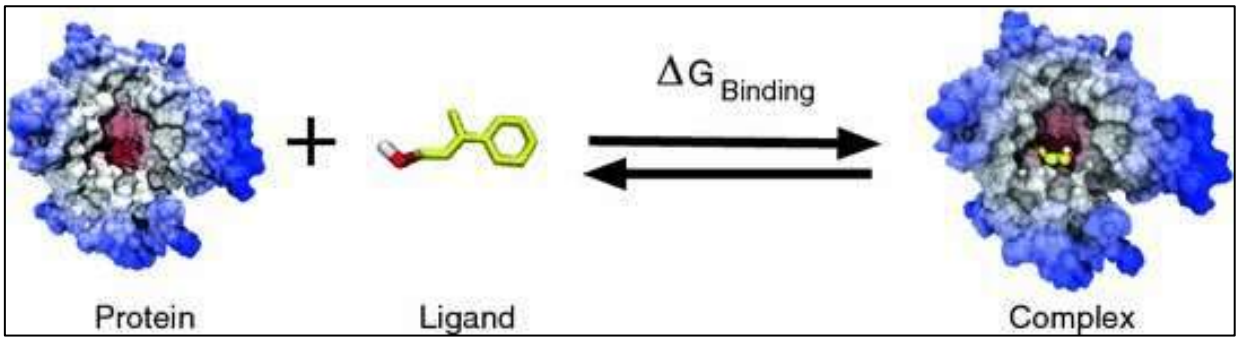


Fig. Protein-Ligand Docking

2.4.2Protein-Protein Docking

In protein-protein docking, the determination of protein complexes involves sequence alignments, structural comparisons, and analysis of multiple protein-protein interactions, considering their specific conformations and docking positions. Also, Protein-protein docking is important for understanding biological processes such as signal transduction, enzymatic reactions, and protein complex formation. (2)

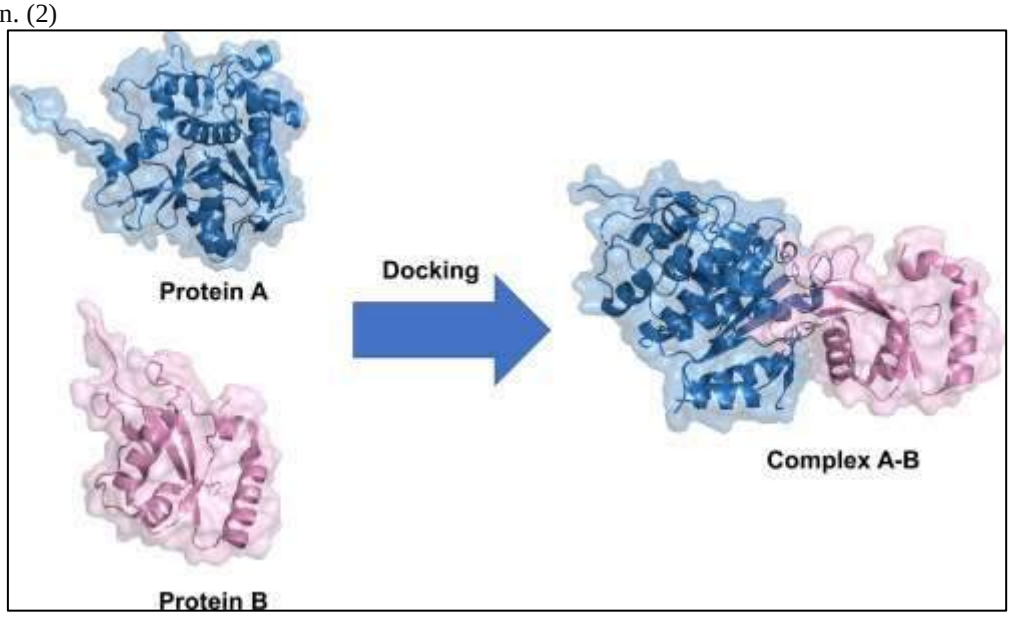


Fig. Protein-Protein Docking

3.Requirements of Molecular Docking:

Tools	Key features
1) Research Collaboratory for Structural Bioinformatics (RCSB)	1. The Research Collaboratory for Structural Bioinformatics Protein Data Bank (RCSB PDB) 2. Information about 3D Dimensional
2) Pubchem	1. Served as a central data repository for the NIH's Molecular Libraries Program (MLP) 2. Mostly high-throughput screening (HTS) data from NIH's MLP and other HTS projects.
3) Pymol	1. To visualize different kinds of molecules such as proteins, compounds, or molecules. 2. Save high-quality images in PNG format.
4) Auto dock Tool 1.5.7	1. 3D molecule visualization, Hydrogen addition, Partial atomic charge assignment, Grid box setup, Results analysis
5) proteins plus	1. They are used in Binding site detection 2D interaction diagrams
6)Discovery Studio Visualizer (BIOVIA)	1. Visualization tool for analyzing protein and modeling data

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3.1 Auto Docking Tool

This guide will provide an overview of docking procedures utilizing the Auto-Dock suite of software. We'll be utilizing a Graphical User Interface (GUI) known as Auto-Dock Tools (ADT), which simplifies the setup of the docking process for two molecules. ADT facilitates the initiation of external computational tasks within Auto-Dock, and upon completion of the docking simulations, it allows users to interactively examine the results in 3D.

Auto-Dock has been widely used in structure-based drug design, virtual screening, and understanding protein-ligand interactions. It continues to be actively developed and maintained, with newer versions and improvements being released periodically to enhance its capabilities and performance.

3.2 Application of Auto Dock tool:

- Auto-Dock is a molecular modeling simulation software known for its efficacy in protein-ligand docking studies.
- Widely acknowledged in the research community, Auto-Dock stands as one of the most referenced docking software applications.
- The software comprises two main programs: Auto-Grid and Auto-Dock. Auto-Grid primarily calculates relevant energy in a grid, while Auto-Dock handles conformation search and evaluation during docking simulations.
- Auto- Dock facilitates lead optimization by predicting the binding modes and affinities of ligands within the active sites of target proteins. Medicinal chemists use these predictions to design and optimize lead compounds with improved binding properties and pharmacokinetic profiles.

3.3 Ligand preparation steps

1. Utilize a Java applet to create visual representations of your ligands or upload individual ligand files or multiple ligands.
2. Employ Marvin Sketch, a Java-based software offering a wide array of editing features and templates, to draw chemical structures with ease.
3. Upload ligand files in various formats such as MDL MOL, SYBYL MOL2, PDB, HYPERCHEM HIN, or SMILES.
4. Upload multiple ligands in SDF format and customize simulation parameters like desired pH, structure optimization, and partial charge calculations using molecular mechanics or semi-empirical quantum chemical methods.
5. Automatically set up rotatable bonds and atom types, or manually adjust them as needed.
6. Download the provided files in formats like mol, pdb, mol2, and pdbqt. Organize your ligands into folders according to your preferences.

4. MOLECULAR DOCKING FOR MEFENAMIC ACID & CELECOXIB:

Introduction :- Mefenamic acid (Test Drug) is a member of the anthranilic acid derivatives (or fenamate) class of nonsteroidal anti-inflammatory drugs (NSAIDs), and is used to treat mild to moderate pain

Introduction: - Celecoxib (Standard Drug) is a nonsteroidal anti-inflammatory drug (NSAID) belonging to the class of selective cyclooxygenase-2 (COX-2) inhibitors. It is widely used for the management of pain, inflammation, and various types of arthritis.(3)

4.1Receptor and Ligand profile

- **Receptor Name:** The Structure of Mefenamic Acid Bound to Human Cyclooxygenase-2
- **PDB ID:** 5ikr
- **PDB DOI:** https://doi.org/10.2210/pdb5IKR/pdb
- **Classification:** OXIDOREDUCTASE
- **Organism:** Homo sapiens
- **Expression System:** Spodoptera frugiperda

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

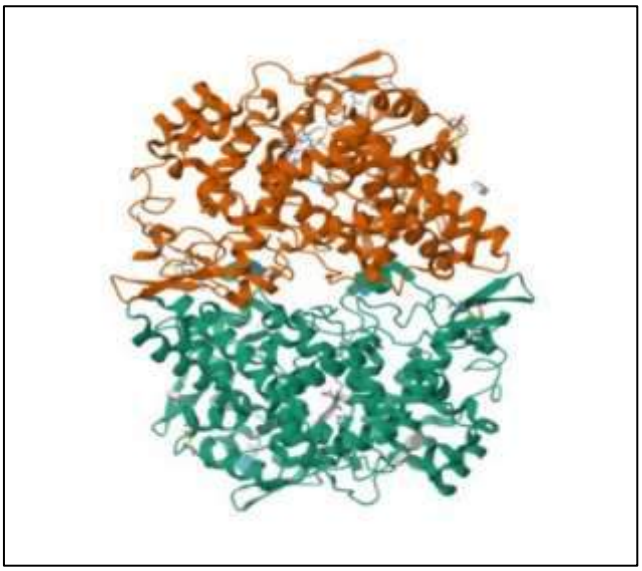


Fig: The Structure of Mefenamic Acid Bound to Human Cyclooxygenase-2

- **Method:** X-RAY DIFFRACTION
- **Resolution:** 2.34 Å
- **R-Value Free:** 0.211
- **R-Value Work:** 0.185(4)

4.2Ligand Profile 1

- **Drug name:** Mefenamic Acid
- **PubChem CID:** 4044
- **Classification:** Anthranilic acid derivative class of NSAIDs (fenamates)
- **Molecular Formula:** C15H15NO2
- **IUPAC Name:** 2-(2,3-dimethylanilino)benzoic acid(3)

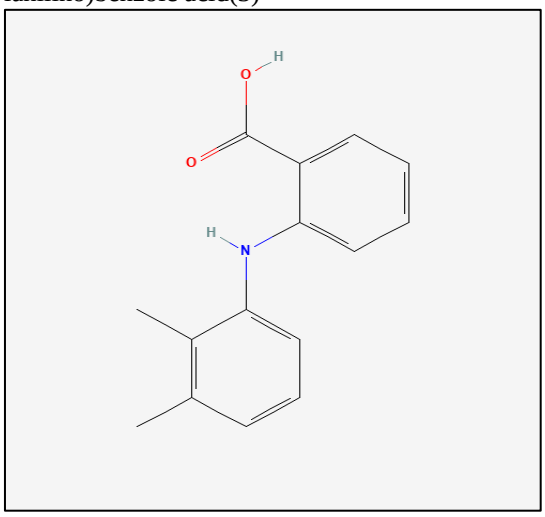


Fig: Structure Of Mefenamic Acid

4.3Ligand profile 2

- **Drug name:** Celecoxib.
- **PubChem CID:** 2662
- **Classification:** Celecoxib is in a class of NSAIDs called COX-2 inhibitors.
- **Molecular Formula:** C17H14F3N3O2S
- **IUPAC Name:** 4-[5-(4-methylphenyl)-3-(trifluoromethyl)pyrazol-1-yl]benzenesulfonamide(3)

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

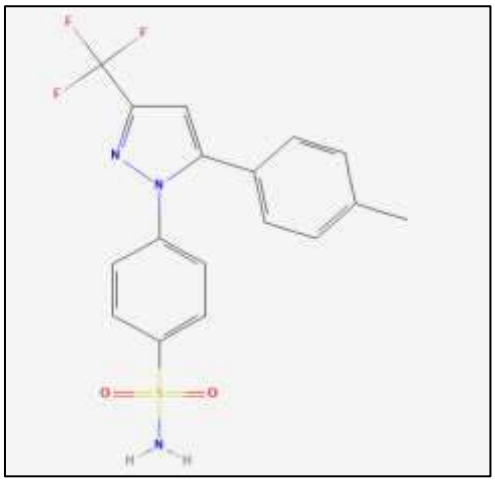


Fig: Structure Of Celecoxib

5.SWISS-ADME Of Mefenamic Acid

Swiss-ADME is a web tool designed for predicting pharmacokinetics and drug-likeness properties of small molecules. It's primarily utilized in drug discovery and development processes to evaluate the absorption, distribution, metabolism, excretion, and toxicity (ADME/Tox) properties of potential drug candidates.

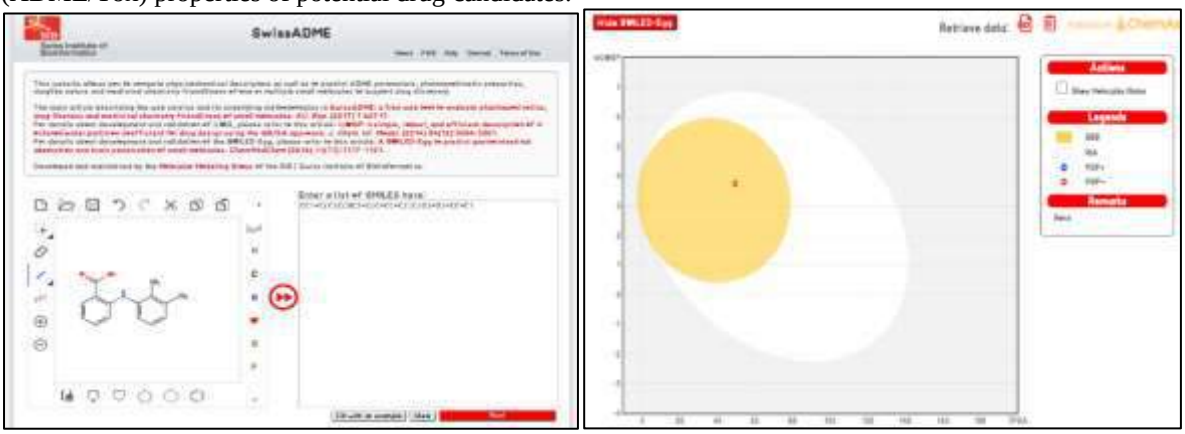


Fig. Boiled Egg of Mefenamic Acid

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

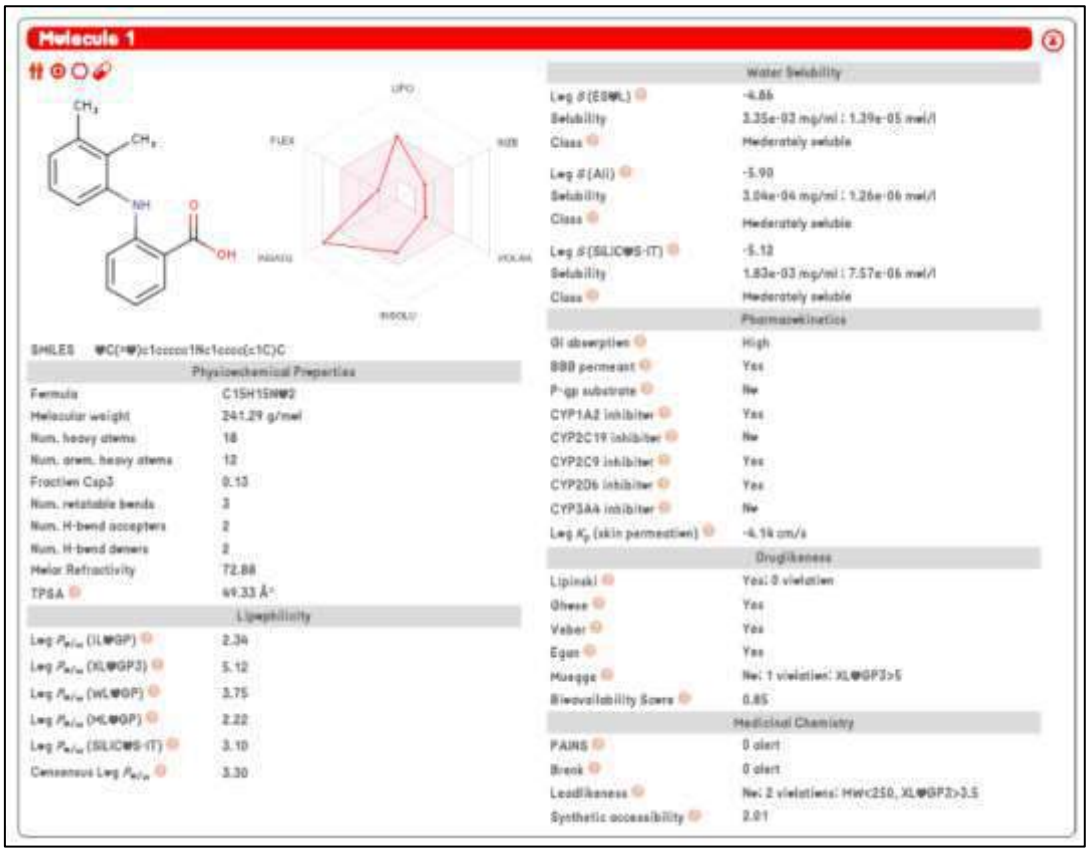


Fig. ADME Study of Mefenamic Acid

5.1SWISS-ADME Of Celecoxib

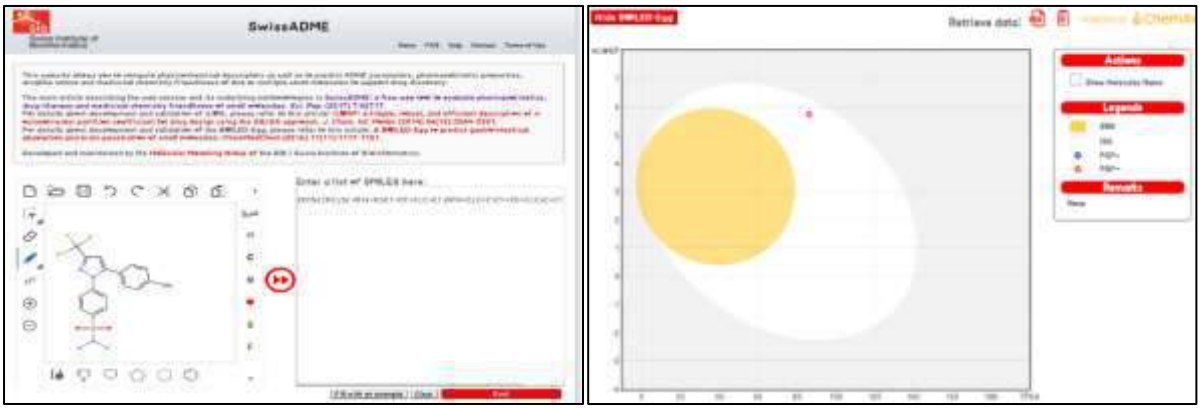


Fig. Boiled Egg of Celecoxib

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

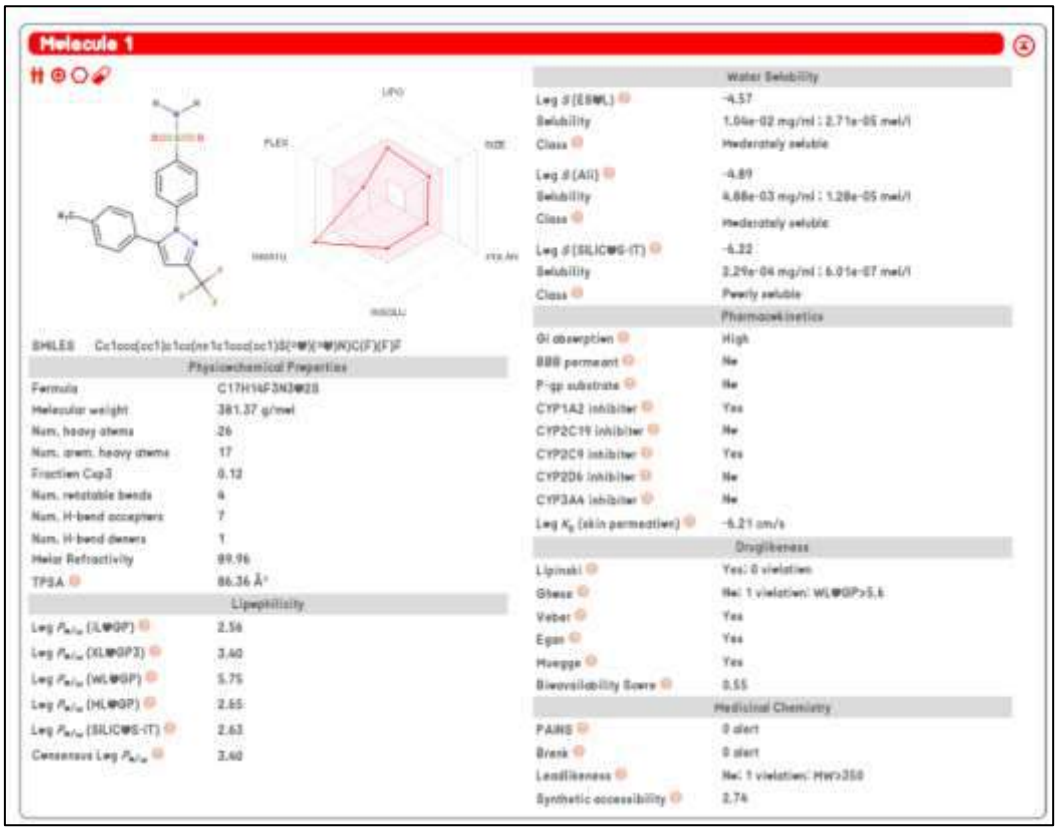


Fig. ADME Study of Celecoxib

5.2Conclusion

Swiss ADME software is a valuable tool in drug discovery and development processes. It offers a range of functionalities related to Absorption, Distribution, Metabolism, and Excretion (ADME) properties of compounds, which are crucial factors in determining the efficacy and safety of potential drug candidates.

6.AUTO-DOCK TOOL

Auto dock Vina is an open-source software tool used for molecular docking. Developed and implemented by Dr. Oleg Trott at the Molecular Graphics Lab, Scripps Research Institute, it offers enhanced accuracy in predicting binding modes compared to Auto dock, based on assessments conducted on the training set used during Auto dock's development.(5)

6.1Target preparation:

The preparation of the receptor is a crucial step. The formation of the receptor-ligand complex is vital for pharmacological activity. In this study, the structure of mefenamic acid bound to human cyclooxygenase-2 was selected from literature survey for investigation. Inhibiting this specific receptor may impede the progression of the disease.



Fig: RCSB Database with PDB ID-5ikr

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

A) Protein preparation

1) Open the PDB format of receptor 5ikr in Auto dock Vina by clicking vina by clicking 'file in subsection read molecule.
2) Go to Edit & Deleting Water molecule, select from string as shown in fig 1:

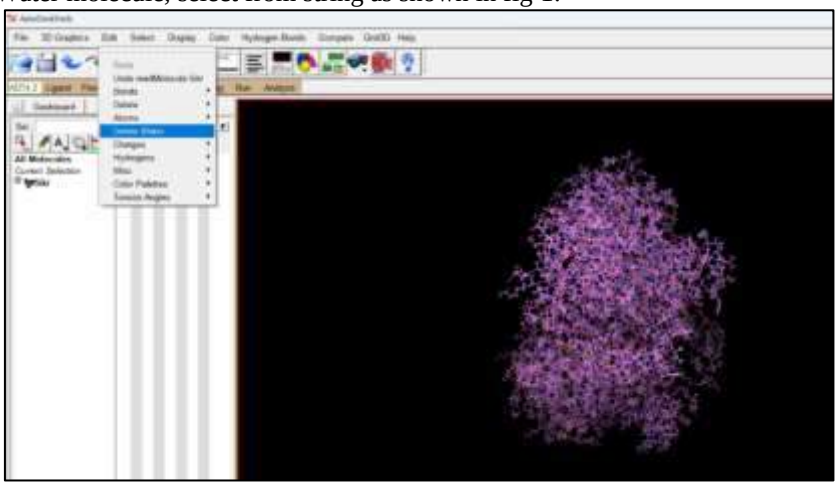


Fig 1: Protein Preparation

3) Then go to select & click on select from string and add Hetatm as show in Fig No:2 & 3

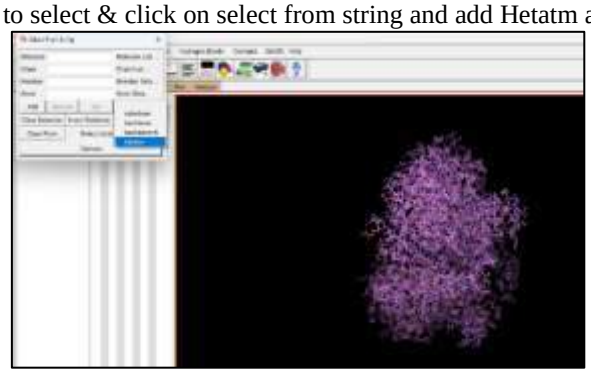


Fig No 2: Select & click select from string

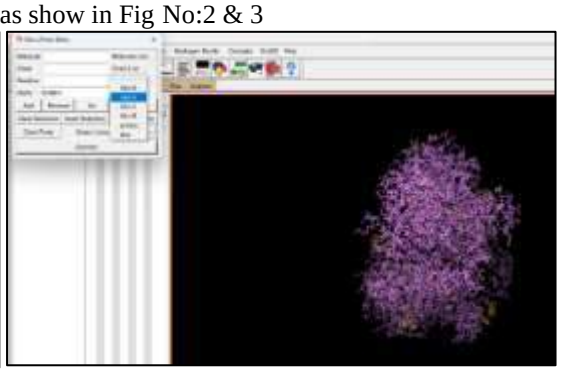


Fig No 3: Add Hetatm

4) Then go to edit and click on Delete Selected Atoms as shown in Fig No:4

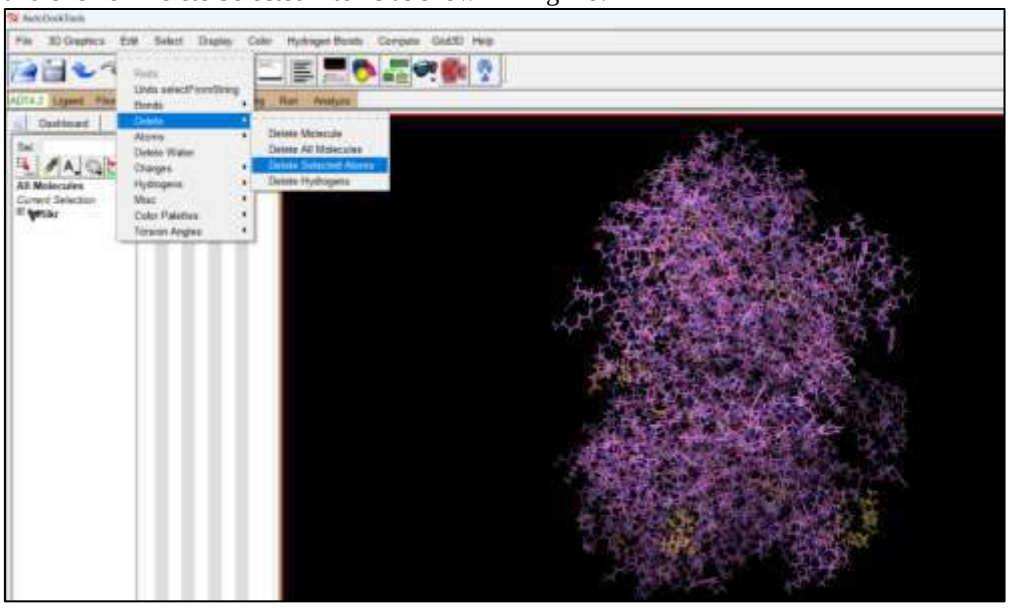


Fig No 4: Delete selected Atom.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5) Then go to edit and click on “add hydrogen (polar only) as show in Fig No:5 & 6

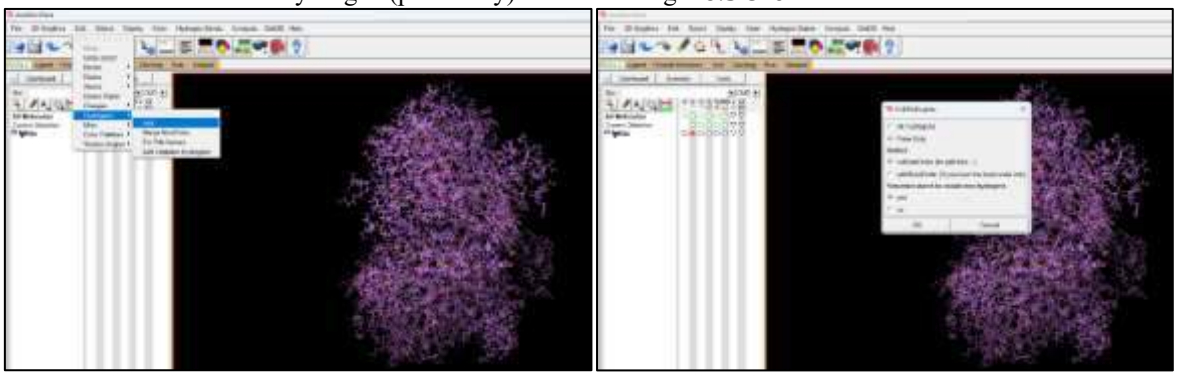


Fig No 5 & 6: Add hydrogen (polar only)

6) Then go to edit and “add kollman charges” as shown in Fig No:7

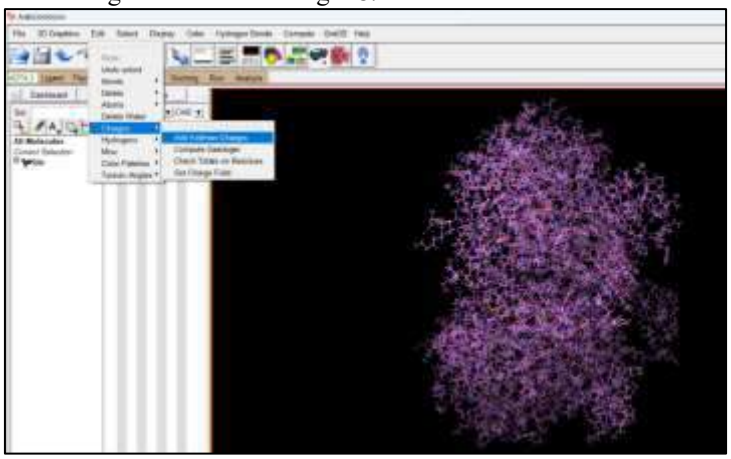


Fig No 7: Add Kollman Charges

7) Then go to edit and click on atoms chose “Assign AD4 type”.as shown in the Fig no:8

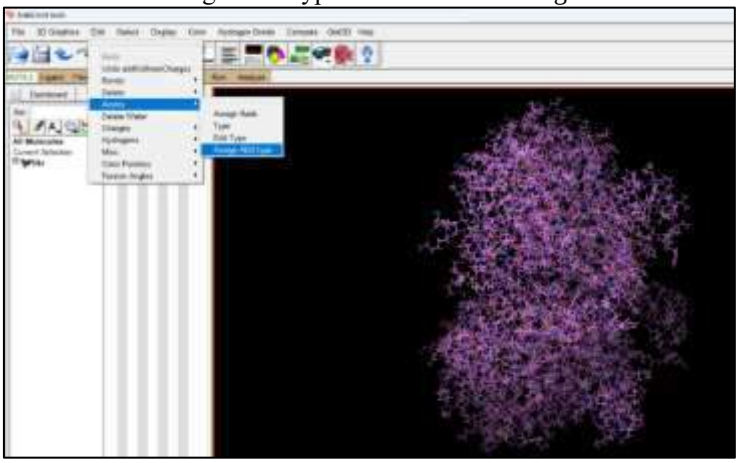


Fig No 8: Assign AD4 type.

8) Then go to the file section and save bottom then select PDBQT format to save & select the END and add molecule, as shown in Fig No:9 & 10

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

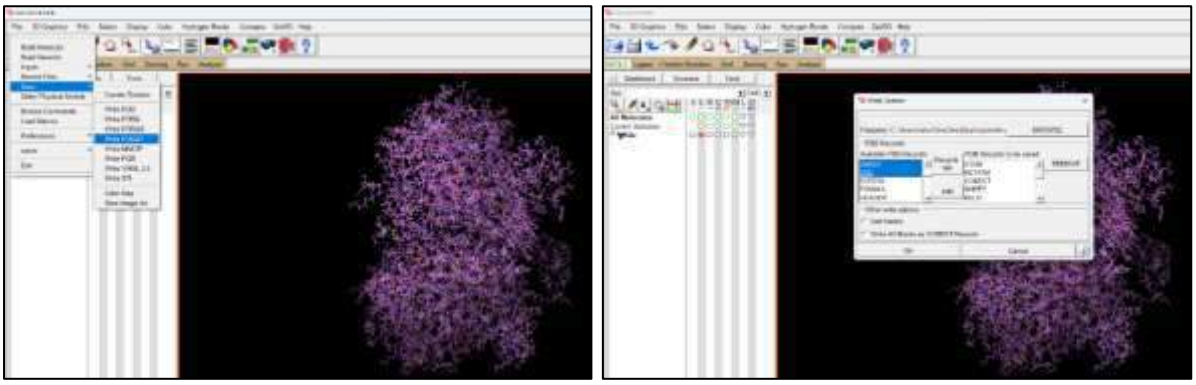


Fig No 9 & 10: Save PDBQT Format

B) ligand preparation

1) click the ligand section then choose input add click on the open option. As shown Fig No:1

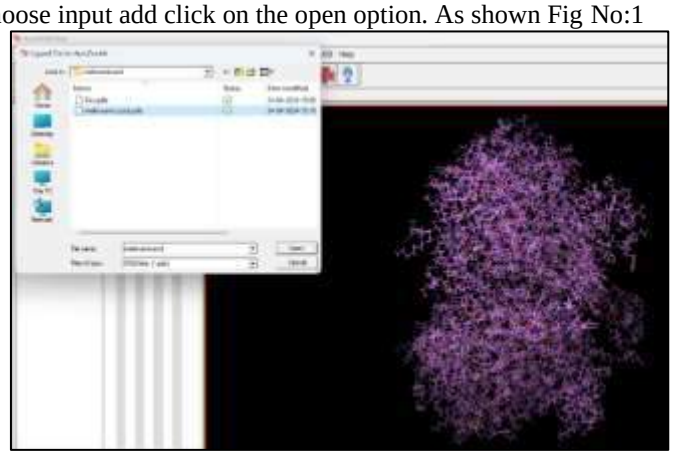


Fig No 1: Click the ligand section then choose input add click.

2) After loading the molecule click the on-torsion tree under the same ligand section and click on **choose root then detect root**.as shown in Fig No.2

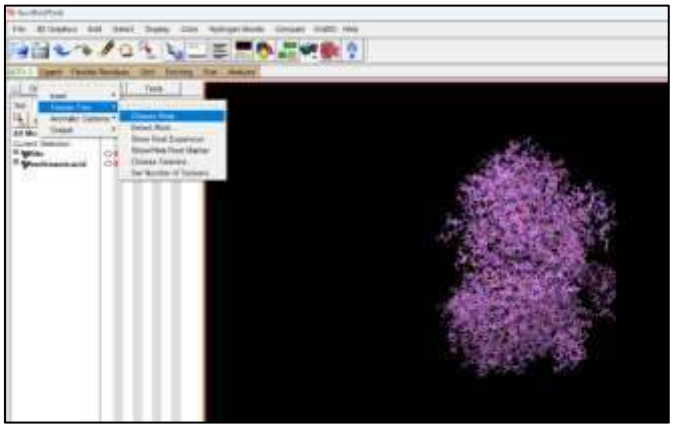


Fig No 2: Choose root then detect root.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3) Then go to the output option and save it in PDBQT format. As shown in Fig No.3

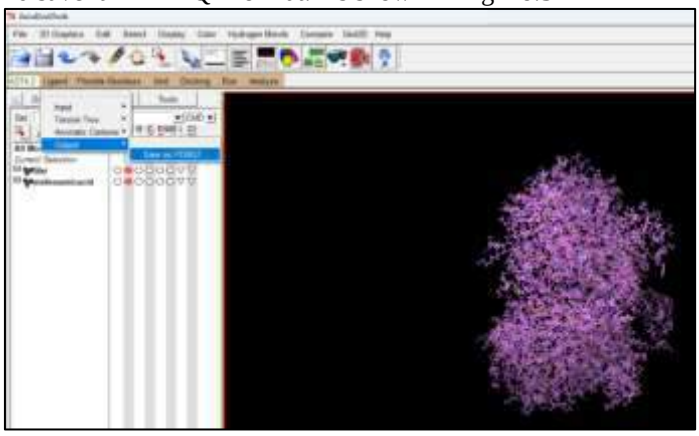


Fig No 3: Save PDBQT

C) Grid generation

1) Open PDBQT of 5ikr receptor which is saved in an earlier step. then the grid and choose and choose a receptor as a macromolecule. Then select the 5ikr receptor molecule and click No for reserve change as shown in Fig No.1 & 2

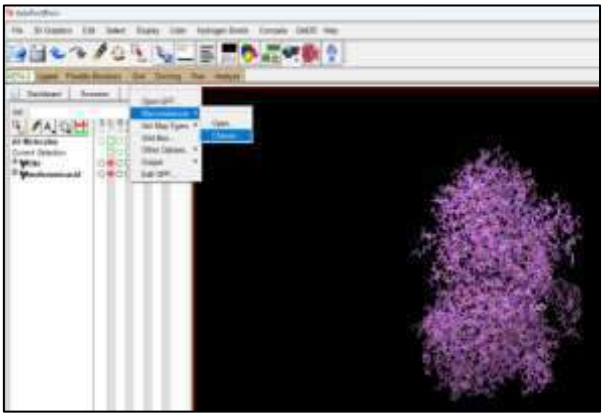


Fig No: 1

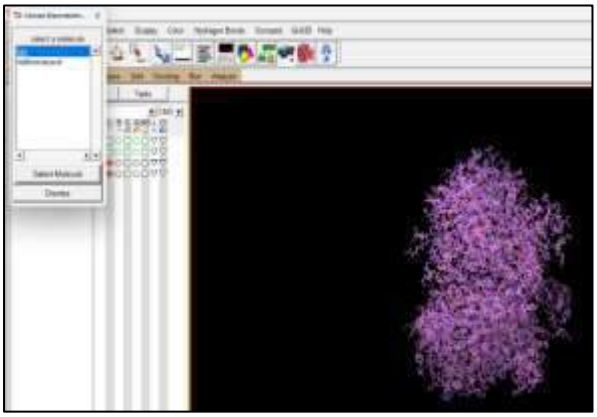


Fig No: 2

2) Then click on Set map types and choose ligand as shown FigNo:3

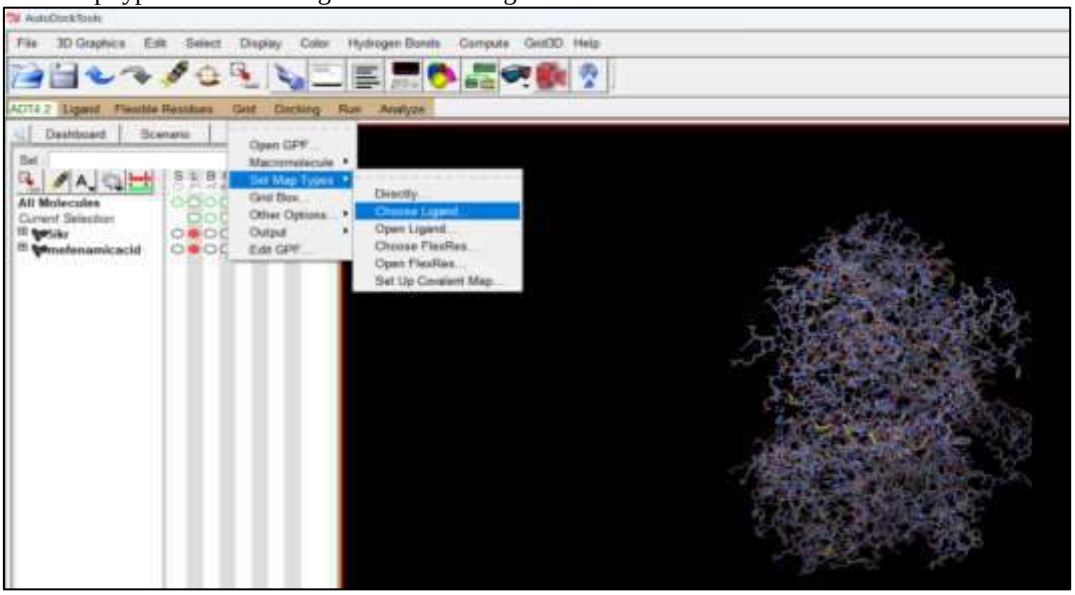


Fig No 3: Set map types and choose ligand.3) Then in the grid section, click on the grid box as shown in Fig No:5

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

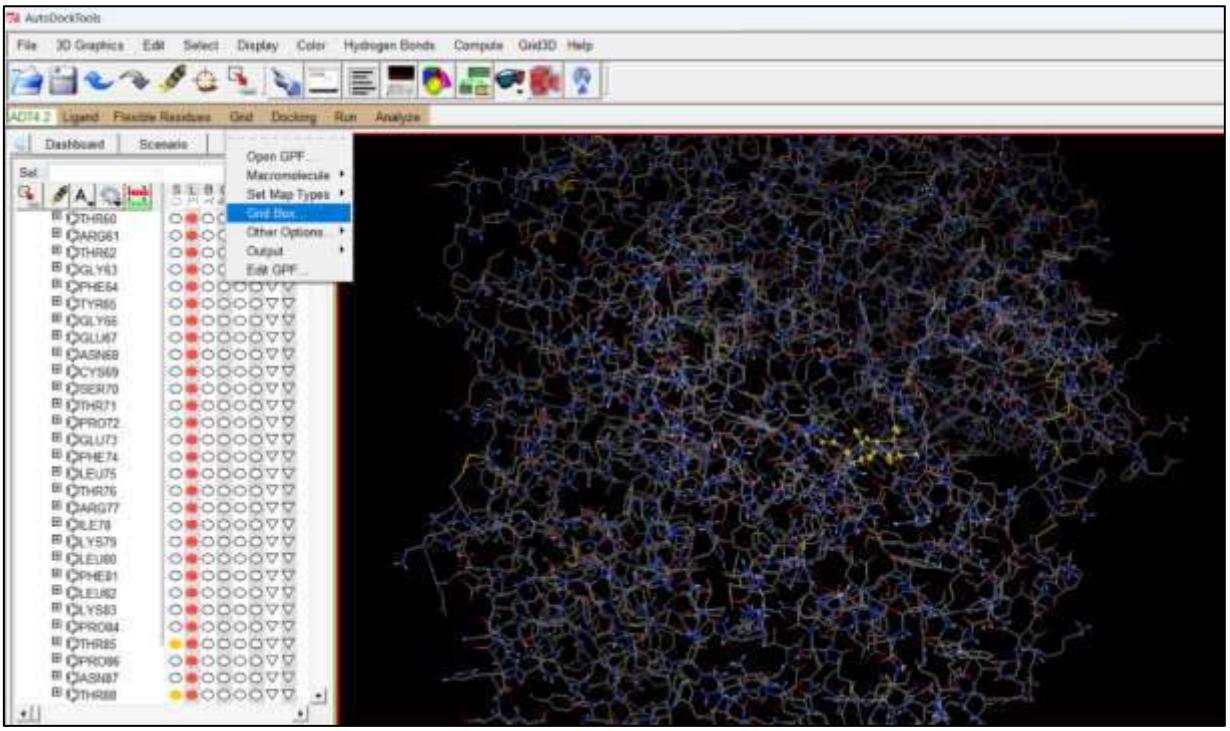


Fig No 5: Grid section

4) Then click on the grid box Adjust the grid box using the grid box coordinates so that the receptor molecule is enclosed within the box then click the button in the grid option and select "output grid dimension file" as shown in Fig No:6

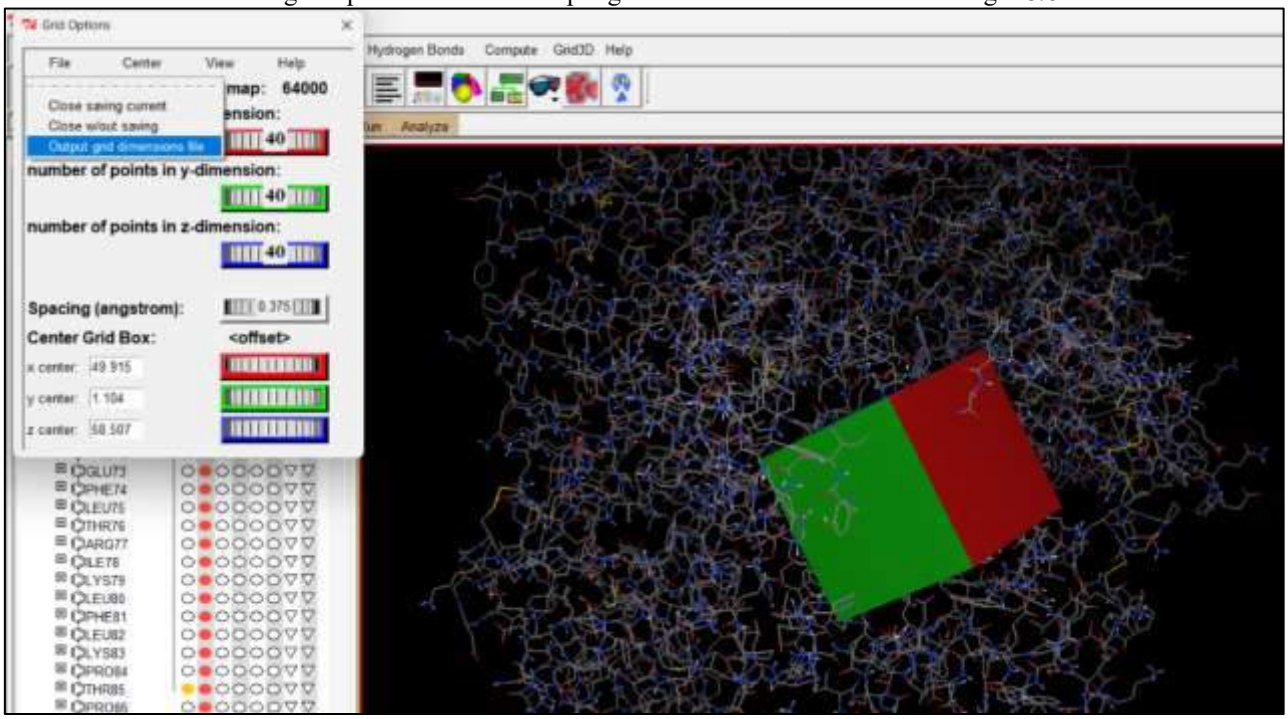


Fig No 6: Output grid dimension file

D) Config file

1) Open a new document file and enter the configuration details of the grid box, receptor name, ligand name, energy range and exhaustiveness as given in picture not as shown in Fig No:1

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

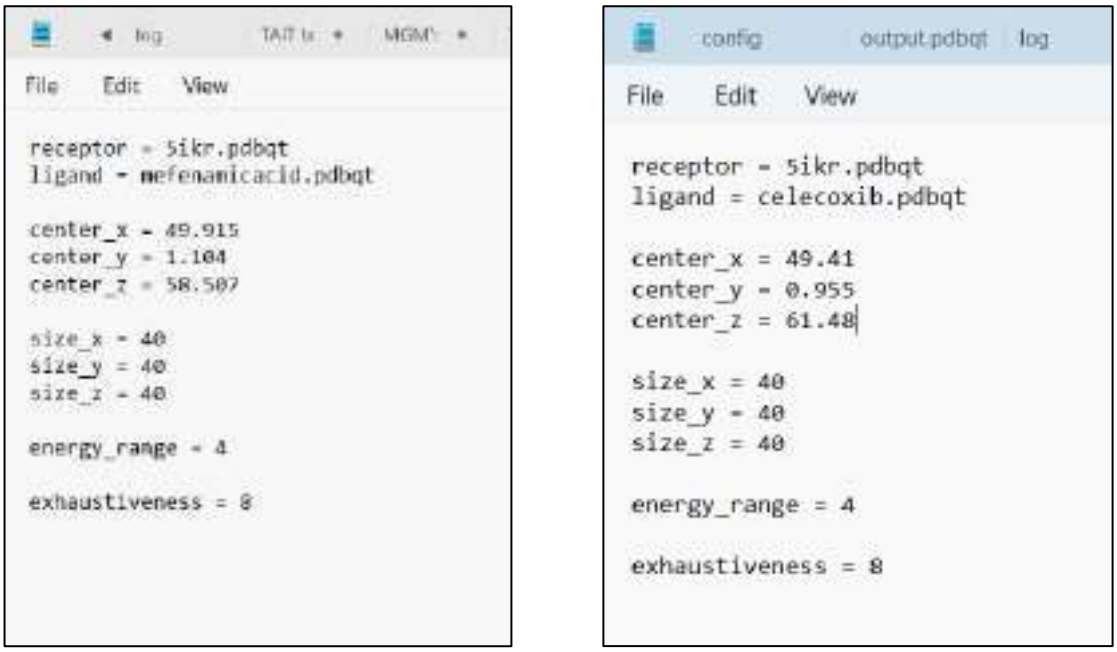


Fig No 1: Config file

E) Command Prompt:

1) Search for command prompt in your laptop or computer.

2) Then enter, followed by 'cd' Paste the folder location in which all require are present them press enter as shown in Fig No:1

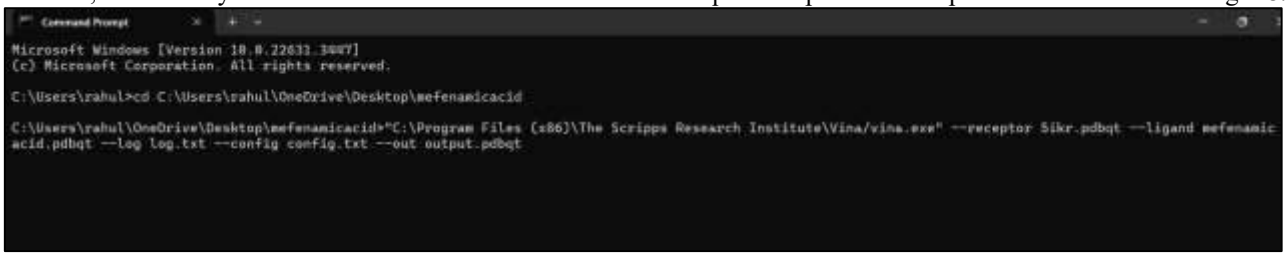


Fig no 1: Command prompt

3) Then run docking vina copy address "vina search-receptor 5ikr.pdbqt –ligand mefenamicacid.pdbqt – config config.txt-log log .txt-out output.pdbqt as shown in Fig No:2



Fig no 2: Run docking vina copy address "vina search-receptor.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4) After that it will take some time and give us the result of docking as shown in Fig:3 & 4

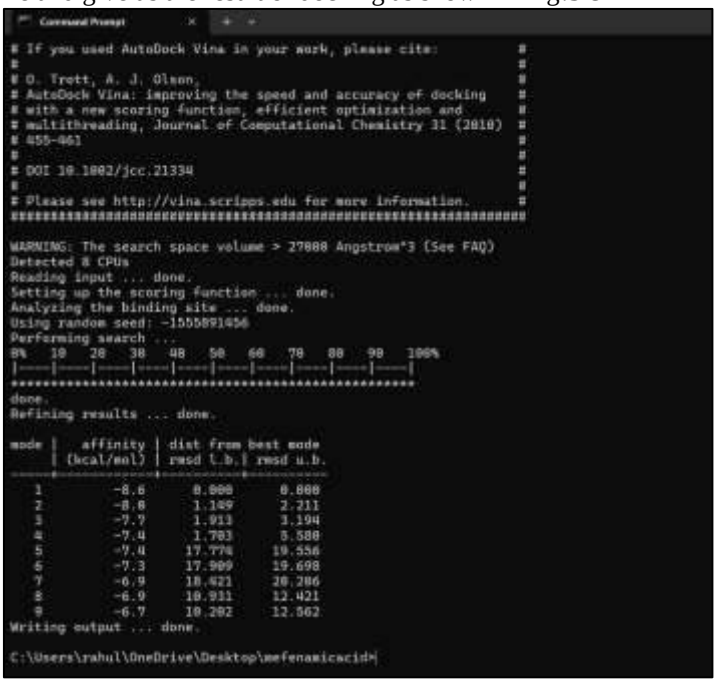


Fig No:3 Docking result of Mefenamic Acid

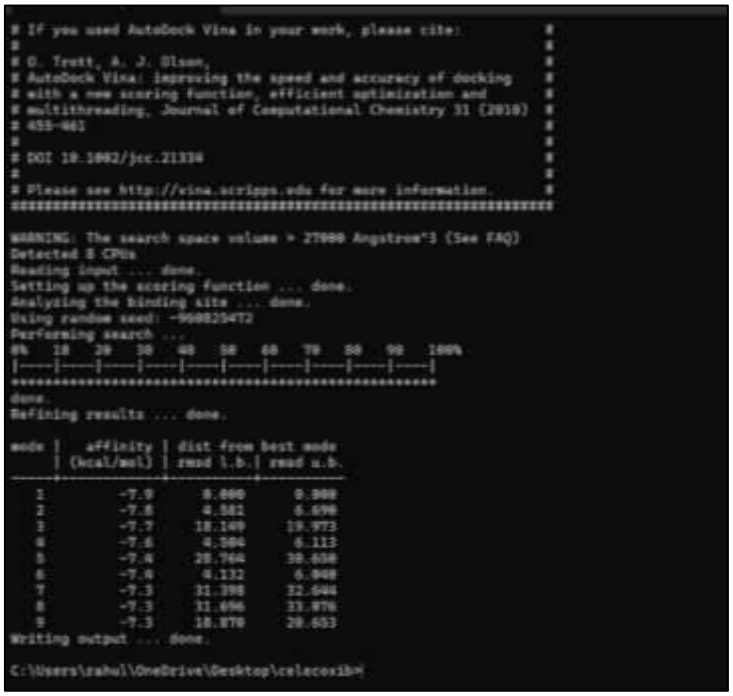


Fig No:4 Docking result of Celecoxib

5) Then Output file of the result will automatically save in the command folder, which can be read by using notepad.

7.VISUALIZATION OF DOCKING RESULT

To visualize the docking results, we use "Discovery Studio BIOVIA". The terminal shown in the figure. To proceed: [6]

1.Open the output file obtained from the docking process by clicking on the file section.

2.Delete all poses except the best pose, which will be labeled as 1 in all cases. Fig:1

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Fig No:1 Terminal of Discovery Studio of Biovia

3.Now go to the file section and open 5ikr receptor PDBQT file in new terminal of biovia software. From this terminal copy receptor & paste it in ligand terminal. As shown in Fig No:2

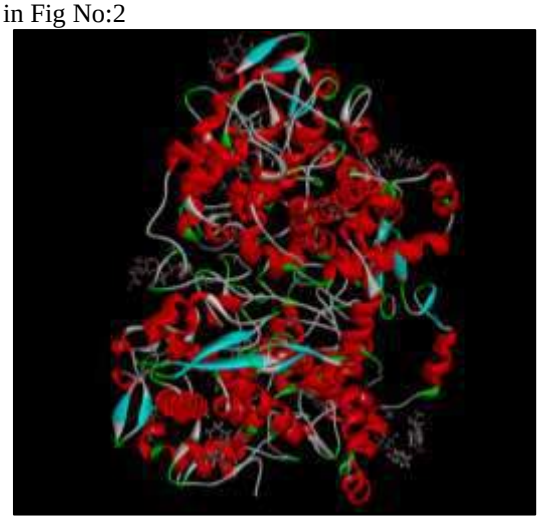


Fig No:2 Complex of ligand with receptor with suitable pose

4.After defining receptor & ligand from the complex, then click on "ligand receptor complex"

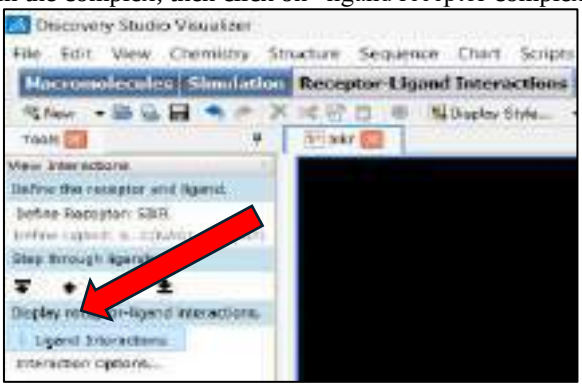


Fig No:3 Ligand interaction option

5.In Show 'receptor ligand interaction in 3d diagram, click on show, 3D Diagram'. Where you will get an image of amino acids attached to ligand in 3D format. As shown in Fig No:4

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

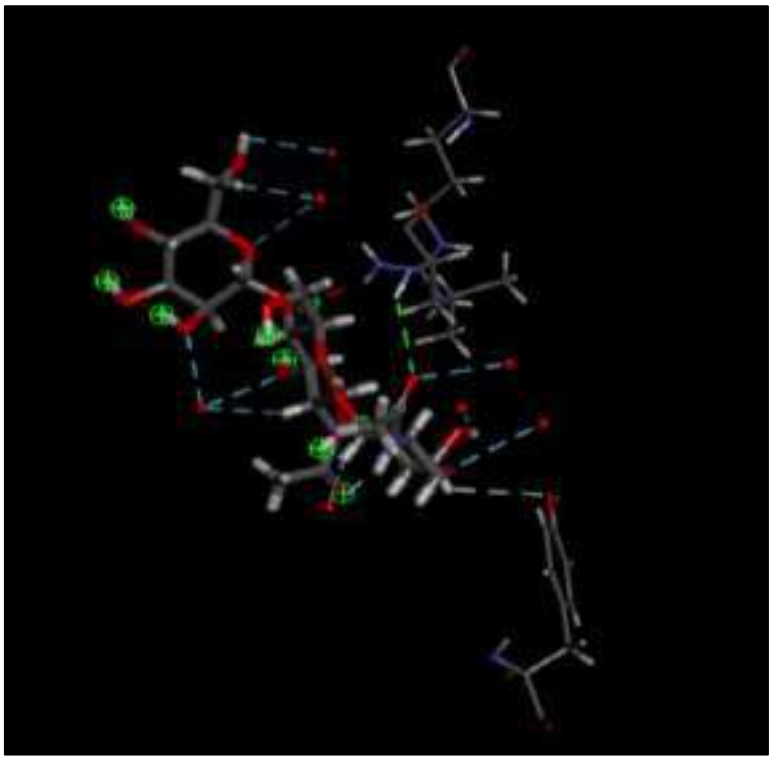


Fig No:4 3D Structure of Ligand (Mefenamic Acid)

6.In Show receptor ligand interaction in 2D Diagram, click on show 2D diagram. Where you will get an image of amino acids attached to ligand in 2D format. As shown in Fig No:5

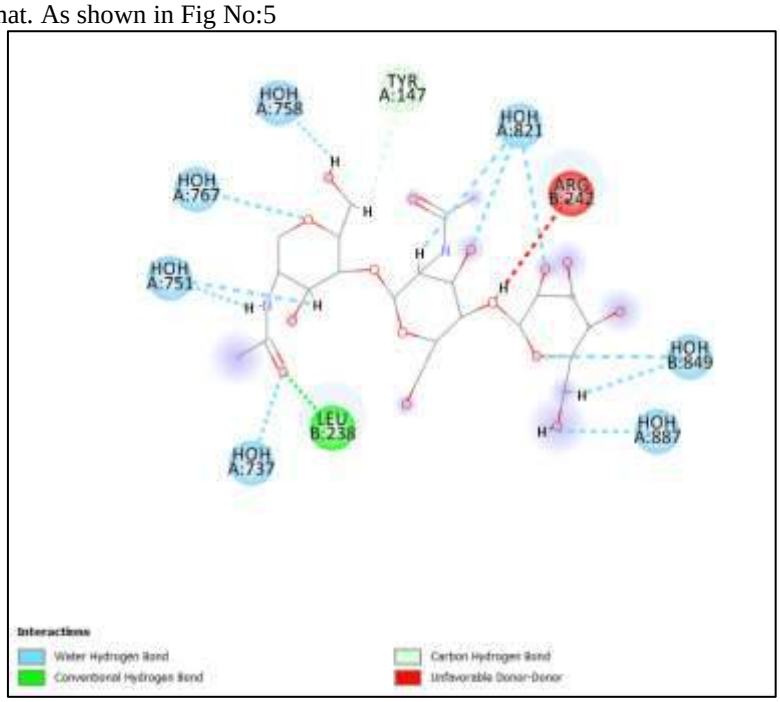


Fig No:5 2D Structure of Ligand (Mefenamic Acid)

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

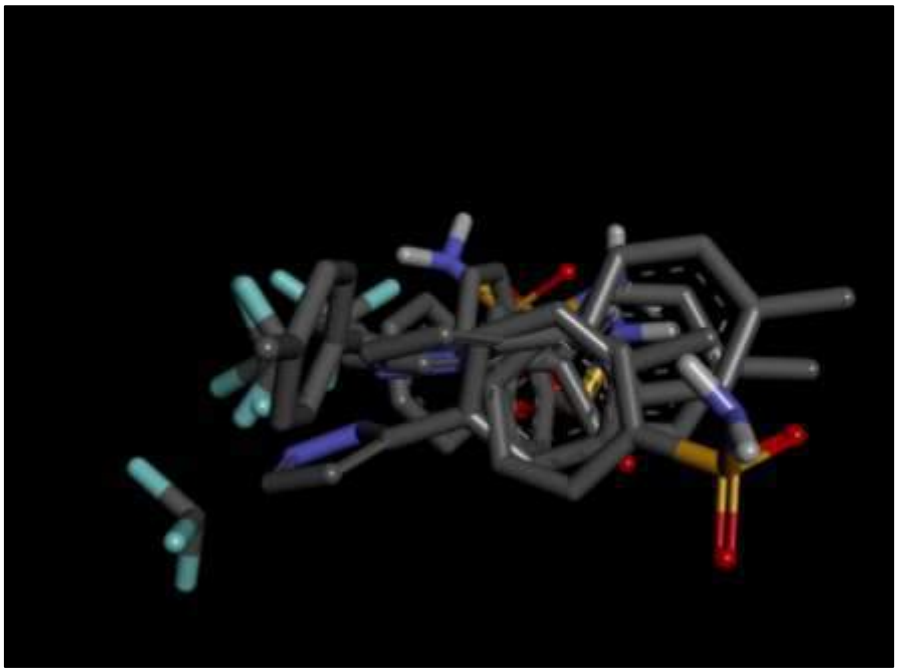


Fig No:6 2D Structure of Ligand (Celecoxib)

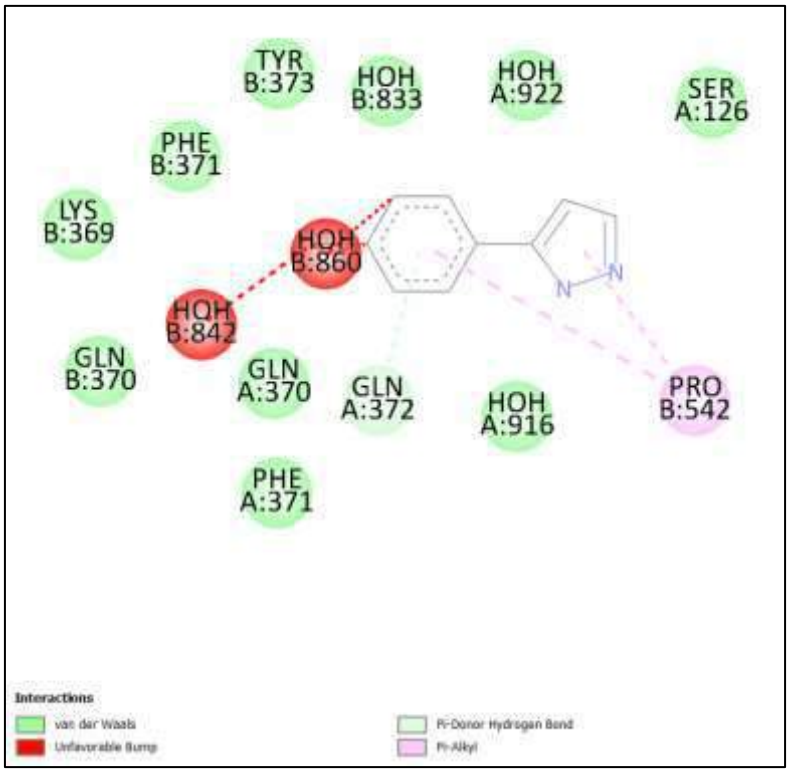


Fig No:7 2D Structure of Ligand (Celecoxib)

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Result Analysis by: BIOVIA Discovery Studio:

Result Analysis	Visualization Software	Protein	Ligand	Docking Score	Amino acid residue
Auto Dock 1.5.7	**BIOVIA Discovery Studio Visualizer**	**5ikr**	**Mefenamic Acid**	**-8.6**	HOH A:737 HOH A:751 HOH A:758 HOH A:767 HOH A:821 HOH A:887 HOH B:849 TYR A:147 ARG B:242 LEU B:238
Auto Dock 1.5.7	**BIOVIA Discovery Studio Visualizer**	**5ikr**	**Celecoxib**	**-7.9**	HOH A:916 HOH A:922 HOH B:833 HOH B:842 HOH B:860 GLN A:370 GLN A:372 GLN B:370 PHE A:371 PHE B:371 TYR B:373 SER A:126 LYS B:369 PRO B:542

Result Docking

Docking Result of Mefenamic Acid & Celecoxib

The result of test drug Mefenamic acid and Standard drug Celecoxib and their target microorganism, PDB ID: 5ikr binding energy and standard drug like a Celecoxib for comparative study have been summarized as below table by auto-dock vina tool.

Sr.no	Target Name	Organism name	PDB ID	Binding energy of Test drug	Binding energy of Standard drug
1	**Cyclooxygenase (COX-1 & COX-2)**	**Homo Sapiens**	**5ikr**	**-8.6**	**-7.9**
2	**Membrane Permeability Inhibitors**	**Escherichia coli**	**2rdd**	**-6.9**	**6.8 (Ampicillin)**

DISCUSSION

Molecular docking of test drug mefenamic acid and standard drug celecoxib and target name is cyclooxygenase (cox1 & cox2) are binding energy of test drug is -8.6 & standard drug is -7.9 & provide valuable insights into their interactions with target proteins, aiding in the understanding of their pharmacological properties and potential applications in drug discovery.

Mefenamic acid and celecoxib are both nonsteroidal anti-inflammatory drugs (NSAIDs) commonly used to alleviate pain and inflammation. Their primary targets include cyclooxygenase enzymes, particularly COX-1 and COX-2, which are involved in the synthesis of prostaglandins.

CONCLUSION

In summary, molecular docking offers a valuable approach to elucidate the potential interactions of mefenamic acid and celecoxib with target proteins. This method provides insights into their mechanisms of action and potential therapeutic applications, contributing to our understanding of their pharmacological properties.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

REFERENCE

1. *Raval K, Ganatra T. Basics, types and applications of molecular docking: A review.2022;7(1):12-1*
2. *A textbook of computer aided drug design by Dr. Dev Bukhsh Singh.*
3. *PubChem (nih.gov)*
4. *RCSB PDB: Homepage*
5. *mgltools (scripps.edu)*
6. *Free Download: BIOVIA Discovery Studio Visualizer - Dassault Systèmes (3ds.com)*
7. *Jignasa K. Savjania, Suja Mulamkattilb, Bhavesh Variyaa, Snehal Patela Molecular docking, synthesis and biological screening of mefenamic acid derivatives as anti-inflammatory agents.*
8. *GABA MONIKA et al: AN OVERVIEW ON MOLECULAR DOCKING April-June 2010, 2(1):219-231*
9. *(9)A textbook of computer aided drug design of pv publication by Dr. Sahil k. Mehta and dr.*
10. *Rajesh k. Singh.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FORMULATION AND EVALUATION OF VITA-C SERUM

Vaishnavi Gulabrao Dalvi [1*], Avinash Gajanan Wagh[2], Dnyaneshwar Dhondiba Dandale[3]

[1]*Student of Bachelor of Pharmacy, Faculty of Pharmacy, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.*

[2]*Department of Pharmaceutics , Faculty of Pharmaceutics, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.*

[3]*Student of Bachelor of Pharmacy, Faculty of pharmacy, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.*

ABSTRACT

Vitamin C serum is a topical skincare product containing a high concentration of ascorbic acid, the active form of vitamin C. It provides numerous benefits for the skin, including increased collagen production, reduced signs of aging, improved skin tone and texture, and protection against sun damage. Vitamin C is an unstable molecule that can easily degrade when exposed to light, heat, and air Maintaining a low pH (below 3.5) is crucial for stabilizing vitamin C in serum formulations and enhancing skin penetration. The efficacy of vitamin C serum is directly proportional to its concentration, with 20% being the maximum effective level. Regular application of vitamin C serum can lead to a tenacious reservoir in the skin, providing long-lasting photoprotection. However, not all vitamin C derivatives used in cosmetic products are physiologically effective, as some may not be adequately delivered into the dermis or converted to the biologically active form. This project aims to develop a stable and effective vitamin C serum by improving the extraction and quantification methods .The stability and skin penetration of the serum will be evaluated under different storage conditions and application methods. The findings of this project will contribute to the development of improved vitamin C-based skincare products with enhanced efficacy and stability.

KEYWORD: *vitamin c serum, ascorbic acid, skin penetration, photo protection, skincare*

INTRODUCTION

Vitamin C is an important water-soluble substance with great significance in human health. It also helps in collagen production as well as the synthesis of neurotransmitters, boosting an immune system against scurvy and as an antioxidant. It was discovered in 1912 and initially synthesized in 1933 because it is not manufactured by the body itself hence people have to obtain it from their food. The presence of this particular nutrient in many citrus fruits makes them vital for overall wellness and numerous metabolic processes, as well as diverse health outcomes. Ascorbic acid or vitamin C is a powerful anti-oxidant that protects cells from damage due to free radicals. Furthermore, it promotes growth of tissues, repairs them when needed thus helping wounds heal faster and skin healthy, bones strong and teeth intact too. Additionally, Vitamin C enhances absorption of iron found in plant foods which boosts immunity thereby providing protection against infections caused by bacteria like microorganisms among others. There are various vegetables containing vitamin c such as garlic or onion which can enable you get your daily requirement of this essential nutrient.

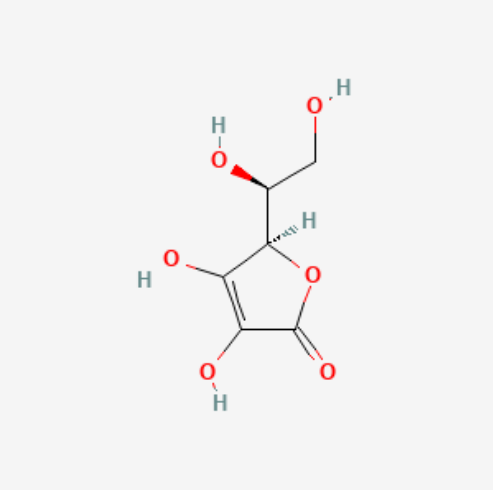


Fig 1. Chemical structure of ascorbic acid -Vitamin C.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The chemical structure of vitamin C determines its physical and chemical properties. It is a weak, water soluble, unstable organic acid which can be simply oxidized or demolished by light, aerobic situations (oxygen), high temperatures, alkali, copper, and heavy metals. [i]

Vitamins are organic substances that preserve metabolic functioning and are extremely sensitive to different physical and chemical agents. From the study of the chemical structure of vitaminC, we can determine some of its physicochemical properties, which is a weak organic acid, water-soluble and easily degraded by changes in temperature, experience to sunlight, and oxygen concentration.

The absorption of vitamin C in the intestine is limited by an active transport mechanism. Hence, a limited amount of the drug is absorbed despite the high oral dose. The bioavailabilityof vitamin C in the skin is insufficient when managed orally. Consequently, oral route cannot actually provide a source of vitamin C to peripheral structures as skin. The only route that can provide an vitamin C source for skin is the topical or local routes, demonstrating that the usage of local application promotes the surgical healing and better tissue reconstruction. Consequently, the oral route of administration does not provide a source of vitamin C to structures such as the skin. Instead, topical or local ways can provide a source of vitamin C, representing that local application indorses surgical healing and better tissue reconstruction.The main function of the skin is to act as a barrier against external agents, and its unique structure demonstrates this. The skin, a continually changing dynamic organ, is composed of two main layers. First is the epidermis, which is the outermost, highly cellular layer that protects us against poisons, bacteria, and fluid loss. [ii] Second is the dermis, which is a deeper layer that confirms strength and elasticity and provides nutritional provision to the epidermis. This organ is vital for our health and relief.

Normal skin contains high concentrations of Vitamin C, with levels comparable to other bodytissues and well above plasma concentrations, suggesting an active accumulation of this compound.[iii] Ascorbic acid (Vitamin C) is related to the cells from the blood vessels presentin the dermal layer. There are only a few reports regarding vitamin C levels in the skin, and usually they are not concordant. These variations may be due to the difficulty in managing skintissue, which is very resistant to degradation and solubilization, but may also be due to the location of the skin model and the age of the donor. Because ascorbic acid (Vitamin C) is a natural antioxidant soluble in water, it has been used as an element in numerous enhancing products to protect and rejuvenate the skin. Most of the vitamin C in the skin appears to be located in the intracellular compartments, with concentrations likely to be in the millimolar range. Intracellular compartment was the site where the highest concentrations in the millimolar range have been measure, Vitamin C content in mg per 100g fresh weight in skeletal muscle is approximately 4, in the liver between 10 and 16, in the brain between 13and 15, in the dermis between 3 and 13 and in the epidermis between 6 and 64.
Further more, the skin collaborates in other functions such as antioxidant protection against UV-induced photo damage and collagen synthesis. All of the above serves as a basis to demonstrate the fundamentals of the use of topical vitamin C in dermatological practice.

Wound Healing
Vitamin C acts as a cofactor for several enzymes, such as lysyl hydroxylase and prolyl hydroxylase. It is a steadying collagen and is essential in wound healing. When vitaminC is deficient, fibroblasts produce unstable collagen, providing a weak framework for repair, which makes wound healing difficult.

Phillips and Pinnell showed that vitamin C counteracted the reduced proliferative capacity of in vivo fibroblasts in older people. Finglas et al. reported lower plasma vitamin C concentrations in the elderly (64–74 years) compared to healthy adults (20–64 years). VitaminC levels are usually low in older patients, which may contribute to slower and more difficult wound healing.

The role of vitamin C supplementation in wound healing remains controversial. There is no evidence that wound healing is improved by vitamin C supplementation, although critically illpatients may benefit from supplements because their reserves are depleted. When patients havelow levels of vitamin C, it is usually observed to a slower and more difficult wound healing. At present, the role of vitamin C supplementation in wound healing is still being discussed.

For preparation of Vitamin C serum we have used these ingredients- Lemon juice, Rose water,Vitamin E capsule, Glycerine, Sodium benzoate preservative benzoate as a preservative.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Equipment Used

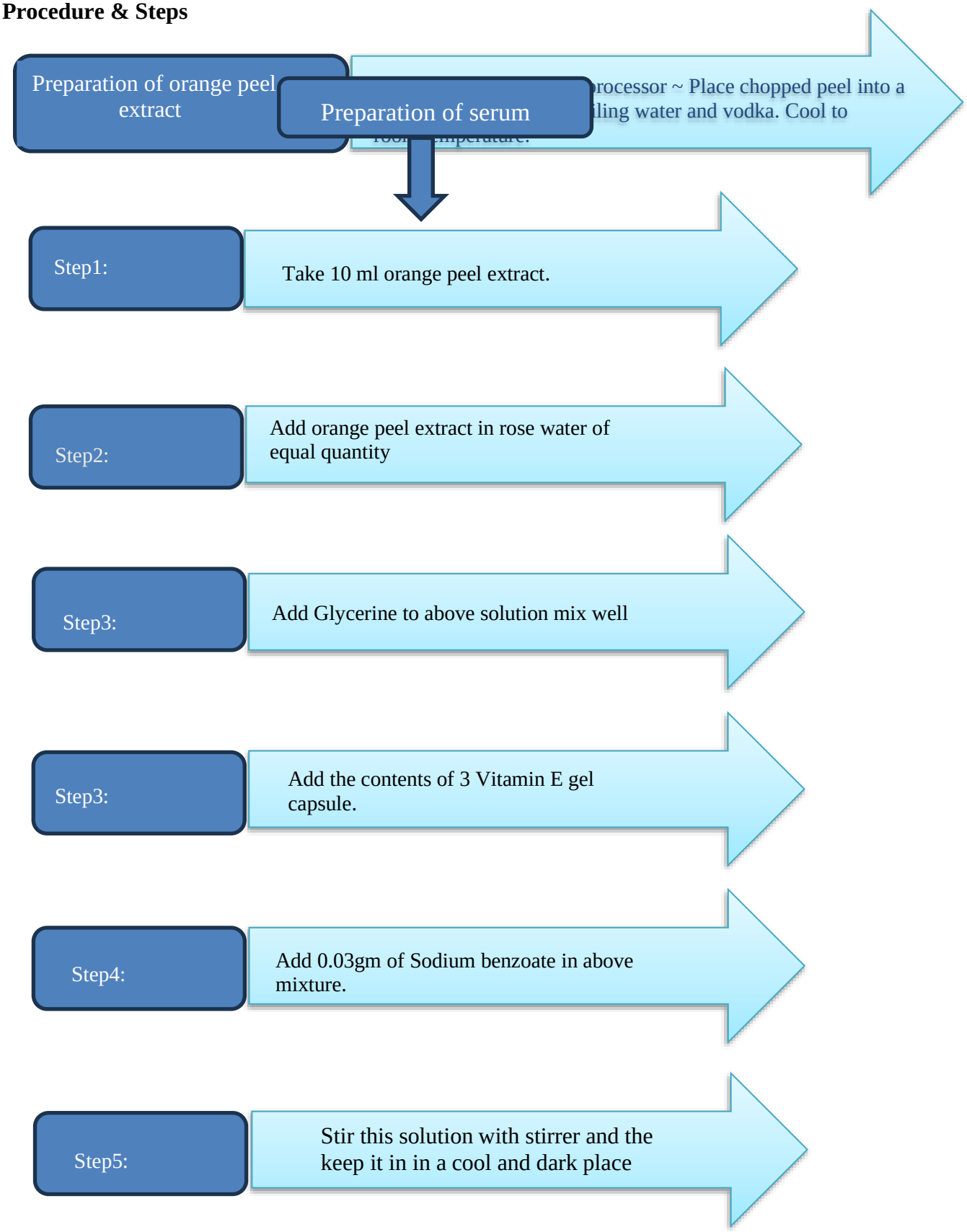
- Beaker
- Measuring cylinder
- Stirrer
- Water bath
- burner
- Glass container for storing the serum

Drugs Used

1. Orange peel extract – 10 ml
2. Rosa damascena flowers (Rose water)- 10 ml
3. Vitamin E capsule- 3capsules
4. Glycerol (Glycerine) – 10 ml
5. Sodium benzoate as a preservative- 0.03gm

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Procedure & Steps



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

1) Orange Peel Extract :



Fig : Orange Peel extract

Texonomical Properties

Odour	Sapindales
Family	Rutaceae Juss Rue family
Genus	Citrus l-citrus P
Species	Sweet orange (Citrus × sinensis), believed to be a hybrid of Citrus maxima and Citrus reticulata.

Physiological Information

Orange peels contain flavonoids – like poly methoxy flavones (PMFs) and hesperidin – and other phytochemicals that are very helpful for your health. Flavonoids are antioxidant compounds that benefit prevent chronic diseases such as cancer and heart diseases. It also contains higher amounts of certain nutrients.

Pharmacological Properties

1) It may show antioxidant activity.
2) It may show anti-inflammatory property.
3) It may show anti-arthritic activity.
4) It may show anticancer activity.
5) It may show anti-ulcer activity.
6) It may show anti-typhoid activity.
7) It may show anti-anxiety activity.

Uses

numerous benefits will be gotten by using orange peel serum on the skin, thanks to its being enriched with vitamin c and antioxidants. Key Advantages include:

Skin brightening: Orange peel serum helps in reducing dark spots and blemishes hence promoting a radiant complexion
Anti Aging: Orange peels are rich in antioxidants which combat free radicals, which aids in reducing wrinkles and sagging skin.
Peeling: For clearer skin, orange peel serum gently exfoliates the dead cells of the skin and unclogs pores
Acne Control: Dried up zit with citric acid from oranges and it also regulates sebum production to prevent acne breakouts.Stimulation of Collagen Production: It is responsible for stimulating collagen synthesis in the body leading to improvement of the skin structure as well as removal of fine lines.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2. ROSA DAMASCENA FLOWERS (ROSE WATER)

Rose water is a mild and perfumed aqueous solution made by extracting the essence of rose petals in water. There are three methods of making it: Simmering, Distilling, and treating Important Oils. These methods want the expertise of professionals but may also be approved out at home.

It is thus a natural solution to treating various skin care and health care problems. Thoughit can be consumed internally to recover digestion, rose water useful for skin come better advised. Primary among these is its ability to soothe the skin's inflammation and uphold its natural pH balance.

Considered to be particularly effective as a toner, rose water is light and gentle on the skin, thus creating it ideal for all skin types. It is one of the best reasons that rose toner benefits outshine its chemical-based complements.

Proven Benefits of Rose Water on face

The following pointers list some benefits of using this simple and slight fragrance water.Skin care specialists believe its benefits magnify with a long-term application, particularly when used overnight, and this fact holds regardless of the skin type.

1. Cleanses and brightens skin:

This fragrant water gently removes additional oil and other environmental impurities, and thus reduces black heads and white heads. It also benefits combat dark spots, acnescars, and discolorations on the skin, thus giving you a radiant appearance.

2. Soothes irritated skin:

Cool and refreshing, rose water contains anti-inflammatory and antibacterial properties that help decrease redness and acne. It is also known to help soothe majorskin care problems like eczema or rosacea.

3. Balances natural oils

It can retain the skin's natural oils in check. This helps the skin cells stay sufficientlynourished, whether the skin type is dry or oily. This helps preserve the cells healthy, nourished, and sufficiently hydrated at all times.

4. Decongests skin pores

It helps explain and balance the skin, and decongest and diminish enlarged pores.This decreases frequent breakouts and improves skin texture.

5. Tightens skin

Rose water tones and tightens the skin for a plane, firm look. It too helps reduce blemishes and wrinkles too.

6. Moisturizes skin

A natural hydrator, rose water preserves the skin rejuvenated by providing deep moisturization. It similarly moisturizes the lips, and helps them stay softer, smoother, and healthy cared for.

7. Slows down multiple signs of aging

It helps smoothen fine lines and actively works to stop new lines from setting in by reducing cell damage.

8. Reduces under-eye puffiness and dark circles

It revitalizes and moisturizes the sensitive skin under the eyes, efficiently reducingpuffiness caused by allergies, stress, or fatigue. Rose water also has Vitamin C, which reduces dark circles and brightens the skin.

9. Protects your skin

Rose water strengthens the skin barrier and protects it from environmental attackers like dust and pollution. It also defends against harmful ingredients found in certain beauty products.

10. Nourishes from within

It penetrates deep into the skin, flushing it with antioxidants and providing thenutrients it necessities. The result is skin that is healthy, beautiful, and prepared for anything.



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3. VITAMIN E CAPSULE

Vitamin E is an antioxidant that help fight free radicals, which are molecules that harm the DNA in cells. People can typically get adequate vitamin E from their diet, but it is also accessible in the form of supplements and skin care products.[iv]
Vitamin E is a nutrient that the body can't make on its individual. It originates from definite foods, such as nuts and seeds, and supplements.

Vitamin E is an antioxidant, which means that it can stop or opposite the damage that free radicals reason to cells. It can also decrease inflammation around the body.

The body supplies vitamin E in the skin, in both the outer epidermis and he deeper dermislayers. This is one reason why numerous skin care products contain vitamin E.

The nutrient exists in sebaceous glands, which produce the base of hair follicles. The bodycarriages vitamin E to the skin through sebum, an oily material that protects and lubricates the skin.

Some potential skin benefits of vitamin E contain:

Moisturizing

Researchers have establish that products having vitamin E can moisturize the skin.However, they have not recognized links between vitamin E intake and skin hydration. Therefore, people who wish to use vitamin E as a moisturizer should branch withtopical products that hold the vitamin.

Fighting UV-related skin damage:

Oregan State University highlights several educations suggesting that vitamin E could fight skin harm from sun contact. However, most of the research to date has intricate animals or human skin cells in a lab setting.

It is possible that adding vitamin E to sunscreen delivers some extra skin benefits, but it is significant to note that vitamin E itself is not an operative sunscreen.

Wound Healing

The author of a appraisal article in the International Wound Journal Trusted Source proposes that vitamin E can promote wound healing.

The theory is that since vitamin E shortages can slow wound healing, a good amount of this nutrient could have the reverse effect. However, the review highlighted the lack of excellence investigation to support this idea.

Anti-Inflammatory Properties

Inflammation is the body's response to a damage or infection. It can cause hurt, discoloration, and swelling. Many mutual skin situations cause inflammation, including acne.

A 2020 study in Scientific Reports Trusted Source reviewed 26 clinical judgments and found some evidence that vitamin E additions decrease inflammation in adults. More high quality research is necessary to confirm this discovery, though.



0

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3. GLYCEROL (GLYCERINE)

Glycerin, also identified as glycerol, is a natural compound derived from vegetable oilsor animal fats. It's a clear, colorless, odorless, and syrupy liquid with a sugary taste.

Glycerin is a humectant, a kind of moisturizing agent that jerks water into the outerlayer of your skin from bottom levels of your skin and the air.

In skin care products, glycerin is usually used with occlusive, another type ofmoisturizing agent, to trap the moisture it inducements into the skin.

Rendering to the American Academy of Dermatology Association, glycerin can:

- hydrate the outer layer of the skin (stratum corneum)
- improve skin barrier function
- provide protection against skin irritants
- accelerate wound-healing processes
- relieve dry skin
- may help with psoriasis



4. SODIUM BENZOATE AS A PRESERVATIVE:

Sodium benzoate is a common preservative used in acidic foods and drinks to prevent mold and bacteria growth.

Sodium benzoate (rendering to the European nomenclature E211) is a salt of benzoic acid and soluble in water, tasteless, and odorless, and due to its antifungal and antibacterial possessions, it is a preservative added to food in severely defined doses. It constrains the growth of bacteria, yeast, and mold.

IUPAC Name	Sodium benzoate
Alternative Names	sodium benzoate
Molecular Formula	C7H5NaO2
Molar Mass	144.105 g/mol
InChI	InChI=1S/C7H6O2.Na/c8-7(9)6-4-2-1-3-5-6;/h1-5H,(H,8,9);/q;+1/p-1

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



A detailed instructional manual for utilizing facial serum.

Get healthy, radiant, and healthy skin by using a face serum and below these steps:

Step 1: Take a pea-sized quantity (about 3-4 drops) of a face serum from the dropper on your palms. (For best effects, you can use a vitamin C serum.)

Step 2: Spread it among your palms without rubbing the material too much.

Step 3: Spread the serum all over your face and neck using small and gentle drumming motions. Wait for a couple of minutes before ongoing with your skincare regime.[v]

Evaluation Parameters

Table 1: Physicochemical Tests.

Sr. No.	Parameter	Result
1	Color	White
2	Odor	Citrus, fruity
3	PH	4.5

Conclusion

The appearance of formulated serum was very attractive regarding color and odor. The pH of the serum is acceptable for use on skin. The Vitamin C serum after applying on skin at bed time and leaving for overnight is appealing in fresh appearance to skin and hence proven tobesafe. Sensitive skin beauties may feel slight tingling sensation initially. If this happens,one may want to start using it on alternate nights for the first few weeks until skin adapts to it.



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

LITRETURE REVIEW

1."**Stability of Topical Vitamin C Derivatives**"
This study by Lin and Zhong (2020) evaluated the stability of various Vitamin C derivatives in cosmetic formulations. It found that certain derivatives, such as ascorbyl glucoside and magnesiumascorbyl phosphate, exhibited better stability compared to L-ascorbic acid.

2**."Enhancing Skin Penetration of Vitamin C"**
Research by Telang (2013) explored techniques to enhance the skin penetration of Vitamin C, such as microencapsulation and the use of penetration enhancers. This study highlighted the importance ofdelivery systems for maximizing Vitamin C efficacy.

3."**Efficacy of Vitamin C in Skincare**"
A review by Pullar et al. (2017) summarized the clinical evidence supporting the efficacy of Vitamin C in skincare. It discussed its role in collagen synthesis, antioxidant protection, and skin brightening,emphasizing the importance of stable formulations for optimal results.

4."**Effect of pH on Vitamin C Stability**"
A study by Al-Niaimi and Chiang (2017) investigated the influence of pH on the stability of Vitamin C formulations. It found that acidic pH levels (around 3.5) were optimal for maintaining Vitamin Cstability and skin penetration.

5**."Antioxidant Synergies in Skincare**"
Research by Działo et al. (2019) explored the synergistic effects of combining Vitamin C with other antioxidants, such as Vitamin E and ferulic acid. This study highlighted the potential for enhanced antioxidant activity and photoprotection in skincare formulations.

6."**Clinical Evaluation of Vitamin C Serums**"
A clinical trial conducted by Humbert et al. (2003) assessed the efficacy of a Vitamin C serum in improving skin texture and reducing wrinkles. The study demonstrated significant improvements inphotoaged skin after regular application of the serum.

7**."Photostability of Vitamin C Formulations**"
An investigation by Lin et al. (2012) examined the photostability of Vitamin C formulations under different light conditions. It identified factors such as packaging materials and antioxidants that couldhelp mitigate Vitamin C degradation upon exposure to light.

8**."Comparison of Vitamin C Derivatives**"
A comparative study by Campos et al. (2008) evaluated the stability and efficacy of various Vitamin C derivatives in skincare formulations. It provided insights into the relative performance of differentderivatives in terms of antioxidant activity and skin penetration.

9."**Safety Assessment of Topical Vitamin C**"
Research by Raschke et al. (2004) investigated the safety profile of topical Vitamin C formulations through clinical testing. The study concluded that Vitamin C serums were generally well-tolerated,with minimal risk of irritation or sensitization.

10**."Role of Vitamin C in Wound Healing**"
A review by Pullar et al. (2017) discussed the role of Vitamin C in wound healing and collagen synthesis. This study emphasized the potential benefits of Vitamin C serums in promoting skin repairand regeneration.

REFERENCE

1. *Levine M, KR Dhariwal, RW Welch, Y Wang, JB Park (1995) Determination of optimal vitamin C requirements in humans. Am J Clin Nutr 62: 1347S-1356S.*
2. *Lidija B, L Pfendt, LV Vesna, BZ Nada, RP Mirjana (2003) Second order derivative spectrophotometric method for determination of vitamin C content in fruits, vegetablesand fruit juices. Eur Food Res Technol 217(3): 269-272.*
3. *Ekta, How To Make Vitamin C Serum At Home July 24, 2011 SKIN CARE by Ekta.https://makeupandbeauty.com/vitamin-serum-home/*
4. *Sodium Benzoate – Harmfulness and Potential Use in Therapies for Disorders Relatedto the Nervous System: A Review Łucja Justyna Walczak-Nowicka and Mariola Herbet*
5. *Kristeen Cherney, PhD, Molly Burford, medically reviewed on August 24, 2022 Is Glycerin Good for Your Skin & Face? https://www.healthline.com/health/glycerin- for-fac*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

[i] *Vitamin C | IntechOpen* ***Nermin M. Yussif*** *(Periodontology Department, MSA University, Giza, Egypt)*
[ii] *Cosmetics | Free Full-Text | Ascorbic Acid in Skin Health (mdpi.com)*
[iii] *The Roles of Vitamin C in Skin Health - PMC (nih.gov)*
[iv] *Vitamin E for skin: Benefits for dry skin, scars, and more (medicalnewstoday.com)*
[v] *Ultimate Guide On How To Use Face Serum | Garnier India*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

SEPARATION & IDENTIFICATION OF BINARY ORGANIC MIXTURE BY USING SYSTEMATIC QUALITATIVE ANALYSIS APPROVAL

Dnyaneshwar Dhondiba Dandale[1*] , Yogiraj Muley[2] ,Vaishnavi Dalvi[3]

[1]*Student of bachelor of pharmacy, Faculty of pharmacy, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.*

[2]*Department of pharmaceutical Chemistry, Faculty of pharmaceutical Chemistry, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.*

[3]*Student of bachelor of pharmacy, Faculty of pharmacy, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad.*

ABSTRACT

The separation and identification of binary organic mixtures are fundamental processes in organic chemistry, with wide-ranging applications in various industries such as pharmaceuticals, environmental science, and forensics. This project aims to develop a systematic approach for the qualitative analysis of binary organic mixtures, focusing on the separation and identification of individual components based on their unique chemical properties.

The outcomes of this project will contribute to the development of a systematic approach for the qualitative analysis of binary organic mixtures, providing valuable insights into the composition and properties of complex organic systems. The findings will have implications for various fields, including chemical education, analytical chemistry, and industrial applications. Overall, this project will advance our understanding of qualitative analysis techniques and their application in the separation and identification of binary organic mixtures, paving the way for future research and practical applications in organic chemistry.

KEYWORDS

1) *Qualitative Analysis*
2) *Organic Chemistry*
3) *Binary Mixtures*
4) *Separation Techniques*
5) *Identification Methods*
6) *Systematic Approach*
7) *Functional Group Tests*
8) *Chromatography*
9) *Spectroscopy*
10) *Fractional Distillation*

1.INTRODUCTION

Systematic quantitative analysis of binary compound mixtures involves separating and identifying components based on physical and chemical properties.

1. Qualitative analysis determines the nature, type, elements, and functional groups present in chemical substances.
2. Quantitative analysis determines the percent composition of various elements in the sample.
3. In organic qualitative analysis, elements or compounds are identified through chemical reactions.

1.1 What is mixture

A mixture arises from the combination of two or more materials or substances without undergoing chemical bonding. This allows them to retain their original properties and be separated by physical means.

1.2. Qualitative Analysis

Qualitative analysis refers to the identification of the chemical elements or compounds present in a sample based on their physical and chemical properties, rather than their quantities. This type of analysis is often used when the exact composition or concentration of substances is not required, but rather the presence or absence of specific components is of interest.

1.3. Binary Compound

Binary compounds consist of two elements only, with the number of atoms of each element not disclosed. The key criterion for binary compounds is that they contain only two elements; the number of atoms and the type of chemical bond are irrelevant. For example, despite containing three atoms, a water molecule is classified as a binary compound because it consists of two elements.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

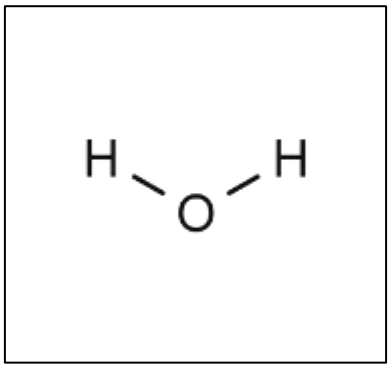


Figure 1: Water consists of three atoms: two hydrogen atoms and one oxygen atom.

1.4 Types of binary compound

Binary compounds encompass a broad category of compounds composed of two elements only. They can be classified into the following categories:

1) Binary acid compounds
2) Binary ionic compounds
3) Binary covalent/molecular compounds

The analysis and identification of unfamiliar organic compounds play a vital role in experimental organic chemistry. Qualitative analysis of organic mixtures typically involves two steps: separation of the mixture and systematic qualitative analysis of individual compounds.

1.4.1 Separation of mixture: The given mixture is separated into two components using a suitable reagent such as water, ether, hydrochloric acid, sodium hydroxide, sodium bicarbonate, or organic solvents.

1.4.2 Systematic qualitative analysis of individual compounds: Separated components in their pure form are analysed through the following steps:

1.4.3 Preliminary investigation: This step provides insights into the unsaturation, aromaticity, and functional groups of compounds. It includes the following tests:

1) Nature
2) Colour
3) Odor
4) Flame test
5) Test for unsaturation:
   a. KMnO4 Test
   b. Bromine Water Test

1.5 Physical Properties of Substances

The substance to be analysed may be solid, liquid, or gaseous. Since gaseous substances pose difficulties in working and are rare among organic compounds, they will not be emphasized here.

The following properties are required for solid substances:

1) Taste
2) Odor
3) Colour
4) Solubility

1.5.1 Taste: Organic substances have unique tastes. Although the toxicity of many substances indicates that this feature is not necessary, determining taste with a small amount of substance in the experiment may not cause toxicity.

- **Bitter taste:** Alkaloids (quinine, morphine, strychnine), quinoline derivatives, glycosides, polyethylene glycol derivatives, barbital.
- **Sweet taste:** Carbohydrates, chloroform, glycol, resorcin, sucrose, sodium salicylate, phenol, etc.

1.5.2 Odor: Many organic substances have characteristic odours, which can indicate their class. For example, the odours of alkalines, esters, phenols, amines, aldehydes, and ketones differ. More volatile substances have more noticeable smells. For instance,

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

coumarin, eugenol, vanillin, ethyl acetate, methyl salicylate, phenols, thymol, menthol, ethanol, acetone, ether, chloroform, amyl alcohol, and pyridine have distinct odours. Sulphur compounds often have a rotten egg smell (e.g., mercaptans, isonitrile). Benzaldehyde, nitrobenzene, and similar compounds smell like bitter almonds. A strong, penetrating odour often indicates a volatile, small molecule.

1.5.3 Solubility test: Groups can be identified based on their solubility in solvents such as water, ether, hydrochloric acid, sodium hydroxide, and concentrated sulfuric acid.

1.5.4 Detection of extra- element: Detecting extra elements guides the next steps. For instance, the absence of nitrogen suggests avoiding testing nitrogen-containing compounds like amino, amido, nitro, and anilides.

1.5.5 Detection of element: Detecting elements in a binary compound mixture is crucial in qualitative analysis, involving preliminary tests, mixture separation, and element detection.

1.6 Preparation of the Mixture:

- **Accurate Weighing:** Ensure precise weighing of mixture components for correct proportions.
- **Mixing:** Thoroughly mix components for uniform distribution.

1.7 Physical Separation Techniques:

- **Distillation:** Separate based on differences in boiling points.
- **Chromatography:** Separate based on molecular size, shape, and polarity differences.
- **Extraction:** Separate based on solubility differences.

1.8 Identification of Components:

1) **Physical Properties:** Assess the physical state, colour, odour, and melting point of each component.
2) **Elemental Analysis:** Determine the percentage composition of elements such as carbon (C), hydrogen (H), nitrogen (N), sulphur (S), and halogens in each component.
3) **Functional Group Identification:** Identify the functional groups present in each component.
4) **Derivative Preparation:** Prepare derivatives of each component to confirm their identity.
5) **Melting Point Determination:** Confirm the identity of each component by determining their melting points.

1.9 Qualitative Analysis

1) **Elemental Analysis:** Determine the percentage composition of elements such as carbon (C), hydrogen (H), nitrogen (N), sulphur (S), and halogens in each component.
2) **Functional Group Analysis:** Quantify parameters like hydroxyl value, amine value, iodine value, saponification value, etc., based on the functional groups present.
3) **Spectrophotometric Analysis:** Employ spectroscopic techniques to quantify organic compounds like amino acids, carbohydrates, proteins, ascorbic acid, aspirin, and cholesterol.

1.10 Common techniques used for qualitative analysis of organic compounds

The most common techniques used for qualitative analysis of organic compounds are:

1) **Fractional Distillation:** If the two compounds have significantly different boiling points, fractional distillation can be used to separate them. This technique involves heating the mixture and collecting the fractions at different temperature ranges. The collected fractions can then be analysed individually using other techniques.
2) **Solubility Tests:** As with single compounds, solubility tests can be useful for binary mixtures. By testing the solubility of the mixture in various solvents, you can determine if one or both of the compounds are soluble in a particular solvent. This can provide initial information about the composition of the mixture.
3) **Chromatography:** Techniques like thin-layer chromatography (TLC) or column chromatography can separate the components of a binary mixture based on differences in polarity, size, or other properties. Each compound will elute at a different rate, allowing for separation and subsequent analysis.
4) **Fractional Crystallization:** If one compound in the mixture is significantly more soluble in a particular solvent than the other, fractional crystallization can be used. By repeatedly dissolving the mixture in a suitable solvent and allowing it to crystallize, you can separate the two compounds based on their differing solubilities.
5) **Spectroscopic Methods:** Techniques like infrared spectroscopy (IR), nuclear magnetic resonance spectroscopy (NMR), and mass spectrometry (MS) can provide information about the functional groups, molecular structure, and mass of the compounds present in the mixture. By comparing the spectra or mass spectra of the mixture to those of known compounds, you can identify the individual components.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

6) **Chemical Reactions:** Chemical reactions specific to certain functional groups can help identify the presence of those groups in the mixture. For example, if one compound in the mixture contains an alkene group, it will react with bromine water, while the other compound won't.

1.11 Application of qualitative analysis of organic compounds

1) **Chemical Education:** Qualitative analysis is often taught in introductory chemistry courses as it provides students with hands-on experience in identifying functional groups, understanding chemical reactions, and interpreting spectroscopic data. It helps students develop essential laboratory skills and critical thinking abilities.
2) **Pharmaceuticals:** In the pharmaceutical industry, qualitative analysis is crucial for quality control and assurance. It is used to confirm the identity and purity of active pharmaceutical ingredients (APIs), detect impurities, and monitor the stability of drug formulations. Techniques like chromatography, spectroscopy, and mass spectrometry play a vital role in these analyses.
3) **Environmental Analysis:** Monitor and measure organic pollutants in air, water, and soil for environmental protection and remediation.
4) **Forensic Analysis:** In forensic science, quantitative analysis is utilized to identify and measure organic compounds in evidence such as drugs, toxins, and residues, assisting in criminal investigations.
5) **Pharmaceutical Industry:** Quantitative analysis is crucial for drug development, ensuring precise dosages and purity of active pharmaceutical ingredients in medications.
6) **Food Industry:** Quantitative analysis is employed to assess the nutritional content, additives, and contaminants in food products, ensuring food safety and quality.
7) **Material Science:** Quantitative analysis aids in characterizing organic materials for applications in electronics, coatings, polymers, and other advanced materials.
8) **Chemical Process Optimization:** Industries utilize quantitative analysis to optimize chemical processes, minimize waste, and enhance efficiency in organic compound synthesis.
9) **Academic Research:** Quantitative analysis is fundamental in academic research for advancing the understanding of organic compounds, their properties, and their interactions across various scientific disciplines.

1.12 Advantages of systematic qualitative analysis of binary organic compounds

1) **Identification of Components:** By systematically analysing the properties and behaviours of a binary mixture, qualitative analysis helps identify the individual components present in the mixture. This information is crucial for understanding the composition of complex mixtures and determining the nature of unknown substances.
2) **Confirmation of Presence or Absence:** Qualitative analysis provides confirmation of the presence or absence of specific functional groups or compounds in a mixture. This can help verify hypotheses about the composition of the mixture and guide further analysis or experimentation.
3) **Comprehensive Characterization:** Systematic qualitative analysis involves a thorough examination of various chemical and physical properties of the components, including solubility, melting point, boiling point, and reactivity. This comprehensive characterization provides valuable insights into the identity, structure, and properties of the compounds in the mixture.
4) **Diagnostic Information:** Qualitative analysis can provide diagnostic information about the functional groups, molecular structure, and reactivity of the components in the mixture. This information is useful for predicting chemical behavior, designing appropriate separation or purification methods, and elucidating reaction mechanisms.
5) **Educational Value:** Systematic qualitative analysis is often used as a teaching tool in chemistry education to develop students' analytical skills, critical thinking abilities, and understanding of chemical principles. Hands-on laboratory experiments involving qualitative analysis allow students to apply theoretical knowledge in practical contexts and gain valuable laboratory experience.
6) **Versatility and Applicability:** Qualitative analysis techniques can be applied to a wide range of organic compounds and mixtures, making them versatile and applicable across various fields, including chemistry, biology, environmental science, and forensic science. These techniques provide valuable qualitative information that complements quantitative analysis methods and contributes to a comprehensive understanding of complex systems.

1.13 Disadvantages of systematic qualitative analysis of binary organic compounds

1) **Time-Consuming:** Qualitative analysis can be a time-consuming process, especially when multiple techniques and tests are required to identify the components of a binary mixture. Each step of the analysis, including sample preparation, testing, and interpretation of results, can require significant time and effort.
2) **Labor-Intensive:** Qualitative analysis often involves hands-on laboratory work, which can be labor - intensive, particularly when analysing large numbers of samples or complex mixtures. Skilled personnel are required to perform the analyses accurately and interpret the results effectively.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3) **Subjectivity:** Qualitative analysis may involve subjective interpretation of experimental results, particularly when assessing the presence or absence of certain functional groups or compounds based on observed properties or reactions. Different analysts may interpret results differently, leading to variability in conclusions.
4) **Limited Quantitative Information:** Unlike quantitative analysis, which provides numerical data about the concentration or amount of specific compounds present in a sample, qualitative analysis primarily yields qualitative information about the identity and properties of compounds. This limitation can hinder the ability to quantitatively compare or measure components in a mixture.
5) **Complexity of Interpretation:** Interpreting the results of qualitative analysis can be complex, especially when dealing with mixtures containing multiple components or compounds with similar properties. Differentiating between closely related compounds or determining the exact structure of unknown substances may require additional confirmatory tests or advanced analytical techniques.
6) **Limited Sensitivity and Specificity:** Some qualitative analysis techniques may lack sensitivity or specificity for certain compounds or functional groups, leading to false-negative or false-positive results. Care must be taken to choose appropriate analytical methods and interpret results cautiously to minimize errors.
7) **Cost:** Qualitative analysis may involve the use of specialized equipment, reagents, and facilities, which can be costly to procure and maintain. Additionally, skilled personnel trained in qualitative analysis techniques may command higher salaries, adding to the overall cost of analysis.

1.14 Limitations of systematic qualitative analysis of binary organic compounds:

1) **Complexity of Mixtures:** Binary organic compounds may possess complex compositions, making it difficult to accurately separate and identify individual components, particularly when components share similar physical or chemical properties.
2) **Interference of Impurities:** Presence of impurities in the organic mixture can interfere with the qualitative analysis process, leading to inaccurate results and hindering the identification of the true components.
3) **Limited Specificity:** Certain qualitative tests may lack specificity, yielding similar results for different functional groups or compounds, thereby introducing ambiguity into the identification process.
4) **Subjectivity in Interpretation:** Interpretation of qualitative tests can be subjective, influenced by the observer's judgment, potentially introducing bias and compromising the analysis's reliability.
5) **Sensitivity to Experimental Conditions:** Qualitative test outcomes may vary based on experimental conditions such as temperature, pH, and reagent concentrations, necessitating careful control for accurate results.
6) **Time-Consuming Process:** Systematic qualitative analysis of binary organic compounds involves multiple tests and procedures, rendering it time-consuming, particularly with complex mixtures.
7) **Limited Information:** Qualitative analysis indicates the presence of functional groups and elements but lacks quantification, limiting the depth of information gleaned from the analysis.
8) **Need for Expertise:** Executing systematic qualitative analysis demands expertise and experience in organic chemistry to interpret results accurately, which may present a challenge for less experienced analysts.

2. Experimental Work

- **Aim:** The aim of the systematic quantitative analysis of ternary organic compound mixtures is to develop a structured and reliable method.
- **Objective**
  1. **Purity Assessment:** It helps in assessing the purity of the compounds present in the mixture by quantifying the impurities or other elements that may be present.
  2. **Research and Development:** By accurately quantifying the elements present, researchers can better understand the properties and behaviour of the compounds, aiding in the development of new materials or products.
  3. **Forensic Analysis:** In forensic science, quantitative analysis helps in identifying and quantifying substances found at crime scenes, providing crucial evidence for investigations.

2.1 Requirement

2.1.1 Chemical

1) Dilute $KMnO_4$
2) Bromine water
3) Saturated $NaHCO_3$
4) Conc. HCL
5) $FeCl_3$
6) NaOH Solution
7) $FeSO_4$ Solution
8) Dil.H_2SO_4
9) Acetic Acid
10) Lead Acetate Solution
11) Nitroprusside Solution
12) Dilute HNO_3
13) $AgNO_3$ solution
14) $CHCl_3$
15) Ferus Sulphate
16) Molish Reagent
17) Tollens Reagent
18) Potassium permanganate Solution

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2.1.2 Apparatus

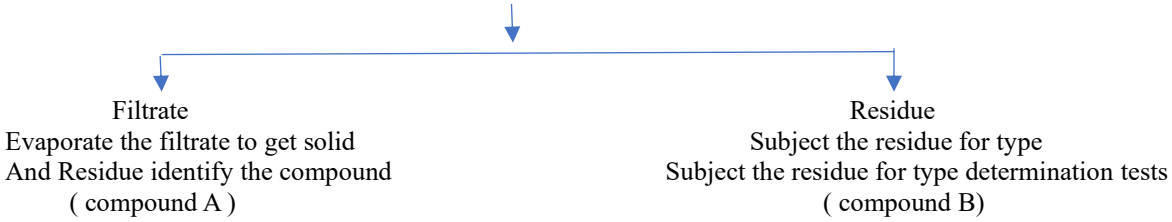
1. Beaker
2. Glass rod
3. Measuring Cylinder
4. Funnel
5. Tripod Stand
6. Test Tube
7. Test Tube Stand
8. Wire Gauze
9. Water bath
10. Fusion Tube
11. Capillary Tube
12. Dropping Funnel
13. China dish
14. Test Tube Holder
15. Spatula

2.2 Separation of organic compound

Separation of solid-solid mixture:

(a) Separation of solid-solid (mixture with water soluble compound) mixture:

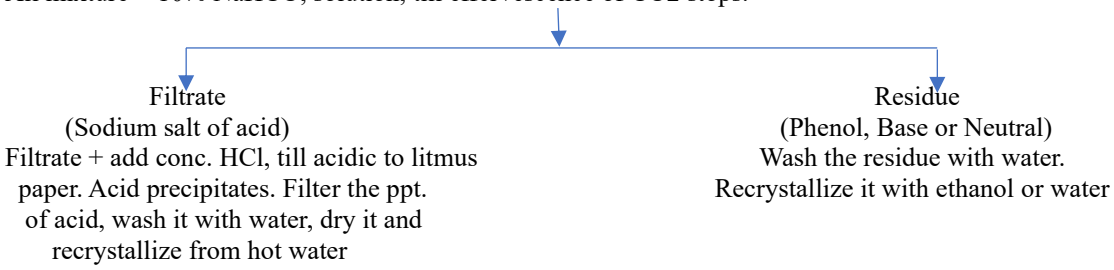
Place the mixture in 50 ml water in a beaker. Stir it for 10-15 minutes and filter.



b) Separation of solid-solid (water insoluble) mixture:

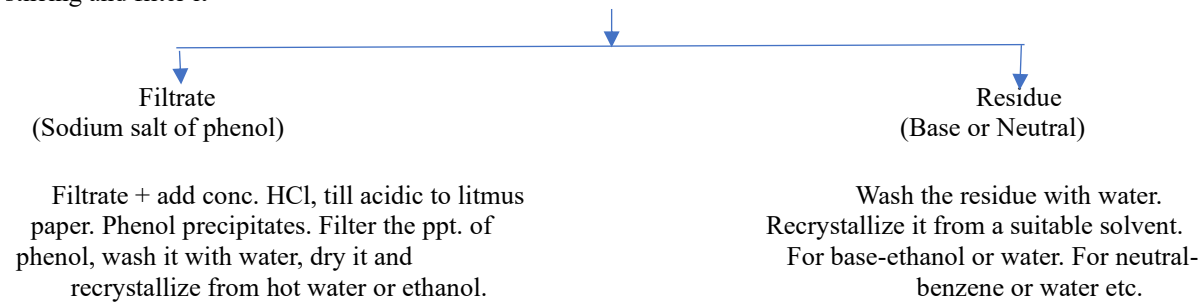
(i) Separation of Acid - Phenol / Acid - Base / Acid - Neutral type mixture:

All mixture + 10% NaHCO, solution, till effervescence of CO2 stops.



(ii) Separation of Phenol-Base / Phenol-Neutral type mixture:

All mixture + 10% NaOH solution, till alkaline to litmus and add about 50 ml distilled water with stirring and filter it

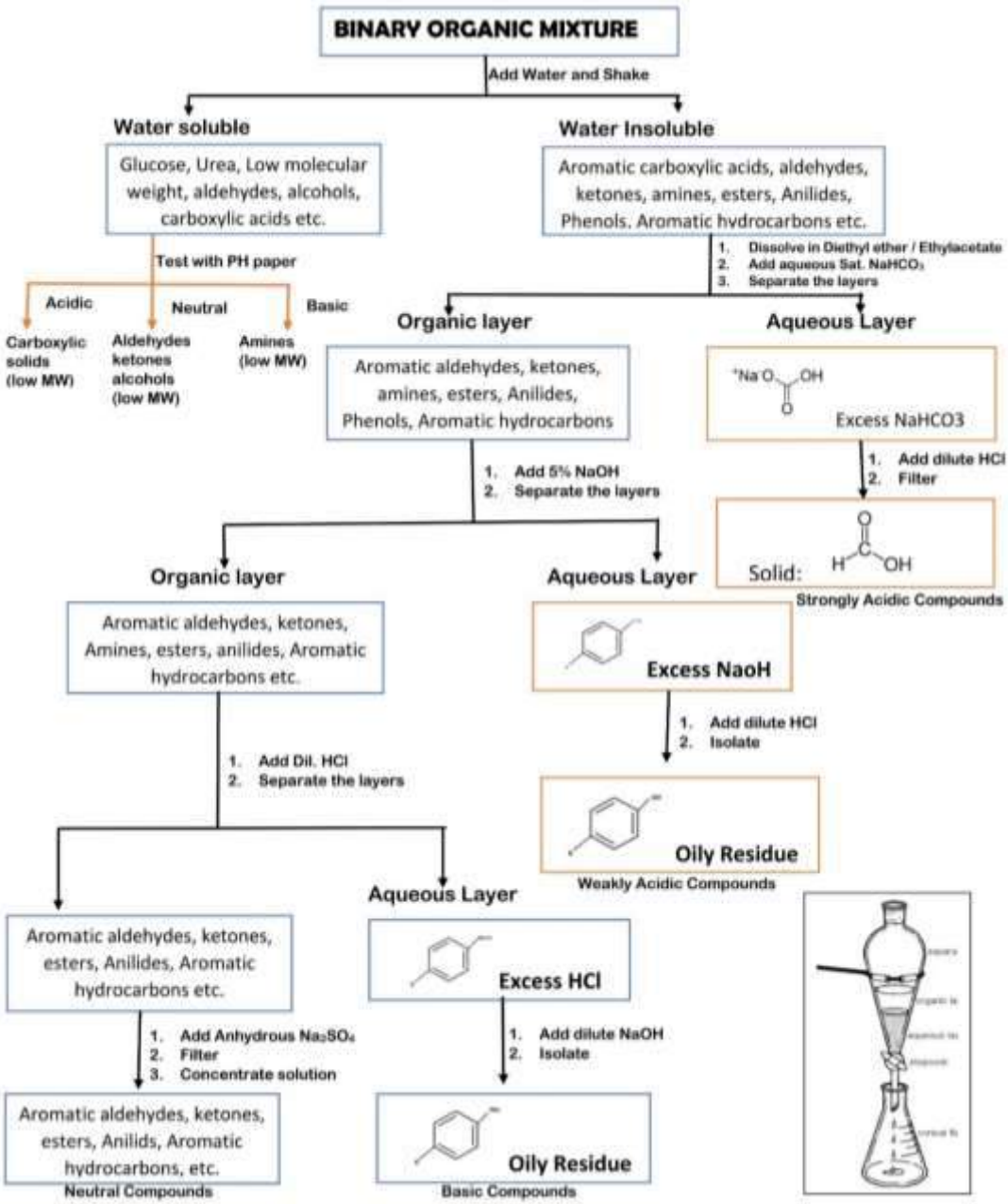


SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

(iii) Separation of Base-Neutral type mixture:

All mixture + 1:1 aq. solution of HCl + 50 ml of water. Stir the mixture for 10-15 minutes and filter it.

Filtrate (Base)	Residue (Neutral)
Filtrate 10% NaOH till alkaline to litmus paper. Filter the ppt, wash it with water, dry it and recrystallize it from ethanol or ethanol- water	Wash the residue with water. Recrystallize from a suitable solvent.



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3. Organic compound identification follows a systematic scheme outlined below:

1. Preliminary Test.
2. Solubility Test.
3. Detection of Extra Elements.
4. Detection of Functional Group.
5. Physical constants determination and compound identification.
6. Confirmatory Test.
7. Derivatives preparation and its m.pt determination.

3.1 Preliminary Test for Compound A:

Test	Observation	Inference
(a) Nature	i) Solid	Carbohydrate, acid, phenol, amine, higher hydrocarbon may be present.
(b) Colour	Colourless	Simple acid, alcohol, ester, ketone aromatic hydrocarbon.
(c) Odour	Moth balls	Naphthalene
(d) Flame Test	i) Sooty flame	Indicates the presence of an aromatic compound or an aliphatic compound containing a small proportion of hydrogen, such as $CHCl_3$ or CCl_4.
(f) Test for unsaturation: 1. $KMnO_4$ test. Substance + 2 ml of water shake well + 2 drops of dilute $KMnO_4$ solution.	Decolourisation of $KMnO_4$	Unsaturated or easily oxidizable compound.
2. Bromine water Test: Substance + 2 ml of water shake well + 2 drops of bromine water.	Decolourisation of bromine water.	Unsaturated compound.

Conclusion: Unsaturated aromatic compound may be present.

3.2 Solubility Test

the substance exhibits insolubility or immiscibility in water.

Test	Observation	Inference
(a) 0.1gm of substance +3 ml Saturated $NaHCO_3$ solution. Shake well. The substance dissolves. **To this clear solution add conc. HCl drop by drop.**	No strong effervescence	Carboxylic acid Absent. Carboxylic acid Absent.
(b) 0.1gm of substance +3 ml dilute NaOH solution. Shake well. The substance dissolves. **To this clear solution add conc. HCl drop by drop.**	A solid or emulsion not appeared	Phenol Absent.
(c) 0.1gm of substance +3 ml 1:1 HCl solution. Shake well. The substance dissolves. **To this clear solution add 20% NaOH solution drop by drop.**	Solid is not appeared	Base Absent.
(d) If substance is insoluble in **$NaHCO_3$, NaOH, HCl** solution.		Neutral compound present.

Conclusion: Neutral compound may be present.

3.3 Detection of Extra Elements: The Lassaigne's test is a chemical analysis technique used to detect the presence of extra elements like halogens, nitrogen, and sulphur in organic compounds. By fusing the organic compound with sodium metal, these elements are converted into their ionic forms, allowing for their detection through specific chemical reactions. The resulting extract, known as Lassaigne's extract, is then subjected to various tests

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

to identify the presence of halogens (chlorine, bromine, iodine), nitrogen, and sulphur based on characteristic reactions with reagents like silver nitrate, sodium nitroprusside, and ferrous sulphate.

Sodium Extract:

1) A small piece of freshly cut sodium metal is placed in an ignition tube along with the solid organic compound sample.
2) The tube is heated strongly with a Bunsen burner until the contents become red hot.
3) The hot tube is then quickly plunged into cold water in a beaker to quench the reaction
4) The contents are boiled with water for about 10 minutes.
5) The mixture is filtered to obtain the sodium fusion extract, also known as the Lassaigne extract.

Detection of Elements

Test	Observation	Inference
Test for Nitrogen: 1 ml of extract + 2-3 drops of NaOH solution to make it alkaline + a few drops of freshly prepared FeSO4solution, boil for a few minutes, cool and acidify it with by adding dil. HCl or dil. H2SO4.	No Blue or green colour solution or Prussian blue coloration.	Nitrogen Absent.
Test for Sulphur: (i) 1 ml of extract +1 ml of 2N Acetic Acid + 1 ml of Lead Acetate Solution.	No black precipitate.	Sulphur Absent.
(ii) 1 ml of extract + 1 drop of sodium nitroprusside solution.	No violet or purple coloration.	Sulphur Absent.
(iii) 1 ml of extract + 1 ml of aqueous FeCl3 solution.	No blood red coloration.	Nitrogen and Sulphur are Absent.
Test for Halogen: (i) 1 ml of extract +1 ml of dilute HNO3 (boil well if N and S are present) + 1 ml of 5% AgNO3 solution.	No thick white precipitate.	Halogen Absent.
(ii) If halogen is present carry out the following test: 1ml of extract + 1ml of dilute H2SO4 +0.5ml of CHCl3 and 0.5ml of chlorine water, shake well and observe the colour of chloroform layer.	(i) No colour	Iodine Absent.
	(ii) No colour	Bromine Absent.
	(iii) No colour	Chlorine Absent.

Conclusion: The elemental composition of sample A is C,H and no any other element is present.

3.4 Detection of Functional Group test:

The atom or group of atom that defines the structure of particular family of organic compound and at the same time determines their properties is called functional group. It is also possible that a compound contains two or more identical or different functional group which are said to be poly-functional groups. Some of the important functional groups and their characteristic tests and reactions for their identification are discussed below.

Classify the provided compound based on its elemental composition.

Based on the elements found within the organic compound, it categorizes into one of four groups, each potentially further divided into subgroups as follows:

Group I: C, H, (O)	**Group III: C, H, (O), N and S**
(i). Carboxylic acids **(ii). Phenol** **(iii). Neutrals**	**(i). Acids** **(ii). Neutrals**
Group II: C, H, (O) and N	**Group IV: C, H, (O) and Halogen**
(i)Carboxylic acids **(ii)Phenols** **(iii)Bases** **(iv)Neutrals**	**(i). Neutrals**

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3.5 Detection of Functional Groups

Group I: C, H, (O) Neutrals		
Test	**Observation**	**Inferences**
(a)Test for Carbohydrates: **Molish Test**:(Perform this test only if the compound is colorless and soluble in water) Dissolve 0.5 gm of the compound in 2ml of water + 2/3 drops of 10% α-naphthol dissolved in ethyl alcohol, add carefully 1 ml of conc.H_2SO_4 along the sides of the test tube.	A Violet ring is not appeared at thejunction of two layers.	Carbohydrate Absent.
(b)Test for Aldehydes and Ketones: **(i)** 0.05 gm of the compound + 3 ml of 2,4dinitrophenyl hydrazine. Shake well.	No precipitate.	Aldehyde or Ketone Absent.
If the result of this test is affirmative, proceed with the subsequent test to differentiate between aldehydes and ketones.		
Test for Aldehydes: **(i) Schiff's Test:** 0.05 gm of the compound + 2/3 ml ofSchiff's Reagent Shake well.	violet color is not developed	Aliphatic aldehyde. Absent.
	Pink color is not developed	Aromatic aldehyde Absent.
(ii) Tollen's Test OR Silver **(i) Mirror test:** 0.1 gm of the compound +2-3mlTollents reagent(i.e. Ammoniacal silver Nitrate solution) + Heat it on a boiling water bath. **(iii) Fehling Solution Test:** 0.1gm of the compound + **1ml Fehling A** + **1mlFehling B** solution. Heat it gently **(iv) Benedict's test:** 0.1gm of the compound + Benedicts solution +Heat it gently.	A silver mirror is Not formed on theinner sides of the test tube No Formation of red ppt of Cuprousoxide No Formation of red ppt Cuprous oxide	Aldehyde Absent.
Test for Ketones: 0.1gm of compound + 2ml of sodium nitroprusside solution + 2 drops of NaOH	Wine Red color or Orange red color is not appeared. CH_3-CO- gr gives this test	Ketone Absent.
(c). Test for Esters: Dissolve 0.1gm or 0.5ml of compound in 1 ml of ethyl alcohol + a drop of phenolphthalein + 2 drops of very dilute NaOH solution. Heat on a boiling water bath.	No color	Ester Absent
(d). Test for Alcohols: (i). Place a small piece of dry sodium metal into a fusion tube and introduce a few drops of the compound. (ii). 1ml of acetyl chloride in a dry test tube +drops of the compound.	No evolution of H_2 Week effervescence	Alcohol Absent Alcohol Absent

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

e). Test for Hydrocarbons 0.5ml of compound + 1 ml of iodine in carbon disulfide, shake well	Purple color of CS_2 layerchanges to brown color is not appeared.	Ether Absent
(f). Test for Hydrocarbons 0.1gm of compound + 1-2 ml of water, shake well + 1-2 drops of very very dilute$KMnO_4$ solution. Shake again.	If all the above tests fail	**Hydrocarbon present**
	Decolourisation	**Unsaturated hydrocarbon present.**
	No decolourisation	Saturated hydrocarbonAbsent

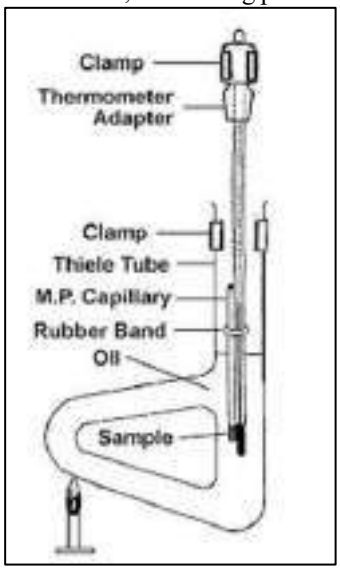
Conclusion: Unsaturated Hydrocarbon may be p

4. DETERMINATION OF PHYSICAL CONSTANTS AND COMPOUND IDENTIFICATION

Aim: To ascertain the melting point of the provided solid substance.

Material Required: Given Solid Substance, Capillary Tube, Paraffin, Laboratory thermometer.

Theory: The change from solid to liquid state of a compound in heating is called melting and the temperature at which a solid in its pure form melts is called the melting point. Each pure solid possesses a distinct melting point, thus the determination of melting point aids in the identification of the compound. The presence of impurities decreases the melting point of a solid. Therefore, the melting point also acts as an indicator of a compound's purity.



Procedure

1) Thiele's tube is the preferred apparatus for determining melting points. It comprises a hard glass test tube fused with V-shaped glass tubes at both the middle and bottom ends.
2) The tube can be sealed with a one-holed cork housing a sensitive mercury thermometer, featuring a side slit. Approximately three-fourths of Thiele's tube is filled with a high-boiling liquid such as concentrated sulfuric acid or liquid paraffin.
3) To determine the melting point of a substance, it's first powdered thoroughly. Then, a capillary tube, about 5 cm in length with one end fused, is selected.
4) The powdered substance is introduced into the capillary tube to form a column of roughly 0.5 cm.
5) The thermometer bulb is moistened with either liquid paraffin or concentrated sulfuric acid. Subsequently, the capillary tube is positioned to adhere to the thermometer in such a way that the bulb and the specimen are in close proximity.
6) The apparatus is then sealed with the cork, ensuring the thermometer is submerged in the liquid while the capillary tube remains above the liquid level. The bulb of the thermometer should be positioned at the upper side tube level, with the open end of the capillary tube above the liquid level.
7) The apparatus is securely fastened to an iron stand and gently heated by directing a flame at the side tube. As the liquid molecules are heated, uniform heating occurs.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

8) To prevent high pressure buildup, vapor escapes through the slit in the cork. During heating, the mercury thread gradually rises until, at a particular moment, the solid substance in the capillary tube suddenly contracts and melts. The temperature is then noted as the melting point of the substance.

Observations

Melting point:

1. 80°C
2. 79°C
3. 81°C

Mean Melting point = (t1+t2+t3)/no. of observation

$$\text{Melting point} = \frac{80°C+79°C+81°C}{3}$$

Melting point=80°C

Conclusion: the melting point of benzoic acid is typically around 79-81°C, so 80°C could indeed be considered within the range. The Naphthalene is confirm.

5. CONFIRMATORY TEST COMPOUND (A):

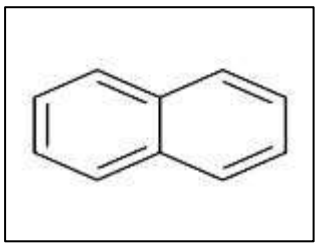
Test	Observation	Inference
Compound + Sodium Bicarbonate	White colour	Naphthalene present.

Conclusion: The conclusion is that Naphthalene is present in the compound being tested. This conclusion is based on the observation of a white colour when the compound is mixed with sodium bicarbonate, indicating the presence of Naphthalene.

Results

From the above step by step analysis of given organic compound shows that, is

Structure:



- **Formula:** $C_{10}H_8$
- **IUPAC Name:** Naphthalene
- **Other Name:** white tar, camphor tar, napthene, napthalin.
- **Molecular Weight:** 128.17 g/mol
- **Category:** Group C, possible human carcinogen
- **State:** Solid state
- **Colour:** White or colourless solid
- **Odour:** Faint, pleasant odour
- **Aromatic / Aliphatic:** Aromatic compound
- **Saturated / unsaturated:** unsaturated
- **Solubility:** Water insoluble.
- **Extra elements:** No present extra element.
- **Functional group:** carboxyl group, benzene ring.
- **Physical Constant:** Melting point: 80°C

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5. PRELIMINARY TEST FOR COMPOUND (B)

Test	Observation	Inferences
(a) Nature	Solid	Carbohydrate, acid, phenol, amine, higher hydrocarbon may be present.
(b) Colour	No Colour	Simple acid, alcohol, ester, ketone aromatic hydrocarbon.
(c) Odour	No particular smell	Aromatic acid, amide, carbohydrate.
(d) Flame Test	Sooty flame	Aromatic compound or aliphatic compound containing small proportion of hydrogen e.g. CHCI3, CCI4
(f) Test for unsaturation: **1. KMnO4 test:** Substance + 2 ml of water shake well + 2 drops of dilute KMnO4 solution.	Decolourisation of KMnO4	Unsaturated or easily oxidizable compound.
2. Bromine water Test: Substance + 2 ml of water shake well + 2 drops of bromine water.	Decolourisation of bromine water.	Unsaturated compound.

Conclusion: Unsaturated Aromatic compound may be present.

5.1 Solubility Test

(A) If the substance dissolves or mixes with water, proceed with the following test.

Test	Observation	Inferences
(a). 0.1gm of substance + 3ml of water shake well. Test the solution with litmus paper.	Blue litmus paper turns red. Red litmus paper is no blue colour.	Water soluble acid or phenol present. Water soluble base Absent.
(b). 0.1gm of substance + Saturated NaHCO3 solution. Strong effervescence and substance dissolves. To this clear solution add conc. HCl	No solid appear	Water soluble acid present
(c). 0.1gm of substance + water shake well, substance dissolves. To this clear solution add alcoholic FeCl3 Solution.	No Colour	Water soluble phenol Absent

Conclusion: Water soluble acid or phenol may be present.

5.2 Detection of Extra Element

The Lassaigne's test is a chemical analysis technique used to detect the presence of extra elements like halogens, nitrogen, and sulphur in organic compounds. By fusing the organic compound with sodium metal, these elements are converted into their ionic forms, allowing for their detection through specific chemical reactions. The resulting extract, known as Lassaigne's extract, is then subjected to various tests to identify the presence of halogens (chlorine, bromine, iodine), nitrogen, and sulphur based on characteristic reactions with reagents like silver nitrate, sodium nitroprusside, and ferrous sulphate.

Sodium Extract

1) small piece of freshly cut sodium metal is placed in an ignition tube along with the solid organic compound sample.
2) The tube is heated strongly with a Bunsen burner until the contents become red hot.
3) The hot tube is then quickly plunged into cold water in a beaker to quench the reaction.
4) The contents are boiled with water for about 10 minutes.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5) The mixture is filtered to obtain the sodium fusion extract, also known as the Lassaigne extract.

Detection of Elements

Test	Observation	Inference
Test for Nitrogen: 1 ml of extract + 2-3 drops of NaOH solution to make it alkaline + a few drops of freshly prepared $FeSO_4$ solution, boil for a few minutes, cool and acidify it with by adding dil. HCl or dil. H2SO4.	No Blue or green colour solution or Prussian blue coloration.	Nitrogen Absent.
Test for Sulphur: (i) 1 ml of extract +1 ml of 2N Acetic Acid + 1 ml of Lead Acetate Solution.	A black precipitate not Appeared	Sulphur Absent.
(ii) 1 ml of extract + 1 drop of sodium nitroprusside solution.	A violet or purple not appeared.	Sulphur Absent.
(iii) 1 ml of extract + 1 ml of aqueous FeCl3 solution.	A blood red not Appeared.	Nitrogen and Sulphur are Absent.
Test for Halogen: (i) 1 ml of extract +1 ml of dilute HNO3 (boil well if N and S are present) + 1 ml of 5% AgNO3 solution.	A thick white precipitate is not Appeared.	Halogen Absent.
(ii) When halogen is detected, conduct the subsequent test: Mix 1ml of the extract with 1ml of diluted H2SO4, 0.5ml of CHCl3, and 0.5ml of chlorine water. Shake the mixture thoroughly and observe the color of the chloroform layer.	(i) No colour	Iodine Absent.
	(ii) No colour	Bromine Absent.
	(iii) No Colour	Chlorine Absent.

Conclusion: The elemental composition of sample B is C,H and no any other element is present.

5.3 Detection of Functional Groups test: The atom or group of atom that defines the structure of particular family of organic compound and at the same time determines their properties is called functional group. It is also possible that a compound contains two or more identical or different functional group which are said to be poly-functional groups. Some of the important functional groups and their characteristic tests and reactions for their identification are discussed below.

Classify the provided compound based on its elemental composition.

Based on the elemental composition of the organic compound, it falls into one of four groups, each of which may be further subdivided into subgroups as follows:

Group I: C, H, (O)	**Group III: C, H, (O), N and S**
(i). Carboxylic acids **(ii). Phenol** **(iii). Neutrals**	**(i). Acids** **(ii). Neutrals**
Group II: C, H, (O) and N	**Group IV: C, H, (O) and Halogen**
(i). Carboxylic acids **(ii). Phenols** **(iii). Bases** **(iv). Neutrals**	**(i). Neutrals**

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

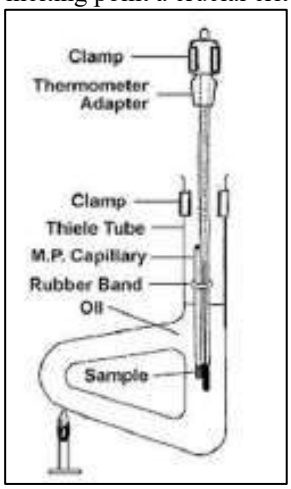
5.4 Detection of Functional Groups

Group I	**C, H, (O) Carboxylic acids**	
Test	**Observation**	**Inferences**
(a) 0.1gm of substance +3 ml Saturated $NaHCO_3$ solution. Shake well. The substance dissolves. **To this clear solution add conc. HCl drop by drop.**	Strong effervescence A solid appeared	**Carboxylic acid present.** **Carboxylic acid confirmed.**
(b) 0.05 gm of compound + 1ml of water,shake well + 1-2 drops of alcoholic $FeCl_3$ solution	Buff coloured precipitate.	**Benzoic acid or phthalic acid.**

Conclusion: Carboxylic acids contain the carboxyl functional group (-COOH), which is present in both benzoic acid and phthalic acid. So, the conclusion is that both benzoic acid and phthalic acid are carboxylic acids.

6. DETERMINATION OF PHYSICAL CONSTANT AND IDENTIFICATION COMPOUND

Aim: To ascertain the melting point of the provided solid substance.
Material Required: Given Solid Substance, Capillary Tube, Paraffin, Laboratory thermometer.
Theory: The change from solid to liquid state of a compound in heating is called melting and the temperature at which a solid in its pure form melts is called the melting point. Each solid possesses a distinct melting point, making the determination of melting point crucial for compound identification. The presence of impurities reduces the melting point of a solid, making melting point a crucial criterion for assessing the purity of a compound.



Procedure

9) Thiele's tube is the preferred apparatus for determining melting points. It comprises a hard glass test tube fused with V-shaped glass tubes at both the middle and bottom ends.
10) The tube can be sealed with a one-holed cork housing a sensitive mercury thermometer, featuring a side slit. Approximately three-fourths of Thiele's tube is filled with a high-boiling liquid such as concentrated sulfuric acid or liquid paraffin.
11) To determine the melting point of a substance, it's first powdered thoroughly. Then, a capillary tube, about 5 cm in length with one end fused, is selected.
12) The powdered substance is introduced into the capillary tube to form a column of roughly 0.5 cm.
13) The thermometer bulb is moistened with either liquid paraffin or concentrated sulfuric acid. Subsequently, the capillary tube is positioned to adhere to the thermometer in such a way that the bulb and the specimen are in close proximity.
14) The apparatus is then sealed with the cork, ensuring the thermometer is submerged in the liquid while the capillary tube remains above the liquid level. The bulb of the thermometer should be positioned at the upper side tube level, with the open end of the capillary tube above the liquid level.
15) The apparatus is securely fastened to an iron stand and gently heated by directing a flame at the side tube. As the liquid molecules are heated, uniform heating occurs.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

16) To prevent high pressure buildup, vapor escapes through the slit in the cork. During heating, the mercury thread gradually rises until, at a particular moment, the solid substance in the capillary tube suddenly contracts and melts. The temperature is then noted as the melting point of the substance.

Observations

Melting point
1. 122°C
2. 123°C
3. 121°C

Mean Melting point = (t1+t2+t3)/no. of observation

$$\text{Melting point} = \frac{122°C+123°C+121°C}{3}$$

Melting point=122°C

Precautions: Fill the capillary tube to one-third of its length. Control the rate of heating carefully.

Conclusion: the observed melting point of 122°C falls within the typical range of 122-123°C for benzoic acid, confirming the identity of the compound as benzoic acid.

6.1Confirmatory Test Compound (B):

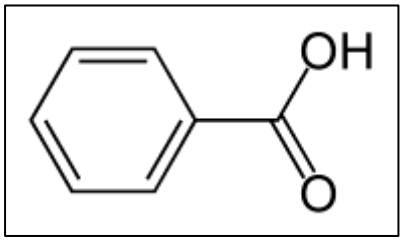
Test	Observation	Inference
Sodium Bicarbonate + Naphthalene +Benzoic Acid + $KMNO_4$ + Conc.H_2SO_4 + Resorcinol + NAOH	Colourless	Benzoic Acid present.

Conclusion: In the presence of benzoic acid, when treated with sodium bicarbonate (NaHCO3), effervescence (bubbling) would occur due to the liberation of carbon dioxide gas This is because benzoic acid reacts with sodium bicarbonate to form sodium benzoate, water, and carbon dioxide gas. So, the conclusion would be that the presence of benzoic acid is confirmed due to the observed effervescence when treated with sodium bicarbonate.

Results

Based on the step-by-step analysis above, it is evident that the organic compound is

Structure



- **Iupac Name:** Benzenecarboxylic acid
- **Formula:** $C_7H_6O_2$
- **Other Name:** benzenecarboxylic acid Carboxybenzene phenylformic acid
- **Molecular weight:** 122 g mol^{-1}
- **Category:** aromatic carboxylic acid.
- **State:** Solid.
- **Colour:** White crystalline solid.
- **Odour:** faint, pleasant odour.
- **Aromatic / Aliphatic:** Aromatic
- **Saturated / unsaturated**: unsaturated
- **Solubility**: soluble in water
- **Extra elements**: carbon atom, hydrogen
- **Functional group:** two conjoined benzene
- **Physical constant:** Melting point: 122°C

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

REFERENCE

1) *A laboratory manual on pharmaceutical organic chemistry*
2) *Practical handbook of pharmaceutical organic chemistry (Nirali Prakashan)*
3) *M.sc. laboratory manual organic chemistry binary mixture seprations | PDF (slideshare.net)*
4) *(PDF) Qualitative analysis of organic mixture (Binary and Ternary) chart for M.Sc. organic students... (researchgate.net)*
5) *Qualitative analysis of organic mixture (binary and Ternary) chart for M.sc organic student. (author: sushil Mathpati S.M.P. College,Murum.*
6) *Skip your morning goof-ups with the new Colgate Maxfresh! Neend Bhagao, Taazgi Jagao | Marathi (youtube.com)*
7) *B.Sc. SEM I.pdf (davjalandhar.com)*
8) *Qualitative Analysis of Organic Compounds (Systematic Approach) author: Mohan Rao Gangula (December 2021)*
9) *M. Sc. I Semester CHEMISTRY LAB-I: INORGANIC AND ORGANIC*
10) *Functional group analysis.pdf (ankara.edu.tr)*
11) *Detection_of_Organic_Compounds.pdf (abhedanandamahavidyalaya.ac.in)*
12) *FYBSc_Qualitative_Analysis_of_Organic_Compounds.pdf (asccollegekolhar.in)*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

COLLECTION AND ANALYSIS OF PRIMARY DATA IN THE PROCESS OF SOCIOLOGICAL RESEARCH

Ulmasbek Karimov
Lecturer, Fergana State University, Uzbekistan, Fergana City

ABSTRACT
Sociological studies are not limited only to the fact that they simply record the major socio-political events taking place in society, but also comprehensively reveal its true essence and content. In this respect, sociology is also valuable among the Social Sciences for its accuracy and concreteness, for the fact that its scientific responses to the issues at hand are based in detail, repeatedly checked. The methodology of sociological research provides conditions for forecasting not only on a full-fledged response to the state of current social situations, but also on the basis of the degree of change in the prospects of social situations.
KEYWORDS: *scientific research, sociological research, dataset, research program, reporting, sociological research methodology*

INTRODUCTION

The methodology of sociological research is the scientific and cognitive field of sociology. The science of sociology consists of different areas according to its subject and structure. They are: demographic sociology, organizational sociology, ethnosociology, sociology of religion, sociology of culture, sociology of family, urban sociology, sociology of crime, political sociology, applied sociology, etc. The methodology of sociological research can be considered as a science that is a branch of applied sociology. Current problems in all other areas of sociology can be studied using the methodology of sociological research.

Most marketing research involves the collection and analysis of primary data. The Marketing research procedure consists of a set of sequential personal actions (steps):

1. Development of a research concept (statement of the problem, setting tasks and goals).

2. Obtaining and analyzing empirical data (development of working tools, process of obtaining data, their processing and analysis).

3. Formation of basic conclusions and presentation of research results.

MAIN PART

Marketing research shows that the first step should be to make it clear what is the main problem you want to solve. This may be the need to increase sales, the need to determine why a competitor's product sells better than yours, or the need to introduce a completely new product into the market and determine the appropriate response to it.

The issues of Marketing research can come from the specific characteristics of the type of product and its consumption, the level of saturation of the market, the action of incentive channels and competitors, the prediction of future demand, the effectiveness of advertising, the price level necessary to sell the product and the identification of potential consumers. from your product. Therefore, first of all, the task is to study the problems on which the current state and further development of the market depends.

In general, the tasks of marketing research will have to determine the potential buyers of your product, their location and the amount of money that you are willing to pay for this product, the reasons for its purchase. In addition, you need to know what means of communication can be used to reach potential buyers. The need for this information arises for the following reasons: the inability to advertise in all media and the need to deliver a product within the framework of the existing distribution system.

"The results of the sociological study are analyzed according to its type and scope. Usually, when analyzing the results of Test studies, less work is done compared to the results of a descriptive study. In its place, the analysis of the results of a descriptive study, on the other hand, is more superficial than that of an analytical study"[1, 200].

The purpose of the study depends on the general definition of tasks and on the real market conjuncture, which arises from the strategic directions of the marketing activities of the enterprise and is aimed at reducing the level of uncertainty in the decision-

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

making of management. A complete marketing research program is optional for any and all information that needs to be obtained. Here you need to come from the level of need for information, the cost of obtaining it and the value for your goals.

At the second stage of Marketing Research, data is collected. We strive to learn as much as possible about the market, so it is very important to decide which of the many ways to get information for the research project to choose.

After the completion of data collection, the third stage begins - processing (analysis) of the received data and creating a report. The first stage of the analysis process is to check the questionnaire to determine the quality of the answers, to identify questionnaires that cannot be accepted due to incomplete filling, etc. The next step is to build the format of the idea presented in the answers by tabulating the information received, especially before the request.

Once the data is processed, they must be presented in the form of a report of the appropriate form, copies must be obtained and presented to all managers of the company for evaluation. Depending on the nature of the study, the report can take the form of a summary or other textual material that helps to assess the result. In all cases, it seems necessary to indicate in a generalized form which way the information was obtained.

METHODS FOR PROCESSING AND ANALYZING PRIMARY EMPIRICAL DATA

The initial data obtained using various quantitative and qualitative methods of data collection can differ significantly in terms of their content and methods of their processing and analysis. Below we will look at the main approaches and stages of processing and analyzing the most common methods in sociology — the initial data obtained through a survey and interview without tools. When working with data collected using other methods, the stages of processing and analysis can change.

Analysis of sociological data collected during empirical sociological research is not only a combination of technical techniques and methods. This is the main stage of the entire study, in which a clear examination of the conformity of the information collected by the sociologist to the models of social phenomena that are specific or hidden is carried out. In addition, in the process of analysis, new models are identified and checked, which correspondingly reflect the patterns in the data collected.

At the first stage of processing, the sociologist uses a standard set of tools for the most visual representation of the information received (as a rule, these are one-dimensional distributions, tables, histograms and graphs).

Operation, questions took the form of indicators. Now the reverse procedure must be carried out, that is, the data must be transferred to a form that answers research questions.

Statistical analysis. This step is important in the process of analyzing sociological data. In the process of statistical analysis, some statistical patterns and dependencies are identified that allow the sociologist to make certain generalizations and conclusions. To carry out statistical analysis, sociologists use many different mathematical methods that allow a complete and comprehensive analysis of the collected data. In modern sociology, computers filled with mathematical and statistical processing programs are actively used for this purpose.

Depending on the methods of obtaining the initial data, different methods of data processing and analysis can be used. Thus, if a sociologist receives a certain amount of information from documentary sources, then he uses two main methods of analyzing documents. Informal (traditional) and formalized (content analysis). Traditional analysis is based on the perception, understanding, understanding and interpretation of the content of documents in accordance with the purpose of the study. Formalized analysis of documentary sources (content analysis-content analysis) is designed to extract sociological data from large arrays of documentary sources that are not available for traditional intuitive analysis. It is based on the identification of some quantitative statistical properties of texts (or messages). At the same time, it is assumed that the quantitative characteristics of the content of documents reflect some important features of the social phenomena and processes under study.

The formalized analysis of documents is based on the standardization of search procedures, the identification of Accounting units within the document, which can be judgments expressed in the form of individual words (terms, geographical names, names of political figures, etc.), sentences, paragraphs, fragments of texts, etc. and others, as well as various publications (genre, type of authors, topics, etc.). Units of calculation are determined by the goals of sociological research.

The analysis of the collected sociological data is the most interesting stage of research. The hypotheses put forward here are investigated, new problems are identified, and sometimes frustration arises.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

RESEARCH METHODOLOGY

A simple grouping is the classification or arrangement of data by a single character. Thus, depending on the hypotheses, the selected population can be grouped by age, gender, occupation, education or reported judgment. The number of selected group members is called lobes or relative frequency. Here you can immediately apply statistical methods of data processing, such as calculating the median, arithmetic mean, calculating frequencies by percentage.

Research can be expressed in a targeted theoretical way. In this case, the main focus in the preparation of the program is on theoretical and methodological problems: the study of scientific literature on issues of interest, the construction of the concept of the subject of research, etc. In this case, the object of research is it is determined when performing additional theoretical work.

The study works on the program taking into account the social characteristics of the social object after receiving a specific social order. A sociologist seeks a research object in accordance with his concept of the subject of research. A sociologist who performs practical tasks first determines what task is in front of them, and then, using scientific literature, performs these tasks solves the problem of exemplary solving.

The initial social data obtained during sociological research requires processing, without which serious scientific analysis of the results of the study is difficult or not at all possible. It is processing that regulates, groups and classifies a large collection of empirical data collected in sociological research.

In order to successfully carry out information processing, it is necessary to adhere to a certain sequence. At the first stage, the entire complex of methodological tools goes through certain preparations. In this case, two main problems must be solved:

1) check the accuracy, completeness and quality of filling the toolkit. These measures include detecting errors in the answers to each question and correcting them. When checking questionnaires for completeness of filling out interview forms, the elimination of less than a third of fill-in is carried out. When checking the quality of the filling, the clarity, clarity and adequacy of the answers are controlled. All questionnaires, interview forms, etc.with the disadvantages listed above are excluded from the subsequent processing process. After control, the remaining documents are numbered so that each of them can be tracked when processing them later;

2) encoding information, that is, its formalization. The principle of coding is the translation of meaningful information into the language of formal logic. This means that one meaning of the answers is not encoded, only the fact of its existence or absence. This form of encoding is sufficient to perform numerical operations with any information, regardless of its original form, form, content, or purpose. The coding procedure involves assigning certain conditional numbers-codes to each answer option. As a result, all information from questionnaires or interview forms becomes a number system, in which the order of codes (numbers) must be decisive.

Only after the end of coding, you can proceed directly to processing information. There are two methods of Information Processing — Manual and machine. The issue of the processing method is also solved in advance at the stage of creating software and research tools. Manual processing is used for a small number (several dozen) of questionnaires. Manual processing of questionnaires is slow, often with errors. It is better to process sociological information on a computer. This process is post-coding. Questionnaires are sorted, information is entered in the memory of the machine. Information processing tasks are compiled by the researcher in accordance with the research hypotheses and their verification tasks.

CONCLUSION

The processing of collected data is an important step in empirical research. The time, cost and overall success of the study depend on how the issue of information processing is solved. The answer to it must be found to repeat the questionnaire, since the coding of the questionnaire depends on the program used to process the material.

Before starting to collect information, it is advisable to determine which methods of data analysis (drawing up tables of a certain type, analyzing factors, etc.), as well as what specific signs are analyzed using one method or another. It is clear that such a plan can only be approximate, since data analysis is an iterative process, the development of which occurs in communication with a computer (direct or superficial). The plan is needed to select the necessary software, as well as as as an initial stage of analysis.

REFERENCES

1. *S.Yuldashev. Sotsiologik tadqiqot metodologiyasi. Toshkent, 2018.*
2. *Просветов Г.И. Социологические исследования: задачи и решения. М.:, 2009.*
3. *Татарова Г.Т. Методология анализа данных в социологии. М.:, 1999.*
4. *Karimova, G. (2022). Forms of organization of educational activities in history in higher educational institutions. Asian Journal of Multidimensional Research, 11(6), 127-132.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5. *Karimova, G. (2018). IMPLEMENTATION OF THE EDUCATIONAL PROCESS WITH THE INTERACTIVE METHODICAL COMPLEX. Теория и практика современной науки, (2 (32)), 3-5.*
6. *Nilufar, M. (2023). FORMATION OF LEGAL CULTURE AMONG YOUNG PEOPLE AND ITS IMPORTANCE IN BUILDING A CIVIL SOCIETY. IMRAS, 6(7), 416-421.*
7. *Karimov, U. (2023). INTERPRETATION AND STUDY OF THE CONCEPT OF ENTREPRENEURSHIP BY CLASSICS OF WORLD SOCIOLOGY. Best Journal of Innovation in Science, Research and Development, 220-225.*
8. *Anvarovna, D. J. (2024). LEGAL ASPECTS OF THE FORMATION OF SOCIAL ACTIVITY IN YOUNG PEOPLE. Miasto Przyszłości, 46, 745-751.*
9. *Karimov, U., & Abduraimjonov, A. (2017). Innovative information technology in education. Форум молодых ученых, (5 (9)), 9-12.*
10. *Karimova, G. (2024). The Use of Modern Innovative Pedagogical Technologies in Sociology. Miasto Przyszłości, 44, 358-362.*
11. *Karimova, G. (2024). THE METHODOLOGY OF COMPILING A SOCIOLOGICAL QUESTIONNAIRE. Miasto Przyszłości, 46, 52-56.*
12. *Teshaboev, M., Karimov, U., Karimova, G., & Karimov, U. (2023). SOCIO-HISTORICAL ROOTS OF APPLIED PHILOSOPHY.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

RELIGION IN THE DIGITAL AGE: APPROACHES IN STUDYING RELIGIOUS CONTENTS

Shahzoda Abduraimova
Basic Doctoral Student of the International Islamic Academy of Uzbekistan
A.Kadiri str. 11, 100011, Tashkent, Uzbekistan.

ABSTRACT

Religious media content in traditional, digital, and web media space is serving as a powerful tool for studying religion. This article examines methodologies ranging from textual analysis of religious media content to digital trends. Approaches to the analysis of oral and written speech, as well as visual media contents, are revealed. It explores various methodologies used to study religious media content in the digital age. It argues that a multifaceted approach is necessary to understand the complexities of religious media. Textual analysis, visual analysis, ethnography, and digital methods, demonstrating how each approach can contribute to a deeper understanding of religious traditions.

KEY WORDS: *Religion, religious content, textual analysis, critical discourse analysis, visual analysis, ethnography, digital methods, religious websites, Social media.*

INTRODUCTION

Religion in the modern world transcends the dusty pages of ancient scriptures and the imposing walls of cathedrals. It flows through a constant stream of social media posts, online sermons, and meticulously designed religious websites. This ever-expanding realm of religious media content offers a captivating window into the beliefs, practices, and evolution of various religious traditions. In today's world, religion permeates our lives not just through ancient scriptures and towering cathedrals, but also through a constant stream of social media posts, online sermons, and religious websites. This ever-expanding realm of religious media content offers a captivating window into the beliefs, practices, and evolution of religious traditions. However, to truly understand the significance of these diverse materials, a multifaceted approach is required. "Religious media content, encompassing a vast array of formats from ancient scriptures to contemporary social media posts serves as a powerful lens through which to examine the ever-evolving world of religion." [1, 12-p]

Also, as Paroma in his book of "Religion and the Media" (2011) emphasizes that understanding the intricacies of this content is crucial for deciphering the dynamics of religious belief, practice, and adaptation in the digital age. This article embarks on a methodological exploration, illuminating the diverse approaches employed by scholars to unlock the meaning embedded within religious media. It delves into a range of established methodologies, each offering unique insights. Textual analysis forms the cornerstone, meticulously examining the content, language, and symbolism within religious texts, both historical and contemporary This approach allows researchers to uncover the core themes and messages communicated through these materials.

By examining techniques like textual analysis, critical discourse analysis, visual analysis, ethnography, and digital methods, we can gain a richer understanding of how religious media shapes and reflects the world around us. This exploration will not only illuminate the power of religious media in transmitting core beliefs and narratives, but also reveal the intricate relationship between media and the lived experience of religion.

ANALYSIS

Textual analysis serves as a cornerstone methodology within the study of religious media content. It delves into the intricacies of religious texts, both historical and contemporary, to unlock their deeper meaning and significance. "Imagine a detective meticulously examining a crime scene; in textual analysis, the evidence lies within the words, phrases, and overall structure of the text"[2, 18-p] This approach offers scholars a powerful lens to explore the core beliefs, values, and practices embedded within religious traditions. This involves a close reading of the text, focusing on the central themes, narratives, and arguments presented.Textual analysis examines the specific language used, including word choice, figurative language (metaphors, similes, etc.), and sentence structure. For example, analyzing the poetic imagery in the Quran, such as metaphors comparing God's light to guidance (Qur'an 24:35), reveals the importance of divine illumination. Many religious texts employ rich symbolic language. Textual analysis helps identify these symbols and decipher their deeper meaning within the religious context. Understanding the historical and cultural context in which a religious text was written is crucial. Religious texts come in various forms, such as laws, poetry, prophesies, or narratives.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Analyzing the genre helps researchers understand the text's intended purpose and interpret it accordingly. Textual analysis serves as a powerful tool for unlocking the meaning and significance of religious media. By meticulously examining the content, language, and context of religious texts, researchers gain invaluable insights into the core beliefs, practices, and evolution of religious traditions.

Religious media extends far beyond the written word. Powerful imagery, from ancient cave paintings to contemporary religious films, plays a crucial role in transmitting beliefs, values, and narratives. Visual analysis, a key methodology in studying religious media, delves into the symbolic meaning embedded within these visual elements. It's akin to deciphering a secret language, where colors, compositions, and even lighting choices all hold significance. Visual analysis look for subject matter: this involves identifying the central figures, objects, or scenes depicted in the artwork or film. Symbolism: visual analysis goes beyond surface appearance to identify symbolic elements. Color: colors often hold symbolic meaning in religious contexts. Composition: the arrangement of elements within an image can convey meaning. Light and Shadow: the use of light and shadow can evoke emotions and highlight specific figures or objects.

Visual analysis serves as a valuable tool for unlocking the deeper meaning of religious media. By examining the symbolic elements, compositions, and artistic choices within religious imagery, researchers gain a richer understanding of how religious traditions use visuals to communicate their core messages and evoke emotions in viewers. Visual analysis serves as a valuable tool for understanding the deeper meaning of religious imagery. By examining the symbolic elements, compositions, and artistic choices within religious art, researchers can gain a richer understanding of how religious traditions use visuals to communicate their core messages and evoke emotions in viewers.[3, 112-p] In other words, Krieg emphasizes that analyzing the use of symbols, the way elements are arranged within an image (composition), and the deliberate choices made by the artist (such as color and light) helps us decipher the messages and emotional impact of religious art.

There is another one called digital methods, which is being popular worldwide. This approach leverages data analysis tools and social network analysis to understand online religious content. Researchers can analyze religious websites, forums, social media trends, and online religious communities to gain insights into contemporary religious beliefs, practices, and digital trends.

RESULTS

In accordance with listed methods two prominent websites of Germany and Uzbekistan have been observed. Islamische-Zeitung.de, situated in a diverse, secular society, frequently addresses issues of integration, religious discrimination faced by Muslims in Europe, and the need for mutual understanding between Muslim and non-Muslim communities. Islom.uz, operating in a predominantly Muslim nation, grapples more with internal debates on tolerance towards diverse Islamic interpretations and expressions within Uzbek society. Islamische-Zeitung.de caters to a broader audience, including German society at large, aiming to bridge the gap between Muslim and non-Muslim communities. Islom.uz primarily targets Uzbek Muslims, focusing on internal religious dialogues and promoting harmonious relations within the Muslim community itself.

Islamische-Zeitung.de frequently utilizes the term "tolerance" explicitly, advocating for its application in diverse spheres like religious practices, cultural expressions, and political discourse. Islom.uz tends to employ broader concepts like "respect," "understanding," and "compassion" while implicitly incorporating them into discussions of interfaith relations and internal religious dialogues. Islamische-Zeitung.de: In an article titled "Tolerance is No Weakness," author Ahmet Toprak condemns Islamophobia and argues for interfaith understanding based on shared values of justice and compassion. He cites Qur'an verses like "There is no compulsion in religion" (2:256) as foundational principles for building tolerance [4].

Islom.uz: In a piece titled "The Importance of Mutual Respect among Muslims," Sheikh Muhammad Yusuf emphasizes the need for understanding and respecting diverse interpretations within Islam, drawing upon Prophetic traditions advocating for peaceful discourse and avoiding unnecessary disputes[5]. Islamische-zeitung.de: An article condemning the Charlie Hebdo attacks in France, emphasizing the importance of peaceful dialogue and respect for all faiths.

The differences likely stem from the historical and social contexts of each nation, target audience considerations**,** and potentially underlying theological or ideological perspectives**.** Recognizing these nuances is crucial for understanding the diverse ways tolerance is represented within Islamic media and fostering genuine interfaith dialogue and understanding across Muslim communities and wider societies.

This comparative analysis reveals both shared and distinct understandings of tolerance on Islamische-Zeitung.de and Islom.uz. While both emphasize tolerance as a core Islamic value, the specific contexts and target audiences shape how this concept is articulated and applied. Recognizing these nuances is crucial for fostering genuine interfaith dialogue and understanding across diverse Muslim communities and wider societies. Future research could explore a wider range of Islamic websites, delve deeper

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

into the underlying factors shaping their representations of tolerance, and examine the potential impact of these online discourses on interfaith relations and social cohesion.

CONCLUSION

In today's world, religion permeates our lives not just through ancient scriptures but through a constant stream of social media posts, online sermons, and religious websites. This ever-expanding realm of religious media content offers a captivating window into the beliefs, practices, and evolution of religious traditions. However, to truly understand the significance of these diverse materials, a multifaceted approach is required.

This article has explored some key methodologies employed by scholars to navigate the complex landscape of religious media. Each approach offers unique strengths and contributes to a richer understanding of the sacred messages embedded within these materials.

Text analysis the cornerstone approach, meticulously examining the content, language, and symbolism within religious texts.[6, 18-p] It excels at uncovering core themes, theological arguments, and the evolution of religious thought through comparisons of texts from different periods. Visual Analysis: Focuses on the symbolic meaning conveyed through artistic choices in religious art, films, and photography. It offers insights into how emotions are evoked and narratives are transmitted. [7,112-p]. However, visual analysis requires careful consideration of historical and cultural context, as an image's meaning might vary depending on the viewer's background. Researchers immerse themselves within religious communities, observing firsthand how media is used and interpreted in everyday life. This approach provides valuable insights into the lived experience of religion and the complex relationship between media and social practices. Studying a religious community's use of online forums can reveal how they foster social connection and share religious teachings. However, ethnographic research can be time-consuming and may not be generalizable to other religious communities.

Ultimately, a multifaceted approach that combines these diverse methodologies is most effective in understanding religious media content. Textual analysis provides a foundation, while visual analysis, ethnography, and digital methods offer additional layers of understanding. By employing this multifaceted approach, we can appreciate the richness and complexity of religious media, fostering a deeper understanding of the sacred messages communicated through an ever-diversifying array of formats. This exploration not only illuminates the power of religious media in transmitting core beliefs and narratives, but also reveals the intricate relationship between media and the lived experience of religion. As religious traditions continue to adapt and evolve in the digital age, these methodologies will undoubtedly continue to play a vital role in helping us understand the ever-changing landscape of faith.

REFERENCES

1. *M. Hussain, Syed Faridul Ahsan Rahman. (2020) "Media, Religion, and Society: A Global Perspective".Routledge.12p*
2. *Moore, Sanders. (2017) "Biblical Interpretation: An Integrated Approach".Oxford university Press.18p*
3. *Krieg, G. A. (2006). "Religious Art in a Secular Age: Aesthetics, Ideology, and the Critical Study of Visual Culture ". Ashgate Publishing. 112p*
4. *H.Hendershot. (2016). "Religion in the digital Age". Fordham university. 50p*
5. *L.Paroma. (2011)"Religion and Social media". Green Bay. 29p*
6. *https://islamische-zeitung.de/category/english/*
7. *https://islom.uz/maqolalar/6/1*
8. *Тоиржонович З. Қ. ИСЛОМ ТАРИХИНИ ЎРГАНИШДА МАНБА ВА УЛАР БИЛАН БОҒЛИҚ МАСАЛАЛАР //European Journal of Interdisciplinary Research and Development. – 2024. – Т. 24. – С. 170-173.*
9. *Toirjonovich Z. K. WORKS IN THE GENRE OF SIIRA AND TABAKAT ARE AN IMPORTANT SOURCE IN THE STUDY OF ARAB-MUSLIM HISTORY //" NEW CENTURY"-SCIENTIFIC-METHODICAL JOURNAL. – 2023. – Т. 1. – №. 1.*
10. *Зоҳидов Қ. Т. "ТАБАҚОТ" АСАРЛАРИНИНГ ИСЛОМ ТАРИХИНИ ЎРГАНИШДАГИ ЎРНИ //Talqin va tadqiqotlar ilmiy-uslubiy jurnali. – 2022. – Т. 1. – №. 13. – С. 61-64.*
11. *Зоҳидов Қ. Т. ИБН ИСҲОҚ–СИЙРАШУНОСЛИК ЖАНРИ АСОСЧИСИ //Proceedings of International Conference on Educational Discoveries and Humanities. – 2023. – Т. 2. – №. 1. – С. 114-116.*
12. *Islomov Z. International Islamic Academy of Uzbekistan–a result of the reforms worth to the centuries //The Light of Islam. – 2018. – Т. 1. – №. 1.*
13. *Islomov Z. The role of the international Islamic academy of Uzbekistan in the development of Islamic studies //The Light of Islam. – 2019. – Т. 2019. – №. 1. – С. 1.*
14. *Islomov Z. Source studies analysis of manuscripts of "muqaddimatu-ladab" in foreign archival funds //The Light of Islam. – 2019. – Т. 2019. – №. 4. – С. 41.*
15. *Islamov Z. et al. WRITING DOWN OF HADITHS IN THE VII-VIII CENTURIES: APPROACHES AND METHODS //PSYCHOLOGY AND EDUCATION. – 2021. – Т. 58. – №. 1. – С. 5536-5545.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

16. *Maxsudov D. Развитие исламоведения (корановедения) в Узбекистане: история и современность //Вестник КазНУ, Серия Религиоведение. – 2020. – Т. 21. – №. 1. – С. 60-67.*
17. *Maxsudov D. The development of transmitted and rational tafsirs //The Light of Islam. – 2019. – Т. 2019. – №. 1. – С. 9.*
18. *Makhsudov D. Muslim world scientists of the temurids period //The Light of Islam. – 2019. – Т. 2019. – №. 3. – С. 4.*
19. *Makhsudov D. Manuscripts of abul barakat al-nasafi's works on furu'Al-Fiqh //Asian Journal of Multidimensional Research. – 2023. – Т. 12. – №. 1. – С. 31-34.*
20. *Makhsudov D. R. Mufassirs of Mawarannahr //ISJ Theoretical & Applied Science, 12 (80). – 2019. – С. 539-543.*
21. *Makhsudov D. R. МУФАССИРЫ МАВЕРАННАХРА В СРЕДНИХ ВЕКАХ //Theoretical & Applied Science. – 2019. – №. 12. – С. 539-543.*
22. *Makhsudov D. A GENIUS OF THE WORLD //Theoretical & Applied Science. – 2019. – №. 5. – С. 544-548.*
23. *Ugli A. Z. Z. THE PLACE OF ALIKHANTORA SOGUNIY IN THE HISTORY OF EAST TURKESTAN //Colloquium-journal. – Голопристанський міськрайонний центр зайнятості, 2020. – №. 24 (76). – С. 32-33.*
24. *Arslonov Z., Ergashev H. ALIKHANTORA SOGUNIY'S VIEWS ON POLITICAL GOVERNANCE IN EAST TURKESTAN //Студенческий вестник. – 2020. – №. 32-2. – С. 84-85.*
25. *Ugli A. Z. Z., Farxodjonova N. Alikhantura Soguniy Role in State Administration in East Turkestan //Journal of Modern Islamic Studies and Civilization. – 2024. – Т. 2. – №. 02. – С. 128-132.*
26. *Zokirjonugli Z. A. Approaches to studying the scientific heritage of Alikhantora Soguni //Asian Journal of Multidimensional Research. – 2022. – Т. 1*
27. *Zokirjonugli Z. A. APPROACHES TO STUDYING THE SCIENTIFIC HERITAGE OF ALIKHANTORA SOGUNI.*
28. *Arslonov Z. Z. THE PLACE OF ALIKHANTORA SOGUNIY IN THE HISTORY OF EAST TURKESTAN //Colloquium-journal. – Голопристанський міськрайонний центр зайнятості= Голопристанский районный центр занятости, 2020. – №. 24-2. – С. 9-11.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

THE EMERGENCE OF SHAZ QIRAT AND ITS TYPES

Madaminzoda Abdulatif Baxtiyor o'g'li
Asia International University, Specialization in Pedagogy and Psychology, Graduate Student of group M8-PP-22
Mir Arab Higher Madrasa Teacher of Balogat (Rhetoric).

ANNOTATION
This article provides information about shaz, its types, and the role of shaz in the eyes of recitation imams. Together with Shoz, other types of recitation were also discussed.
KEY WORDS: *Qur'an, recitation, shaz, ahod, famous, mudrija and topic.*

The dictionary definition of the word "shoz": the word "shoz" is derived from the word "shddh" which means to be alone from many, to be rare, to be few, and to be separated from many. comes in nos. From this it is known that the word shaz has many meanings.

There are several definitions of shaz recitation from the scholars, some of them I will give below:
Shahz recitation is a recitation whose sanad is not authentic, the Arabic language does not correspond to it at least in one form, and the picture does not correspond to the Usmani Mushafi. Imam Jazari (may God have mercy on him) said this definition.

Shoz recitation is a recitation that has lost one of the three columns. Imam Suyuti (may God have mercy on him) said this definition. Shahz recitation is the opposite of mutawatir recitation and is what is narrated as the Qur'an without mutawatir and has not been accepted among the ummah.Tepada keltirilgan ta'riflardan kelib chiqadiki shoz qiroat bu – o'n qiroatlardan boshqa va u biror sahobiy (roziyallohu anhum) larga nisbat beriladimi boshqagami farqi yo'qdir. Bu qiroat turini nodir va ozgina deb ham nomlanadi.

Recitations during the times of our Prophet (peace and blessings of Allah be upon him) and the sheikhs were a source that was needed by other tribes. Among these tribes there were those who followed the good path and the methods of the Holy Qur'an. But these recitations began to diverge in the circles of Hazrat Uthman ibn Affan (may Allah be pleased with him), the third caliph, in ways that contradicted the laws and principles that were easy for the ummah. The greatest fear of the Companions (may Allah be pleased with them) was that something would be lost from the Holy Qur'an, and the fact that the Muslims would not stand in one line also caused fear. As a result, the recitations were divided into several types. Caliph Uthman (may God bless him and grant him peace) tried hard to eliminate the seditions that had arisen during this time. One of the things he did was to compile the recitations agreed upon by him into one Mushaf. At the same time, recitations that were not in accordance with the ijma appeared. It is narrated that Hazrat Uthman (may God bless him and grant him peace) removed several narrations from the Qur'an of the Muslims, whose transmission did not reach the Prophet (peace and blessings of Allah be upon him), and reciters who came to each city according to their own recitations, i.e. the recitations compiled by the companions, they sent a copy of the Mushaf with them. After that, Rasmi Mushafi Uthmani, mutawatir became the main conditions for authenticity of recitation, and those that did not comply with it were considered shaz recitation.

There are a few more types of recitation left outside of the Ottoman Mushaf. Like the recitations of Ubayy ibn Ka'b, Abdullah ibn Mas'ud (may Allah be pleased with him) and others. Scholars say about such recitations that such recitations do not correspond to the recitations that our Prophet (peace be upon him) recited to Gabriel (peace be upon him) for the last time. The owners of such recitations continued to read these recitations, because they had personally heard these recitations from the Prophet (peace and blessings of Allah be upon him).

Some of these recitations were interpretations of the words or rulings of the Holy Qur'an, and that is why some of the Companions (may Allah be pleased with them) quoted such recitations next to the verse. For example: the recitations of Sa'd Ibn Abu Waqqas (may Allah be pleased with him),

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

وَلَهُ أَخٌ أَوْ أُخْتٌ مِنْ أُمٍّ[1]

In this verse, it is known that a mother is a sister. This recitation is given a proportion to the ahod recitation and to the shaz recitation that does not agree with the consensus. This recitation is not mutawatir and it is not from the seven directions in which the Qur'an was revealed. That is why Imam Tabari was very careful about accepting such recitations, it can be understood from what he himself said below.

"We do not consider this recitation to be authentic due to some reasons that its reports are authentic

Despite the fact that these recitations are shaz and do not conform to ijma, their recitation was not stopped by some Qurras, rather, they were convinced that the chain of these recitations goes to the Prophet (peace and blessings of Allah be upon him) and it was impossible to forget them. It continued until the division of recitations into mutawatir and shaz in the 3rd century. Imam Tabari was the first person who used the term shaz for these recitations.

وَإِنْ كَانَ مَكْرُهُمْ[2]

In this verse كان Abdullah ibn Mas'ud (may God bless him and grant him peace) recited the letter "dal" instead of the letter "nun" and said that this recitation is "shaz" and contradicts the Mushaf of Muslims.

- Over time, recitations continued to develop and clarify, until our day, one of the most important sciences, the explanation in the Arabic language dictionary and Shari'i rulings became clear.
- If we look at the meaning of shaz recitation and the valid conditions for obtaining judgment from it, we find that there are several types of this recitation. Great scholars have divided the recitations into the following parts:
- **Ahod recitation** is a recitation whose sanad is authentic, but not like the sanad of mutawatir or popular recitations, and its mushafi is contrary to the Ottoman and Arabic language. For example: it is narrated that our Prophet (peace be upon him) read the following verse as follows;

متكئين على رفارف خضر وعبقري حسان[3]

In this verseرفارف "alif" after the first letter "fa" in the word is missing in mutawatir recitation.

This verse is recited mutawatir:

متكئين على رفرف خضر وعبقري حسان

appeared.[4]

Shoz recitation is a recitation that has lost three verses or one of them, such as reciting the following verse:

فاليوم ننحيك ببدنك

In this verse ننحيك The letter "ha" in the word is the letter "jim" in mutawatir recitation.

- **Mudrija recitation is a recitation** that is more than the reason for the interpretation of the recitation. The scholars have added it to the tafsir recitations. An example of this is the recitation of Sa'd ibn Abu Waqqas (may Allah be pleased with him) mentioned above. In it, the word "Umm" was read with an increase.
- **The subject is recitation –** a recitation woven from lies, attributing it to the reciter without any evidence. It is like a text recitation attributed to Imam Abu Hanifa (may Allah have mercy on him). In it:

إنما يخشى الله من عباده العلماء[5]

- The word "Allah" in this verse has been narrated as "nasb" by "raf" and "al-ulama"', contrary to the mutawatir recitation. This is contrary to mutawatir recitation.
- **Popular recitation –** This recitation is authentic, narrated by a fair narrator from a narrator similar to him, conforms to the rules of the Arabic language, and conforms to at least one of the Ottoman copies of the Mushafi, and the narrations of which are accepted, whether it is from the famous authors of seven recitations or others. It is a recitation narrated from the imams, but not raised to the level of mutawatir. Scholars differed on adding this recitation to the list of royal recitations.

LIST OF USED SOURCES AND REFERENCES

1. *Qur'on karim.*
2. *Abdurrahmon ibn Abu Bakr Suyutiy. Al-Itqon fi ulumil Qur'on. Birinchi nashr. – Damashq: "Muassasa ar-risala an-nashurun", 2008. – 832 b.*

[1] *Surah Nisa, verse 12.*
[2] Surah Ibrahim, verse 46.
[3] Surah Ar-Rahman, verse 76.
[4] This recitation was quoted by Ibn Jarir al-Tabari, Jami' al-bayan an ta'wil al-Qur'an, book 27, page 165, which was not memorized from the Prophet (peace and blessings of Allah be upon him) and is not authentic..
[5] Surah Fatir, verse 28.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3. *Hofiz Muhammad ibn Muhammad Damashqiy Ibnul Jazariy. An-Nashr fil qiroaatil a'shr. – Madinai munavvara: "Majma'ul Malik Fahd", 1435 h.*
4. *Abu Ja'far Muhammad ibn Jarir Tabariy. Jami'il bayon fi ta'vilil ayatil Qur'on. – Qohira: "Dar hijr", 2001.*
5. *Abu Abdulloh Muhammad ibn Ahmad Qurtubiy. Al-Jami' liahkamil Qur'on. Riyoz: "Dar a'limul kutub", 1423 h.*
6. *Imadud Din Abul Fido Ismoil ibn Umar ibn Kasir, Tafsiri Qur'on al-a'zim, Bayrut: "Dar ibn Hazm", 2009.*
7. *Makhsudov D. Manuscripts of abul barakat al-nasafi's works on furu'Al-Fiqh //Asian Journal of Multidimensional Research. – 2023. – T. 12. – №. 1. – C. 31-34.*
8. *Makhsudov D. R. Mufassirs of Mawarannahr //ISJ Theoretical & Applied Science, 12 (80). – 2019. – C. 539-543.*
9. *Makhsudov D. R. МУФАССИРЫ МАВЕРАННАХРА В СРЕДНИХ ВЕКАХ //Theoretical & Applied Science. – 2019. – №. 12. – C. 539-543.*
10. *Makhsudov D. A GENIUS OF THE WORLD //Theoretical & Applied Science. – 2019. – №. 5. – C. 544-548.*
11. *Ugli A. Z. Z. THE PLACE OF ALIKHANTORA SOGUNIY IN THE HISTORY OF EAST TURKESTAN //Colloquium-journal. – Голопристанський міськрайонний центр зайнятості, 2020. – №. 24 (76). – C. 32-33.*
12. *Arslonov Z., Ergashev H. ALIKHANTORA SOGUNIY'S VIEWS ON POLITICAL GOVERNANCE IN EAST TURKESTAN //Студенческий вестник. – 2020. – №. 32-2. – C. 84-85.*
13. *Ugli A. Z. Z., Farxodjonova N. Alikhantura Soguniy Role in State Administration in East Turkestan //Journal of Modern Islamic Studies and Civilization. – 2024. – T. 2. – №. 02. – C. 128-132.*
14. *Zokirjonugli Z. A. Approaches to studying the scientific heritage of Alikhantora Soguni //Asian Journal of Multidimensional Research. – 2022. – T. 1*
15. *Islomov Z. Source studies analysis of manuscripts of "muqaddimatu-ladab" in foreign archival funds //The Light of Islam. – 2019. – T. 2019. – №. 4. – C. 41.*
16. *Islamov Z. et al. WRITING DOWN OF HADITHS IN THE VII-VIII CENTURIES: APPROACHES AND METHODS //PSYCHOLOGY AND EDUCATION. – 2021. – T. 58. – №. 1. – C. 5536-5545.*

USED INTERNET SITES

1. *www.muslim.uz*
2. *www.islom.uz*
3. *http://www.maroc-quran.com*
4. *islamweb.net*
5. *ar.m.wikipedia.org*
6. *uz.m.wikipedia.org*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

INNOVATIVE RESEARCH ON IMPROVING THE SCIENTIFIC OUTLOOK AND MATHEMATICAL THINKING OF YOUNG PEOPLE IN THE HIGHER EDUCATION SYSTEM

Kilichev Farkhod Davlatyarovich
Researcher, Urgench State University

Article DOI: https://doi.org/10.36713/epra17296
DOI No: 10.36713/epra17296

ABSTRACT
This article highlights the innoative research potential on the improving the scientific outlook of young people in the higher education system. Furthermore, the influence of the Third Renaissance on the formation of the scientific outlook of young people through higher education is discussed.

KEY WORDS: *scientific worldview, schools and universities, education, curriculum, information technologies*

Social development is determined by young people with high intellectual potential, thirst for knowledge, and ready to devote their creative energies to the interests of their country. It is thanks to the determination of young people that it is possible to implement the idea of the Third Renaissance in New Uzbekistan, to ensure the innovative development of our country. As stated in the development strategy, the future of our republic depends on deeply educated and broad-minded young people, their creative activity, and higher education should serve this purpose. “You are all well aware”, says our President Sh.M. Mirziyoev in his congratulatory speech to the teachers and coaches of Uzbekistan, “we have defined the issue of further development of the education system as one of our main tasks within the framework of the development strategy of New Uzbekistan. Our goal is to make a school and university graduate of New Uzbekistan a person who has acquired modern skills, mastered information technology, creative thinking, can make independent decisions, and has a broad outlook” [1].

We still do not have a clear scientific vision and views about the Third Renaissance. It is observed that scientific analysis, socio-philosophical generalization of existing experiences, revealing its conceptual aspects, in short, presenting the still abstract concept of “Eastern Renaissance” as a scientific innovation in the articles published in newspapers are becoming a habit. It is their style to tautologically repeat the thoughts and imaginations of the head of our state. True, candidate of philosophy, professor A. Erkaev tries to objectively assess the problem. He strives to reveal the processes before the Third Renaissance and writes: “Firstly, both Renaissances (scientific, educational and spiritual changes that occurred in Central Asia in the 9th and 15th - 16th centuries) forms of ownership, means of production and technologies did not develop in accordance with the level of cultural and scientific development of the society and remained stagnant; the scythe and the plow, the hoe and the belt, the simple work tools, the wheel and the mill were kept. Production could not leave the family circle. As a result, production concentration did not occur. Research on production tools and devices requiring more sophisticated engineering technical thinking and practical solutions was not conducted, such devices and enterprises and specialists using them were not created.

Agriculture and handicrafts, which use traditional labor tools, have almost fully revealed their internal capabilities. Economic stagnation did not give a social order to scientific and technical research. This gradually led to a decrease in the need for new natural-scientific,mathematical and engineering sciences…
Secondly, political instability, the struggle for the throne, and the struggle between different groups and dynasties also led to the decline of progress. Internal conflicts, palace conspiracies, internal and external wars drained the country’s treasury and people’s livelihood. Scientists, researchers and engineers were forced to go everywhere, where there is social and political stability, in any case safe places. Third, science has become disconnected from the practices and requirements of production. Fourth, at the end of the 11th century, the doors of ijtihad were closed. This debate in legal and social issues, in the interpretation of Islamic beliefs, in the teaching of Islamic science in madrasahs has gradually put an end to discussions, creative approaches, research, and freedom of thought. Dogmatism led to the rule. Limitation of debates and creative research, increase of religious dogmatism prevented the development of science of natural science, philosophy and logic. These sciences had a positive effect on free and creative religious thinking. Even in some bigoted circles, views appeared that the term “science” refers only to Shari’a sciences” [2]. There are many reasons that hindered scientific progress in previous times and led to the rise of religious dogmatics, and they can be cited again and

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

again. Summarizing them from a socio-philosophical point of view is a future task. An important aspect for us is the problem of the influence of the Third Renaissance on the formation of the scientific outlook of young people through higher education.

Measures related to the organization of higher education in accordance with the requirements of international standards were determined in decisions approved by the head of our state, such as "On State Policy Regarding Youth" (2016), "On Education" (2017), "On Science and Scientific Activity" (2019) and "Year of Development of Science, Enlightenment and Digital Economy" (2020), "Year of supporting youth and strengthening public health" (2021), "Year of human dignity and quality education" (2023), "On approval of the concept of development of the higher education system in the Republic of Uzbekistan until 2030" (2019), "On the establishment of Akfa International University in Tashkent" (2019). This was primarily due to the transition to the credit module system. In the 2020/2021 academic year, as an experiment, 35 higher educational institutions in our republic, and from the 2021/2022 academic year, all higher educational institutions were transferred to the credit module system. According to experts, the transition to the credit module system will help improve the quality of education and modernize it. "In the previous academic years, the curriculum consisted of 5 blocks (humanitarian and social economic, mathematical and natural-scientific, general professional, specialty, additional), and from the 2021/2022 academic year, it will consist of 2 blocks (compulsory and optional subjects).

"The share of non-specialist subjects in the curricula has also led to a sharp decrease. Previously, it was 35:65 percent, now this indicator is 15:85 percent, that is, 85 percent consists of specialized subjects. After the introduction of the credit module system, ample opportunities for independent education of students were created. For example, in the academic year 2019/2020, the ratio of classroom and independent education was 60:40 percent, while this indicator is 50:50 percent in the academic year 2020/2021, and 40:60 percent in the academic year 2021/2022" [3]. An important and noteworthy point for us is that when the prestigious international GS organization announced the results of the ranking of Asian universities for 2023 (GS Asia University Rankings 2023), mainly exact sciences in our republic were prioritized - Tashkent: National Research University of the Institute of Irrigation and Agricultural Mechanization Engineers (301- 350 places), Tashkent Financial Institute (551-600 places), Tashkent State technical university (551-600 places) [4]. In the national ranking, the national research university of the Tashkent Institute of Irrigation and Agricultural Mechanization, the Tashkent Financial Institute, and the Navoi Mining Institute took the leading positions [4]. Mathematics, higher mathematics, geometry, algebra, trigonometry, and physics are the main subjects of these universities, which are ranked high in international and national rankings, which indicates their intellectual potential. At the same time, this paradox is that up to 30% of the admission quotas allocated to these higher educational institutions are not fulfilled. "Explanation of this controversial situation, in our opinion, requires special studies. But it's not that universities prioritize specific sciences and mathematics, because some such universities (for example, Termiz Institute of Engineering Technology, Termiz Institute of Agro-Technology and Innovative Development, Yangier and Shahrisabz branches of Tashkent Institute of Chemical Technologies, Samarkand State Veterinary Medicine, Animal Husbandry and Biotechnology University Nukus and Tashkent branches) took low places in the national ranking" [4].

So, it does not depend on whether the universities are in the directions related to mathematics and concrete sciences or not in these directions, it is about the practical manifestation of the intellectual potential in them. "It is known from world experience that the income of highly educated specialists is higher than that of others. For example, in the US, they earn 1.7 times more per hour than others, those with a master's degree earn 2.1 times more, and those with a bachelor's degree earn 3.1 times more. Mathematically minded programmers earn 4-5 times more. And in Zenland, they earn $7 more per hour than others" [5]. Most importantly, highly educated personnel determine scientific progress, they can introduce automation, programming and digital control technologies to the national economy instead of simple manual labor. At the present time, when every innovation, every success in the national economy depends on scientific research, digitization technology, it is inevitable that the demand and need for higher education will increase. In the development strategy of New Uzbekistan for 2022-2026, it is planned to gradually increase the monthly salary of teachers and doctors with higher education to the equivalent of one thousand US dollars. It is also envisaged to increase the level of education coverage to 50%. That is why today the number of universities in our republic has reached 210. More than 1 million young people study in them. In our republic, the participation and mobility of people with higher education in the labor market is higher than that of others. It is known that more than 600,000 young people enter the labor market in our country every year. People with higher education ensure stability in the labor market, play an important role in reducing external labor migration, informal employment, crime and poverty (the share of people with higher education in Uzbekistan's poverty rate is 6.7 percent). Although 18.2 percent of the total employed population in the economy has a higher education, digitalization of the economy, mechanization of production, innovations in the service sector, and the wide and rapid application of ICT are causing the expansion of intellectual jobs and, as a result, an increase in the demand for specialists with higher education. In our country, there is a high demand for highly educated personnel and the high interest of young people in getting higher education. According to the accounting books of experts, the total demand for vacancies (as of April 29, 2022) with higher education is 49.3%.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

REFERENCES

1. *Mirziyoev M.M. To teachers and coaches of Uzbekistan // "New Uzbekistan". 2022, September 30.*
2. *Erkaev A. Lessons of history and the need for the Third Renaissance // "People's Word", 2002, January 6.*
3. *Zaripov L. Credit module system in higher education of Uzbekistan: problems and solutions // "Higher education in Uzbekistan", 2022, No. 3. 81 p.*
4. *Among the strongest universities in Asia// "Higher education in Uzbekistan", 2022, #3. 85 p.*
5. *www.yuz.uz*
6. *A. R. Shoxakimov "Use of Amir Temur's Teachings in Formation of National Pride in the Young Generation and Ensuring Social Security and Sustainability" Published in International Journal of Trend in Scientific Research and Development (IJTSRD), ISSN: 2456-6470, Volume-5 | Issue-6, October 2021, pp.1801-1803,*
   URL: https://www.ijtsrd.com/papers/ijtsrd47725.pdf
7. *Шохакимов А.Р. «ПРОЦЕССЫ ПОВЫШЕНИЯ НАЦИОНАЛЬНОГО ДУХА В ПОНИМАНИИ НАЦИОНАЛЬНОЙ ИДЕНТИЧНОСТИ», Журнал «Экономика и социум».-2021.- №11(90)*
   (дата публикации: __.11.2021)
   URL: https://www.iupr.ru/_files/ugd/b06fdc_cff12792c7864b6b90f16f0317e12530.pdf?index=true
8. *Шохакимов А.Р. «ЗНАЧЕНИЕ ПОЛКОВОДЧЕСКОГО ИСКУССТВА АМИРА ТЕМУРА В ПОВЫШЕНИИ БОЕВОГО ДУХА ВОЕННОСЛУЖАЩИХ», Журнал «Экономика и социум».-2023.- №11(114)*
   (дата публикации: __.11.2023)
   URL https://www.iupr.ru/_files/ugd/b06fdc_f3902c05b9df4738942eef8a7757708d.pdf?index=true
9. *Akromjon Shoxakimov. (2022). THE FACTOR OF NATIONAL SELF-AWARENESS IN THE FORMATION OF THE NATIONAL SPIRIT IN SERVICEMEN. American Journal of Interdisciplinary Research and Development, 3, 20–25. Retrieved from https://ajird.journalspark.org/index.php/ajird/article/view/22*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

HEPATO PROTECTIVE AND ANTIOXIDANT EFFECT OF CNIDOSCOLUS PHYLLACANTHUS AGAINST D-GALACTOSAMINE INDUCED OXIDATIVE STRESS IN RATS

Mr. Prashant Tiwari, Ms Priya Bisen, Dr. Neelesh Kumar Dwivedi
Department of Pharmacology, Shri Rawatpura Sarkar Institute of Pharmacy Jabalpur (M.P.)

ABSTRACT

The aim of present investigation is one of traditionally used herbs anti-Hepatotoxicity being assessed against the Paracetamol induced Hepatotoxicity in rats.The drug related Hepatotoxicity is uncommon for many drugs, the reported incidence is between 1 in 10,000- its true incidence is difficult to determine. The number may be much higher,because of underreporting,difficulties in detection or diagnosis,and incomplete observation of persons exposed (Navarro and John, 2006). Paracetamol treatment caused significant ($p<0.001$) decreases in the activities of SOD, catalase, GPx and GSH level in liver tissue when compared to control group.. Silymarin-treated animals also showed a significant ($p<0.001$) increase in antioxidant enzymes, namely SOD, catalase, GPx activities and GSH level compared to paracetamol-treated rats.To understand the effect of the extract on liver, histology of liver was performed. Firstly, Organoleptic Characterization of plant extract was performed. Organoleptic evaluations are subjective, sensory judgements. They can involve eyeing, feeling and taste of the extract to the judge its appearance, coour, integrity, texture and flavours. The organoleptic characters of alcoholic extract of Cnidoscolus Quercifolias leaf extract were found to be dark green in colour, semi solid, and taste is acrid. Solubility testing of alcoholic extract of Cnidoscolus Quercifolias leaf is done mainly to study the ability of the dissolve in different solvent for the preparation of aqueous extract for dosing. The alcoholic extractwas observed to be dissolved in water and DMSO. In the present study, the preliminary phytochemicals test was done on the alcoholic extract of Cnidoscolus Quercifolias leaf and it is found to be rich in Carbohydrates, Proteins, Saponin, Flavonoids and Phenolic compound. For the determination of protective effect of Cnidoscolus Quercifolias leaf extract against paracetamol induced Hepatotoxicity, firstly level of GSH and SOD was checked. GSH and SOD level was tested in vehicle treated group after that Paracetamol treated group and then 200 mg/kg of plant extract along with Paracetamol treated group and after that 400 mg/kg of plant extract along with Paracetamol treated group

KEYWORDS: *Herbal, Extract, Medicine, Antioxidant, Phytochemicals.*

INTRODUCTION

Herbal medicine is the use of medicinal plants for prevention and treatment of diseases: it ranges from traditional and popular medicines of every country to the use of standardized and titrated herbal extracts. Generally cultural root ednessen during and widespread use in a Traditional Medical System may indicate safety, but not efficacy of treatments, especially in herbal medicine where tradition is almost completely based on remedies containing active principles at very low and ultra low concentrations, or relying on magical-energetic principles. In the age of globalization and of the so-called‘plateworld’,assessing the ‘transferability’ of treatments between different cultures is not a relevant goal for clinical research, while are the assessment of efficacy and safety that should be based on the regular patterns of mainstream clinical medicine. The other black box of herbal-based treatments is the lack of definite and complete information about the composition of extracts. Herbal derived remedies need a powerful and deep assessment of their pharmacological qualities and safety that actually can be realized by new biologic technologies like pharmacogenomic, metabolomic and microarray methodology. Because of the large and growing use of natural derived substances in all over the world, it is not wise to rely also on the tradition or supposed millenarian beliefs; explanatory and pragmatic studies are useful and should be considered complementary in the acquisition of reliable data both for health caregiver and patients. In recent times natural products are becoming an integral part of human health care system, because there is a now popular concern over toxicity and side effects of modern drugs. There is also a realization that natural medicines are safer and allopathic drugs are often ineffective in several aliments. Medicinal plants existed even before human being made their appearance on the earth. Man's existence on this earth has been made possible only because of the vital role played by plant kingdom in sustaining his life. Since the down of civilization, in addition to food crops, man cultivated herbs for his medicinal need.In the last few decades there has been an exponential growth in the filed of herbal medicine. It is getting popularized in developing and developed countries owing to its natural origin and lesser side effects. More than 700 mono and polyherbal

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

preparations in the form of decoction, tincture, tablets and capsules from more than 100 plants are in clinical use .However, there are many limitations regarding safety and efficacy of these preparations. Knowledge about active principles of herbal preparations are not well defined, information on toxicity and adverse effect of these formulations are lacking.

Information regarding pharmacokinetics and bioavailability is not available. Packet inserts providing details regarding safety and warning are not required for sale of these, which are available as over the counter preparations. The lay public should know the risk of untested and unregulated remedies. Selection of plant material based on quality, standardization of methods of preparation, enforcement of regulation regarding appropriate labels are measures, which will improve the quality and acceptability of herbal preparations as therapeutic agents. Documentation of research publications in journals and availability of information on website, are other measures to assist research in this field.

Classification of Herbal Medicine System

Herbal Medicine can be broadly classified into various basic systems; Traditional Chinese Herbalism, which is part of Traditional Oriental Medicine, Ayurvedic Herbalism, which is derived from Ayurveda, and Western Herbalism, which originally came from Greece, Rome and Europe then spread to north and South America. Chinese and Ayurvedic Herbalism have developed into highly sophisticated system of diagnosis and treatment over the centuries. Western Herbalism is today primary a system of folk medicine etc.

Traditional system of medicine such as Ayurveda(India), Traditional Chinese Medicine(TCM), Tibetan Medicine, Unani-tibb (Greco-arabic) and Kampo (Japan) have a long and impressive history of effectiveness. Modern research has now confirmed the usefulness and safely of what has been used as primary medical care by much of the world's population.

Herbal and Alternative types of Medicine

Many people argue about the validity of natural and alternative types of medicine as effective medicines mainly due to the lack of scientific research performed to prove or disprove their effectiveness. Pharmaceutical companies are unable to patent herbal remedies as the wide spread use of natural and alternative types of medicine would basically put them out of business. (Patwardhan, 1992).

Need and Scope of Herbal Therapy

Today we are more concerned with life style diseases like depression, cancer and heart troubles caused by faulty nutrition and stress. Because these diseases have a mental or emotional component, there is a growing conviction that allopathy is largely unable to cure them, all of it offers is temporary relief from symptoms. There is a need of alternative therapy, to cover a good health for all. Herbal therapy will be one of the best practices to overcome the illness. Traditional Indian practice held that certain drugs should be formulated through the addition of chosen substance that enhances bioavailability of the drug. Recent work, particularly in two Indian modern biology labs, has confirmed this bioavailability enhancer ability of pepper and point to the active component as the molecule piperine. An anti-TB drug RIFAMPICIN has to be given at a higher dose than required, in order to compensate for losses on the way to the target site. Formulation of piperine with rifampicin will save the drug and counter effects.

Herbal oriented pharmaceutical companies like Dabur and the Himalaya Drug Company are investing crores of rupees on researching, developing and popularizing OTC remedies. Most of these address modern maladies such as stress, premenstrual syndrome, Depression and Obesity based on adapted version of ancient Vedic formulas (Thaibinh, 1998).

MATERIALS AND METHODS

Table 1: List of Instruments

S. No.	Instrument	Company
1	Vertex Shaker	Remi
2	Double Beam UV-VIS Spectrophotometer	Systronic
3	Cooling microcentrifuge	Remi
4	Clinical Centrifuge	Remi
5	High speed homogenizer	Remi
6	Animal weighing balance	Scientech
7	Syringe discarder	MRK Healthcare
8	Refrigerator	Godrej
9	Digital colony counter	EI
10	Digital camera	Sony

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Chemicals Used

Table 2: List of chemicals

S. No.	Chemical Name	Company
1.	Sodium Carbonate	Merck
2.	Ethylene Diamine Tetra Acetic Acid	Merck
3.	Acetic Acid	Merck
4.	Ammonia	Merck
5.	Pyridine	Merck
6.	Nitro-Bluetetrazolium	Himedia
7.	Nutrientbroth	Himedia
8.	Potassium Dehydrogenate Phosphate	Merck
9.	Dipotassium Hydrogen Phosphate	Himedia
10.	Agar-Agar	Himedia

METHODS

Selection and collection plant: Plant and plant parts was selected on the basis of Ethano-botanical survey.

Authentication of plant

The authentication of plant was done by the botanist. A herbarium of plants weresubmitted in Dept. of Botany Janata PG College, APS University and authenticated by Dr. S. N. Dwevedi Professor and Head Department of Botany Janata PG College, APS University, Rewa, M.P.

Extraction of plant material:

Cnidoscolus Quercifolias leaves collected, washed with distilled water. 250 gm dried *Cnidoscolus Quercifolias* leaves were ground to powder form and stored in a tightly sealed container. The Soxhlet apparatus and method was used for extraction.The Soxhlett himble was filled with the powdered leaves and inserted into the Soxhlet main chamber and closed. One liter of70% ethanol was filled into the Soxhlet main chamber and attached to the Soxhlet apparatus, which was heated until the solvent vapour filled the main chamber. The solvent vapour then condensed and dripped back down into the chamber containing the *Cnidoscolus Quercifolias* leaf extract. The *Cnidoscolus Quercifolias* leaf extract using 70% ethanol was then evaporated with a rotary evaporator at3 0oC and concentrated to50 Ml before beingfreeze-dried.The powdered form of freeze-dried extract was kept in the freezer to maintain the compound.

RESULT AND DISCUSSION

Table 3: Physical Evalution of Cnidoscolus Quercifolias leaf extract

S. No.	Organoleptic Characteristics	Result
1.	Colour	Dark Green
2.	Taste	Acrid
3.	Odour	Pungent
4.	Appearance	Semi-solid
5.	Consistency	Sticky

Solubility Tests

Table 4: Solubility of Cnidoscolus Quercifolias leaves extract in different solvents.

S.No.	Solvent	Observation
1.	DMSO	Soluble
2.	Distilledwater	Soluble
3.	Chloroform	Insoluble
4.	Methanol	Soluble

In-vitro antioxidant potential of hydroalcohalic Extract of *Cnidoscolus Quercifolias*

Total phenol and total flavonoid content:

Total phenolic content was measured using the Folin–Ciocalteu reagent in the extract and expressed as Gallic acid equivalent.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 5: Total phenolic content and total flavonoid content of alcoholic extract

Extracts	Total Phenolic Content (mg of GAE/g)	Total Flavanoid Content (mg of QE/g)
Cnidoscolus Quercifolias	64.65± 1.2	46.43 ±1.32

Values represent mean ± SD (n=6)

2,2-diphenyl -1-picrylhydrazyl (DPPH) radical scavenging activity

Antioxidant activity of hydroalcohalic extract of *Cnidoscolus Quercifolias* was evaluated by various in-vitro methods. DPPH radical was used as a substrate to evaluate free radical scavenging activity of hydroalcoholic extract.

Table 6: DPPH radical scavenging activity of Cnidoscolus Quercifolias

Concentration µg/ml	% Inhibition	
	Ascorbic Acid	*CnidoscolusQuercifolias*
10	45.54±0.05	40.76±0.04
40	54.765±0.03	49.65±0.02
60	66.86±0.02	65.76±0.05
80	76.97±0.04	73.65±0.04
100	89.32±0.06	82.65±0.02

Values are expressed as mean ± SD (n=6). Values are significant at $p<0.05$.

Total flavonoid are expressed as mg of total flavonoid content/g of sample, where GAE = Gallic acid equivalent, QE = Quercetin equivalent

Nitric oxide scavenging activity

In the Nitric oxide scavenging assay, crude extract of the plant was evaluated for its inhibitory effect on nitric oxide production and ascorbic acid was used as standard.

Table 7: Nitric oxide scavenging activity of Cnidoscolus Quercifolias

Concentration µg/ml	**% Inhibition**	
	Ascorbic Acid	***CnidoscolusQuercifolias***
10	28.43±0.15	16.15±0.12
40	36.11±0.07	24.12±0.02
60	43.89±0.12	32.54±0.13
80	55.97±0.22	46.25±0.21
100	67.92±0.11	52.28±0.04

In vivo oxidative stress markers

Table 8: Effect of Cnidoscolus Quercifolias leaf extract on SOD in Paracetamol induced oxidative stress in Liver.

S. No.	Groups	Absorbance
1.	Control	151.83±11.64
2.	Vehicle	56.47±31.53
3.	Ex(200mg/kg)	78.36±28.92**
4.	Ex(400mg/kg)	111.02±22.52**

Significantly different ($P<0.05$) as compared to the SOD level in the normal control group. Results are expressed as Mean±SD

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

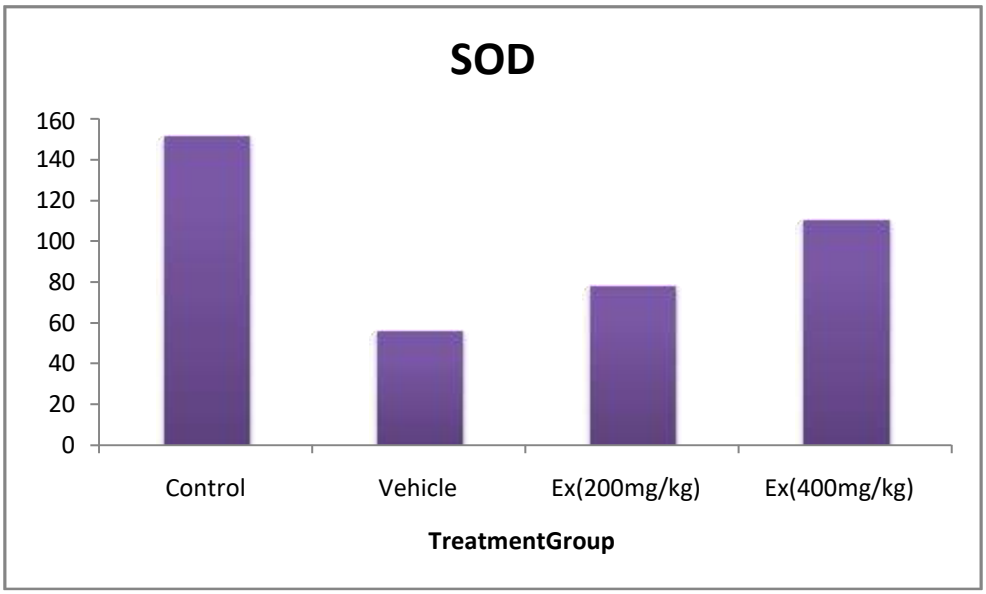


Figure 1: Effect of Cnidoscolus Quercifolias leaf extract on SOD in Paracetamol induced oxidative stress in Liver.

Table 9: Effect of Cnidoscolus Quercifolias leaf extract on GSHin Paracetamol induced oxidative stress in Liver

S. No.	Groups	Absorbance
1.	Control	0.4352±0.75
2.	Vehicle	0.26± 0.066
3.	Ex(200mg/kg)	0.32±0.052**
4.	Ex(400mg/kg)	0.466±0.028**

Significantly different (P<0.05) as compared to the GSH level in the normal control group. Results are expressed as Mean±SD.

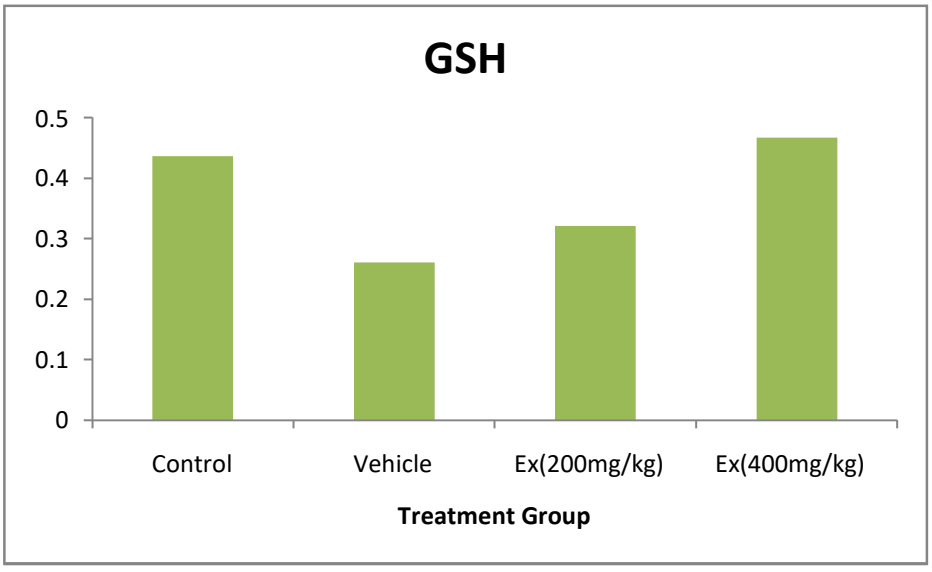


Figure 2: Effect of Cnidoscolus Quercifolias leaf extract on GSH in Paracetamol induced oxidatives tress in Liver

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Liver Function test

Table 10: AST (SGOT)

S. No.	Groups	Absorbance
1.	**Control**	78.33±1.366
2.	**Vehicle**	221.33±10.875
3.	**Ex(200mg/kg)**	271.83±9.087**
4.	**Ex(400mg/kg)**	106.17±4.708**

Significantly different (P<0.05) as compared to the SGOT level in the normal control group. Results are expressed as Mean±SD

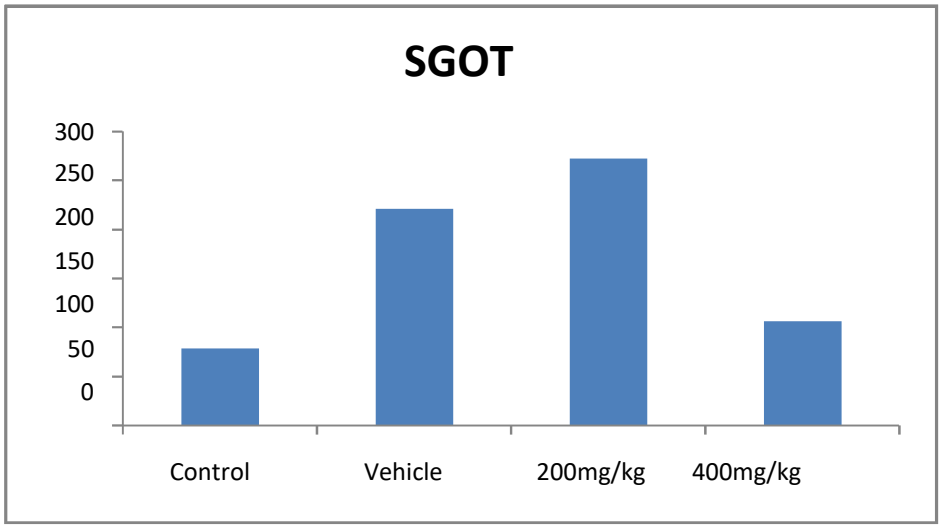


Figure 3: Effect of Cnidoscolus Quercifolias leaf extract on AST in Paracetamol induced Liver model

Table 11: ALT (SGPT)

S. No.	Groups	Absorbance
1.	**Control**	41.00±4.69
2.	**Vehicle**	162.83±8.424
3.	**Ex(200mg/kg)**	200.1±7.083**
4.	**Ex(400mg/kg)**	77.00±3.795**

Significantly different(P<0.05) as compared to the SGPT level in the normal control group. Results are expressed as Mean±SD

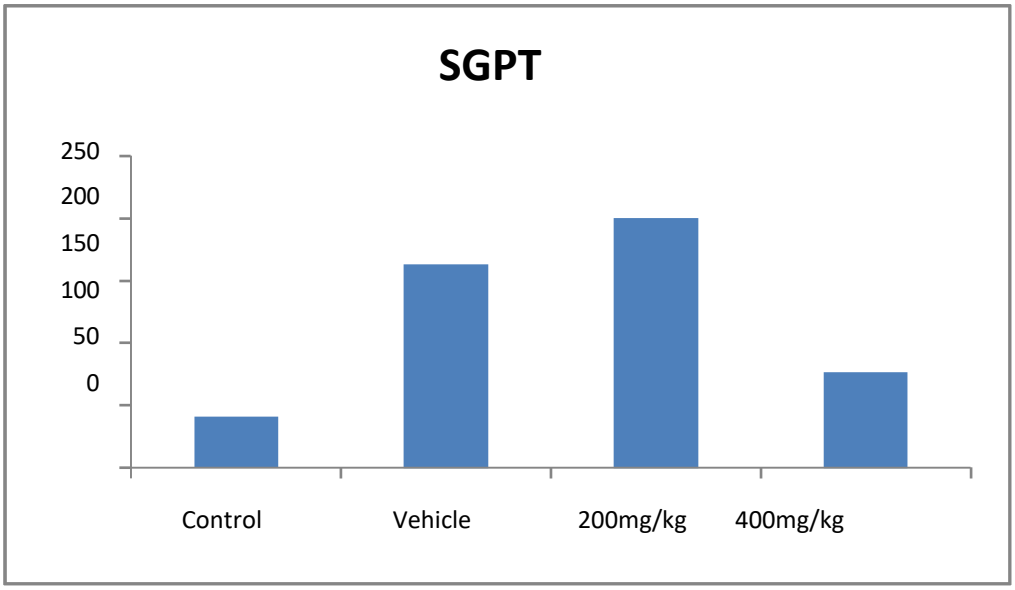


Figure 4: Effect of Cnidoscolus Quercifolias leaf extract on AlT inParacetamol induced Liver model.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 12: ALP

S. No.	Groups	Absorbance
1.	**Control**	179.67±4.179
2.	**Vehicle**	306.83±4.708
3.	**Ex(200mg/kg)**	105.5±2.429**
4.	**Ex(400mg/kg)**	198.50±3.688**

Significantly different (P<0.05) as compared to the ALP level in the normal control group. Results are expressed as Mean±SD

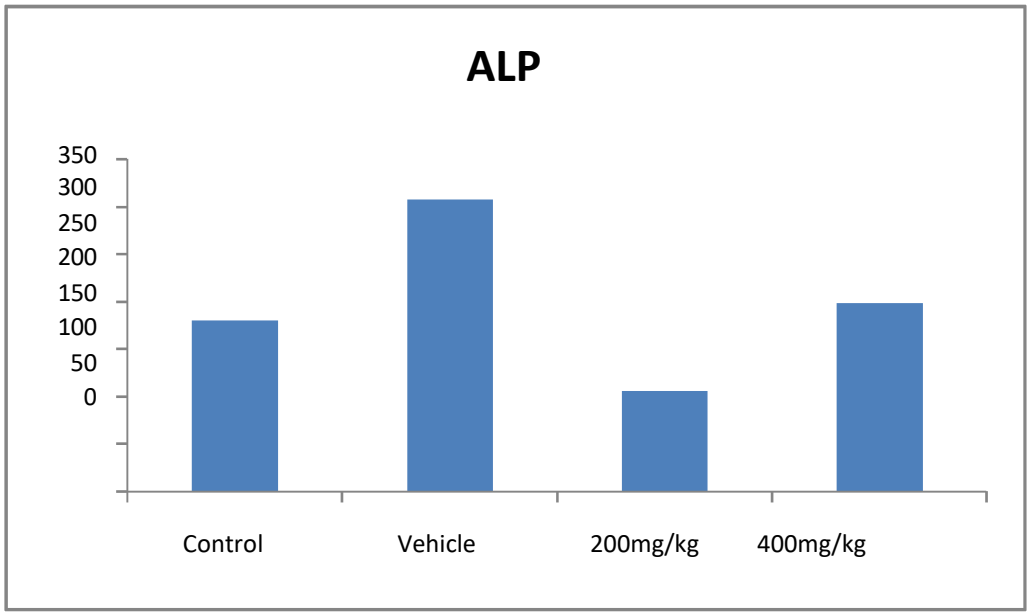


Figure 5: Effect of Cnidoscolus Quercifolias leaf extract on ALP in Paracetamol induced Liver model.

SUMMARY AND CONCLUSION

In present investigation one of traditionally used herbs anti-Hepatotoxicity being assessed against the Paracetamol induced Hepatotoxicity in rats.The drug related Hepatotoxicity is uncommon for many drugs, the reported incidence is between 1 in 10,000- its true incidence is difficult to determine. The number may be much higher,because of underreporting,difficulties in detection or diagnosis,and incomplete observation of persons exposed (Navarro and John, 2006). Paracetamol treatment caused significant ($p<0.001$) decreases in the activities of SOD, catalase, GPx and GSH level in liver tissue when compared to control group.. Silymarin-treated animals also showed a significant ($p<0.001$) increase in antioxidant enzymes, namely SOD, catalase, GPx activities and GSH level compared to paracetamol-treated rats.To understand the effect of the extract on liver, histology of liver was performed.

Firstly, Organoleptic Characterization of plant extract was performed. Organoleptic evaluations are subjective, sensory judgements. They can involve eyeing, feeling and taste of the extract to the judge its appearance, coour, integrity, texture and flavours. The organoleptic characters of alcoholic extract of *Cnidoscolus Quercifolias* leaf extract were found to be dark green in colour, semi solid, and taste is acrid. Solubility testing of alcoholic extract of *Cnidoscolus Quercifolias* leaf is done mainly to study the ability of the dissolve in different solvent for the preparation of aqueous extract for dosing. The alcoholic extractwas observed to be dissolved in water and DMSO. In the present study, the preliminary phytochemicals test was done on the alcoholic extract of *Cnidoscolus Quercifolias* leaf and it is found to be rich in Carbohydrates, Proteins, Saponin, Flavonoids and Phenolic compound. In present study Acute oral toxicity of plant extract was performed to check the toxicity of plant and extract was found to be non toxic up to the dose of 2000 mg/kg. Hence, 2000 mg/kg was considered as not observed adverse effect limit (NOAEL).$1/10^{th}$ and $1/5^{th}$ of NOAEL, i.e. 200mg/kg and 400mg/kg were selected as dose for oral administration of extract. For the determination of protective effect of *Cnidoscolus Quercifolias* leaf extract against paracetamol induced Hepatotoxicity, firstly level of GSH and SOD was checked. GSH and SOD level was tested in vehicle treated group after that Paracetamol treated group and then 200 mg/kg of plant extract along with Paracetamol treated group and after that 400 mg/kg of plant extract along with Paracetamol treated group. In-vivo antioxidant activity was measured through a set of enzymes including SGOT, SGPT, and ALP. The levels were measured and it indicated that the extract had significant antioxidant activity however the results obtained were

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

dose dependent the higher the dose (400 mg/kg) the better activity. The extract administered at dose 400mg/kg showed better activity. In animal treated with Paracetamol level of **SGOT** was 222.00±31.166, which were significantly higher (P<0.001) as compared to vehicle treated animals. The amino transferases are the most frequently utilized and specific indicators of hepato cellular necrosis. these enzymes Aspartate aminotransferase (AST, formerly serum glutamate oxaloacetic transaminase-SGOT) catalyze the transfer of the amino acids of aspartate and alanine respectively to the keto group of ketoglutaric acid.AST is present in a wide variety of tissues like the heart, skeletal lmuscle, kidney, brain and liver.Large increases in mitochondrial AST occur in serum after extensive tissue necrosis. Because of this, assay of mitochondrial AST have been advocated in myocardial infarction. Mitochondrial AST is also increased in chronic liver diseases. In extract treated animals with 200mg/kg and 400mg/kg level of SGOT was found to be 106.25±4.349, 268.75±32.755 respectively which is significantly less (P<0.001) when compared with Paracetamol treated animals. In animals treated with Paracetamol level of **SGPT** was 163.50±10.376, which were significantly higher (P<0.001) as compared to vehicle treated animals. The amino transferases are the most frequently utilized and specific indicator of hepatocellular necrosis. these enzymes Aspartate aminotransferase (AST, formerly serum glutamateo xaloacetic transaminase-SGOT) catalyze the transfer of the amino acids of aspartate and alanine respectively to the keto group of ketoglutaric acid. ALT is primarily localized to the liver. (Nalpus et al., 1986). In extract treated group of animals with 200mg/kg and 400mg/kg level of SGPT was found to be 77.00±4.396, 199.50±11.818 respectively.

REFERNCES

1. *Firenzuoli, F., & Gori, L. (2007). Herbal medicine today: clinical and research issues. Evidence-Based Complementary and Alternative Medicine, 4 (S1), 37-40.*
2. *Kampa ,M., & Castanas, E. (2008). Human health effects of air pollution. Environmental pollution, 151(2), 362-367.*
3. *Nicholson, J.K., Connelly, J., Lindon, J.C., & Holmes, E. (2002). Metabonomics: a platform for studying drug toxicity and gene function. Nature reviews Drug discovery, 1(2),153.*
4. *Kumar, A. (2012). A review on hepatoprotective herbal drugs. Int J Res Pharm Chem, 2 (1), 96-102.*
5. *Alzaher, W. M. I. (2014). Probing herb induced liver injury (HILI) using population data and computational phyto-analysis (Master's thesis, University of Sydney.*
6. *Akaerue, B.I., & Onwuka, G.I. (2010). Evaluation of the yield, protein content and functional properties of mung bean [Vigna radiata (L.) Wilczek] protein isolates as affected by processing. Pakistan Journal of Nutrition, 9(8),728-735.*
7. *Lee, W.M. (1995). Drug-induced hepatotoxicity. New England Journal of Medicine, 333 (17), 1118-1127.*
8. *Watanabe S, Phillips MJ. Acute phalloidin toxicity in living hepatocytes: evidence for a possible disturbance in membrane flow and for multiple functions for actin in the liver cell. AmJ Pathology.1986;122(1):101-11.*
9. *Trauner M, Meier PJ, Boyer JL. Molecular pathogenesis of cholestasis. NEng l J Med. 1998; 339 (17) :1217-27.*
10. *Cullen JM. Mechanistic classification of liver injury. Toxicol Pathol. 2005; 33(1): 6-8.*
11. *Faubion WA, Guicciardi ME, Miyoshi H, Bronk SF, Roberts PJ, S vingen PA, et al. Toxic bile salts induce rodent hepatocyte apoptosis via direct activation of Fas. J Clin Invest. 1999; 103 (1):137-45.*
12. *Pessayre D, Mansouri A, Haouzi D, Fromenty B.Hepatotoxicity due to Mitochondrial dysfunction. Cell Biol Toxicol.1999;15:367-73.*
13. *Arora N, Goldhaber SZ. Anticoagulants and transaminase elevation.Circulation, 2006;113: 698-702.*
14. *Shimizu S, AtsamiR, Itokawa Ket.al. Metabolism-dependent hepatotoxicity of amodiaquine in glutathione-depleted mice. ArchToxicol,2009;83:701-707.*
15. *Kaplowitz N.Idiosyncratic drug hepatotoxicity.Nat Rev Drug Discov, 2005;4:489-499.*
16. *Stedman C. Herbal hepatotoxicity. Semin Liver Dis, 2002; 22:195-206.*
17. *Chow EC, TeoM, Ring JA, et al. Liver failure associated with the use of black cohosh for menopausal symptoms. Med J Aust2008;188:420-422.*
18. *Ridker PM, Ohkuma S, McDermott WV, et al. Hepaticveno-occlusive disease associated with the consumption of pyrrolizidine containing dietary supplements.Gastroenterology,1985;88:1050-1054.*
19. *Ridker PM, McDermott WV. Comfrey herb tea and hepatic venoocclusive disease.Lancet,1989;1:657-658.*
20. *Abdual mjid RJ, Sergi C. Hepatotoxic botanicals - an evidence-based systematic review. J Pharm Pharmaceutical Sci2013; 16:376-404.*
21. *StournarasE, TziomalosK. Herbal medicine-related hepatotoxicity.World J Hepatol 2015;7:2189-2193.*
22. *Chaudhary S, Gulati K, Rai N, Ray A. Evaluation of anti-Inflammatory and immunomodulatory effects of aqueous extract of Solanum xanthocarpum in experimental models of Bronchial Asthma.EC Pharmacol Toxicol. 2016; 2:241-50.*
23. *Rai N, Ray A, Jamil SS, Gulati K. Cellular and molecular mechanisms of action of polyherbal preparation UNIM-352 in experimental models of bronchial asthma. Indian J Exp Biol. 2015; 53(10): 625-31.*
24. *Kashaw Varsha, Amit KN, Abhinav A. Hepatoprotective prospective of herbal drugs and their vesicular carriers- a review. IJRPBS. 2011;2(2):360-74.*
25. *OguC, Maxa J. Drug interactions due to cytochrome P450. Proc Bayl Univ Med Cent, 2000;13:421-423.*
26. *Schonborn J. The role of the liver in drug metabolism anaesthesisa tutorial of the Week 179. WFSA 2010;1-6.*
27. *Schiano TD. Hepato toxicity and complementary and alternative medicines. Clin Liver Dis 2003;7:453-473.*
28. *Seeff LB, Lindsay KL, Bacon BR, et. al. Complementary and alternative medicine in chronic liver disease. Hepatology*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2001;34:595-603.

29. *Stickel F, Droz S, Patsenker E, etal. Severe hepatotoxicity following ingestion of herbal if nutritional supplements contaminated with bacillus subtilis. J Hepatol. 2009;50:111-117.*
30. *Bhardwaj SS, Chalasani N. Lipid lowering agents that cause drug induced hepatotoxicity. Clin Liver Dis, 2007;11:597.*
31. *Estes JD, Stolpman D, Olyaei A, etal. High prevalence of potentially hepatotoxic herbal supplement use in patients with fulminant hepatic failure. Arch Surg, 2003;138:852-858.*
32. *Suk KT, Kim DJ. Drug-induced liver injury: present and future. Clin Mol Hepatol, 2012; 18: 249-257.*
33. *Singh A, Bhat TK, Sharma OP. Clinical biochemistry of hepatotoxicity. J Clinic Toxicol 2011;S4:001.*
34. *Grattaglianol, Bonfrate L, Diogo CV, etal. Biochemical mechanisms in drug-induced liver injury:certain ties and doubts. World J Gastroenterol 2009;15:4865-4876.*
35. *Fontana RJ. Pathogenesis of idiosyncratic drug-induced liver injury and clinical perspectives. Gastroenterology, 2014; 146:914-28.*
36. *Uetrecht J. Idiosyncratic drug reactions: current understanding. Annu Rev Pharmacol Toxicol, 2007;47:513-53.*
37. *Bunchorntavakul C, Reddy KR. Acetaminophen-related hepatotoxicity. Clin Liver Dis, 2013;17:857-607.*
38. *Björnsson ES. Hepatotoxicity by drugs: the most common implicated agents. Int J Mol Sci 2016;17:224.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

PROMOTING DEVELOPMENTAL MILESTONES IN PEDIATRIC PATIENTS: ASSESSMENT AND EARLY INTERVENTION STRATEGIES

Gayathri N.S[1]
[1]*Vice Principal, Child Health Nursing Department, Sri Shanmugha College of Nursing for Women, Pullipalayam, Morour.PO. Sankari. T.K.Salem.Dt.*

ABSTRACT
Ensuring optimal development is paramount in pediatric healthcare. This review explores the significance of promoting developmental milestones in pediatric patients and outlines assessment techniques and early intervention strategies. It discusses the importance of early identification of developmental delays, multidisciplinary collaboration, and family-centered care in facilitating optimal outcomes. Keywords: pediatric patients, developmental milestones, assessment, early intervention, multidisciplinary collaboration.
KEYWORDS: *pediatric patients, developmental milestones, assessment, early intervention, multidisciplinary collaboration.*

INTRODUCTION

The achievement of developmental milestones is a critical aspect of pediatric healthcare, as it reflects the progression of a child's physical, cognitive, social, and emotional growth. Timely identification of developmental delays and implementation of early intervention strategies are imperative in supporting children's overall well-being and maximizing their potential. This review aims to elucidate the importance of promoting developmental milestones in pediatric patients, highlighting assessment approaches and intervention strategies for healthcare professionals.

IMPORTANCE OF DEVELOPMENTAL MILESTONES

Developmental milestones serve as benchmarks for monitoring children's growth and identifying potential delays or deviations from typical development. These milestones encompass various domains, including motor skills, language acquisition, cognitive abilities, social interactions, and emotional regulation. Achieving milestones within expected timeframes is indicative of healthy development and lays the foundation for future learning and functioning. Conversely, delays in meeting milestones may signal underlying concerns that require further evaluation and intervention.

Developmental milestones serve as crucial indicators of a child's progress across various domains of growth and maturation. These milestones encompass key achievements in motor skills, language acquisition, cognitive abilities, social interactions, and emotional regulation, reflecting the intricate development of the child's brain and body. Understanding the significance of developmental milestones is essential for healthcare professionals, educators, and caregivers as it provides valuable insights into a child's overall well-being and developmental trajectory.

1. Monitoring Growth and Development

Developmental milestones serve as benchmarks for monitoring children's growth and development from infancy through childhood and adolescence. They provide a framework for assessing whether a child is progressing at an expected rate and reaching age-appropriate milestones. By tracking developmental milestones, healthcare professionals can identify deviations from typical development and intervene promptly to address any concerns.

2. Early Identification of Developmental Delays

One of the primary benefits of developmental milestones is their role in facilitating the early identification of developmental delays or disorders. Children who experience delays in achieving milestones may require further evaluation to determine the underlying causes and appropriate interventions. Early identification allows for timely intervention, which can help mitigate the impact of developmental delays and optimize outcomes for the child.

3. Predictive Value for Future Functioning

Attainment of developmental milestones within expected timeframes is indicative of healthy development and lays the foundation for future learning, socialization, and functioning. Milestone achievements in early childhood, such as language acquisition and motor coordination, are predictive of later academic success, social competence, and emotional well-being. Conversely, persistent delays in reaching milestones may signal increased risk for developmental challenges in later childhood and adolescence.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4. Individualized Care and Intervention
Understanding a child's developmental progress through milestone assessment enables healthcare professionals to tailor interventions and support services to meet the child's unique needs. Early intervention programs, such as speech therapy, occupational therapy, and behavioral interventions, can be initiated based on the specific areas of concern identified through developmental assessment. Individualized care plans empower children and families to address developmental challenges effectively and maximize the child's potential.

5. Monitoring Neurodevelopmental Disorders
Developmental milestones also play a crucial role in monitoring children at risk for neurodevelopmental disorders, such as autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD). Deviations from typical developmental trajectories may raise suspicion for underlying neurodevelopmental conditions, prompting further evaluation and diagnostic assessment. Early recognition of these disorders allows for early intervention and access to appropriate support services, improving long-term outcomes for affected children.

Assessment Techniques
Assessment of developmental milestones involves systematic observation, standardized screening tools, and parent/caregiver reports to comprehensively evaluate a child's progress. Healthcare professionals utilize validated screening instruments such as the Ages and Stages Questionnaires (ASQ) or the Denver Developmental Screening Test (DDST) to assess developmental domains systematically. Additionally, developmental surveillance during routine pediatric visits enables healthcare providers to monitor children's development over time and identify subtle signs of delay or regression.

Assessing developmental milestones in pediatric patients requires a comprehensive approach that incorporates various techniques to evaluate the child's progress across multiple domains of development. These assessment techniques aim to provide healthcare professionals with a holistic understanding of the child's strengths, challenges, and areas of potential concern. The following elaborates on the key assessment techniques commonly utilized in pediatric healthcare:
1. Systematic Observation: Systematic observation involves the direct observation of a child's behavior, interactions, and abilities in naturalistic settings such as home, school, or clinical environments. Healthcare professionals, including pediatricians, nurses, and therapists, observe the child's motor skills, communication abilities, social interactions, play behaviors, and emotional regulation during routine interactions and structured activities. Systematic observation provides valuable insights into the child's functional abilities, preferences, and developmental patterns, serving as a foundational component of developmental assessment.

2. Standardized Screening Tools: Standardized screening tools are validated instruments designed to assess specific developmental domains and identify potential delays or deviations from typical development. These tools typically consist of a series of age-appropriate questions or tasks administered to parents/caregivers to gather information about the child's skills and behaviors. Examples of widely used standardized screening tools include the Ages and Stages Questionnaires (ASQ), the Denver Developmental Screening Test (DDST), and the Pediatric Evaluation of Disability Inventory (PEDI). These tools enable healthcare professionals to systematically evaluate the child's developmental progress and identify areas of concern that warrant further assessment or intervention.

3. Parent/Caregiver Reports: Parent/caregiver reports are valuable sources of information in assessing a child's developmental milestones, as they provide insights into the child's behavior, functioning, and daily experiences within the home environment. Healthcare professionals often rely on parental/caregiver reports to gather information about the child's developmental history, milestones achieved, and any concerns or observations regarding the child's development. Structured interviews, questionnaires, and developmental checklists may be utilized to elicit relevant information from parents/caregivers, facilitating a collaborative approach to developmental assessment and intervention.

4. Developmental Surveillance: Developmental surveillance involves the ongoing monitoring of a child's developmental progress and milestones during routine healthcare encounters, such as well-child visits and immunization appointments. Healthcare providers engage in developmental surveillance by observing the child's growth, behavior, and interactions, as well as eliciting information from parents/caregivers about the child's developmental milestones and any concerns or observations. Developmental surveillance enables healthcare professionals to identify subtle signs of developmental delay or regression, prompting further assessment and intervention as needed.

5. Developmental Testing and Assessment Tools: In addition to screening tools and observation, healthcare professionals may utilize specialized developmental testing and assessment tools to evaluate specific aspects of a child's development in greater detail. These tools may include standardized assessments of cognitive functioning, language skills, motor abilities, social-emotional

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

development, and adaptive behaviors. Examples of developmental testing tools include the Bayley Scales of Infant and Toddler Development, the Peabody Developmental Motor Scales, and the Vineland Adaptive Behavior Scales. These assessments provide quantitative data about the child's abilities and areas of strength or weakness, facilitating individualized intervention planning and monitoring of progress over time.

Early Intervention Strategies

Early intervention plays a pivotal role in mitigating the impact of developmental delays and promoting optimal outcomes for pediatric patients. Multidisciplinary collaboration among healthcare providers, educators, therapists, and family members is essential in designing individualized intervention plans tailored to the child's specific needs. Early intervention services may include speech therapy, occupational therapy, physical therapy, behavioral interventions, and special education services, depending on the areas of concern identified during assessment.

Early intervention strategies are crucial in addressing developmental delays and promoting optimal outcomes for pediatric patients. These strategies encompass a range of therapeutic interventions, educational approaches, and support services tailored to the individual needs of the child and family. By initiating interventions promptly, healthcare professionals aim to mitigate the impact of developmental delays, enhance developmental trajectories, and facilitate the child's integration into their environment. Here, we elaborate on various early intervention strategies commonly employed in pediatric healthcare:

1. Multidisciplinary Collaboration: Early intervention often involves a collaborative effort among healthcare professionals, educators, therapists, and family members to address the complex needs of pediatric patients comprehensively. A multidisciplinary team approach allows for the integration of diverse perspectives, expertise, and resources to develop individualized intervention plans tailored to the child's specific strengths and challenges. Collaboration among team members facilitates coordinated care delivery, ensures continuity of services, and maximizes the effectiveness of interventions across multiple domains of development.

2. Speech Therapy: Speech therapy is a fundamental component of early intervention for children with communication and language delays or disorders. Speech-language pathologists (SLPs) assess the child's speech, language, and communication skills and provide targeted interventions to improve expressive and receptive language abilities, articulation, phonological awareness, and social communication skills. Speech therapy may involve various techniques such as play-based activities, picture communication systems, augmentative and alternative communication (AAC) devices, and parent/caregiver coaching to facilitate language development and enhance communication abilities.

3. Occupational Therapy: Occupational therapy focuses on promoting the development of fine motor skills, gross motor skills, sensory processing abilities, and activities of daily living (ADLs) in pediatric patients. Occupational therapists (OTs) assess the child's functional abilities and design intervention plans to address deficits and enhance independence in self-care, play, school, and social activities. Occupational therapy interventions may include sensory integration therapy, motor coordination exercises, hand-eye coordination activities, adaptive equipment usage, and environmental modifications to support the child's participation and engagement in daily routines.

4. Physical Therapy: Physical therapy aims to improve gross motor skills, mobility, balance, coordination, strength, and overall physical functioning in pediatric patients with motor delays or impairments. Physical therapists (PTs) conduct comprehensive assessments of the child's movement abilities and design personalized intervention plans to address deficits and optimize functional mobility. Physical therapy interventions may include therapeutic exercises, balance and coordination activities, gait training, assistive device training, orthotic management, and environmental adaptations to facilitate safe and independent movement in various settings.

5. Behavioral Interventions: Behavioral interventions focus on addressing challenging behaviors, promoting social skills, and supporting emotional regulation in pediatric patients with developmental delays or behavioral difficulties. Behavioral therapists or psychologists utilize evidence-based strategies such as applied behavior analysis (ABA), positive behavior support (PBS), cognitive-behavioral therapy (CBT), and social skills training to target specific behavioral goals and teach adaptive coping strategies. Behavioral interventions are often implemented collaboratively with parents/caregivers to enhance consistency and generalize skills across different environments.

6. Special Education Services: Special education services encompass a range of educational interventions and accommodations designed to meet the unique learning needs of children with developmental delays or disabilities. Special education teachers, in collaboration with other professionals, develop individualized education plans (IEPs) or individualized family service plans (IFSPs) that outline educational goals, instructional strategies, and support services tailored to the child's abilities and challenges. Special education services may include specialized instruction, curriculum modifications, assistive technology, classroom accommodations, and ongoing progress monitoring to facilitate academic success and educational inclusion.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Multidisciplinary Collaboration and Family-Centered Care: Effective management of developmental delays necessitates a collaborative approach involving various stakeholders, including healthcare professionals, educators, community resources, and most importantly, the child's family. Family-centered care acknowledges the integral role of parents/caregivers in their child's development and fosters partnership, empowerment, and shared decision-making. Collaborative efforts aim to provide holistic support to children and families, address their unique strengths and challenges, and facilitate access to timely interventions and support services.

CONCLUSION

Promoting developmental milestones in pediatric patients is essential for fostering optimal growth, learning, and well-being. Through systematic assessment and early intervention strategies, healthcare professionals can identify developmental delays promptly and implement targeted interventions to support children's progress. Multidisciplinary collaboration and family-centered care are integral components of effective developmental support, emphasizing the importance of partnerships and holistic approaches in pediatric healthcare. By prioritizing early identification and intervention, healthcare providers can empower children and families to navigate developmental challenges and achieve their full potential.

REFERENCES

1. *American Academy of Pediatrics. (2020). Developmental surveillance and screening of infants and young children.*
2. *Council on Children with Disabilities, Section on Developmental Behavioral Pediatrics, Bright Futures Steering Committee, & Medical Home Initiatives for Children with Special Needs Project Advisory Committee. (2006). Identifying infants and young children with developmental disorders in the medical home: An algorithm for developmental surveillance and screening.*
3. *Glascoe, F. P. (2013). Collaborating with parents: Using parents' evaluations of developmental status to detect and address developmental and behavioral problems. Nashville, TN: Ellsworth & Vandermeer Press, LLC.*
4. *Duffy, V. G. Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management: 15th International Conference, DHM 2024, Held as Part of the 26th HCI International Conference, HCII 2024, Washington, DC, USA, June 29–July 4, 2024, Proceedings, Part I. Springer Nature.*
5. *Johnson, C. P., Myers, S. M., & American Academy of Pediatrics Council on Children with Disabilities. (2007). Identification and evaluation of children with autism spectrum disorders.*
6. *Sices, L. (2007). Developmental screening in primary care: The effectiveness of current practice and recommendations for improvement.*
7. *Zuckerman, B., & Halfon, N. (2003). Recognition of the importance of children's social and emotional development in the pediatric office. Current Opinion in Pediatrics, 15(6), 581-586.*
8. *Hart, S. M. Transition with Dignity: School Leaving from the Perspectives of Young Adults with Significant Disabilities. Springer Nature.*
9. *Wang, T., Hu, Y., Zhang, Z., Dai, X., Zhang, M., He, Y., & Li, Y. (2024). Cognitive function of children with biliary atresia after primary living donor liver transplantation. BMC Pediatrics, 24(1), 1-8.*
10. *Barlow, J., et al. (2016). Systematic review of the effectiveness of interventions to promote mental wellbeing in primary schools.*
11. *Brandenburg, J. B., & Mulick, J. A. (2016). Early intervention for autism.*
12. *Center on the Developing Child at Harvard University. (2007). The science of early childhood development.*
13. *Watson, D., & Crowther, A. (2024). Enabling Difficult Conversations about Childhood Trauma with Care Experienced Children and Young People in the Home: A Conversation between a Researcher and an Adoptive Mother. Nurturing 'Difficult Conversations' in Education: Empowerment, Agency and Social Justice in the UK, 185.*
14. *Dawson, G., & Zanolli, K. (2019). Early intervention for autism spectrum disorder: A critical analysis. Wiley Online Library.*
15. *Guralnick, M. J. (2011). Early intervention for children with intellectual disabilities: An update. Wiley Online Library.*
16. *Johnson, C. P., & Myers, S. M. (2007). Identification and evaluation of children with autism spectrum disorders. Wiley Online Library.*
17. *Ministry of Health. (2017). Well child Tamariki Ora programme practitioner guidance.*
18. *Rogers, S. J., & Vismara, L. A. (2008). Evidence-based comprehensive treatments for early autism.*
19. *Sices, L. (2019). Clinical report—implementation of developmental screening and surveillance: A clinical report of the American Academy of Pediatrics.*
20. *Spittle, A. J., & Morgan, C. (2015). Early intervention for children aged 0 to 2 years with or at high risk of cerebral palsy: International clinical practice guideline based on systematic reviews.*
21. *Zaphiris, P. Learning and Collaboration Technologies: 11th International Conference, LCT 2024, Held as Part of the 26th HCI International Conference, HCII 2024, Washington, DC, USA, June 29–July 4, 2024, Proceedings, Part III. Springer Nature.*
22. *Stirling, J., et al. (2018). Conduct disorders in children and young people: Recognition and management.*
23. *Wood, D. L., & Noland, R. M. (2011). Performance-based pediatric assessment: An early intervention tool for the 21st century.*
24. *Zwaigenbaum, L., & Bauman, M. L. (2013). Early identification of autism spectrum disorders.*
25. *Cohen, D. J., & Pichichero, M. E. (2014). Diagnosis and management of acute otitis media.*
26. *Jones, G. (2016). The early recognition and management of sepsis in infants and children.*
27. *Kopecky, K. E., & Chappell, K. B. (2018). Management of pediatric respiratory infections in primary care.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

AN OVERVIEW ON CANCER CHRONOTHERAPY

Rachana Botla*, Syeda Nishat Fathima
Jayamukhi College of Pharmacy, Narsampet, Warangal-506332, Telangana, India

Article DOI: https://doi.org/10.36713/epra17244
DOI No: 10.36713/epra17244

ABSTRACT
The circadian clock is a complex biological circuitry that controls the daily rhythm of functions such as sleep, body temperature, and digestion. The master "clock" is an area in the brain that senses environmental cues (such as light) and communicates information to secondary clocks in other organs. The breaking of circadian tolerance or disbalance in the circadian clock results in the outbreak of several diseases. The prime factors that play in a disbalance circadian clock are artificial light during day or night, unbalanced diet, work-life balance, and unbalanced lifestyle. Defects or disruption in normal circadian functioning and altered levels of clock gene expressions can increase the risk of prostate cancers, breast cancers, ovarian cancers, colorectal cancers, endometrial cancers, non-Hodgkin's lymphoma, pancreatic cancers, osteosarcomas, head and neck squamous cell carcinomas, acute myeloid leukemia, and hepatocellular carcinomas. Chronotherapy for cancer involves optimal timing of drug delivery based on individual circadian times, which can improve treatment tolerability and efficacy of anti-cancer medications.

KEYWORDS: *Chronotherapy; Cancer; Biological clock*

INTRODUCTION
Circadian rhythm is the 24-hour internal clock in our brain that regulates cycles of alertness and sleepiness by responding to light changes in our environment. The daily light-dark cycle governs rhythmic changes in the behavior and/or physiology of most species. Studies have found that these changes are governed by a biological clock, which in mammals is located in two brain areas called the suprachiasmatic nuclei. The circadian cycles established by this clock occur throughout nature and have a period of approximately 24 hours. [1] At cellular level Disruptions in age, environment, or genetic mutation can have adverse effects on the cellular function and health of an organism. The circadian rhythm uses positive and negative molecular feedback loops as a mechanism to regulate their expression. There are several identified clock genes, BMAL1/BMAL2, CLOCK, CRY1/CRY2, and PER1/PER2/PER3, that regulate and control transcription and translation. Expression of these core clock genes inside the cell influence many signaling pathways which allows the cells to identify the time of day and perform appropriate function. Furthermore, phosphorylation of core clock proteins leads to degradation to keep the 24-hour cycle in sync. The presence of circadian rhythms in cells with and without nuclei indicate that the molecular clock is autonomous and external cues can be utilized for regulation. [2] Cancer is the second leading cause of death in the world today, killing millions of people every year [3]. According to reports, it is generally associated with disrupted circadian rhythms caused by various factors, including genetic, environmental, and internal factors. Defects or disruption in normal circadian functioning and altered levels of clock gene expressions can increase the risk of prostate cancers, breast cancers, ovarian cancers, colorectal cancers, endometrial cancers, non-Hodgkin's lymphoma, pancreatic cancers, osteosarcomas, head and neck squamous cell carcinomas, acute myeloid leukemia, and hepatocellular carcinomas. Chronotherapy against cancers are dependent on the effect that the circadian rhythm exerts on multiple cellular processes, such as cell cycle, DNA repair, proliferation and apoptosis, and drug metabolism, which are crucial molecular determinants of cellular pharmacokinetics and pharmacodynamics of cytotoxia/cytostatic drugs. Chronotherapy is a treatment strategy that searches for the optimal time for drug administration in accordance with the body biological clock, in order to promote the therapeutic effect of anti-cancer drugs.

Mechanism of Circadian Rhythm
The circadian pacemaker is the suprachiasmatic nucleus (SCN) of the hypothalamus. As the body transitions from light to dark, the body sends inputs to the retinohypothalamic pineal pathway. During the light cycle, axons from the retinal ganglionic cells deliver signals that activate the suprachiasmatic nucleus via cranial nerve II, the optic nerve. The SCN then delivers a signal via the inhibitory neurotransmitter GABA (gamma-amino-butyric acid) that inhibits the paraventricular nucleus. Axons subsequently send impulses through the intermediate lateral column to inhibit the superior cervical ganglion thus inhibiting the sympathetic nervous system. As a result, melatonin does not get released from the pineal gland into circulation. As night approaches, the departure of light signals the retinal ganglion cells to inhibit the suprachiasmatic nucleus activating the paraventricular nucleus which then sends

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

axons through the intermediolateral nucleus (IML) to the superior cervical ganglion stimulating the sympathetic nervous system which induces sleepiness. The pineal gland is mobilized to secrete melatonin into circulation. [4]

Molecular design of the mammalian daily clock

The core molecular clock is comprised of positive regulators (Bmal1 and CLOCK) and negative regulators (cryptochrome (Cry 1/2) and period-Per1/2). The protein clock Bmal1 heterodimerizes with CLOCK/NPAS2 to initiate the transcription of target genes through E-boxes present in the promoter region of target genes, resulting in the expression of Per and Cry genes. Per and Cry dimerizes and translocates to the nucleus after being phosphorylated by casein kinase 1 epsilon (CK1ε) and casein kinase 1 delta (CK1δ), respectively, and repress their transcription. The Per and Cry proteins inhibit the expression of Bmal1 and CLOCK, creating the core negative feedback loop. In turn, CLOCK-Bmal1 generates another negative feedback loop that upregulates the negative transcription of REV-ERB proteins and negatively regulates Bmal1 transcription, and RORα binding to RORE elements increases the expression of Bmal1. Additionally, Per and Cry genes are regulated by proteins such as AMP-activated protein kinase (AMPK) and CK1ε/δ by phosphorylation and subsequent degradation. This phosphorylation targets Per genes for polyubiquitination by βTrCP and, similarly, Cry1/Cry2 are phosphorylated by the Fox- proteins, FBXL3 and FBXL21, directing them to ubiquitin-mediated proteasomal degradation. Collectively, these feedback loops trigger circadian oscillations and subsequently regulate the circadian expression of downstream clock-controlled genes (CCGs). [5]

Chronobiology of Cancer

Cell proliferation in rapidly renewing tissues follows a circadian rhythmic pattern. In 24-hour synchronized diurnally active human subjects, the proportion of cells going through the S-phase of the cell division cycle in tissues like bone marrow, intestinal mucosa, buccal epithelium, and skin may vary by 50% or more over a 24-hour span. In diurnally active human subjects, the probability of cells being in the S-phase in bone marrow, intestinal, and buccal epithelia is highest between 8:00 a.m. and 8 p.m. and lowest between midnight and 4:00 a.m.

On the molecular level, circadian clock proteins operate during normal S-phase progression and regulate DNA synthesis and repair. The circadian clock genes modulate the cell's sensitivity to genotoxic stress, which may form the basis for the circadian time-dependent changes in the effect of genotoxic agents, both in carcinogenesis and in chronochemo- or chronoradiotherapy. The circadian clock acts as a tumor suppressor at the systemic, cellular, and molecular level by controlling the expression of cell-cycle and tumor-suppressor genes at the transcriptional and posttranscriptional level. [6]

Mechanism of Circadian Rhythm in Cancer

The circadian clock plays an important role in tumorigenesis, tumor growth, metastasis, tumor immune escape, and other processes by regulating various biological functions, such as apoptosis and proliferation. The mechanisms may include the following: [7]

1. Tumour cells undergo a variety of biochemical reactions, including cell growth and senescence, cell proliferation and apoptosis, DNA damage repair process, and various metabolic processes; the circadian clock may affect tumour occurrence and development by regulating these reactions.
2. Cancer stem cells undergo tumorigenesis, development, and metastasis, and the circadian clock plays a crucial role in the stemness of self-renewal cancer cell subsets, such as acute myeloid leukemia and pleomorphic glioblastoma.
3. CLOCK components regulate the expression of angiogenic factors such as hypoxia-inducible factor 1α (HIF-1α), aryl hydrocarbon receptor nuclear translocator (ARNT), and vascular endothelial growth factor (VEGF) in cancer cells. Increased levels of these angiogenesis-promoting factors in the tumour microenvironment (TME) promote tumour development and metastasis.
4. CLOCK regulates the inflammation mediated by myeloid cells—a crucial cancer marker. For instance, in glioblastoma, CLOCK changes the microglial content of glioblastoma stem cells through transcriptional regulation of the chemokine olfactomedin-like 3. The infiltration of immune cells such as macrophages and neutrophils in renal clear cell carcinoma is associated with rhythmic changes in the expression of CLOCK-associated components (BMAL1, PER, etc.).
5. In addition, immune escape is an integral part of cancer progression. Changes in $CD8^+$ T cells often affect CLOCK expression in patients with glioblastoma multiforme.
6. The depletion of T cells and up-regulation of programmed death-ligand (PD-1) in patients with cancer may be associated with the widespread mutation and genomic instability of the CLOCK gene.

Targeting circadian rhythms in Cancer Treatment

Further insights into circadian rhythms and their related diseases have ignited growing interest in how these processes can be utilized to improve cancer prevention and treatment. Chronotherapeutic approaches for treatment of cancer can be categorised into three types: (1) training the clock: interventions to enhance or maintain a robust circadian rhythm in feeding-fasting, sleep-wake, or light–dark cycles; (2) drugging the clock: using small-molecule agents that directly target a circadian clock; and (3) clocking the drugs: optimizing the timing of drugs to improve efficacy and reduce adverse side effects [8]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Applications of Chronotherapy in cancer

- The purpose of chronotherapy in anticancer medicine is to improve host tolerance and safety or tumour cytotoxicity.
- Chronotherapy in cancer is optimizing the administration time of anti-cancer treatment according to circadian rhythm and cellular phase to improve the efficacy against tumour cells while decreasing side effects on normal cells.
- Chronotherapy offers the opportunity to leverage existing treatments to extend patient survival and to increase their quality of life.
- Chronotherapy optimizes treatment timing based on the circadian rhythm of the individual patient, such that the treatment efficacy is maximized, and adverse effects are minimized.

Chronotherapy in Brest Cancer

Breast cancer growth is regulated by the circadian clock, with two daily peaks and clock-controlled genes. PER1 down-expression promotes tumor growth by enhancing the amplitude of these peaks. Vascular endothelial growth factor (VEGF) expression in malignant tumours is significantly increased and associated with poor prognosis. Circadian oscillation in hypoxic tumor cells and cancer cells implanted in mice controls VEGF transcription. Circadian variation of VEGF affects the pharmacological efficacy of antiangiogenic agents, with angiogenesis inhibitors showing the most repressive effect on tumour growth. The circadian rhythm plays a crucial role in the response to anticancer drugs in mice. Wild-type mice's sensitivity to cyclophosphamide (CY) treatment varies, with Clock mutant and Bmal1 knockout mice showing high sensitivity. However, mice with Cry1-/-Cry2-/- double knockouts show more resistance to CY. A recent study suggests a molecular relationship between circadian rhythm and oral drug absorption, with the expression of breast cancer resistance protein (BCRP) regulating oral drug absorption. The circadian clock-ATF4 pathway causes oscillation of BCRP function, causing a change in intestinal drug absorption. Understanding the difference in intestine absorption capacity between normal and cancer tissues can help predict the most favourable time for drug administration. [9]

Chronotherapy in Prostate Cancer

Chronotherapy has shown success in treating prostate cancer (PCa) and improving disease management. It can be applied to radiotherapy, as morning proton beam therapy for localized PCa significantly ameliorates worsening lower urinary tract symptoms compared to therapy around noon or late afternoon. Androgen deprivation therapy (ADT) is a common treatment for PCa patients, but most progress to castration-resistant PCa (CRPC). Circadian clock genes are involved in lipid metabolism regulation, and variants of circadian genes may be associated with varying serum sex steroid levels. ADT may aggravate circadian clock disruption and promote the progression of CRPC, making therapy targeting the circadian clock a new option for treating CRPC. Exogenous melatonin supplementation may resynchronize the circadian rhythm, providing a novel way in PCa management. Melatonin therapy inhibits tumor growth and reverses enzalutamide resistance in CRPC animal models with a disruption of circadian rhythm. It also inhibits PCa metastasis in both in vitro and in vivo models. Oral melatonin intake at human-achievable doses significantly inhibits PCa tumorigenesis in both in vitro and in vivo models. Other pharmaceutical agents that directly target the circadian clock might also be a new option. Longdaysin and KL001, small molecules that lengthen the circadian period and lead to PER1 degradation, have shown potential therapeutic potential when combined with chronotherapy. Circadian rhythm may also help in surveillance of PCa metastasis, as daily fluctuations in circulating tumor cell (CTC) count peaked during the nocturnal active phase in rodents. [10]

Chronotherapy in Glioblastoma

Temozolomide (TMZ), a standard treatment for Glioblastoma, has been studied for its potential to regulate toxicity in both humans and mice. TMZ has a short half-life in plasma and easily crosses the blood-brain barrier, so studies have explored administering it based on the circadian rhythm in humans and mouse Glioblastoma cells. The sensitivity of Glioblastoma cells to TMZ-induced DNA damage, apoptosis, and growth inhibition was most pronounced around the peak of BMAL1 expression in the morning for both humans and mice. However, the active phase of mice occurs during the lights-off period, so considerations for shifts in the endogenous CR need to be taken into account. Adapting TMZ administration to the peak of BMAL1 expression in Glioblastoma cells can enhance its efficiency. [11]

Chronotherapy in Colorectal Cancer

Chronotherapy consists of chemotherapy delivery according to circadian rhythms. These genetically based rhythms modulate cellular metabolism and cell proliferation in normal tissues. As a result, both the host tolerance and antitumor efficacy of 5-fluorouracil (5-FU) and oxaliplatin (L-OHP), like 30 other anticancer drugs, vary largely according to the dosing time in laboratory rodents. The transfer of this concept to the clinic is aimed primarily at increasing the dose-intensity of the therapy through adjustment of drug-delivery to 24h rhythms in host tolerance. A specific technology (programmable-in-time infusion pumps) enables administration of chronotherapy to fully ambulatory patients. Phase I-III clinical trials show chronotherapy significantly increases tolerance to high doses of cancer drugs and improves antitumor activity in patients with metastatic colorectal cancer. These safe conditions of drug-delivery led to the first demonstration of the high activity of the 5-FU-leucovorin-L-OHP protocol. Chronotherapy with these three drugs also allows surgical removal of previously unresectable liver and lung metastases. [12]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Perspectives

Circadian disruption is an independent risk factor for cancer and has been classified as a carcinogen. As described herein, perturbations of the circadian clock strongly influence neoplastic transformation and tumor growth through alterations of multiple cancer regulatory pathways including cell cycle, apoptosis, DDR, and metabolism. While the robust link between circadian dysfunction and cancer is well established, mechanistic understanding is nascent. Therefore, it is imperative to continue to elucidate the mechanisms by which the mammalian circadian clock regulates cancer progression. [13]

CONCLUSION

Understanding the relationship between cancer and the circadian clock offers possibilities for new and effective cancer treatments and would help develop chronotherapeutic approaches to overcome cancer progression.

REFERENCES

1. *Vitaterna MH, Takahashi JS, Turek FW. Overview of circadian rhythms. Alcohol Res Health. 2001;25(2):85-93. PMID: 11584554; PMCID: PMC6707128.*
2. *Reddy, S., Reddy, V., & Sharma, S. (2023, May 1). Physiology, circadian rhythm. StatPearls - NCBI Bookshelf. https://www.ncbi.nlm.nih.gov/books/NBK519507/*
3. *Nagai H, Kim YH. Cancer prevention from the perspective of global cancer burden patterns. J Thorac Dis. 2017 Mar;9(3):448-451. doi: 10.21037/jtd.2017.02.75. PMID: 28449441; PMCID: PMC5394024.*
4. *Reddy, S., Reddy, V., & Sharma, S. (2023b, May 1). Physiology, circadian rhythm. StatPearls - NCBI Bookshelf. https://www.ncbi.nlm.nih.gov/books/NBK519507/*
5. *Malik S, Stokes Iii J, Manne U, Singh R, Mishra MK. Understanding the significance of biological clock and its impact on cancer incidence. Cancer Lett. 2022 Feb 28;527:80-94. doi: 10.1016/j.canlet.2021.12.006. Epub 2021 Dec 11. PMID: 34906624; PMCID: PMC8816870.*
6. *Weger, M., Diotel, N., Dorsemans, A. C., Dickmeis, T., & Weger, B. D. (2017). Stem cells and the circadian clock. Developmental Biology, 431(2), 111–123. https://doi.org/10.1016/j.ydbio.2017.09.012*
7. *Huang C, Zhang C, Cao Y, Li J, Bi F. Major roles of the circadian clock in cancer. Cancer Biol Med. 2023 Jan 12;20(1):1–24. doi: 10.20892/j.issn.2095-3941.2022.0474. PMID: 36647780; PMCID: PMC9843445.*
8. *Lee, Y. Roles of circadian clocks in cancer pathogenesis and treatment. Exp Mol Med* ***53****, 1529–1538 (2021). https://doi.org/10.1038/s12276-021-00681-0*
9. *Li, S., Ao, X., & Wu, H. X. (2013). The role of circadian rhythm in breast cancer. PubMed. https://doi.org/10.3978/j.issn.1000-9604.2013.08.19*
10. *Wei, Q., Yang, L., Zhu, W., He, Q., & Feng, D. (2023). Circadian rhythm in prostate cancer: time to take notice of the clock. Asian Journal of Andrology/Asian Journal of Andrology, 25(2), 184. https://doi.org/10.4103/aja202255*
11. *Petković M, Henis M, Heese O, Relógio A. Chronotherapy in Glioblastoma: state of the art and future perspectives. EBioMedicine. 2023 Mar;89:104470. doi: 10.1016/j.ebiom.2023.104470. Epub 2023 Feb 14. PMID: 36796229; PMCID: PMC9958380.*
12. *Giacchetti S. Chronotherapy of colorectal cancer. Chronobiol Int. 2002 Jan;19(1):207-19. doi: 10.1081/cbi-120002602. PMID: 11962676.*
13. *Shafi AA, Knudsen KE. Cancer and the Circadian Clock. Cancer Res. 2019 Aug 1;79(15):3806-3814. doi: 10.1158/0008-5472.CAN-19-0566. Epub 2019 Jul 12. PMID: 31300477; PMCID: PMC8121183.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FORMULATION AND EVALUATION OF HERBAL CHURNA CONTAINING FENUGREEK EXTRACT FOR ANTI-DEPRESSANT ACTIVITY

Sonali Tukaram Chavan[1*], Avinash Hatkar[2], Swapnil Bharat Rathod[3]

[1]Student of Bachelor of Pharmacy, Faculty of Pharmacy, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad

[2]Department of Pharmacology, Faculty of Pharmacology, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad

[3]Student of Bachelor of Pharmacy, Faculty of Pharmacy, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad

ABSTRACT

Depression is a prevalent mental health disorder with significant public health implications, often resistant to conventional drug treatments. This paper explores the formulation and pharmacology of an herbal churna aimed at addressing depression using fenugreek seeds, ashwagandha, Brahmi, turmeric, and black pepper. These ingredients are selected based on their known antidepressant and anxiolytic properties, supported by their chemical constituents. The formulation process involves gathering, cleaning, drying, grinding, and mixing the ingredients in specific quantities. Pharmacologically, the churna leverages the antidepressant effects of compounds like 4-hydroxyisoleucine, withanolides, bacosides, and curcumin. The addition of black pepper enhances bioavailability. Evaluation tests such as organoleptic assessment, loss on drying, and ash value determination ensure quality and authenticity. This herbal churna presents a promising natural approach to managing depression, offering potential benefits for mental health and overall well-being.

KEY WORDS: *-Herbal Churna, Fenugreek extract, Anti-depressant.*

INTRODUCTION

Depression is a common chronic recurrent syndrome often refractive to drug treatment affecting quality of life and overall productivity. In recent years clinical depression has been recognised as a major public health problem. According to the world health organisation (WHO) in its 1998 report depression (including complication of depression) affected about 12% of the world population and was supposed to be second greatest cause of premature death and disability worldwide by the year 2023[(2)].

The high prevalence of suicide in depressed patients (up to 15%) along with the complications arising from mental stress and effect on the cardiovascular system have confirmed depression as contributory factor to fatal coronary disease[(1)].

Depression is a syndrome that affects a person 's mood physical health and alters behaviour patients with major depression disorder have symptoms that reflects change in brain monoamine neurotransmitters specifically serotonin, nor epinephrine and dopamine. Depression is commonly accepted to be a disorder due to disturbance in neurotransmitters function, particularly serotonin (5-HT) nor epinephrine (NE) and dopamine although several classes of antidepressant are currently being used due to clinical limitations and adverse effect there is critical interest in development of efficient and safe drug for treatment of depression.

The most widely used antidepressant namely serotonin reuptake inhibitor (SSRI) increase extra cellular availability of serotonin. Depression is highly prevailing psychological ailments, characterized by sad mood, lack of interest, absence of Vigor, feeling of guilt, disturbed sleep, and appetite, decreased energy and reduce centralisation[(3)].

Many plants have documents antidepressant action like hypericum perforatum and pueraria labata, Fenugreek (Trigonella foenum graecum) belonging to family Fabaceae in a renowned prehistoric plant.

Different parts of this plant are consumed in diet such as seeds and leaves Fenugreek seed have a unique rhomboid shape distinctive peppery small and acrimonious taste.

Seed are usually consumed as spice in diet as well as for the cure of various medical ailments[(3)]. It contains several bioactive components i.e. carpaine (alkaloids) Fenugreekine diosgenin (saponin) genetianine trigonelline flavonoids and 4- hydroxy isoleucine, arginine (amino acid).
Various activities of this plant have been reported such as hypoglycaemic, hypolipidemic and evaluate the effect of FS-ME on depression in mice.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Figure 1: Herbal Churna

Materials collection: - Herbal ingredients

1. ***Fenugreek seed***
2. ***Ashwagandha***
3. ***Bramhi***
4. ***Turmeric***
5. ***Black paper***

1. Fenugreek seeds

Fenugreek is an annual plant in the Fabaceae (legume) family that is cultivated worldwide as a semiarid crop. Fenugreek plants are erect, loosely branched, and less than 1 metre (3 feet) tall with trifoliate light green leaves and small white flowers. The slender pods are up to 15 cm (6 inches) long, curved and beaked, and contain yellow-brown seeds that are flat rhomboids characterized by a deep furrow, less than 0.5 cm (0.2 inch) long[(4)].



Figure 2: fenugreek

Kingdom	Plantae
Phylum	Tracheophyta
Class	Magnoliopsida (Dicot)
Order	Fabales.
Family	Fabaceae.
Scientific name	*Trigonella foenum-graecum*
Common name	methi seeds, methi dana**.**
Synonyms	*Origanum thymus* Kuntze *Thymus collinus* Salisb**.**

Table.no.1

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2. Ashwagandha

Ashwagandha, also known as Indian Ginseng, is a medicinal herb with a wide range of health benefits. It is commonly used in Ayurvedic medicine for its tonic properties, reducing stress, improving athletic performance, enhancing cognitive function, and potentially benefiting conditions like **anxiety**, infertility, and diabetes. Research indicates it may increase testosterone levels, reduce inflammation, and aid heart health[6].



Figure 3: Ashwagandha

Kingdom	Plantae
Phylum	Angiosperm
Class	Eudicots
Order	Solanales
Family	Solanaceae
Scientific name	*Withania somnifera*
Common name	Winter cherry
Synonyms	Indian ginseng.

Table.no.2

3. Bramhi

Brahmi, also known as Bacopa monnieri, is a perennial herb native to India and other parts of Asia. It is a popular ingredient in Ayurvedic medicine and is revered for its numerous health benefits. Brahmi is believed to enhance memory, cognitive function, and mental clarity. It is also used to treat various health conditions such as cold, chest congestion, and bronchitis by clearing out mucus from the air passages, which helps ease breathing[5].

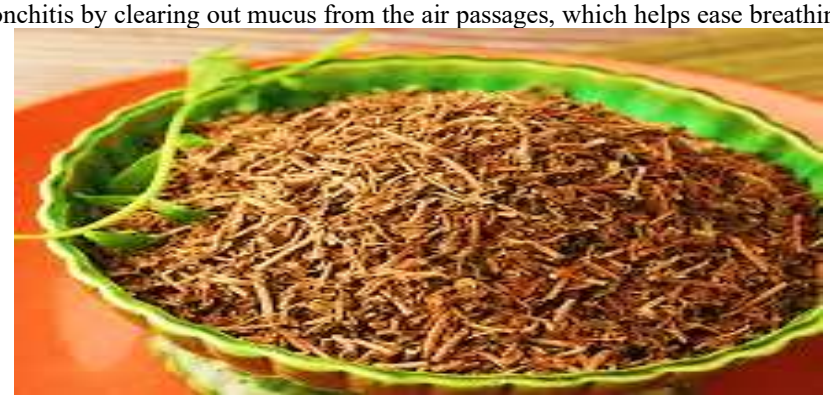


Figure 4: Bramhi

Kingdom	Plantae
Phylum	Anthophyta
Class	Dicotyledonae
Order	Scrophulariales
Family	Scrophulariaceae
Scientific name	*Bacopa monnieri*
Common name	Water hyssop
Synonyms	Herb of grace

Table.no.3

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4. Turmeric

Turmeric (Curcuma longa) is a perennial, rhizomatous, herbaceous plant that belongs to the ginger family Zingiberaceae. It is native to the Indian subcontinent and Southeast Asia. They have a rough, segmented skin and a dull orange interior. The main rhizome is pointed or tapered at the end and measures 2.5-7 cm (1-3 inches) in length and 2.5 cm (1 inch) in width, with smaller tubers branching off[8].



Figure 5: Turmaric

Kingdom	Plantae
Phylum	Magmoliophyta
Class	Liliopsida
Order	Zingiberales
Family	Zingiberaceae
Scientific name	*Curcuma longa*
Common name	Haldi
Synonyms	Indian saffron

Table no.4

5. Black pepper

Black pepper, scientifically known as Piper Nigrum, is a perennial vine native to Malabar, India, belonging to the Piperaceae family. It produces small, round berries known as peppercorns, with black peppercorns being the most common type. The plant grows best in warm, humid climates with well-draining soils, pH of 5.5-6.5, and temperatures between 10-40°C. Black pepper vines require 3-4 meters of spacing, partial to full sunlight, and 125-200 cm of annual rainfall. The plant's alkaloid Piperine gives it its pungent taste, and it is widely used as a spice globally[7].



Figure 6: Black Papper

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Kingdom	Plantae
Phylum	Monolipophyta
Class	Magnoliopsida
Order	Piperales
Family	Piperaceae
Scientific name	*Piper nigrum*
Common name	Pepper corns, king of spices
Synonyms	Black gold

Table no.5

Chemical constituent and their uses

Sr.no	*Ingredient*	*Chemical constituent*	*Uses*
1	Fenugreek seeds[9]	Trigonelline, 4-hydroxyisoleucine, orientin	Anti-depressant
2	Ashwagandha[10]	Withanolides A-Y, withaferin A, withasomniferin A	Reduce stress and anxiety
3	Bramhi[11]	Bacoside A, bacoside B, triterpenoid saponin glycosides	Improve neurotransmission
4	Turmeric[12]	Demethoxycurcumin, α-turmerone, β-turmerone	Antioxidant
5	Black pepper[13]	Piperine	Enhancer to turmeric

Table no.6

Procedure of formulation

1. **Gather and Prepare Ingredients**: Acquire high-quality fenugreek seeds, ashwagandha root powder, Brahmi leaf powder, turmeric powder, and black pepper powder.
2. **Cleaning and Drying**: Ensure all ingredients are clean and free from impurities. If the seeds are not pre-powdered, dry roast the fenugreek seeds lightly in a pan until aromatic. Allow them to cool before grinding.
3. **Grinding:** Use a grinder or mortar and pestle to finely grind the fenugreek seeds into a powder.
4. **Mixing:** Combine all the powdered ingredients together - fenugreek seed powder, ashwagandha root powder, brahmi leaf powder, turmeric powder, and black pepper powder. Mix thoroughly until the powders are evenly distributed.
5. **Storage**: Store the churna in an airtight container, away from moisture, heat, and sunlight. Use a dark-colored glass container, if possible, to protect the Churna from light exposure.

Formula: -

Sr.no.	Ingredient	Quantity(gm)	Uses
1	Fenugreek seeds	50	Anti-depressant
2	Ashwagandha	25	Reduce stress and anxiety
3	Bramhi	25	Improve neurotransmission
4	Turmeric	10	Antioxidant
5	Black pepper	5	Enhancer to turmeric

Table no.7

Pharmacology of Used Herbs (Crude Drug): -

Several of the herbs in this formulation have shown antidepressant-like effects in various studies.

Fenugreek (Trigonella foenum-graecum) contains compounds like 4-HI that have exhibited anti-anxiety and antidepressant-like effects, potentially by increasing serotonin turnover in the brain.[16]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

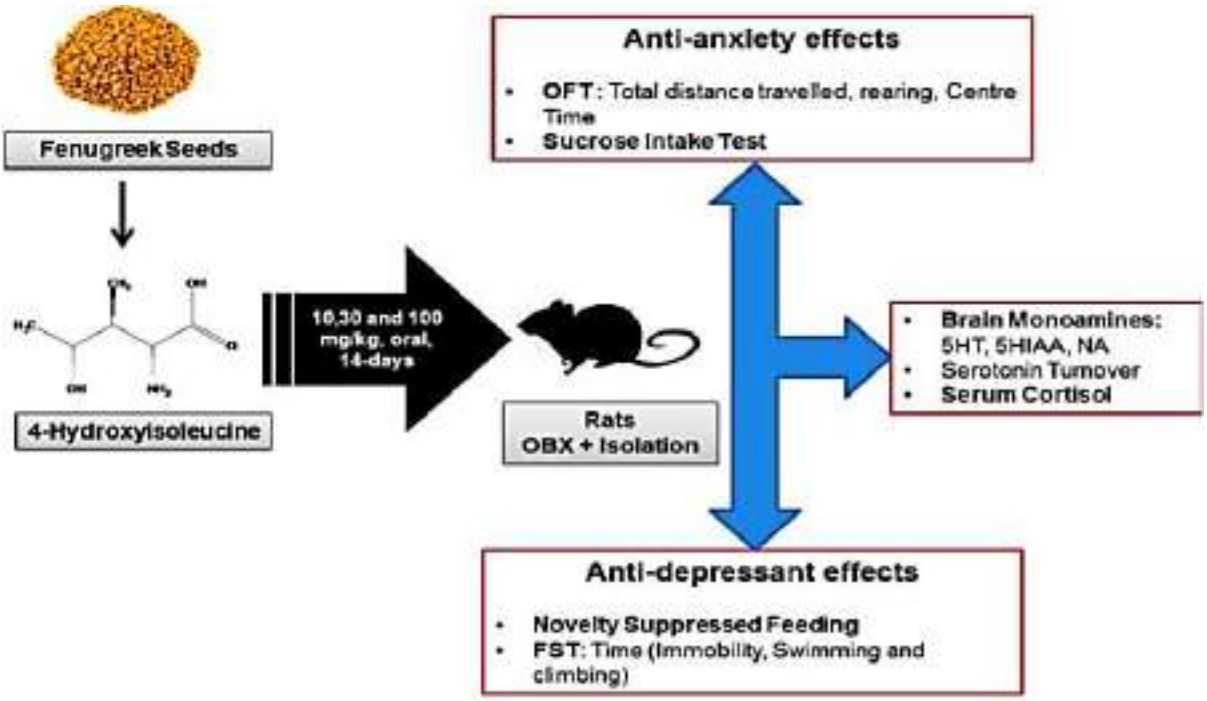


Figure 7: MOA

Ashwagandha (Withania somnifera) is an adaptogenic herb that has been used traditionally to treat psychiatric disorders and has shown antidepressant properties in preclinical studies.[17]

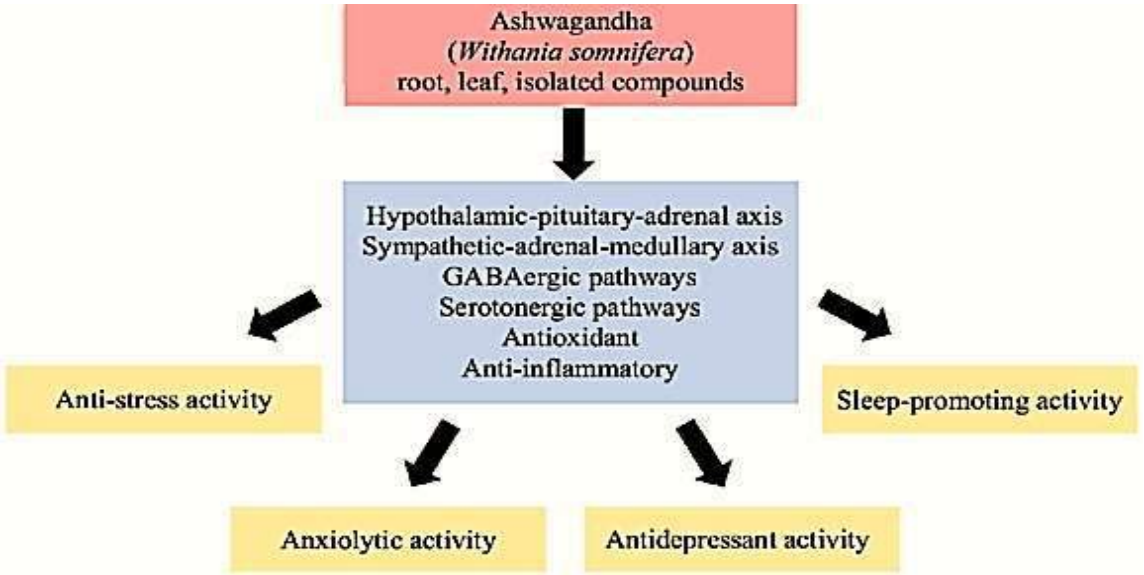


Figure 8: MOA

Brahmi (Bacopa monnieri) has demonstrated antidepressant activity in animal models of depression, likely through mechanisms like modulating neurotransmitters and reducing oxidative stress.[19]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

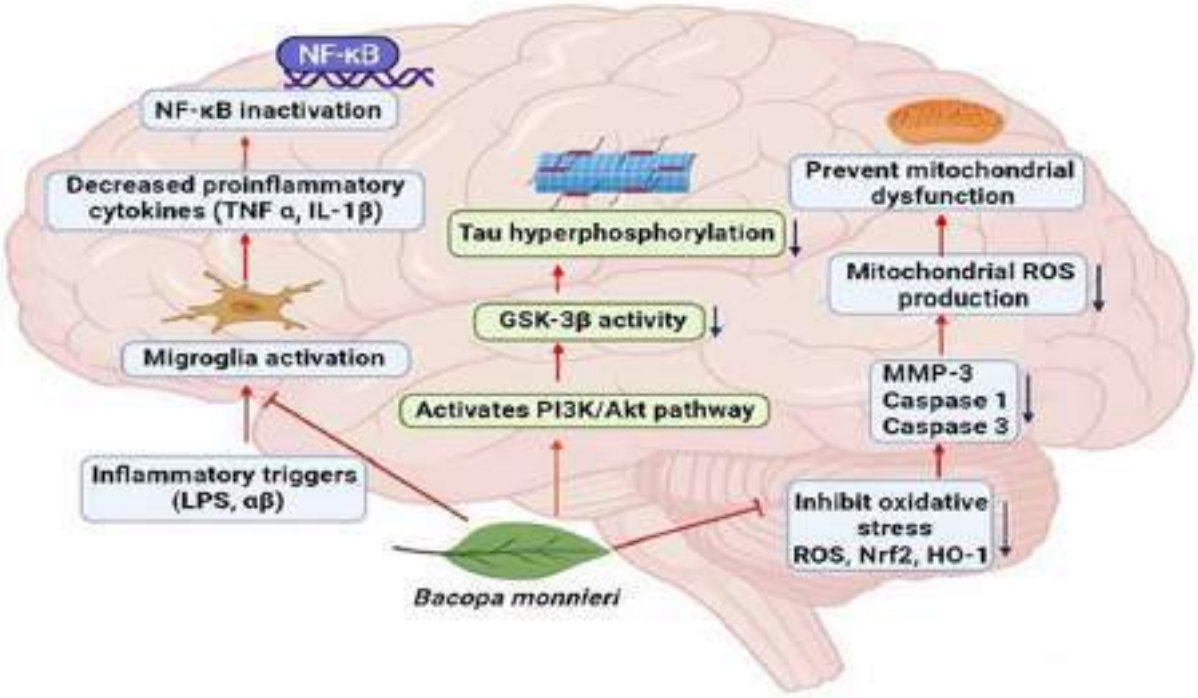


Figure 9: MOA

Turmeric (Curcuma longa) contains curcumin, which has demonstrated antidepressant-like effects in animal models, possibly by regulating monoaminergic systems.[18]

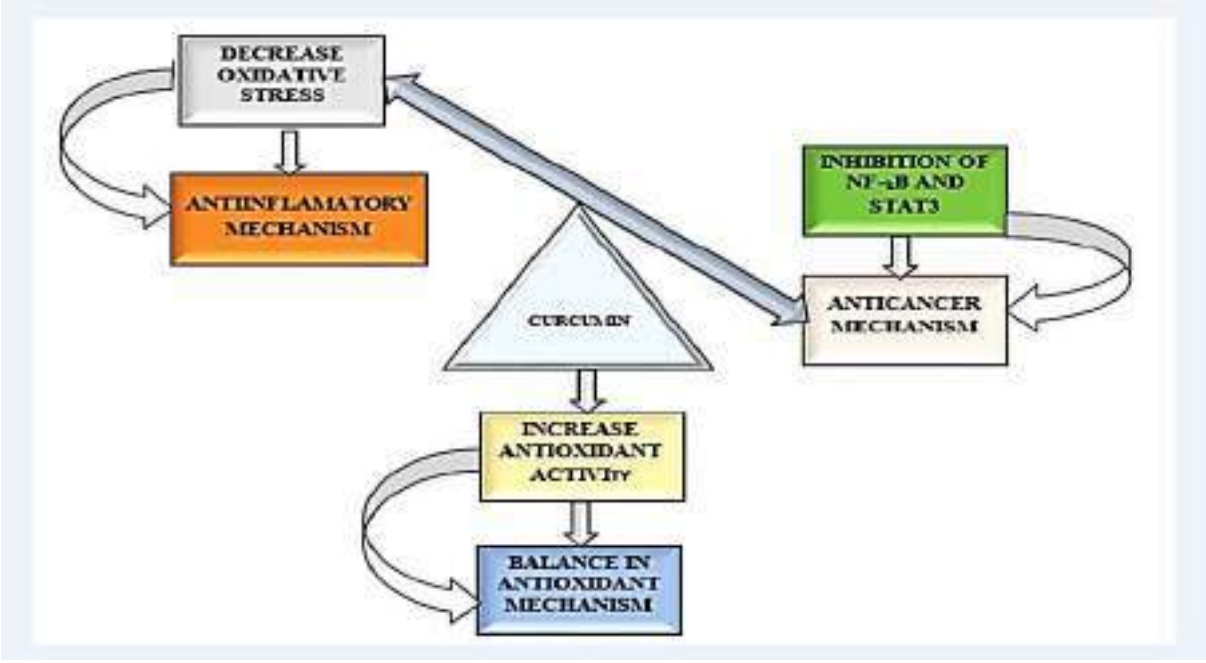


Figure 10: MOA

The addition of **black pepper** may enhance the bioavailability of some of these phytochemicals.[20]

Evaluation Test For Formulation: -

1. **organoleptic properties:** The organoleptic properties of herbal churna, like other churna formulations, are important in assessing the quality and authenticity of the product. Parameters such as colour, odour, taste, and texture are evaluated as part of the standardization process.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Figure 11: Organoleptic Property

2. **Loss of drying:** Loss on drying (LOD) is a common test method used in the pharmaceutical industry to determine the moisture content and volatile substances present in a sample, such as a churna (an Ayurvedic herbal powder formulation).
The key points regarding the loss on drying test for a churna are:
The test is carried out on a well-mixed sample of the churna. If the churna is in the form of large particles, the size should be reduced by rapid crushing to a powder.
The churna sample is weighed in a glass-stoppered, shallow weighing bottle that has been previously dried. The sample is distributed evenly in the bottle, not exceeding a depth of 10 mm.
The loaded bottle is then placed in a drying oven or chamber, with the stopper removed, and dried at the temperature and for the time specified in the monograph. Typical drying conditions are 105°C for 2-4 hours.
After drying, the bottle is promptly closed, allowed to cool in a desiccator, and reweighed. The loss on drying is calculated as the percentage weight loss from the initial weight. [14]
The acceptance criteria for the loss on drying of a churna is typically specified in the individual monograph or product specification.
In summary, the loss on drying test provides a measure of the moisture and volatile content in a churna sample, which is an important quality parameter for Ayurvedic herbal formulations.



Figure 12: Loss On Drying

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3. **Ash value**: The ash value represents the inorganic residues present in herbal drugs, primarily consisting of phosphates, carbonates, and silicates. These residues are a major index for evaluating the quality and purity of herbal medicines. The ash value is determined by incinerating the drug at a temperature of 450°C or above, which converts organic and carbon matter into ash. The ash content can be further divided into different types, including total ash, water soluble ash, acid insoluble ash, and sulphated ash, each providing specific information about the drug's composition.[15]



Figure 13: Ash value

4. **Microbial study:**

The evaluation test of the antimicrobial activity of herbal churna containing fenugreek, ashwagandha, turmeric, brahmi, and black pepper can be conducted by assessing the inhibitory effects of this combination on a range of bacteria, yeasts, and fungi. Each ingredient has known antimicrobial properties.



Figure 14: Microbial study

Fenugreek seeds have shown antimicrobial activity, ashwagandha has been studied for its antibacterial effects against Gram-positive cocci, turmeric is efficient against certain fungus and bacterial strains, Brahmi has antimicrobial properties, and black pepper exhibits antimicrobial activity. Combining these ingredients in churna form could potentially enhance their individual antimicrobial effects, making it a promising natural remedy against various pathogens.

5. **Identification test for alkaloid tannin saponin:**

The identification tests for alkaloids: Mayer's test, Dragendorff's test, Wagner's test, and Marme's test[21]

Identification test for saponin: Liebermann-Burchard test: Spraying the TLC plate with a reagent of ethanol and sulfuric acid. The appearance of white spots indicates the presence of saponin compounds.[22]

Identification test for tannin: Ferric chloride test: Adding a few drops of 5% ferric chloride solution to a water extract of the plant material produces a greenish precipitate, which is a positive indication for tannins.[23]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

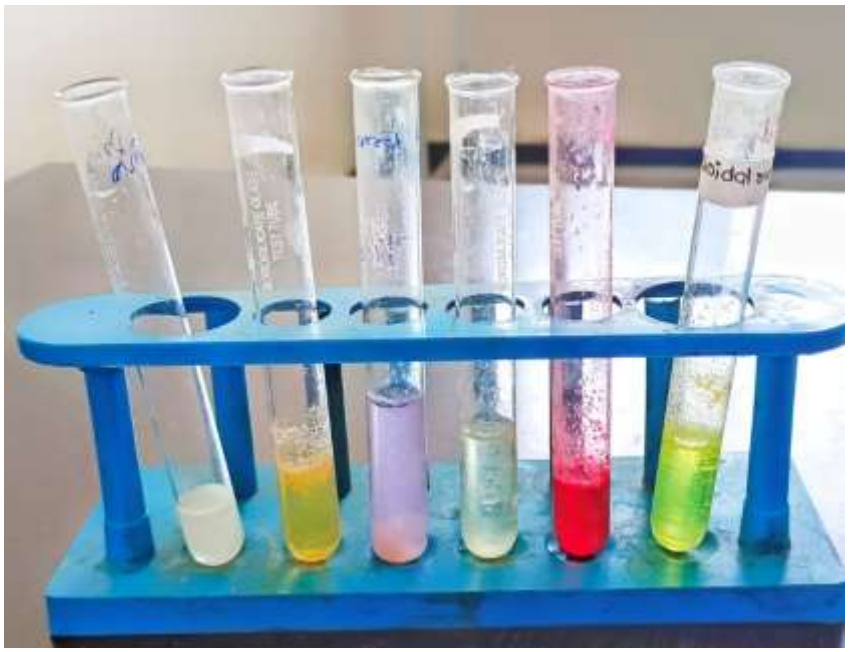


Figure 15: Identification Test

Observation and Result

a. organoleptic parameter:

Sr.no	Physical parameter	
1	Colour	Yellowish Brown
2	Odour	Pungent
3	Taste	Slightly Bitter
4	Texture	Smooth

b. loss of drying

W_1 – empty crucible - 30.23 gm
W_2 – drug – 2.06 gm
W_3 – crucible +drug -32.28 gm
W_4 – crucible + drug after heat - 32.10 gm
Loss of drying = $W_3 - W_4 = 32.28 - 32.10$ **= 0.18 gm = 9%**

c. Ash value

W_1 – empty crucible - 30.20 gm
W_2 – drug – 2.02 gm
W_3 – crucible +drug -32.22 gm
W_4 – crucible + drug after heat – 31.16 gm

$$\%ash = \frac{\text{[(ashed wt.)-(crucible wt.)]}}{\text{[(crucible + sample wt.)-(crucible wt.)]}}$$

$= 0.955 \times 100$
= 95.5%

d. ***microbial studies*****:** the solution of herbal churna shows zone of inhibition to bacteria and shows bacterial growth.
e. ***identification test*****:** the identification test of herbal churna is identified and results show the active ingredients present in the churna formulation.

CONCLUSION

the selected herbal ingredients, including fenugreek seeds, ashwagandha, Brahmi, turmeric, and black pepper, possess known antidepressant and anxiolytic properties, supported by their chemical constituents.
The formulation process, involving gathering, cleaning, drying, grinding, and mixing of the ingredients, follows a systematic approach to ensure the quality and authenticity of the churna.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Pharmacologically, the churna leverages the antidepressant effects of compounds like 4-hydroxyisoleucine, withanolides, bacosides, and curcumin, with black pepper enhancing bioavailability.

Evaluation tests such as organoleptic assessment, loss on drying, and ash value determination confirm the quality and authenticity of the churna, meeting pharmaceutical standards.

the herbal churna presents a promising natural approach to managing depression, offering potential benefits for mental health and overall well-being. Further research and clinical studies are warranted to validate its efficacy and safety in human subjects.
Overall, this project highlights the potential of herbal remedies, particularly fenugreek-based churna, as a viable option for individuals seeking alternative treatments for depression, contributing to the growing body of evidence supporting natural therapies in mental health management.

REFERENCE

1. *Britta Haenisch, Heinz banisch, Depression and antidepressants: Insights from knockout of dopamine, serotonin or noradrenaline re-uptake transporters, Pharmacology & Therapeutics,Volume 129, Issue 3,2011,Pages 352-368, ISSN 0163-7258,https://doi.org/10.1016/j.pharmthera.2010.12.002.*
2. *Vaibhav Gaur, Subhash L. Bodhankar, Vishwaraman Mohan, Prasad Thakurdesai,Antidepressant-like effect of 4-hydroxyisoleucine from Trigonella foenum graecum L.Â seeds in mice,Biomedicine & Aging Pathology,Volume 2, Issue 3,2012,Pages 121-125,ISSN 2210-5220, https://doi.org/10.1016/j.biomag.2012.07.002.*
3. *Rajput, Muhammad. (2021). Assessment of antidepressant activity of fenugreek seeds methanol extract. Rawal Medical Journal. 46. 236-239.*
4. *Britannica, T. Editors of Encyclopaedia. "fenugreek." Encyclopedia Britannica, April 2, 2024. https://www.britannica.com/plant/fenugreek.*
5. *Walker EA, Pellegrini MV. Bacopa monnieri. [Updated 2023 Mar 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK589635*
6. *Singh N, Bhalla M, de Jager P, Gilca M. An overview on ashwagandha: a Rasayana (rejuvenator) of Ayurveda. Afr J Tradit Complement Altern Med. 2011;8(5 Suppl):208-13. doi: 10.4314/ajtcam.v8i5S.9. Epub 2011 Jul 3. PMID: 22754076; PMCID: PMC3252722.*
7. *Britannica, T. Editors of Encyclopaedia. "black pepper." Encyclopedia Britannica, April 10, 2024. https://www.britannica.com/plant/black-pepper-plant.*
8. *Missouri Botanical Garden - Plant Finder Entry for Curcuma longa https://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=281676*
9. *Awasthi et al. (2022). 4-Hydroxyisoleucine from fenugreek (Trigonella foenum-graecum L.) displays anxiolytic and antidepressant properties by modulating brain serotonin levels and HPA axis function. Journal of Functional Foods.*
10. *Andrade C, Aswath A, Chaturvedi SK, Srinivasa M, Raguram R. A double-blind, placebo-controlled evaluation of the anxiolytic efficacy of an ethanolic extract of withania somnifera. Indian J Psychiatry. 2000;42(3):295-301.*
11. *Sairam, K., Dorababu, M., Goel, R. K., & Bhattacharya, S. K. (2002). Antidepressant activity of standardized extract of Bacopa monniera in experimental models of depression in rats. Phytomedicine, 9(3), 207-211.*
12. *Kulkarni, S. K., Bhutani, M. K., & Bishnoi, M. (2008). Antidepressant activity of curcumin: involvement of serotonin and dopamine system. Psychopharmacology, 201(3), 435-442. doi: 10.1007/s00213-008-1300-y*
13. *Chaudhary, A., Singh, N., Dalvi, M., & Wele, A. (2011). A progressive review of Sandhana kalpana (Bioavailability Enhancers). AYU (An International Quarterly Journal of Research in Ayurveda), 32(3), 308–316. https://doi.org/10.4103/0974-8520.93912*
14. *https://www.pharmaguideline.com/2011/08/what-is-loss-on-drying-and.html*
15. *Ajazuddin, Saraf S. Evaluation of physicochemical and phytochemical properties of Safoof-E-Sana, a Unani polyherbal formulation. Pharmacognosy Res. 2010 Sep;2(5):318-22. doi: 10.4103/0974-8490.72332. PMID: 21589760; PMCID: PMC3093045.*
16. *Yadav, R., & Kumari, R. (2021). Antimicrobial potential of fenugreek (Trigonella foenum-graecum L.): An overview. Egyptian Journal of Biological Pest Control, 31(1), 1-10. https://doi.org/10.1186/s41938-021-00451-5*
17. *Arora, S., Dhillon, S., Rani, G., & Nagpal, A. (2004). The in vitro antibacterial/synergistic activities of Withania somnifera extracts. Fitoterapia, 75(3-4), 385-388. https://doi.org/10.1016/j.fitote.2004.01.008*
18. *Moghadamtousi, S. Z., Kadir, H. A., Hassandarvish, P., Tajik, H., Abubakar, S., & Zandi, K. (2014). A review on antibacterial, antiviral, and antifungal activity of curcumin. BioMed Research International, 2014, 186864. https://doi.org/10.1155/2014/186864*
19. *Vijayan, P., Raghu, C., Ashok, G., Dhanaraj, S. A., & Suresh, B. (2004). Antiviral activity of medicinal plants of Nilgiris. Indian Journal of Medical Research, 120(1), 24-29.*
20. *Karsha, P. V., & Lakshmi, O. B. (2010). Antimicrobial activity of black pepper (Piper nigrum Linn.) with special reference to its mode of action on bacteria. Indian Journal of Natural Products and Resources, 1(2), 213-215*
21. *https://www.biologydiscussion.com/plants/detection-of-alkaloids-plants/57192*
22. *Soltani M, Parivar K, Baharara J, Kerachian MA, Asili J. Hemolytic and cytotoxic properties of saponin purified from Holothuria leucospilota sea cucumber. Rep Biochem Mol Biol. 2014 Oct;3(1):43-50. PMID: 26989736; PMCID: PMC4757088*
23. *https://en.m.wikipedia.org/wiki/Tannin*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

EVALUATION AND PREPARATION OF HERBAL COUGH SYRUP BY IN-VITRO METHOD

Nikita Rajendra Ukarde[1*], Avinash D. Hatkar[2*], Dr.Sunil .S. Jaybhaye[3]
[1]Student of Bachelor in pharmacy, Dr.Babsaheb Ambedkar Technological University, Raigad,Lonere.
[2]Department of pharmacology, Faculty of pharmacology, Dr.Babsaheb Ambedkar Technological University , Raigad, Lonere
[3]Department of Pharmaceutical Analysis, Faculty of Pharmaceutical Analysis, Dr.Babsaheb Ambedkar Technological University , Raigad, Lonere

**Corresponding Author*

ABSTRACT
The cough is a most common problem are face by the all people .there are the two types of cough one is the dry cough and second is the wet cough. The dry cough is a no mucus and secretion while in wet cough there is a cough mucus or secretion .the syrup is most commonly used and popular Dosage form there is a used in cure the cough and cold because it having case of patients compliance. The herbal cough syrup was formulated using Anacyclus pyrethrum flower extract, cinnamon, clove, ginger extract, tulsi, spearmint leaves extract and Honey.

The herbal cough syrup is studied which is liquid Dosage form it is easy to administer than solid Dosage form and is more effective and fst acting in order to cure cough.

KEYWORDS: *Cough , Herbal syrup, Herbal Formulation.*

INTRODUCTION

A cough, also known as tussis, is a voluntary or involuntary act that clears the throat and breathing passage of foreign particles, microbes, irritants, fluids, and mucus; it is a rapid expulsion of air from the lungs. Coughing can be done deliberately or as part of a reflex.[1] Although coughing can be a sign of a serious illness, more often, it will clear up on its own without the need for medical attention Coughing is a quick, repeating activity that helps to cleanse the airways of various fluids, irritants, microorganisms, and foreign objects. The brain detects any obstruction or discomfort in the upper airway or throat and signals the body to cough to expel the particle

Types of cough

The cough is mainly classify in two types-[2]

Dry cough:- It is an efficient and productive cough. These dry coughs are brought on by dust, smoke, or dry irritation

 Wet cough:- These types of coughs are contagious and ineffective. It is most helpful for clearing mucus and other

On the basis of duration of action of cough is classified as:-

1. Acute cough
2. Subacute cough
3. Chronic cough

Acute cough:-

Coughs that last three weeks or less are referred to as acute coughs.The most frequent causes of acute cough are acute bronchitis and upper respiratory tract infections.[2]

Subacute cough:-

The cough is lasts for three to eight weeks. It is the cough began with an upper respiratory tract infection. The mostcommon conditions to take into consideration are asthma, bacterial sinusitis, and post infectious cough.[2]

Chronic cough:-

The cough lasts for more than eight weeks is known as chronic cough.[2]

Needs of plants:-

Man has employed plants and herbs to treat sickness since the dawn of time.[] For a range of purposes, including the treatment of several diseases, shelter, food, clothing, writing, weapons, and cosmetics, plants have offered and continue to offer essential materials. There is no question that the great civilizations of prehistoric China, India, and North Africaleft written records of chronic coughing. The resourcefulness of man in employing plants to treat a variety of diseases.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Most commonly prescribed cough medicines are made from botanical extracts. Numerous compounds, including those derived from diverse plant species and their derivatives, are well-known western medications for treating cough or underlying disorders, including codeine, morphine, noscapine, bromhexine, guaifenesin, ephedrine, and cromolyn.[3]

Herbal cough syrup

Herbal cough syrups made from concentrated herbal teas are kept in sugar or honey. Herbal syrups have long been used to enhance the flavour and shelf life of bitter medicinal plants.[4]

Advantages of herbal cough syrup:-[4]

- No adverse effects.
- Readily available.
- Simple to modify the dosage for the child's weight.
- There is no need for nursing care, therefore the patient can take it without help.
- The liquid dosage form is executed for products like cough medicines.
- Herbs Grow in everyday life.
- By delaying oxidation while sugar is hydrolyzed into cellulose and dextrose, antioxidant.

Material and Methods

Anacyclus pyrethrum flowers extract
Cinnamon
Clove
Ginger
Spearmint
Tulsi



Honey

Anacyclus pyrethrum

Kingdom: plantae
Class : magnoliospidia
Species : Anacyclus pyrethrum
Family : Asteraceae
Chemical constituents:
flowers contain sesquiterpene lactones, alkamides, flavonoids, and polysaccharides, which contribute to their medicinal properties and biological activities. These compounds are sourced from the plant's metabolism and play important roles in its ecological interactions and potential therapeutic applications. Anacyclus pyrethrum, Indian trade name is ‘Akkarkara’ is a small hairy herbaceous perennial belonging to the family of Asteraceae. The plant mainly contains Alkaloids, tannins, flavonoides, steroid some trace metals and phenols

Bioactive compounds produced in plant species are usually responsible for their pharmacological properties such as antidiabetic, anti-inflammatory, anticancer, and antimicrobial activities Bacteria, fungi, and viruses are responsible for causing many infectious diseases .Antimicrobial resistance has been observed with time, even though many modern antimicrobial drugs have been developed to manage contagious diseases.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The plant is used as sex stimulant, antidiabetic, antioxidant, treating asthama, cardiac diseases, and throat problems, remove laziness, nerves weakness, carminative, stomache, arthritis, sciatica, diuretic, tooth and gum problems, aphrodisiacs[5], hiccoughs, epilepsy, headache, pains, muscle relaxant, worm infestation, anti-rheumatism, anticonvulsant, brain tonic, common cold and other human related disorders

How to prepare Anacyclus pyrethrum flower powder:




Wash the plant flower to remove impurities, then dry them completely under dark room until there is no remaining moisture. Macerate the dried flower into the grinder till it becomes form fine powder.

Extraction procedures

Powder is macerated in suitable Solvent such as Ethanol, Methanol , Hexane distilled water to dissolve desired compound. The solvent is then evaporated to obtain the extract [6]



Cinnamon

Synonyms:



cinnamon bark , kalmi – dalchini , Ceylon cinnamon.[7]

Biological sources:

it consists of dried inner bark of the shoots of a copied trees of cinnamomum zeylanium Nees

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Chemical Constituents

Cinnamon consists of a variety of resinous compounds, including **cin**namaldehyde, cinnamate, cinnamic acid, and numerous essential oils .The presence of a wide range of essential oils, such as *trans*-cinnamaldehyde, cinnamyl acetate, eugenol, L-borneol, caryophyllene oxide, b-caryophyllene, L-bornyl acetate, E-nerolidol, *α*-cubebene, *α*-terpineol, terpinolene, and *α*-thujene, has been reported.[8]

Family : Lauraceae

Scientific name : cinnamomum verum

In addition to being an antioxidant, anti- inflammatory, Anti- diabetic, anti- microbial .it may improve insulin sensitivity, cinnamon infused water has been a traditional remedy for heaging cold cough and sore throat.

Cinnamon content potent anti- Bacterial and anti- fungal quality that that help your immune system naturally fight off pathogen. It contains compound that may help alleviate cough symptoms by reducing inflammation and irritation in a throat.

How to prepare cinnamon powder:



Break the stick :

Break the cinnamon stick into a small small pieces this will make them easier to into a powder.

Grinding:

using morter and pestle. It's important to ensure that the grinder is clean and dry before use to prevent contamination or moisture affecting the powder

Grind the cinnamon pieces in batches if necessary, until achieve the desired consistency

Finally store the ground cinnamon powder in an airtight container to maintain it's freshness and flavor. For using cough syrup.

Clove :



Synonyms:

Caryophyllum Clove flower, clove bud , lavang

Biological sources:

It consists of a dried flower bud of Eugenia caryophyllus

Chemical constituents:

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

It consists of volatile oil (15-20%), Eugenol (70-90%), Acety Eugenol ,Tannins other substances mainly methyl furfural and dimethyl furfural.
Clove has been traditionally used to help alleviate cough symptoms due to its natural analgesic and expectorant properties. You can make clove tea by steeping a few cloves in hot water and drinking it to soothe a sore throat and ease coughing. However, it's essential to consult with a healthcare professional for persistent or severe coughs, especially if accompanied by other symptoms.

Ginger:



Synonyms: Zingiber, zingiberis
Biological sources:
Fresh or dried peeled or unpeeled or coated rhizome of Zingiber officinale
Chemical constituents:
It contains 0.25 – 3% volatile oil, (5-8%) Resinous matter, (56%) starch and protein, volatile oil contains a mixture of more than 25 constituents containing.

Family : Gingiber officials
A perennial herb belonging to the *Zingiberaceae* family, ginger (*Zingiber officinale Roscoe*) is one of the most extensively consumed food and herbal spices in the world today. Owing to its favourable attributes of aroma and biological and pharmacological activities, ginger has served as an essential ingredient in traditional Chinese, Ayurveda and Unani medicine across centuries. Native to South-East Asia, the ginger rhizome has witnessed its widespread use in countries like China, India and the USA to manage a range of conditions, including cough, nausea, vomiting, diarrhoea etc. Fresh root ginger, preserved ginger in syrup form and dried ginger spice are the three routinely available forms of ginger in the market.[9]

Properties of Ginger
Rich in various biologically active compounds like phenolic and flavonoids, ginger might possess a wide range of beneficial properties.[10] These may include,

- It may have antioxidant activity,
- It may have anti-inflammatory action,
- It may have anti-cancer activity,
- It may have antimicrobial activity
- It may benefit in keeping a healthy weight.
- It may boost blood glucose tolerance
- It may augment lipid profile.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Take a fresh ginger
Then a cut the ginger into a small small pieces
Then they place in a dark room for a completely dry
Once a ginger completely dried and brittle grind it into a fine powder using a morter and pestle
Store a ginger powder into a airtight container for using cough syrup.



Spearmint
Synonyms: spearmint, Garden mint ,mackerel mint,green mint, lugli pudina.
Biological source :
Mentha spicata
Chemical constituents:
A total of 63 chemical constituents were identified in spearmint oil using GC/MS, constituting 99.9% of the total identified compounds. The main components were carvone (40.8% ± 1.23%) and limonene (20.8% ± 1.12%).

Mentha species belong to the family Lamiaceae and are widely distributed in Europe, Asia, Africa, Australia, and North America .Plants from this genus can be found in multiple and diverse environments .

Recent data, based on morphological, cytological and genetic characteristics, have shown that genus *Mentha* can be classified into 42 species, 15 hybrids and hundreds of subspecies, varieties and cultivars. Indeed, mint taxonomy is highly complex and there is not always a consensus. The *Mentha* genus is often divided into 5 sections: *Audibertia*, *Eriodontes*, *Mentha*, *Preslia*, and *Pulegium* . Genus *Mentha*, a member of Lamiaceae family, encompasses a series of species used on an industrial scale and with a well-described and developed culture process. Extracts of this genus are traditionally used as foods and are highly valued due to the presence of significant amounts of antioxidant phenolic compounds.

Many essential oil chemotypes show distinct aromatic flavor conferred by different terpene proportions. Mint extracts and their derived essential oils exert notable effects against a broad spectrum of bacteria, fungi or yeasts, tested both *in vitro* or in various food matrices.[11] Their chemical compositions are well-known, which suggest and even prompt their safe used.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

In this review, genus *Mentha* plant cultivation, phytochemical analysis and even antimicrobial activity are carefully described.[12] Also, in consideration of its natural origin, antioxidant and antimicrobial properties, a special emphasis was given to mint-derived products as an interesting alternative to artificial preservatives towards establishing a wide range of applications for shelf-life extension of food ingredients and even foodstuffs.[13,14]

Spearmint contains vitamins, antioxidants, and vital nutrients. Its aroma is very similar to that of peppermint. It contains less menthol than peppermint, but it is rich in limonene, dihydrocarvone, and cineol. It has a sweeter taste than peppermint.

Like other herbs of the mint family, spearmint has a square-shaped stem. Its leaves are around 5 centimeters to 9 centimeters long and 1.5 centimeters to 3 centimeters wide. The tips of the leaves are pointed, like spears, hence its name.[15]

Tulsi:




Synonyms: sacred basil , Holly basil , tulasi (Telgu)
Biological sources:
Leaves of Ocimum sanctum, Ocimum basilicum
Chemical constituents:
The leaves of Ocimum sanctum contains 0.7% volatile oil comprising about 71 % Eugenol and 20 % methyl eugenol . The oil also contain carvacrol sesquiterpene hydrocarbon caryophyllene
Tulsi (Ocimum sanctum L.) in Hindi or Tulasi in Sanskrit (holy basil in English) is an exceptionally adored culinary and restorative fragrant herb from the family Lamiaceae that is indigenous to the Indian subcontinent and been utilized inside Ayurvedic medication over 3000 years. In the Ayurveda framework tulsi is frequently alluded to as a "Solution of Life" for its mending powers and has been known to treat a wide range of basic wellbeing conditions.

Medicinal Properties
1. Antimicrobial Activity
- Tulsi has strong antibacterial, antiviral, and antifungal properties, making it effective against a variety of pathogens. This is attributed to its essential oils and compounds like eugenol and beta-caryophyllene.

2. Anti-inflammatory Effects
- The herb is known to reduce inflammation due to the presence of compounds such as eugenol and rosmarinic acid. This makes it beneficial for conditions like arthritis and inflammatory diseases.

3. Antioxidant Properties
- Tulsi is rich in antioxidants, which help in neutralizing free radicals, thereby protecting the body from oxidative stress and associated chronic diseases.

4. Respiratory Health
- Tulsi is particularly beneficial for respiratory ailments. It helps in relieving symptoms of asthma, bronchitis, and other lung diseases. Its expectorant properties aid in expelling mucus from the respiratory tract.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5. Cardiovascular Health
- It helps in reducing blood lipid levels, thus protecting against cardiovascular diseases. Eugenol, in particular, has a beneficial effect on blood pressure and cholesterol levels.

6. Antidiabetic Effects
- Tulsi has been shown to improve blood sugar levels and enhance insulin sensitivity, making it a supportive herb for managing diabetes.

7. Gastrointestinal Health
- The herb aids digestion and can help alleviate gastrointestinal issues such as indigestion, gas, and ulcers due to its carminative properties.

Health Benefits in Daily Life
1. Boosts Immunity
- Regular consumption of tulsi tea or leaves can enhance the immune system, making the body more resilient to infections and diseases.

2. Stress Relief
- Tulsi helps in reducing stress and anxiety levels, promoting mental clarity and focus. It can be consumed as tea or in supplement form for its adaptogenic benefits.

3. Respiratory Relief
- Inhaling steam with tulsi leaves or consuming tulsi-based herbal cough syrups can provide relief from cold, cough, and other respiratory conditions.

4. Oral Health
- Chewing tulsi leaves or using tulsi-based oral care products can help in maintaining oral hygiene and preventing dental issues.

5. Skin and Hair Health
- Tulsi's antimicrobial and anti-inflammatory properties are beneficial for skin health. It can be used in face packs to treat acne and other skin conditions. Additionally, tulsi oil can promote healthy hair growth and reduce dandruff.

6. Digestive Aid
- Consuming tulsi can help in digestion and alleviate digestive disorders. It is often included in detox drinks for its digestive benefits.

Honey :



Synonyms:
Madhu , Madh , Mel
Biological source :
Honey is a sugar secretion deposited in honey comb by the bees
Chemical constituents:
Honey is a aqueous solution of glucose 35%, fructose 45%, and sucrose about 2 %

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The proportion of sugar may vary depending upon the source of nectar and enzymatic activity responsible for converting nectar into the honey. The other constituents of honey are maltose, gum , traces of succinic acid , acetic acid , dextrin , formic acid , colouring matter , enzymes (invertage , insulage).

Medicinal Properties

1. Antimicrobial Activity
   - Honey exhibits strong antibacterial, antifungal, and antiviral properties. This is largely due to the presence of hydrogen peroxide, low pH, and high osmolarity. Additionally, certain types of honey, like Manuka honey, contain unique compounds like methylglyoxal that enhance its antimicrobial efficacy.
2. Anti-inflammatory Effects
   - Honey has significant anti-inflammatory properties. It can reduce inflammation and promote healing, making it beneficial for conditions like wounds, ulcers, and inflammatory diseases.
3. Antioxidant Properties
   - Rich in antioxidants, honey helps neutralize free radicals in the body, reducing oxidative stress and preventing chronic diseases. The antioxidants in honey, such as flavonoids and phenolic acids, contribute to its protective effects.
4. Cough Suppressant
   - Honey is a well-known natural remedy for coughs. It soothes the throat, reduces irritation, and acts as a demulcent, coating the mucous membranes and providing relief from cough.
5. Wound Healing
   - Due to its antibacterial and anti-inflammatory properties, honey is effective in wound healing. It promotes tissue regeneration, reduces infection, and accelerates the healing process.
6. Digestive Health
   - Honey aids in digestion and can help alleviate gastrointestinal issues such as ulcers and gastritis. It acts as a prebiotic, promoting the growth of beneficial gut bacteria.
7. Immunomodulatory Effects
   - Regular consumption of honey can boost the immune system, enhancing the body's ability to fight infections.

Method of Preparation

To prepare final cough syrup, bring the water to a boil
Once a **boiling**, add a dried powder of clove, cinnamon, Ginger and boil for 20 minutes.
Then after 20 minutes filter the solution from filter paper.
Add this solution in a anacyclus pyrethrum flower extract
Then crushed the tulsi and spearmint leaves and boil for 10 min and filter out
Add a Honey as a sweetening agent, and add sodium benzoate, benzoic acid , propyl paraben as preservatives.
Herbal cough syrup was prepared and Solubility was checked by observing clarity of solution visually.

Formulation for Bottle A & B

Ingredients	Quantity Taken (gm)		Category
	A	B	
Anacyclus pyrethrum (flower)extract	5 gm	5 gm	Antimicrobial
Clove	2 gm	2 gm	Antimicrobial
Cinnanmon	2 gm	1 gm	Antibacterial, antifungal
Ginger	3 gm	2 gm	Anti-viral
Tulsi leaves	8 gm	9 gm	Antibacterial
Spearmint leaves	9 gm	9 gm	Aromatic
Honey	10 ml	8 ml	Sweetening agent
Sodium benzoate	3:1	2:1	Preservatives

Evaluation test:

1) Colour Examination:

5 ml of prepared syrup was taken on watch glass
Watch glass placed against white background in white tubelight.
Color was observed by naked eyes.

2) odour Examination:

2 ml of prepared syrup was taken and smelled by individually.

3) Taste Examination:

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

A pinch of final syrup was taken and examined on taste buds of the tongue.
4 pH Determination:
10 ml of prepared syrup taken in a 100 ml of volumetric flask.
Make up volume to 100 ml with distilled water.
Sonicare for 10 min.
PH was measured by using digital PH meter .
5) viscosity Determination:
The viscosity of each formulation was determined by using Oswald u tube viscometer.



Formulation (A) cough syrup



Formulation (B) cough syrup

Results & Discussion

Table 1:

Formulation	Colour	Odour	Taste
A	Light-green	Aromatic	Slightly pungent
B	Light-green	Aromatic	Slightly pungent

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 2: PH observation

Formulation	PH
A	6.2
B	6.9

Antimicrobial activity of formulated herbal cough syrup was observed.

Formulation A and B are evaluated for its in vitro antimicrobial activity by using standard ciprofloxacin. From the zone of inhibition, the Formulation of B was found more superficial towards, antimicrobial activity as compared to Formulation A.

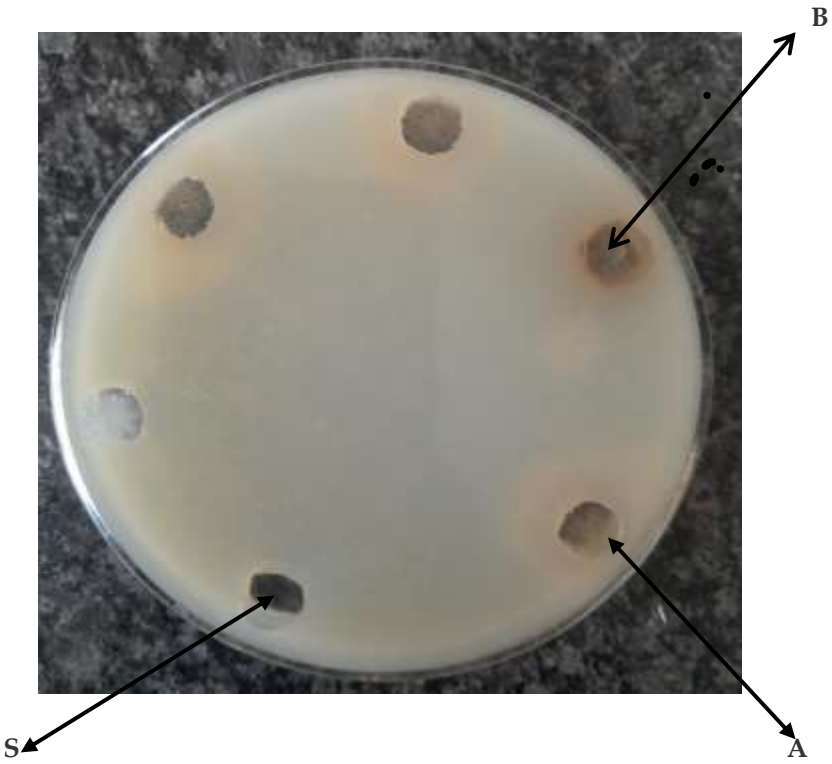


Fig: Antimicrobial Activity of Herbal cough syrup

CONCLUSION

The aim of this project was to formulate and evaluate herbal cough syrup. The present study helped us to understand what actually cough means, what are different types of coughs, factors responsible for causing cough.Herbal treatments for cough were studied briefly. As the study shows that the herbal treatment is more beneficial than that of allopathy treatment which uses standard drugs for treatment as Herbal drugs have less or no side effects. Herbal treatments are more preferred widely. Herbal drugs are easy to available than that of prescribed drugs.This study helps us to understand cough and measures to be taken in order to avoid cough.The pre-formulation studies of all three formulations were within specification.Two formulations were prepared and evaluation test such as colour, odor, taste and pH were performed.

REFERENCE

1. https://www.medicalnewstoday.com/articles/220349
2. https://cnazone.com/materials/Aspiration-Risks-Recognition-and-Prevention-Ceu.pdf/
3. https://www.jetir.org/papers/JETIR2305854.pdf
4.https://www.researchgate.net/publication/367751467_Formulation_and_Evaluation_of_Herbal_Syrup/fulltext/63da98ebc465a873a2772f70/Formulation-and-Evaluation-of-Herbal-Syrup.pdf/

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5.https://www.researchgate.net/profile/Sandeep-Pandey-8/publication/324042819_CHEMICAL_COMPOSITION_AND_MEDICINAL_USES_OF_ANACYCLUS_PYRETHRUM/links/5aba8fa545851563660ae187/CHEMICAL-COMPOSITION-AND-MEDICINAL-USES-OF-ANACYCLUS-PYRETHRUM.pdf
6. https://www.yourarticlelibrary.com/biology/plants/cinnamon-sources-cultivation-and-uses/49884
7. https://www.brettelliott.com/cinnamon-cinnamomum-zeylanicum-herbal-monograph/
8. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4003790/
9. https://pharmeasy.in/blog/ayurveda-uses-benefits-side-effects-of-ginger/
10. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6161068/
11.https://mdpi-res.com/d_attachment/plants/plants-07-00070/article_deploy/plants-07-00070.pdf?version=1536055519
12. https://research.caluniv.ac.in/publication/plants-of-genus-mentha-from-farm-to-food-factory
13. https://pubmed.ncbi.nlm.nih.gov/30181483/
14. https://www.medicalnewstoday.com/articles/266128/
15. https://brandandgeneric.com/articles/266128

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

ANALYTICAL METHOD DEVELOPMENT FOR QUANTIFICATION OF TINIDAZOLE BY REVERSED PHASE HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

Md Saleem[1] Dr.Dasari Srinivas[2*] J Sravan Kumar[3] V.Raju[4] Sepuri Vijayalaxmi[5]

[1,3,4,.]Assistant Professor, Moonray Institute of Pharmaceutical Sciences, Raikal, Shadnagar, RangaReddy, TS.
[2]Professor &HOD, Department of Pharmaceutical Analysis,Chilkur Balaji College of Pharmacy,Hyderabad.TS.*
5Associate Professor, Siddartha Institute of Pharmaceutical Sciences, Korremula Rd, Narepally, Ghatkesar, Hyderabad, Telangana 501301.

ABSTRACT

A simple and rapid reversed-phase high performance liquid chromatography (HPLC) assay for determination of tinidazole level in human plasma was developed and validated. Hydrochlorothiazide *was used as an internal standard (IS). Human plasma (0.4 ml) were deproteinized with 20 µl perchloric acid, vortexed and centrifuged. The supernatant 100 µl was collected and injected into the HPLC system. Analysis was performed using Atlantis dC18 column with a mobile phase composed of 50 mM potassium phosphate, dibasic (pH=3.0) and acetonitrile (80:20, v:v). The eluent was monitored spectrophotometrically at 317 nm. No interference from blank plasma components or commonly used drugs was observed. The relationship of tinidazole concentration and peak area ratio of tinidazole / IS was linear ($R^2 \geq 0.9902$) in the range of 0.05 – 30 µg/ml, the intra and inter-day coefficient of variations were ≤8.9% and ≤8.2%, with a corresponding bias of ±8.2% and ±4.6%, respectively. Mean extraction recovery of tinidazole and the IS were 83% and 95%, respectively. The method was applied to assess the stability of tinidazole under various conditions encountered in the clinical laboratory. Tinidazole stability in processed samples (stored at room temperature for 24 hours or at -20°C 48 hours), unprocessed samples (stored for 24 hours at room temperature or, 8 weeks at -20°C), and after three freeze and thaw cycles was ≥88%, respectively.*

KEYWORDS: *Tinidazole, Hydrochlorothiazide, Human plasma, HPLC*

1. INTRODUCTION

Tinidazole, chemically known as 1-[2-(ethyl sulfonyl) ethyl]-2-methyl-5-nitroimidazole, utilized in the treatment of various bacterial infection that causes diarrhea and other intestinal issues [1-2]. Its oral bioavailability is about 99% with a peak plasma concentration of 10.1±0.6µg/ml within 1-2 hours after ingestion of 500 mg therapeutic dosage [3]. **Figure 1** depicts the chemical structures of tinidazole and the internal standard (IS) hydrochlorothiazide.

Several analytical methods have been reported for the determination of tinidazole concentration in pharmaceutical formulations and in various biological samples [4-18]. The techniques, which incorporates potentiometry [6], thin layer chromatography [7], polarography [8], spectrofluorometry [9] spectrophotometry [10], capillary electrophoresis [11], gas chromatography [12], high performance thin layer chromatography [13], high performance liquid chromatography (HPLC) [14-18] and HPLC coupled with tandem mass spectrometry [19]. Tinidazole level particularly in human serum/plasma were often determined by HPLC with UV detector [14-18]. Few reported HPLC assays utilized 95% chloroform as extraction solvent, whereas some were used metronidazole as internal standard in sample preparation [16-18]. Since chloroform and metronidazole both are carcinogenic in nature and an accordance to safety guidelines utilization of these chemicals ought to be maintained a strategic distance from or limit by substituting with reasonable nontoxic or less harmful chemical substances [20].

In the current study, we described a simple and rapid HPLC assay for determination tinidazole level in human plasma. We utilized low volume of perchloric acid for plasma protein precipitation and hydrochlorothiazide was used as internal standard in sample preparation. The method was fully validated and successfully applied to assess the stability of tinidazole under various laboratory conditions.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2. MATERIAL AND METHODS

2.1 Apparatus

Chromatography was performed on a Waters Alliance HPLC 2695 system (Waters Associates Inc., Milford, MA, USA) consisting of a quaternary pump, autosampler, column thermostat, and photodiode array detector. We used a reversed-phase Atlantis dC18 (4.6 x 150 mm, 5 µm) column protected by guard column Symmetry C18 (3.9 x 20 mm, 5 µm). Data collected with a Pentium IV computer, using Empower Chromatography Software.

2.2 Chemical and reagents

All chemical reagents were of analytical-reagent grade except if expressed something else. Tinidazole and hydrochlorothiazide purchased from Sigma-Aldrich MO, USA. Methanol and acetonitrile, (both HPLC grade), perchloric acid (70%) and potassium phosphate (dibasic) were purchased from Fisher Scientific, Fairlawn, NJ, USA. HPLC grade water was prepared by reverse osmosis and further purified by passing through a Synergy Water Purification System (Millipore, Bedford, MA, USA). Drug-free human plasma was obtained from the blood bank of King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia.

2.3 Chromatographic conditions

The mobile phase was composed of 0.05 M potassium phosphate (dibasic) (pH=3.0±0.1, adjusted with phosphoric acid) and acetonitrile (80:20, v:v) and was delivered at a flow rate of 1.0 ml/minute at ambient temperature with a run time of 10.0 minutes. A photodiode array detector set at 317 nm was used.

2.4 Preparation of standard and quality control samples

Stock solution of tinidazole and hydrochlorothiazide (1.0 mg/ml) were prepared in methanol. They were then diluted with blank human plasma and mobile phase to produce working solutions of 30 µg/ml and 100 µg/ml, respectively. Nine calibration standards in the range of 0.05 – 30 µg/ml and four quality control (QC) samples (0.05, 0.15, 15, and 27 µg/ml) were prepared in human plasma. Calibration standards and QC samples were vortexed for one minute and 0.4 ml aliquots were transferred in to 1.5 ml micro centrifuge polypropylene culture tubes and stored at –20 °C until used.

2.5 Sample preparation

Aliquots of 0.4 ml of calibration curves, or QC samples in culture tubes were allowed to equilibrate to room temperature. To each tube, 100 µl IS working solution was added and the mixture was vortexed for 10 seconds. 20 µl perchloric acid were added to the mixture and vortexed for one minute, and then centrifuged for 10 minutes at 11500 rpm at room temperature. The clear supernatant was transferred into an auto-sampler vail and 100 µl sample was injected into the HPLC system with a run time of 10 minutes.

2.6 Stability studies

Three of QC samples (0.05, 0.15, and 27 µg/ml) were used for stability studies. Five aliquots of each QC sample were extracted and immediately analyzed (baseline), five aliquots were allowed to stand on the bench-top for 24 hours at room temperature before being processed and analyzed (counter stability, 24 hours at room temperature), five aliquots were stored at –20°C for eight weeks before being processed and analyzed (long term freezer storage stability), and five aliquots were processed and stored at room temperature for 24 hours, or at –20°C for 48 hours before analysis (autosampler stability). Finally, fifteen aliquots of each QC sample were stored at –20°C for 24 hours. They were then left to completely thaw unassisted at room temperature. Five aliquots of each sample were extracted and analyzed and the rest returned to –20°C for another 24 hours. The cycle was repeated three times (freeze-thaw stability).

2.7 Method validation

The method was validated according to standard procedures described in the US Food and Drug Administration (FDA) bioanalytical method validation guidance [21]. The validation parameter included specificity, linearity, accuracy, precision, recovery and stability.

3. RESULTS AND DISCUSSION

3.1 Optimization of chromatographic conditions

The mobile phase was composed of 0.05 M potassium phosphate (dibasic) (pH=3.0±0.1, adjusted with phosphoric acid) and acetonitrile (80:20, v:v) delivered at a flow rate of 1.0 ml/minute at ambient temperature, with a run time of 10 minutes. A photodiode array detector set at 317 nm was utilized. The retention times of IS and tinidazole were around 4.4 and 5.6 minutes, respectively.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3.2 Specificity

Specificity is a measure of the ability of the analytical method to differentiate and quantify the analytes of interest in the presence of other components. No endogenous component from extracted human plasma co-eluted with hydrochlorothiazide or the IS. **Figure 2** depicts a representative chromatogram of drug free human plasma used in preparation of calibration standards and QC samples.

3.3 Linearity, Accuracy and Precision

Linearity of tinidazole assay was evaluated by analyzing nine curves of ten calibration standards over the range (0.05 - 30 µg/ml) prepared in human plasma. **Figure 3** represents an overlay of chromatograms of extracts of 0.4 ml human plasma spiked with the IS with or without nine concentrations of tinidazole. The peak area ratios were subjected to regression analysis. The suitability of the calibration curves was confirmed by back-calculating tinidazole concentration from the calibration curves (**Table 1**). All back-calculated concentrations were well within the acceptable limits. Precision and bias were also determined for four QC samples (0.05, 0.15, 15, and 27 µg/ml). The intra-day (n=10) and inter-day (n=20, over three consecutive days) precision was ≤8.9% and ≤ 8.2%, respectively. The intra-day and inter-day bias was in the range of -1.1 to 8.2% and of -3.7 to 4.6%, respectively. The results are summarized in **Table 2**.

3.4 Recovery

Tinidazole recovery was assessed by direct comparison of its peak area in plasma and in mobile phase samples, using five replicates for each of four QC samples (0.05, 0.15, 15, and 27 µg/ml). Similarly, the recovery of the IS was determined by comparing its peak area (at 10.0 µg/ml) in plasma and in mobile phase samples. The mean recovery of tinidazole and the IS was 83% and 95%, respectively.

3.5 Stability

As shown in **Table 3**, tinidazole stability in processed and unprocessed QC samples (0.05, 0.15, and 27 µg/ml) was investigated. Tinidazole was stable in processed samples for at least 24 hours at room temperature (≥ 96%) or 48 hours at -20 °C (≥ 93%). Tinidazole in unprocessed samples was stable for at least 24 hours at room temperature (≥ 88%), eight weeks at -20 °C (≥ 98%), or after three freeze-and thaw cycles (100%).

4. CONCLUSIONS

The described HPLC assay is accurate, precise, and rapid. It requires only 0.4 ml plasma and utilizes a simple and convenient protein precipitation procedure. The assay was successfully applied to monitor stability of tinidazole under various conditions generally encountered in the clinical laboratories.

Conflict of Interest

None to declare

Table 1: Back-calculated tinidazole concentrations from ten calibration curves

Nominal Level (µg/ml)	Calculated level (µg/ml)		CV (%)*	Bias** (%)
	Mean	SD		
0.05	0.05	0.002	4.9	8.8
0.25	0.27	0.011	4.3	6.1
0.50	0.51	0.059	7.1	0.8
1.00	1.11	0.062	5.6	10.8
2.50	2.65	0.168	6.3	6.1
5.00	5.24	0.334	6.4	4.8
10.0	10.77	0.463	4.3	7.7
20.0	21.25	1.033	4.9	6.3
30.0	29.33	0.588	2.0	-2.2

*Coefficient of variation (CV) = standard deviation (SD) divided by mean measured concentration x 100. **Bias = measured level – nominal level divided by nominal level x 100.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 2: Intra- and inter-day precision and bias of tinidazole assay

Nominal Level (µg/ml)	Measured level (µg/ml)		CV (%)*	Bias (%)
	Mean	SD		
		Intra-day (n=10)		
0.05	0.049	0.003	5.8	-1.1
0.15	0.153	0.014	8.9	2.2
15.0	15.022	0.707	4.7	0.1
27.0	24.798	2.121	8.6	8.2
		Inter-day (n=20)		
0.05	0.052	0.003	6.5	3.9
0.15	0.155	0.013	8.2	3.4
15.0	15.685	0.696	4.4	4.6
27.0	25.999	1.969	7.6	-3.7

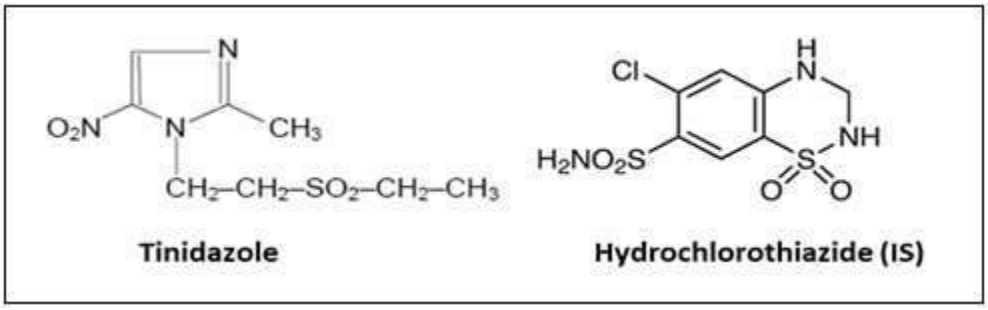
*CV, coefficient of variation (CV) = standard deviation (SD) divided by mean measured level x100.Bias = measured level - nominal level divided by nominal level x 100.

Table 3: Stability of tinidazole under various clinical laboratory conditions

Nominal level	Unprocessed		Processed		Freeze-Thaw Cycle		
(µg/ml)	24 hrs RT	8 wks -20 °C	24 hrs RT	48 hrs -20 °C	1	2	3
0.05	100	104	102	90	110	107	113
0.15	93	98	96	93	108	109	104
27.0	88	100	101	98	113	104	106

Data represent stability (%) calculated as mean measured concentration (n=5) at the indicated time divided by mean measured concentration (n=5) at baseline x 100. Spiked plasma samples were processed and analyzed immediately (baseline, data not shown), after storing 24 hours at room temperature (24 hrs RT) or after freezing at –20ºC for 8 weeks (8 wks, –20ºC) or after 1 to 3 cycles of freezing at –20ºC and thawing at room temperature (freeze-thaw)., or were processed and then analyzed after storing for 24 hours at room temperature (24 hrs, RT) or 48 hours at –20ºC (48 hrs, -20ºC)

Figure 1: Chemical structures of tinidazole and hydrochlorothiazide (IS)



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Figure 2: Representative chromatogram of blank human plasma

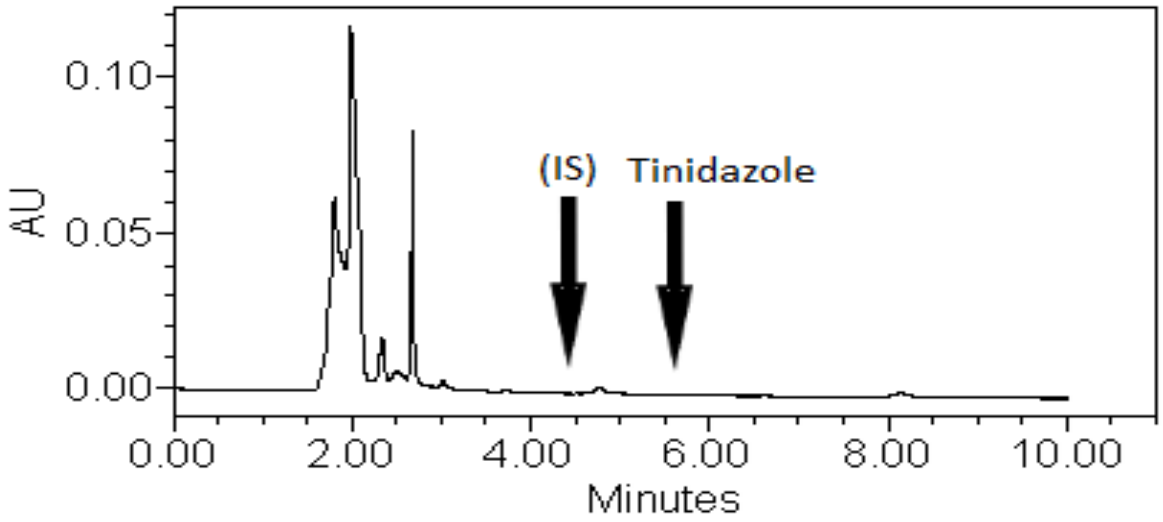
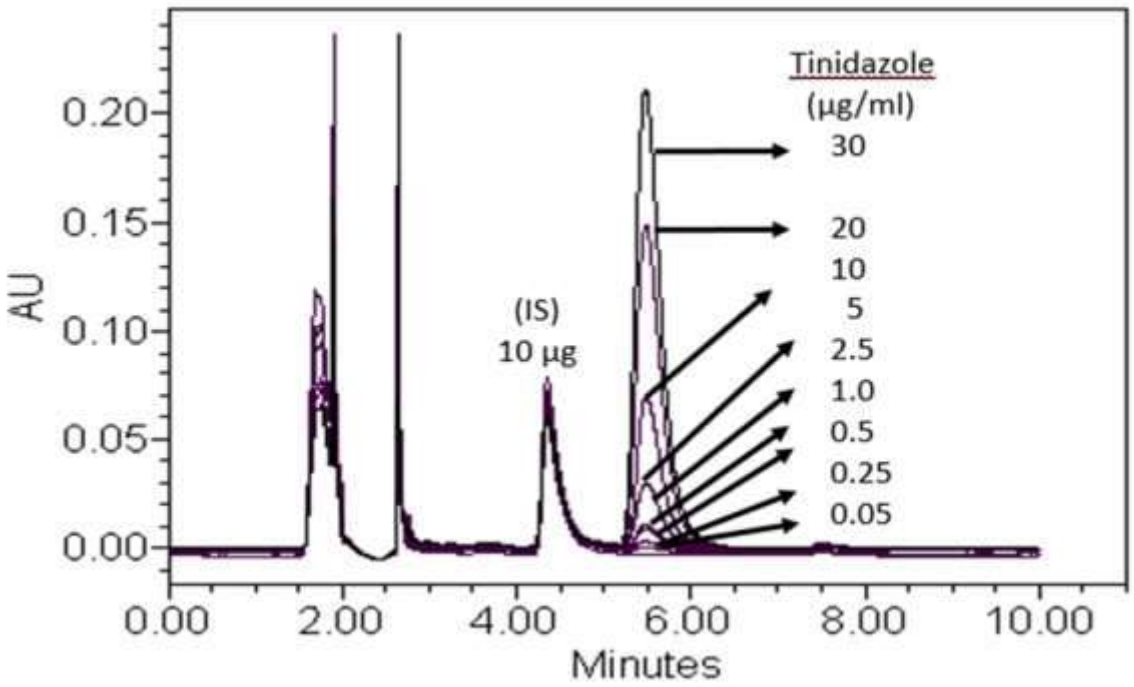


Figure 3: Overlay chromatograms of extracts from 0.4 ml human plasma spiked with the internal standard (IS) alone or with tinidazole at one of nine concentrations



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

REFERENCES

1. *Gerald LM, In; Goodman, Gilman. The pharmacological basis of therapeutics, 9th Edn. McGraw-Hill, New York, 1998; 1065.*
2. *Carmine AA, Brogden RN, Heel RC, Speight TM, G S Avery GS. Tinidazole in anaerobic infections: a review of its antibacterial activity, pharmacological properties and therapeutic efficacy, 1982; 24(2):85-117.*
3. *Mattila J, Mannisto PT, R Mantyla R, Nykanen S, Lamminsivu U. Comparative pharmacokinetics of metronidazole and tinidazole as influenced by administration route. Antimicrob. Aents Chemother, 1983; 23(5):721-725.*
4. *Kumar De A, Kumar Bera A, Biswajit Pal. Method development and validation for the determination of tinidazole by reverse phase technique, Int J Pharm Sci. Resh, 2015; 56: 3594-3598.*
5. *Zhikui Y, Suying Ma, Jincai W, Xiaojun S. Journal of Analytical Methods in Chemistry 2013(3):185706.*
6. *Basavaiah K, Nagegowda P, Chandrashekar U. Determination of tinidazole by potentiometry, spectrophotometry and high performance liquid chromatography, Indian Journal of Chemical Technology, 2005; 12(3):273-280.*
7. *Wood BA, Monro AM. Pharmacokinetics of tinidazole and metronidazole in women after single large oral doses. Brit. J Vener Dis. 1975; 51(1): 51–53.*
8. *Slamnik M. Determination of tinidazole in tablets by dc polarography, J Pharm Sci. 1976; 65(5):736-737.*
9. *Ismail El-Bagary R, Asmaa Ahmed El-Zaher, Farouk Elkady E, Abdelkerim MA. A novel method for determination of tinidazole and metronidazole in aqueous solutions based on fluorescence quenching of functionalized CdS quantum dots as luminescent probe Future Journal of Pharmaceutical Sciences 2018; 4 (2): 2018, 185-190.*
10. *Singh L, Nanda S. Method for Determination of Tinidazole using Direct UV-Visible Spectrophotometry and Differential Spectrophotometry in Pure and Tablet Dosage Forms. East and Central African Journal of Pharmaceutical Sciences. 2011; (14) 75-80.*
11. *Ahmed A, Hamed HA, Abubakr MI. Capillary electrophoresis for the determination of norfloxacin and tinidazole in pharmaceuticals with multi-response optimization. Talanta 2007; 72 (2): 842-846.*
12. *Laufen H, Scharpf F, Bartsch G. Sensitive gas chromatographic assay of tinidazole in tissue and plasma Journal of Chromatography B: Biomedical Sciences and Applications. 1979; 163 (2): 217-220.*
13. *Dhananjay BM, Priyanka M, Sapna DD, Madhukar RT. Simultaneous Determination of Fluconazole and Tinidazole in Combined Dose Tablet using High Performance Thin Layer Chromatography. Der Chemica Sinica, 2017; 8(1):133-137.*
14. *Vinge E, Andersson KE, Ando G, Lunell E. Biological availability and pharmacokinetics of tinidazole after single and repeated doses Scand J Infect Dis. 1983;15(4):391-397.*
15. *Eunice EMK, , Eunice KK, Simone GS, Cristina Helena dos RS, Valentina P. Bioequivalence evaluation of two different tablet formulations of tinidazole in healthy volunteers arzneimittelforschung 2008; 58(11): 598-601.*
16. *Emam J, Rezazadeh M. Rapid, sensitive, and validated HPLC method for analysis of metronidazole and tinidazole under identical chromatographic conditions with UV detection and liquid-liquid extraction: application in bioequivalence studies Acta Chromatographica, 2013; 25(1); 111–125.*
17. *Huang LJ, Zhang CX, Gui M, Lei Y. A HPLC method for the determination of tinidazole in human plasma and application to a bioequivalence study. Latin American Pharm, 2014; 33(3):408-413.*
18. *B.Ramu et al, Formulation Of Lamotrigine Orodispersible Tablets By Using New Generation Superdisintegrants World Journal Of Pharmacy And Pharmaceutical Sciences Volume 4,2015, Issue 06, 631- 643.*
19. *Ramu B, Sathish Kumar M, Ramakrishna M (2015) Current Regulatory Scenario for Conducting Clinical Trials in India. Pharmaceut Reg Affairs. 4:137. doi: 10.4172/2167-7689.1000140.*
20. *Mounika, I y Ramu, B. 2018. "Lifestyle drugs: concept and impact on society." Journal of Human Virology & Retrovirology, 6(2): 46-49. https://doi.org/10.15406/ jhvrv.2018.06.00194*
21. *Ramu B, Saibaba SV. Role of community pharmacist in management of anaemia. Pharm Pharmacol Int J., 2018; 6(3): 216–220. DOI: 10.15406/ppij.2018.06.00178.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

UDC 58

MOUNTAIN ELEMENTS IN THE FLORA OF BUKANTAU

Serekeeva G.A.
Candidate of Biological Sciences, Associate Professor, Karakalpak State University named after. Berdaha
The Republic of Uzbekistan

ANNOTATION
The article discusses the features of mountain elements in the flora of Bukantau. In general, the mountain elements that are still preserved here in remnants are only a reminder of the mountain floras that once dominated here. Now these floras represent the flora of rocky deserts (hamada), which is being replaced by psammophilous groups due to the intensification of xerophilization processes
KEY WORDS: *salt marsh, psammophilus, flora, element, ridge, genus, family.*

The Kyzylkum Desert is located in the interfluve of the great Central Asian rivers Amu Darya and Syr Darya on an area of more than 300,000 sq. km. In the east, it abuts the western spurs of the Pamir-Alai (Pistalitau, Nuratau and Aktau ridges), ending in the southeast with the Sundukli sands. Along with the existing saline depressions (up to -17 m below sea level), Kyzylkum is characterized by the presence of 18 low-mountain remnant meridional ridges (Sultanuizdag, Aktau, Altyntau, Muruntau, Sangruntau, Dzhetimtau, Kazakhtau, Karaktau, Kokchatau, etc.). One of the highest among them is Bukantau (764 m), located in the north of Kyzylkum and composed of highly dislocated and metamorphosed Paleozoic shales.

P.K. Zakirov (1971) studied the flora and vegetation of the remnant lowlands of Kyzylkum (together with the flora of Nuratau) and estimated the flora of this desert to be 983 species of vascular plants belonging to 412 genera and 65 families. The reliability of these data raises very serious doubts, since they reflect a more deserted part of it. Undoubtedly, such a large number of taxa is due, first of all, to the presence of a whole network of remnant lowlands. The largest number of mountain elements has been preserved in Kuldzhuktau and Bukantau.

The species *Rhamnus coriacea (Regel) Kom*, previously given erroneously for Kyzylkum. - this is actually a well-separated race close to the Iranian bush *Rh. aff. sintenisii Rech. f.* Endemic species *Stipa aktauensis Roshev*. represents a Western Tien Shan relationship, and the remnant species *Silene tomentella Schischk.* and *Lepidium subcordatum Botsch. et Vved.* also show Mountain-Central Asian kinship.

Endemic umbrella species *Ferula kysylkumica Korovin* and the recently collected *Ferula aff. tenuisecta Korovin* also gravitate toward Western Tien Shan species. There is no doubt that the latter species is one of the few Western Tien Shan derivatives of the low-mountain semi-savannas that once dominated the remnants of central and northern Kyzylkum.

Allium rinae F. O. Khass., Shomuradov et Tojibaev, recently described from here, is a related group with the central mountainous Central Asian species *A. filidens Regel.* Another petrophytic endemic, *Astragalus holargyreus Popov,* belongs to the Caucasus-Central Asian-Dzungarian section *of Laguropsis Bunge.*

In 2010, several non-flowering plants of the monotypic petrophytic Khorasan-Mountain Central Asian genus *Chalcanthus Boiss were found here. (Ch. renifolius Boiss.).* Another endemic recently described from Bukantau, *Convolvulus afanassievii Luferov*, is close to the South Pamir-Alai *C. tujuntauensis Kinzik.*

As the remnant mountains move away to the north and northwest, the flora becomes much poorer and mountain ephemeral species are no longer present. Another remnant endemic is *Lagochilus vvedenskyi Kamelin et Zuckerw.* - also shows Western Pamir-Alai kinship.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



***Fig 1. Allium rinae* F.O.Khass., Shomuradov & Tojibaev**



***Fig 2. Astragalus holargyreus* Popov**



***Fig 3. Lepidium subcordatum* Botsch.et Vved.**

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Thus, the mountainous Central Asian floristic elements in the flora of the remnants of Kyzylkum have not yet disappeared, despite the strong aridization of the climatic situation observed throughout the territory of Turan. If we analyze the endemism of the floras of the remnants of Kyzylkum each separately, then only for Sultanwise 3 strict endemics out of 444 species were noted.

In Bukantau the number of endemics is greatest - 6 (out of about 500 species), and in Kuljuktau (about 600 species) - only 4 species. For Tamdytau, only 2 species are strictly endemic. Two species are also endemic to Kokchatau. In total, 31 endemic species were registered for all remnants, which is almost 2/3 of all endemics of Kyzylkum.

Thus, this endemism, despite its fairly high percentage (3.9%), cannot be compared with that of the Mountainous Central Asian province and its individual floristic districts and even regions. Moreover, this endemism has a young, progressive character based primarily on the Western Pamir-Alai and Western Tien Shan floras. On the other hand, endemic and, in particular, subendemic taxa (in fact, endemics of the Turanian province) undoubtedly define the core of the Kyzylkum flora as a relict desert flora, associated with African floras through Asia Minor.

The extra-arid lowlands proposed by Kamelin (1990) unite all available remnants within Turan. The floras of the variegated low mountains of the western part of the Fergana Valley undoubtedly gravitate towards those of the Turkestan and Kuraminsky ranges, just as the low mountains of Mangyshlak and Krasnovodsk, together with the Small Balkhan, are floristically close to the Kopetdag. In general, the mountain elements that are still preserved here in remnants are only a reminder of the mountain floras that once dominated here. Now these floras represent the flora of rocky deserts (hamada), which is being replaced by psammophilous groups due to the intensification of xerophilization processes.

BIBLIOGRAPHY

1. *Geldikhanov A. Flora Garakumov.: Author's abstract. dissertation d.b. n. Ashgabat, 1995, 34 p.*
2. *Granitov I.I. Vegetation cover of the southwestern Kyzylkum. Tashkent: FAN, 1964, T. 1, 417 p.*
3. *Zakirov P.Z. Botanical geography of the low mountains of Kyzylkum and the Nuratau ridge Tashkent: FAN, 1972, 417 p.*
4. *Kamelin R.V. Florogenetic analysis of the natural flora of Mountainous Central Asia. L.: Nauka, 1973b, 356 p.*
5. *Kamelin R.V. Flora of the Syrdarya Karatau. L.: Nauka, 1990, 145 p.*
6. *Khasanov F.O., Serekeeva G., G. Kadyrov. A new species of the genus Scrophularia from Bukantau // DAN, 2010, 2, pp. 76-77.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

UDC 621.382.2/.3

RESEARCH OF AVALANCHE BREAKDOWN OF P-N JUNCTIONS

Abdreymov A.A., Tagaev M.B., Khozhamuratova A.R., Karimboeva V.R.
Karakalpak State University named after Berdakh, The Republic of Uzbekistan

SUMMARY
The perfection of the source material, at the same time, very much depends on the technological processing methods used. Dislocations in the crystal structure are generated due to the occurrence of internal stresses, leading to plastic deformation of the material. Numerous studies have shown that one of the main causes of degradation and failure of semiconductor devices is the presence of internal mechanical stresses in them, the relaxation of which is accompanied by the appearance of structural defects.
KEY WORDS: *avalanche breakdown, microplasma breakdown, light emission, cylinder shape.*

1. INTRODUCTION

The reliability of semiconductor devices is primarily determined by the degree of perfection of the source material at the same time, and very much depends on the technological processing methods used. Obtaining films on a single-crystalline substrate or epitaxial growth makes it possible to introduce a dopant with an arbitrary required concentration and obtain a p-n junction, avoiding the process of solid-phase diffusion. This is due to the fact that the degradation of almost all devices is based on the phenomena of diffusion, defect formation and decomposition of supersaturated solid solutions [1].

In devices containing p-n junctions with high impurity concentration gradients, degradation of parameters will be observed over time, associated, for example, with the spreading of concentration profiles due to diffusion [2]. Taking into account all the factors that appear during the operation of devices, knowing the diffusion coefficients of impurities, it is possible to determine the amount of deformation of the concentration profile and predict the degree of degradation of electrical characteristics associated with changes in the profile [3Analyzing these processes, the process of avalanche breakdown of real large-area p-n junctions, which has a microplasma character, remains poorly studied. Indeed, already in the very first studies of avalanche breakdown of p-n junctions and Schottky diodes, it was shown that the breakdown in them is highly localized [4].

The local breakdown region has small geometric dimensions and a significantly lower breakdown voltage compared to homogeneous regions. The region of such localized breakdown was called microplasma [Mp]. However, [5-6] it was shown that dislocations do not always cause the appearance of microplasmas. p-n addition, in [7] it was theoretically proven that the phenomenon of microplasma breakdown can be interpreted as a special type of instability that occurs even in the case of an ideal p-n junction. In addition, analysis of experimental data shows that a local decrease in the breakdown voltage is most likely promoted not by single dislocations, but by their clusters.

2. EXPERIMENTAL SAMPLES

Experiments on silicon p-n junctions have revealed that the effect on the impact ionization current during an avalanche breakdown of inhomogeneous heating of a semiconductor is fundamentally different from the case of uniform heating. The temperature gradient, depending on the direction relative to the current, can either effectively (more strongly than with uniform heating) reduce or increase the impact ionization current. In this case, the breakdown voltage of the p-n junction changes significantly. The results obtained are explained by theory [8], which takes into account that, under the realized conditions, the flow of electric current leads to an increase or decrease in the number of electron-hole pairs in the space charge region of the p-n junction.

According to the theory of these phenomena [8], heating the p-n junction reduces the impact ionization coefficients of electrons and holes, which results in a decrease in the impact ionization current and an increase in the breakdown voltage of the p-n junction. These results are confirmed by experiments in which p-n junctions were heated uniformly.

We investigated impact ionization and avalanche breakdown in inhomogeneously heated p-n junctions. It was found that the effect of such heating on the current is fundamentally different from the case of uniform heating. The temperature gradient, depending on the direction relative to the current, can either effectively (more strongly than with uniform heating) reduce or increase the impact

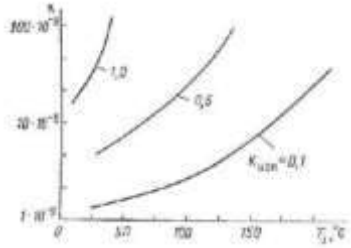
SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

ionization current. In this case, the breakdown voltage of the p-n junction changes significantly. The existing theory of impact ionization does not even qualitatively explain the experimental results obtained.

This stimulated the development of the theory of breakdown of a pn junction located in a nonuniform temperature field. This theory was developed in [9] and with its results the experimental results of this work are compared. Since the threshold ionization energy is proportional to the band gap width, elastic deformation leads to an increase in the local ionization coefficient. Other factors that lead to a decrease in avalanche breakdown voltage are also associated with dislocations, since dislocations are centers of deposition and increase the diffusion coefficients of impurities, which can lead to a local narrowing of the space charge region (SCR). In [10, 11], dislocations, point defects in silicon and associated localized energy states, as well as kinetic phenomena in deformed Si crystals, were studied.

Taking into account the above, it can be argued that the role of dislocations in the occurrence of microplasma breakdown is not fully understood. We studied p-n junctions with a breakdown voltage of 12V; at room temperature, the appearance of the first microplasma causes a current jump or fracture in the current-voltage characteristic. In the voltage range of the phenomenon of the first microplasma, no other microplasmas appeared in its vicinity.

Microplasma radiation using an optical system built on the basis of a vertical microscope for high temperatures.



Rice. 1 Dependence of the failure rate of semiconductor devices on the temperature of the structure [12]

The curves in Fig. 1 show how the failure rate of semiconductor devices changes with increasing structure temperature: already at a temperature of about 100°C, the reliability of the devices decreases by 5-10 times compared to the reliability at a temperature of 25°C [12]. If at the same time the device is simultaneously used to the maximum in any electrical parameter, then the failure rate can increase 100 times or more.

3. CALCULATION RELATIONS: SIMULATION OF 3-DIMENSIONAL CONTINUOUS RANDOM DEFECTS AT A P-N JUNCTION WITH ARBITRARY COORDINATES USING THE MONTE CARLO METHOD

In diol p-n junctions we denote all points with the letter ξ1,..., ξn are dependent, their joint density can be represented as the product of the conditions of the probability densities of these quantities: $P_Q(x_1, \ldots, x_n) = P_1(x_1)\, P_2(x_2 \mid x_1)\, P_3(x_3 \mid x_1, x_2) \ldots P_n(x_n \mid x_1, \ldots, x_{n-1})$. All conditional probability densities are expressed through the joint density $P_n(x_1, \ldots, x_n)$. We present expressions for conditional densities in general form; all integrals are taken from -∞ to +∞ let' s define the first defect $P_1(x_1) = \int \ldots \int P_Q dx_2 \ldots dx_n$, second defect $P_2(x_2|x_1) = \int \ldots \int P_Q dx_3 \ldots dx_n, [P_1(x_1)]^{-1}$
third defect $P_3(x_3|x_1, x_2) = \int \ldots \int P_Q dx_1 \ldots dx_n, [P_1(x_1)P_2(x_2|x_1)]^{-1}$,
n-1st defect $P_{n-1}(x_{n-1}|x_1, \ldots x_{n-2}) = \int P_Q dx_n, [P_1(x_1) \ldots P_{n-2}(x_{n-2}|x_1 \ldots x_{n-3})]^{-1}$,
we define the nth defect $P_n(x_n|x_1, \ldots x_{n-1}) = P_Q[P_1(x_1) \ldots P_{n-1}(x_{n-1}|x_1 \ldots x_{n-1})]^{-1}$
In the form of conditional definitions of distribution function defects $F_i(x_i|x_1, \ldots x_{i-1}) = \int_{-\infty}^{x_i} P_i(x|x_1 \ldots x_{i-1})dx$. Let γ1, …, γn be independent random numbers, which we will define as a random defect. A set of random variables ξ1,…, ξn obtained by sequentially solving equations with the system

$$F_1(\xi_1) = \gamma_1$$
$$F_1(\xi_2 \mid \xi_1) = \gamma_2$$
,,,,,,,,,,,,,,,,,,
$$F_n(\xi_n|\xi_1, \ldots, \xi_{n-1}) = \gamma_n$$

At each coordinate there are silicon atoms or either electrons and holes, defects. We have determined the functions of defects located at the p-n junction. If we prove that these defects located at the p-n junction, the values ξ1= x1, …, ξ i-1= xi-1 are fixed, then we

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

denote the random variable ξ 1 with the distribution function as F_i (ξ _i | x_1,⋯, x_(n-1))= γ _i. Then the definition of defects probability in the inequality x1< ξ 1< xi+dx is equal to P {x_ (i)< ξ _ (i)<x_(i)+dx_(i) |x_(i-1) }=P_i (x_i |x_i, …,x_(i-1))dx

Consequently, with the accuracy of determining the defect to infinitesimals of a higher order, the probability of joint fulfillment of the inequalities is equal to the product $P\{x_1 < \xi_1 < x_1 + dx_1, \dots, x_n < \xi_n < x_n + dx_n\} = P\{x_1 < \xi_1 < x_1 + dx_1\}P\{x_2 < \xi_2 < x_2 + dx_2 \mid \xi_1 = x_1\} \dots P\{x_n < \xi_n < x_n + dx_n \mid \xi_1 = x_1, \dots, \xi_{n-1} = x_{n-1}\} =$
$P_1(x_1)dx_1 P_1(x_1)dx_1 P_2(x_2|x_1)dx_2 \dots P_n(x_n|x_1, \dots, x_{n-1})dx_n = P_Q(x_1, \dots, x_n)dx_1 \dots dx_n$. and the definition of the defect is proven.

Using the geometric Monte Carlo method, we will determine the volume of microplasma based on its cylindrical shape. Let's mark the volume of space charge at the p-n junction with the letter Vopz. In this area we find a defect with which means microplasma. At this coordinate, we note the appearance of microplasma functions f(P) where located in the segment 0⩽ f(P) ⩽ h. In the three-dimensional space x, y, z, consider the cylindrical region $V_{mp}=V_{scr}\times(0, h)$, and in the microplasma volume V_{mp}, consider a random height point of the microplasma coordinate zh with density $\bar{\bar{P}}(x,y,z) = \frac{1}{h}P(x,y)$.

Obviously, the projection of the point z_h on the x, y planes where the defect that affected the microplasma is located is a random point h=(x, y), and the third coordinate h, let's call it z, does not depend on x and y and is uniformly distributed in the interval 0< z<h, so that its density P_z (z)=1/h we choose N independent realizations h1, h2, …, hn of the random point h; Let us denote by ν the number of points that are below the surface z=f(P) and make an estimate $\overline{(\Theta_N)}$=(h×ν)/N. The discrete random variable ν obeys the Bernoulli distribution P{ ν =m}=h_N^m P^m 〚(1-P)〛^(N-m) (m=0,1,⋯N), where P is the probability that the point h will be below the surface of the microflame z=f(P) .

Let's calculate this probability: $P = P\{h_{\text{мп}} < f(x_{\text{мп}}; y_{\text{мп}})\} = \int_{V_{\text{мп}}} dxdy \int_{\theta}^{f(x,y)} \bar{P}(x,y,z)dz = \frac{1}{h}I$. because $M\nu = N_p = \frac{1}{h}NI$, then from $\overline{\theta_N} = \frac{h\times\nu}{N}$ it follows that $M\overline{\theta_N} = I$. Convergence $\theta_N \xrightarrow{P} I$ follows from the well-known Bernoulli theorem on the convergence of frequencies to probabilities. However, the estimate from$\overline{\theta_N} = \frac{h\times\nu}{N}$ тасап also be represented in the form $\overline{\xi_N} = \frac{1}{N}\sum_1^N \xi_i$. Absolute convergence of the integral I= $\int_{scr} f(P)P(P)dP$ follows from the limitation 0≤ f(P) ≤ h. .

The geometric method is a generalization of the method for calculating the volume of microplasma where the defect is located in the space charge region. if the SCR volume is limited then we solve it like this $P(\text{P}) \equiv \frac{1}{S_{scr}}$ at $P \in V_{scr}$, then for large N numbers it is equal to $\frac{\nu}{N} \approx \frac{I}{h} = \frac{V_{MP}}{V_{scr}}$ where $V_{MP} = \int_{V_{scr}} f(P)dP$ volume of part space charge region V_{scr} , microplasma wire limited at the top by a cord surface$z = f(x_{\text{мп}}; y_{MP})$ and the volume of microplasma is equal to$V_{MP} = h \cdot S_{MP}$ this is the volume of the entire cylindrical region of the mycoplasma.

4. METHODOLOGY OF EXPERIMENTAL RESEARCH

Breakdown of a semiconductor diode most often occurs primarily through local areas where there are significant field distortions in the SCR, arising due to various types of defects, or associated with inhomogeneity of doping. Such areas are called microplasmas (MP). Accordingly, the degradation of semiconductor devices operating in the breakdown region is determined to a greater extent by the thermal properties of the MF. The study of the thermal properties of microplasmas is possible by measuring the noise characteristics of microplasmas, the method of modulation differentiation, as well as some optical methods. Measurement of noise microplasma characteristics.

Turning on the MF is accompanied by the appearance of jumps or bends in the current-voltage characteristic, as well as high-frequency noise when the MF is turned on and off. (Fig. 1a).



Fig.-1 Typical view of the reverse branch of the current-voltage characteristic of a diode with microplasmas (a), section of the current-voltage characteristic with an enhanced high-frequency noise component (b), [13] 1-section preceding the switching on of the first MF, 2-section with the switching on of the first MF. The dashed lines show transitions from 1 and 2 when the MP is turned on and from sections 2 and 1 when the MP is turned off.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

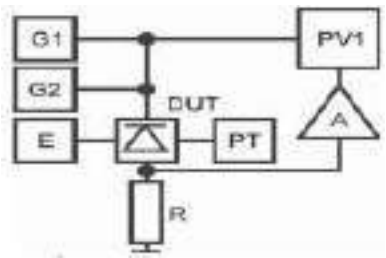


Fig.2. Block diagram of a microplasma characterograph: G1-direct current source; G2 sawtooth current generator; DUT-connecting device with diode; PV1-oscilloscope with recording device; A-Selective amplifier; RT case temperature meter; E-heater

The amplitude of microplasma noise characterizes the magnitude of the voltage jump between sections 1 and 2; therefore, information about the magnitude of this jump can be extracted from the noise characteristics of the current-voltage characteristic.

To study microplasma noise, a microplasma curve tracer is used, the block diagram of which is shown in Fig. 2 [13]. The operation of the characterograph is based on the fact that microplasma noise has components with a frequency above 100 kHz, which makes it possible to separate it from the constant component. Current flows through the DUT diode under study from the sawtooth current generator G2 and the direct current source G1, and the voltage drop across the diode through amplifier A is supplied to the input of oscilloscope 4, synchronized with generator 1.

The amplifier has unity gain at frequencies below 50 kHz and variable gain at frequencies above 50 kHz and variable gain at frequencies above 50 kHz, which ensures that only high-frequency noise is amplified. Microplasma characterograph: differential resistances, currents flowing through the MP in operating mode, diameters of hot areas and their temperatures. Using these parameters, it is possible to sort diodes and predict uptime.

The differential resistance of the i-th MF $R_{Дi}$ is determined by the slope of the linear section of the current-voltage characteristic. If R_{di}-1, R_{di} are the differential resistances of successive linear sections of the current-voltage characteristic, then the resistances of the corresponding MPs are equal to:

$$R_{МПi} = \frac{R_{дi-1}R_{лi}}{R_{дi-1}-R_{лi}}10^9 \qquad (1)$$

The current flowing through the MP in operating mode can be found by extrapolating the corresponding section of the current-voltage characteristic to the operating voltage of the diode. The differential resistance of the MF can be represented as the sum of three components: $R_{MP} = R_C + R_{OSC} + R_t$, where R_C is the spreading resistance, RSC is the resistance of the space charge region, Rt is the thermal component of the resistance. $R_C = \frac{\sqrt{2}\cdot\rho}{\pi\cdot d_{мп}}$

where , $\rho = \frac{1}{e\cdot\mu_n\cdot n}$ - resistivity of the quasi-neutral region of the semiconductor;

μ – carrier mobility, d_{mp} - microplasma diameter,
n – concentration of free charge carriers.
SCR resistances can be found using the approximate formula:

$$R_{SCR} = \frac{L_{MP}}{\pi\varepsilon_S\upsilon_S d_{MP}} \qquad (2)$$

Where ε_S is the dielectric constant of the semiconductor, and υ_S is the saturated drift velocity of carriers in the semiconductor, L_{MP} is the length of the MP. The thermal component of the MF resistance largely depends on the material and design features of the diode. If the multiplication region is removed from the metal heat sink, then R_t- can be found from the expression

$$R_t \simeq \frac{0{,}07\cdot B\cdot V_{МП}^2}{k\cdot L_{МП}}\left[4\cdot\sqrt{\frac{L_{МП}}{d_{МП}}}-1\right] \qquad (3)$$

where B is the temperature coefficient of diode breakdown voltage, k is the thermal conductivity coefficient, V_{MP} is the breakdown voltage of the MP. As you can see, R_t significantly exceeds R_s and R_{SCR}. Based on this, using the formula

$$R_t \simeq \frac{0{,}07\cdot B\cdot V_{MP}^2}{k\cdot L_{MP}}\left[4\cdot\sqrt{\frac{L_{MP}}{d_{MP}}}-1\right]$$

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

find d_{mp} and determine overheating

$\Delta T_{\text{МП}} = I_{\text{MP}} \frac{R_t}{B \cdot V_{MP}}$ (4) . Using these data, it is possible to reject diodes with the hottest MPs and predict the life of the diodes.

Measurement of derivative current-voltage characteristics. The presence of nonlinearity in the diode's current-voltage characteristic may indicate a change in the mechanism of current flow, the inclusion of an MP, or a violation of the uniformity of current flow.

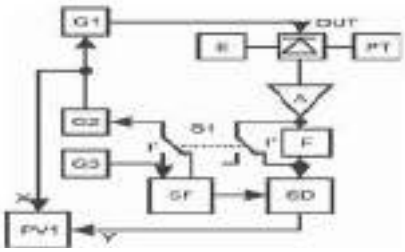


Fig. 3. Block diagram of the characteristic graph for modulation differentiation (CVH) [14].

Weak changes in the current-voltage characteristics associated with these nonlinearities are poorly diagnosed from static current-voltage characteristics, but are easily visible on their derivatives, which makes it possible to determine the rate of degradation processes and predict diode failures. There are several methods for measuring derivatives of the current-voltage characteristics, including numerical differentiation of the current-voltage characteristics and differentiation using modulation with sinusoidal or linearly varying voltages. Modulation methods are usually preferred because they are placed higher up.

The essence of the method for measuring derivatives of current-voltage characteristics with sinusoidal modulation is to measure the parameters of a filtered alternating current signal through a diode, to which a modulating sinusoidal signal is applied in combination with the bias voltage.

The block diagram of modulation studies of microplasma breakdown is shown in Fig. 3. It includes a series-connected scan generator G_1, a constant bias source G_2, an audio frequency modulation generator G_3, which forms a signal source block. The I0 value is set slightly below the start of the breakdown. The sweep to the section of the current-voltage characteristic that interests us is carried out by a sweep generator. The sample current is measured by the operational amplifier after processing using a synchronous SD detector and is used to plot differential dependence graphs.

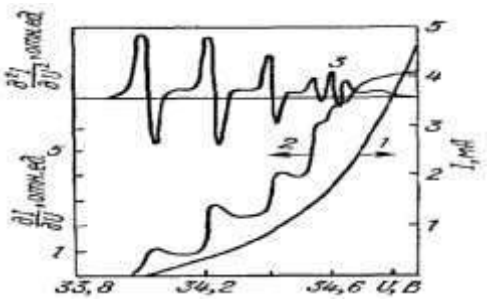


Fig. 4. Breakdown section of the current-voltage characteristic of a Schottky diode (1) and the curves of the first (2) and second derivatives (3), obtained on a modulation characterograph [14].

In the case where the first derivative is measured, the bias voltage is modulated by a double-frequency signal. To obtain the second derivative, the mixing voltage is modulated by the frequency of the first harmonic.

Voltage modulation leads to width and frequency modulation of microplasma pulses, which forms an alternating output signal, the harmonics of which are proportional to the derivatives of the current-voltage characteristics of individual MPs. Since the breakdown section of the current-voltage characteristic is formed by a set of MFs that are sequentially turned on as the bias current increases, the graph of the first derivative of the current-voltage characteristic turns out to consist of individual steps (Fig. 4.).

Based on the height of the steps, it is possible to determine the conductivity of each individual MP and calculate the thermal parameters of the MP, similar to measurements of noise microplasma characteristics. Based on the appearance of the second derivative of the current-voltage characteristic, one can detect the formation of a hot spot and estimate its diameter and temperature.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Thus, monitoring the thermal parameters of high-power semiconductor devices is one of the main ways to predict individual failure-free operation. The choice of method and equipment for monitoring the thermal parameters of semiconductor devices depends on the production stage, the type of packaging of the semiconductor device and its operating mode.

5. EXPERIMENTAL RESULTS AND DISCUSSION

In the experiments, simultaneously with the observation of the current-voltage characteristic of the p-n junction, the intensity of light emission of a separate microplasma was measured. To observe the current-voltage characteristic, a microplasma curve tracer was used. Areas with a current-voltage characteristic were observed, which made it possible to determine the absolute values of the electrical parameters of the microplasma by a "jump" in the current or a break in the current-voltage characteristic.

The maximum light intensity can be taken as the limit separating the area of avalanche breakdown with increasing voltage and light intensity from the area of thermoelectric breakdown with decreasing light intensity with increasing voltage. On the side of high voltages, the region of thermoelectric breakdown of microplasmas limits the appearance of negative dynamic resistance of the secondary breakdown of the p-n junction.

6. CONCLUSION

It was found that an increase in the reverse bias voltage leads to an increase in the intensity of the output pulse flux at the output of the noise diode. It was revealed that at high intensity values of the output pulse flux, for all studied brands of noise diodes, the presence of correlations between the pulses was observed. It has been established that the dependence of the intensity of the output pulse flow on the magnitude of the current flowing through the noise diode has two sections in which this dependence is linear. Thus, based on the analysis of the obtained dependencies and characteristics, we can conclude that the following processes occurring in noise diodes affect the intensity of the pulse flux at their output: impact ionization of minority charge carriers leaving the space charge region; thermal generation of charge carriers.

BIBLIOGRAPHY

1. *Tagaev M. B. Study of the inhomogeneity of avalanche breakdown processes in silicon p-n junctions. doctoral dissertation*
2. *Sinkevich V.F., Solovev V.N. Physical mechanisms of degradation of semiconductor devices. -Abroad.electron. Techn. 1984, issue. 2, p. 3-46.*
3. *Stoneham A. M. Non-radiative transitions in semicanductors. -Rep.progr.phys.-1981, Vol. 44, N12, pp. 1251-1295.*
4. *Mc Intyre R. J. Theory of microplasma instability in sillcon. - J. Appl. phys., 1961, V. 32, N6, P. 31-43.*
5. *Cottrel A. Theory of dislocations. -M.; Mir, 1969, 96 p.*
6. *Kikuchi, K. Tachikama Visible light emission and microplasma phenomena in silicon p-n junctions. - J. Phys. soc. Jap., 1960, pt.l.v.15, p.835-848, classification of weak spots in diffused p-n junctions.-J.Phus.soc. Jap., 1960, v.15, pt.2, p.1822-1830.*
7. *Gribnikov Z.S. On one mechanism of instability of homogeneous avalanche breakdown of Schottky layers. - FTP, 1977, v. 11, no. 11, pp. 2111-2118.*
8. *Grekhov I.V., Serezhkin Yu.N. Avalanche breakdown of a p-n junction in semiconductors. L., 1980. 152 p.*
9. *Dobrovolsky V.N., Gryaznoe S.B.//FTP .1992. T.26.V.8.S.1366-1374.*
10. *Grazhulis V.A., Kveder V.V., Mukhina V. Yu. Phys. Status Solidi (a), 44, 107 (1977).*
11. *Kveder V.V., Osipyan Yu.A., Schr¨oter W., Zoth G. Phys. Status Solidi (a), 72, 701 (1982).*
12. *Tugov N.M., Glebov V.A., Charykov N.A. Semiconductor devices. - M: Energoatomizdat, 1990.*
13. *Wald-Perlov V.M., Martirosov I.M., Tager A.S. Avalanche transit semiconductor diode. No. 245922. Publ. 1969, No. 20.*
14. *Konakova R.V., Kordosh P., Thorik Yu.A., Fainberg V.I., Shtofanik F. Predicting the reliability of semiconductor avalanche diodes. Kiev: Naukova Dumka, 1986. -188s.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

ISSUES OF FINANCIAL SUPPLY MANAGEMENT AND INCREASE EFFICIENCY OF JOINT STOCK COMPANIES

Shernaev Akbar Akmirzayevich
Ph.D., Associate Professor of the Department "Finance and financial technologies" of the Tashkent State University of Economics, Uzbekistan

ABSTRACT
The main goal of the article is to develop a scientific proposal and practical recommendations regarding the importance of financial strategy in ensuring the financial stability and growth of joint-stock companies. It covers objectives such as setting in motion other mechanisms for joint-stock companies to operate in accordance with their status in accordance with market relations.
KEY WORDS. *Financial strategy, financial management, foreign investor, marketing, corporation, consumers, corporate environment, corporate management, investors, investment activities.*

RELEVANCE OF THE TOPIC

In a relatively short period of time in our country, the adoption of laws on expropriation and privatization of property, protection of joint-stock companies and shareholders' rights, and other laws on the securities market in the full sense of the protection of the right to private ownership and economic development created an important basis for the development of corporate entrepreneurship in the form of competitive national joint-stock companies, which can become the main driving force of the economy.

Nowadays, joint-stock companies (corporations) play a greater role in determining the perspective of the national economy, and they perform important socio-economic functions by expanding the scale of production and creating new jobs. Almost all production facilities in our country are organized according to the principle of joint-stock companies, but let's ask ourselves the question of how well they operate in accordance with their status and use their rights. What other mechanisms should be put into action for joint-stock companies to operate in accordance with their market relations status.

Improving the financial management organization system in modernized large joint-stock companies plays an important role in solving tasks in this direction.

The development of joint-stock companies, which are considered to be large corporate links of the market infrastructure in our national economy, requires the introduction of modern management methods into the practice of these structures, and the rapid implementation of measures to unify their comprehensive activities around a clear strategic goal.

The organization of financial management in joint-stock companies represents the form of summarizing the activities of individual and collective entities. It can be considered that this process is a product of production management in a new content, it represents the process of socially transformed, complex relations that creates modern relations and fully meets the requirements of the market economy.

EXISTING PROBLEMS WITH THE SUBJECT

Determining the specific features of the organization of financial management in joint-stock companies, the development of corporate management, which is considered important for the Republic of Uzbekistan, is one of the urgent issues in the current situation. Taking this into account, the organization of corporate governance in foreign countries, its management aspects and mechanisms, organizational structures were studied, and based on this, the mechanisms for making management decisions, projecting the strategic direction, and organizing the management of the corporation's financial resources were justified. In the development of joint-stock companies in the republic, it is necessary to carry out rational financial management. This situation requires a two-way implementation of ensuring production efficiency, attracting additional financial resources to expand production, and fulfilling economic and social obligations to interested entities. Proper implementation of financial management in joint-stock companies ensures an increase in the amount of investments of foreign investors necessary for the development of the republic's economy.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Joint-stock companies with full foreign capital and foreign methods of corporate management are successfully operating in the territory of Uzbekistan. It is necessary to deeply study the experiences of these foreign companies and, based on their analysis, to create model structures of corporate management for joint-stock companies, to reform the management system of joint-stock companies in all branches and sectors of the real economy on this basis, and to actively introduce them into practice. Resolutely abandoning the obsolete and obsolete management plan-allocation system and nomenclature of positions, commercial director, finance director, customer service and procurement project manager, who meet the requirements of the market economy, and we should widely introduce other new positions in accordance with international practice, clearly defining their job duties and tasks. It is this classifier that should become the main criterion for the training of today's new generation of professional personnel. Today, the processes of modernization, restructuring and reorganization of joint stock companies are being carried out at a rapid pace in our country. At the same time that this process has become an urgent task, the issue of structural reorganization of enterprises is important.

It is known that any joint stock company goes through several stages in the process of its activity. The first stage consists of the process of establishing and restoring joint-stock companies, which are registered in the relevant state authorities (city or district authorities). This indicates the emergence of a new economic entity. In the conditions of the market economy, it is difficult for most of the state-registered enterprises to withstand competition in the first period of their activity. Therefore, the state supports small, joint, private and other enterprises according to national values and priorities and financial capabilities.

In order to find their place, some joint-stock companies are looking for ways to achieve savings by creating new production and functional departments in the development process, opening new shops to increase efficiency, or merging departments. In this case, the process of reorganization of joint-stock companies also takes place within the scope of making changes to their activities or closing the old enterprise and registering a new one. A special form of enterprise reorganization consists of structural reorganization of independent economic entities or their adherence to existing legal norms.

There are several points of view on the issue of the nature of structural reorganization. Restructuring in the market economy is defined as the reorganization of structural divisions of joint-stock companies as legal entities with independent balance sheets and account numbers.

WAYS TO SOLVE THE PROBLEM

Restructuring of joint-stock companies, that is, its structural reorganization, restructuring of assets and liabilities, gives the enterprise the opportunity to create sufficient conditions for the implementation of necessary innovative projects. The restructuring of the enterprise organized in the form of joint-stock companies is aimed at:

- Increase the overall investment attractiveness of the enterprise;
- Creation of a mechanism for investing in innovative projects that takes into account the competitive advantage of the enterprise;
- Such as the elimination of organizational obstacles that prevent effective management of prestigious and innovative projects.

The process of corporate restructuring can only be successful if it increases the market value of the restructured firm. On the other hand, it will be possible to achieve such a situation only if favorable financial opportunities and organizational conditions are created for the purpose of restructuring the company and implementing innovative projects that can give the company a competitive edge.

It can increase the market value of the enterprise, attract foreign capital and stimulate debt restructuring. This is especially important for companies facing a financial crisis. In this case, creditors agree to restructure even "hardened" debts.

Such restructuring is intended for debtors who have not fulfilled the agreements of both parties on the transfer of credit and who, according to their wishes, request the postponement of debts in an official way, of course, such postponement includes additional interest.

In the respective reporting periods, 25 of 31 joint-stock companies and state-owned enterprises of strategic importance made a net profit and 6 state-owned enterprises made a loss.[1].

Among the top 5 enterprises that ended their operations with a net profit in 2022 are Navoiy KMK JSC, Almalyk KMK JSC, Uzavtosanoat JSC, Uzbekneftgaz JSC, Uzmilliybank JSC (first half of 2023 according to the results, "Uzmilliybank" JSC took the

[1] *Information on the financial situation of strategically important joint stock companies and state enterprises for the first half of 2022 and 2023*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

place in the top 5, replaced by "Uztransgaz" JSC). The share of the top 5 enterprises in the total net profit received by 31 strategic enterprises is more than 70 percent.

In turn, by the end of the first half of 2022 and 2023, the largest net profit among 25 strategic enterprises was earned by JSC "Navoiy KMK". In this regard, 50.1 percent (15.4 trillion soums) of the net profit received by 25 strategic enterprises in 2022 will go to JSC "Navoiy KMK". In the first half of 2023, this figure was 34.5 percent (7.8 trillion soums).

At the same time, 6 state-owned enterprises ended their operations with a loss during the corresponding reporting period, and 5 of them made losses in two consecutive reporting periods. Among them were "National Electric Networks of Uzbekistan" JSC, "UzGazTrade" JSC, "Regional Electric Networks" JSC, "Toshshahartranskhizmat" JSC and "Uzbekistan Railways" JSC.

At the end of 2022, the company with the biggest loss was Uzbekistan National Electric Networks JSC, with 4.3 trillion soums in 2022 (36.4 percent of the total loss) and 1.3 trillion in the first half of 2023. soums (19.9 percent of total losses) were damaged.

As of July 1, 2023, the total assets of strategic enterprises amounted to 1 quadrillion 45.3 trillion soums and increased by 4.3% (44.4 trillion soums) compared to January 1, 2023.

However, compared to the previous period, the assets of about 10 state-owned enterprises had the opposite trend of decrease. Including the assets of JSC "Uzbekneftegaz" for 7.1 trillion soums (6.4 percent), the assets of JSC "Heating Electric Stations" for 4.3 trillion soums (9.3 percent), the assets of JSC "Uzbekistan Airports" - 3.7 trillion soums (22.1 percent), assets of Uzmilli Bank JSC - 3.2 trillion soums (2.8 percent), assets of "Asakabank" - 2.8 trillion soums (5.8 percent), the assets of Hududgaztaminot JSC decreased by 0.6 trillion soums (4.9 percent), the assets of Navoiyazot JSC decreased by 0.4 trillion soums (2.3 percent). .

Also, during the reporting period, the net assets of all state enterprises increased by 5.2 percent (20.1 trillion soums). In this case, the following state enterprises were among the top 5 with an increase in net assets: "Heat Power Stations" JSC (6 trillion soums or 36.3 percent), "Regional Electric Networks" JSC (3.6 trillion soums m or 27.2 percent), "Navoiy KMK" JSC (4.6 trillion soums or 19.4 percent), "Almalik KMK" JSC (3.5 trillion soums or 17.7 percent) and "Navoiyuran" » DK (0.9 trillion soums or 17.5 percent).

In turn, among the top 5 companies with a decrease in net assets are "Asakabank" ATB (3.2 trillion soums or 7.1 percent), "Uzbekgidroenergo" JSC (383.1 billion soums or 6.4 percent), "Toshshahartranskhizmat" JSC (36.8 billion soums 6.4 percent), "Uzbekistan Airways" JSC (197.9 billion soums or 2.6 percent) and "Hududgaztaminot" JSC (20, 4 billion soums or 1.0 percent).

Earlier, in March 2023, the state's stake in 31 large state-owned enterprises, commercial banks and UzAssets investment company, given to the Agency for Strategic Reforms, was transferred to the Ministry of Economy and Finance in March 2023.

In such a situation, the creditor is ready to wait a long time for the closing of the debt in exchange for covering the long-term "hardened" debt with additional interest. In the financial policy of joint-stock companies, new forms and methods of decision-making, which serve to increase the efficiency of its activity, represent the formation of the financial management environment.

SCIENCE-BASED SUGGESTIONS AND RECOMMENDATIONS

Having theoretically and methodologically studied the stages of financial management organization in joint-stock companies under the conditions of economic modernization, the conclusions and proposals on the features of the formation of financial management organization in joint-stock companies and directions for improvement are briefly as follows:

1. Although various financial problems of managing the activities of joint-stock companies have been important issues in the focus of attention of economists-scientists and practitioners for a long time, the foundations of financial management are just being formed in the Republic of Uzbekistan.
2. Organization of financial activities in joint-stock companies in the current conditions should have an appropriate effect on the improvement of production and economic activity through the effective use of the state's preferential loans, tax benefits, credit settlement system, perfect tax and loan interest rates;
3. In order to effectively organize financial management in joint-stock companies under the conditions of economic liberalization, it is necessary to encourage the use of achievements of scientific and technical development in their financial and economic activities, the organization and development of innovative activities;
4. In the conditions of economic liberalization, necessary needs such as provision of qualified personnel of joint-stock companies, improvement of their qualifications, require revision of the policy of financing of social expenses in it, search for necessary funds for relevant purposes.
5. Financial control is necessary in order to ensure the purposeful use of funds at the disposal of joint-stock companies, to ensure the integrity of goods and material assets, and to accelerate the circulation of working capital.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

6. In our opinion, due to the significant impact of inflation rates on the financial condition of joint-stock companies, financial managers of joint-stock companies should constantly take into account the impact of the consequences of the inflation process on the financial-value ratio of reproduction, the redistribution of financial resources, and the formation of income and expenses. they should evaluate indicators with appropriate changes when making financial estimates.

7. During the organization of financial management by joint-stock companies, they allow the following shortcomings:

- More striving for temporary results and therefore the insignificance of a prospective approach;
- Passive participation of heads of joint-stock companies in the process of development and justification of important directions of development due to limited knowledge and desire;
- Is a low level of preparedness of managers for new possibilities of financial activity, introduction of management principles in its important areas, taking into account the characteristics of enterprise activity.

8. In order to effectively organize financial management in joint-stock companies, it is advisable to make extensive use of the experiences of organizing financial management formed in enterprises operating in developed foreign countries.

Effective use of financial management creates a new value system in the economic life of joint-stock companies, changes its development prospects and laws. In the financial policy of joint-stock companies, new forms and methods of decision-making, which serve to increase the efficiency of its activity, represent the formation of the financial management environment.

REFERENCES

1. *Kobulov K. et al. Modeling the processes of forming a strategy for the revenue potential of local budgets //Journal of Advanced Research in Dynamical and Control Systems. – 2020. – T. 12. – №. 6. – C. 1210-1216.*
2. *Malikov T. et al. Methodological approaches to assessing and forecasting the tax potential of the region //Turkish Journal of Computer and Mathematics Education (TURCOMAT). – 2021. – T. 12. – №. 11. – C. 7056-7060.*
3. *Kobulov K. МЕТОДОЛОГИЯ ОЦЕНКИ НАЛОГОВОГО ПОТЕНЦИАЛА ТЕРРИТОРИИ //Архив научных исследований. – 2020. – Т. 35.*
4. *Kobulov K. НАЛОГОВЫЙ ПОТЕНЦИАЛ РЕГИОНА В КОНТЕКСТЕ ИНСТИТУЦИОНАЛИЗАЦИИ ЭКОНОМИЧЕСКИХ ОТНОШЕНИЙ //Архив научных исследований. – 2020. – Т. 35.*
5. *Kobulov K. СТРАТЕГИЯ РАЗВИТИЯ ДОХОДНОГО ПОТЕНЦИАЛА РЕГИОНА В УСЛОВИЯХ ИННОВАЦИОННОГО РАЗВИТИЯ ЭКОНОМИКИ //Архив научных исследований. – 2020. – Т. 35.*
6. *Kobulov K. Local budget revenues-as an important part of the profitable potential of the region //Архив научных исследований. – 2020. – Т. 35.*
7. *Malikov T., Kobulov K. Models of market economy formation and Interaction of fiscal policy //International Journal of Economic Growth and Environmental Issues-ISSN. – С. 2321-6247.*
8. *Shokirovich K. A. DIRECTIONS FOR OPTIMIZING LOCAL BUDGETS IN THE SUSTAINABLE DEVELOPMENT OF REGIONS //Spectrum Journal of Innovation, Reforms and Development. – 2023. – Т. 22. – С. 190-196.*
9. *Zayniddinovna B. P., Abdukarimovich Q. X. Directions For The Effective Use Of The Economic Potential Of The Region In Increasing The Revenues Of Local Budgets //International Journal of Progressive Sciences and Technologies. – 2021. – Т. 29. – №. 1. – С. 218-224.*
10. *Kobulov K. Methodological issues of forming the profitable potential of the region //International Journal of Economics, Business and Management Studies-ISSN. – 2020. – С. 2347-4378.*
11. *Kobulov K. INTERBUDGETARY EQUALIZATION IN FORMING THE INCOME POTENTIAL OF THE REGION //EPRA International Journal of Economics, Business and Management Studies (EBMS). – 2023. – Т. 10. – №. 3. – С. 84-87.*
12. *Eremina I. et al. Automation of investment and project management based on the introduction of an enterprise resource planning system in the power grid company //Sustainable Development and Engineering Economics. – 2023. – №. 1. – С. 8-26.*
13. *Akbarov M. A. et al. PRIORITIES FOR DEVELOPING THE INCOMES POTENTIAL OF THE REGIONS //Galaxy International Interdisciplinary Research Journal. – 2022. – Т. 10. – №. 11. – С. 1334-1337.*
14. *Kobulov K. et al. ISSUES OF EFFECTIVE MANAGEMENT OF INVESTMENT PROJECTS IN THE CONTEXT OF DIGITALIZATION OF THE ECONOMY //EPRA International Journal of Economics, Business and Management Studies (EBMS). – 2024. – Т. 11. – №. 1. – С. 1-4.*
15. *Kobulov K., Boymurodova L. ABOUT SOME FEATURES OF THE INVESTMENT CYCLE IN MODERN CONDITIONS //EPRA International Journal of Economics, Business and Management Studies (EBMS). – 2023. – Т. 10. – №. 12. – С. 37-41.*
16. *Enikeev A. A. et al. XVII International Multidisciplinary Conference "Prospects and Key Tendencies of Science in Contemporary World". Proceedings of the Conference (March, 2022). Bubok Publishing SL, Madrid, Spain. 2022. 100 p. – 2022.*
17. *Akbarov M. A. et al. PRIORITIES FOR DEVELOPING THE INCOMES POTENTIAL OF THE REGIONS //Galaxy International Interdisciplinary Research Journal. – 2022. – Т. 10. – №. 11. – С. 1334-1337.*
18. *SHERNAEV A.A. TAX ANALYSIS IN MICROLEVEL TAX PLANNING // ELECTRONIC JOURNAL OF ACTUAL PROBLEMS OF MODERN SCIENCE, EDUCATION AND TRAINING. FEBRUARY, 2021 -IV. ISSN 2181-9750, 75-82-p.*
19. *SHERNAEV A.A. ON THE ISSUE OF THE EFFICIENCY OF TAXATION OF JOINT STOCK COMPANIES // «ЭКОНОМИКА И БИЗНЕС: теория и практика». Международный ежемесячный научный журнал - №9-2 (67). Москва, изд. ООО «Капитал», 2020. – с. 149-152.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

20. *Shernaev A.A. GENERAL METHODOLOGICAL BASES OF TAX PLANNING IN ENTERPRISES // International Journal of Economics, Commerce and Management United Kingdom ISSN 2348 0386 Vol. VIII, Issue 4, April 2020 Licensed under Creative Common Page 357*
21. *Шернаев А.А. Налоговое планирование в системе обеспечения финансовой безопасности в акционерных обществах // «Интернаука»: научный журнал - № 12(141). Часть 2. Москва, изд. «Интернаука», 2020. - с. 43-45*
22. *Shernaev, A. A. Principles and methods of organization of the internal tax control system in joint stock company. International Journal of Economics, Business and Management Studies-ISSN, 2347-4378.*
23. *Шернаев, А. А. (2020). Совершенствование налогового планирования в акционерных обществах-как механизм повышения эффективности финансового менеджмента. Экономика и общество, (4), 20-28.*
24. *Шернаев А.А. Актуальность среднесрочного бюджетированя в Республике Узбекистан. Перспективы Инноваций, Экономики и Бизнеса – Прага, 2009. - №1. – С. 65-66*
25. *Шернаев А.А. Необходимость перехода от годового прогнозирования бюджета к среднесрочному бюдетированию в Узбекистане. Экономика и финансы. – Москва, 2008. - №13. – с. 9-11*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

NAVIGATING URINARY TRACT INFECTIONS: ANTIBIOTIC RESISTANCE DYNAMICS AND TREATMENT PERSPECTIVES

Arun K S [1] Prejish C [2] Jomol P J[3] Anakha Vijayan[4] Bernaitis L[5]

[1]Scientific officer, Metropolis Health care, Ernakulam, Kerala, India - 682025
[2]Assistant Professor, Department of microbiology, Al Jamia Arts and Science college, Malappuram Dt, Kerala, 679325
[3] Senior Executive – Quality Controller, ToxiVen Biotech Private Limited, Coimbatore, Tamil Nadu, 641042
[4] Post graduate, Department of Biotechnology, MG University, Kottayam, Kerala, 686560.
[5]Associate professor, Department of microbiology, Nandha siddha medical college, Erode, Tamilnadu – 638107.

Corresponding Author: *Dr. Bernaitis L,Associate Professor,Department of Microbiology, Nandha Siddha Medical College and Hospital, Erode-638052.*

ABSTRACT

One of the most common medical disorders, urinary tract infections (UTIs) affect the kidneys, ureters, bladder, and urethra. Most of these infections affect the bladder and urethra, which are the main organs in the lower urinary system. Depending on the site and symptoms of the infection, UTIs might present as acute pyelonephritis, cystitis, or urethritis. UTIs can arise as a result of multiple risk factors. Escherichia coli, Klebsiella species, Enterococcus faecalis, Pseudomonas aeruginosa, Proteus species, Enterobacter species, coagulase-negative Staphylococci, and Acinetobacter species are common bacteria that cause these illnesses. Through processes including transformation, conjugation, transduction, and cross-resistance, antibiotic resistance in bacteria that cause urinary tract infections is quickly rising. The potential of plant-based therapies as alternate UTI treatment alternatives is also explored in this paper.

KEYWORDS: *Urinary tract infections, Antibiotic resistance, Uropathogens, Cystitis,Pyelonephritis, Alternative medicine*

INTRODUCTION

Urinary tract infections (UTIs) are among the most common types of infections, typically caused by microorganisms affecting the kidneys, ureters, bladder, and urethra. Most UTIs occur in the lower urinary tract, primarily involving the bladder and urethra (1). Women are at a higher risk of developing UTIs compared to men. Symptoms of UTIs can include a burning sensation during urination, frequent urge to urinate with small amounts of urine, cloudy urine, urine that appears red, bright pink, or cola-colored indicating blood, strong-smelling urine, and pelvic pain in women (2).

UTIs can be categorized based on symptoms and the affected area. Acute pyelonephritis, for example, presents with back and side pain, high fever, nausea, and vomiting. Cystitis is characterized by pelvic pressure, lower abdominal discomfort, frequent painful urination, and blood in urine. Urethritis involves burning during urination and discharge. UTIs occur when bacteria enter the urinary tract through the urethra and multiply in the bladder (3). Although the urinary system has defense mechanisms to prevent infections, sometimes these defenses fail, leading to infection. The most common cause of bladder infection (cystitis) is *Escherichia coli*, part of the normal human flora. Infections of the urethra (urethritis) are usually caused by gastrointestinal bacteria (4).

RISK FACTORS IN UTIs

The microorganisms commonly causing UTIs include

Several bacterial species are commonly associated with urinary tract infections (UTIs), posing challenges to effective treatment and management. Among these are *Escherichia coli* (E. coli), which is the most prevalent pathogen responsible for UTIs, particularly in community-acquired cases. Klebsiella species, including *Klebsiella pneumoniae*, are also frequently implicated in UTIs, especially in healthcare settings. *Enterococcus faecalis*, a gram-positive bacterium, can cause UTIs, particularly in individuals with underlying health conditions. *Pseudomonas aeruginosa*, known for its multidrug resistance, is another significant pathogen associated with complicated UTIs (9). Additionally, various species of Enterococcus, Proteus, Enterobacter, coagulase-negative Staphylococci, and Acinetobacter are commonly isolated pathogens in UTIs, each presenting unique challenges in treatment and antibiotic resistance profiles. Understanding the diverse array of bacterial species involved in UTIs is crucial for implementing targeted therapeutic strategies and mitigating the impact of antibiotic resistance in clinical practice (10).

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Antibiotic Resistance in UTI Pathogens

Antibiotic resistance in urinary tract infection (UTI) pathogens continues to pose significant challenges in clinical practice, necessitating ongoing research and surveillance efforts. Recent updates in this field highlight the evolving landscape of antibiotic resistance patterns among UTI-causing pathogens compared to earlier publications (11).

Escherichia coli (E. coli), the predominant cause of UTIs, has shown increasing resistance to commonly used antibiotics, such as trimethoprim/sulfamethoxazole, fluoroquinolones (e.g., ciprofloxacin), and cephalosporins. This trend is particularly concerning in community-acquired UTIs, where E. coli strains with extended-spectrum beta-lactamase (ESBL) production have become more prevalent, limiting treatment options and necessitating the use of carbapenems or alternative agents(12).

Klebsiella species, including *Klebsiella pneumoniae*, exhibit similar resistance trends, with rising rates of ESBL production and multidrug resistance, complicating UTI management in both community and healthcare settings (13). Additionally, carbapenem-resistant Klebsiella strains, often associated with healthcare-associated infections, pose significant therapeutic challenges due to limited treatment options and higher mortality rates.

Enterococcus faecalis, another common UTI pathogen, has shown variable resistance patterns, with some strains demonstrating resistance to ampicillin and vancomycin, further limiting treatment options in severe infections. *Pseudomonas aeruginosa*, known for its intrinsic and acquired resistance mechanisms, continues to exhibit multidrug resistance, particularly in complicated UTIs, necessitating the use of alternative agents such as polymyxins or aminoglycosides (14).

Other UTI pathogens, including Proteus species, Enterobacter species, coagulase-negative Staphylococci, and Acinetobacter species, have also demonstrated varying degrees of antibiotic resistance, posing challenges in empirical treatment selection and patient management (15).

Recent updates in antibiotic resistance patterns among UTI pathogens underscore the importance of antimicrobial stewardship, infection control measures, and the development of novel therapeutic strategies to address the growing threat of multidrug-resistant infections in clinical practice. Continual surveillance and research efforts are essential to monitor evolving resistance trends and inform evidence-based approaches to UTI management (16).

The Potential Alternatives for Antibiotics

Due to the challenges posed by microbial resistance, severe side effects, repeated high doses, high costs, and low efficacy of conventional antibiotics, researchers are increasingly motivated to explore natural remedies for the treatment of UTIs. Medicinal plants offer a wide range of therapeutic applications and are often used in communities lacking access to modern medical care (17). These traditional medicinal plants are employed to treat various ailments, including skin diseases, diabetes, UTIs, hepatitis, sexually transmitted diseases, cancer, hypertension, sexual impotence, and as contraceptives.

Herbal medicines are particularly effective against bacterial resistance due to their high efficacy and minimal or no side effects, along with easy availability. This has garnered significant attention from researchers interested in herbal treatments for UTIs. Some common medicinal plants used in managing and curing UTIs include *Vaccinium macrocarpon* (cranberry), *Tribulus terrestris, Trachyspermum copticum, Cinnamomum verum,* and *Hybanthus enneaspermus*. Although herbal medicines show great potential, further research is needed to explore their phytoconstituents and understand the mechanisms of action responsible for managing and curing UTIs (18).
Cranberry (Vaccinium macrocarpon Aiton) is the best-studied home remedy for UTIs. Evidence suggests that proanthocyanidins present in cranberries prevent bacteria from adhering to the walls of the urinary tract. Probiotics such as Lactobacillus and Bifidobacterium are beneficial microorganisms that act against infections in the urogenital tract (19). Reports on potential vaccine agents and antibodies targeting different toxins and effector proteins remain obscure, except for those targeting uropathogenic E. coli.

Other herbal remedies commonly explored for their potential antibacterial properties against UTIs include:

1. **Uva Ursi (Arctostaphylos uva-ursi)**: This herb contains arbutin, which is metabolized in the body to produce hydroquinone, a compound with antimicrobial properties. Uva ursi has been traditionally used to treat urinary tract infections (20).
2. **Dandelion (Taraxacum officinale)**: Dandelion has diuretic properties and may help increase urine production, potentially flushing out bacteria from the urinary tract (21).
3. **Goldenseal (Hydrastis canadensis)**: Goldenseal contains berberine, a compound with antimicrobial properties that may help inhibit the growth of bacteria, including some strains of E. coli (22).

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4. **Marshmallow Root (Althaea officinalis)**: Marshmallow root has mucilage properties, forming a protective layer over the urinary tract lining and potentially reducing inflammation and irritation (23).
5. **Echinacea (Echinacea purpurea)**: Echinacea is known for its immune-boosting properties and has been explored for its potential to support the immune system's response to bacterial infections (24).

While these herbal remedies show promise, it's essential to approach their use cautiously and consult with a healthcare professional, particularly for individuals with underlying health conditions or those taking medications (25). Additionally, more research is needed to establish the efficacy, safety, and optimal dosing of herbal remedies for UTI management. Integrating herbal remedies into comprehensive treatment approaches, alongside conventional medical therapies and preventive measures, may offer a multifaceted approach to combating UTIs while minimizing antibiotic use and mitigating the risk of resistance (26).

CONCLUSION

Urinary tract infections (UTIs) are among the most prevalent infections, particularly affecting women, and their treatment is increasingly challenged by the rising issue of antibiotic resistance. Misuse and overuse of antibiotics, along with genetic mutations in pathogens, have led to a significant increase in resistance, rendering many conventional treatments less effective and prompting longer and more intensive treatment regimens. These factors not only raise healthcare costs but also pose risks of side effects and further disruption of the human microbiome.

Preventive measures such as increased water intake, regular urination, avoiding irritants like alcohol and caffeine, and maintaining proper genital hygiene can help reduce the incidence of UTIs. However, given the growing problem of antibiotic resistance, there is an urgent need for alternative treatments.

Medicinal plants offer a promising solution, with a long history of use in traditional medicine for treating a wide range of ailments, including UTIs. Herbal remedies, such as those derived from cranberries and other medicinal plants, provide a natural, effective, and low-side-effect alternative to conventional antibiotics. Additionally, probiotics like Lactobacillus and Bifidobacterium show potential in preventing and managing UTIs.

Future research should focus on further exploring the phytoconstituents and mechanisms of action of these herbal remedies to fully understand their therapeutic potential. By integrating traditional knowledge with modern scientific research, we can develop more effective and sustainable treatments for UTIs, addressing the critical issue of antibiotic resistance and improving global health outcomes.

REFERENCE

1. *Flores-Mireles A, Walker JN, Caparon M, Hultgren SJ. Urinary Tract Infections: Epidemiology, Mechanisms of Infection and Treatment Options. Nat Rev Microbiol. 2015;13(5):269–284. doi:10.1038/nrmicro3432.*
2. *Hill A. Medically reviewed by Kubala J. 8 Herbs and Natural Supplements for UTIs. Healthline. 2020 May 18.*
3. *Aslam B, Wang W, Arshad MI, Khurshid M, Muzammil S, Rasool MH, et al. Antibiotic Resistance: A Rundown of a Global Crisis. J Infect Drug Resist. 2018;11:1645–1658. doi:10.2147/IDR.S173867.*
4. *Tan CW, Chlebicki MP. Urinary Tract Infections in Adults. Singapore Med J. 2016;57(9):485–490. doi:10.11622/smedj.2016153.*
5. *Shaheen G, Akram M, Jabeen F, Shah SMA, Munir N, Daniyal M, et al. Therapeutic Potential of Medicinal Plants for the Management of Urinary Tract Infection: A Systematic Review. Clin Exp Pharmacol Physiol. 2019;46(7):613–624. doi:10.1111/1440-1681.13124.*
6. *Patel H, Soni S, Bhagyalaxmi A, Patel N. Causative Agents of Urinary Tract Infections and their Antimicrobial Susceptibility Patterns at a Referral Centre in Western India: An Audit to Help Clinicians Prevent Antibiotic Misuse. J Family Med Prim Care. 2019;8(1):154. doi:10.4103/jfmpc.jfmpc_191_18.*
7. *Hooton TM, Scholes D, Hughes JP, Winter C, Roberts PL, Stapleton AE, et al. A Prospective Study of Risk Factors for Symptomatic Urinary Tract Infection in Young Women. N Engl J Med. 1996;335:468–474. doi:10.1056/NEJM199608153350703.*
8. *Lin HA, Yang YS, Wang JX, Lin HC, Lin DY, Chi CH, et al. Comparison of The Effectiveness and Antibiotic Cost among Ceftriaxone, Ertapenem, and Levofloxacin in Treatment of Community-acquired Complicated Urinary Tract Infections. J Microbiol Immunol Infect. 2016;49:237–242. doi:10.1016/j.jmii.2014.06.007.*
9. *Terlizzi M, Gribaudo G, Maffei M. Uropathogenic Escherichia coli (UPEC) Infections: Virulence Factors, Bladder Responses, Antibiotic, and Non-Antibiotic Antimicrobial Strategies. Front Microbiol. 2017;8:1566. doi:10.3389/fmicb.2017.01566.*
10. *Tessema NN, Ali MM, Zenebe MH. Bacterial Associated Urinary Tract Infection, Risk Factors, and Drug Susceptibility Profile among Adult People Living with HIV at Haswassa University Comprehensive Specialized Hospital, Hawassa, Southern Ethiopia. Sci Rep. 2020;10:10790. doi:10.1038/s41598-020-67426-1.*
11. *Das S. Natural Therapeutics for Urinary Tract Infections – A Review. Futur J Pharm Sci. 2020;6(1):64. doi:10.1186/s43094-020-00076-z.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

12. *Gupta K, Trautner BW. Urinary Tract Infections, Pyelonephritis, and Prostatitis. In: Bennett JE, Dolin R, Blaser MJ, editors. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases. 9th ed. Philadelphia: Elsevier; 2020. p. 882–909. doi:10.1016/B978-0-323-48246-4.00113-8.*
13. *Flores-Mireles AL, Walker JN, Caparon M, Hultgren SJ. Urinary Tract Infections: Epidemiology, Mechanisms of Infection and Treatment Options. Nat Rev Microbiol. 2015;13(5):269–284. doi:10.1038/nrmicro3432.*
14. *Medina M, Castillo-Pino E. An Introduction to the Epidemiology and Burden of Urinary Tract Infections. Ther Adv Urol. 2019;11:1756287219832172. doi:10.1177/1756287219832172.*
15. *Tandogdu Z, Wagenlehner FM. Global Epidemiology of Urinary Tract Infections. Curr Opin Infect Dis. 2016;29(1):73–79. doi:10.1097/QCO.0000000000000228.*
16. *Naber KG, Bergman B, Bishop MC, Bjerklund Johansen TE, Botto H, Lobel B, et al. EAU Guidelines for the Management of Urinary and Male Genital Tract Infections. Eur Urol. 2001;40(5):576–588. doi:10.1159/000047913.*
17. *Guo Y, Huang W, Wang L, et al. The traditional uses, phytochemistry, pharmacology, toxicology and quality control of Cinnamomi Ramulus: A review. J Ethnopharmacol. 2018;220:223-243. doi:10.1016/j.jep.2018.03.019.*
18. *Yap PSX, Yiap BC, Ping HC, Lim SHE. Essential oils, a new horizon in combating bacterial antibiotic resistance. Open Microbiol J. 2014;8:6-14. doi:10.2174/1874285801408010006.*
19. *Diop EA, Queiroz EF, Carvalho KM, et al. Evaluation of the anti-inflammatory, analgesic and antipyretic activities of the natural polyphenol chlorogenic acid. Biol Pharm Bull. 2002;25(12):1237-1240. doi:10.1248/bpb.25.1237.*
20. *Magalhães CB, Riva DR, DePaula LJ, et al. In vivo anti-inflammatory action of eugenol on lipopolysaccharide-induced lung injury. J Appl Physiol (1985). 2010;108(4):845-851. doi:10.1152/japplphysiol.01160.2009.*
21. *Kim M, Lim SJ, Kang SW, Um BH. In vitro antioxidant activity of some selected Prunus species in Korea. Arch Pharm Res. 2003;26(4):288-294. doi:10.1007/BF02980045.*
22. *Abubakar EM, Abboussi O, Mun'im A, Nindatu M, Halid A. Antimicrobial and antioxidant activities of endophytic fungi isolated from the leaves of Cassia alata Linn. J King Saud Univ Sci. 2015;27(4):334-341. doi:10.1016/j.jksus.2015.03.004.*
23. *Costa LC, da Silva TS, da Rocha RF, et al. Evaluation of analgesic and anti-inflammatory activities of the essential oil of Lippia gracilis leaves. J Ethnopharmacol. 2018;224:482-490. doi:10.1016/j.jep.2018.06.024.*
24. *Murugan K, Senthilkumar B, Senbagam D, et al. Novel synthesis of silver nanoparticles using leaf ethanol extract of Cassia auriculata: Characterization and their anti-bacterial activity. Mater Lett. 2013;105:220-223. doi:10.1016/j.matlet.2013.04.126.*
25. *Karimkhani MM, Ariff AB, Abdul Manan MA. Cinnamomum cassia bark in the production of quality vinegar: Optimizing the conditions using response surface methodology. J Food Sci Technol. 2015;52(4):2310-2318. doi:10.1007/s13197-014-1311-6.*
26. *Ibrahim MB, Ismail S, Omar W, Kassim JM, Bejo MH. In vitro antibacterial activity of Melaleuca cajuputi against clinical isolates of methicillin-resistant Staphylococcus aureus. J Teknol. 2013;65(3):49-52.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

RISK ASSESSMENT IN FINANCIAL DECISION MAKING ANALYSIS ONFISHERMAN PERSPECTIVE IN COASTAL REGION: A CASE STUDY

Mr. Swarn G Kanchan[1], Dr. C. K. Hebbar[2]

[1]*Research Scholar, Institute of Management & Commerce, Srinivas University, India.*
OrcidID: 0000-0003-0715-2325

[2]*Research Professor, Srinivas University, India.*
OrcidID: 0000-0002-3711-9246

Article DOI: https://doi.org/10.36713/epra17298
DOI No: 10.36713/epra17298

ABSTRACT

Assessing financial decision-making from a fisherman's perspective in coastal regions involves considering a range of risks. Market volatility, driven by fluctuations in fish prices and changing consumer demands, poses immediate challenges. Environmental factors, suchas climate change and natural disasters, can disrupt fishing conditions, impacting yields. Regulatory uncertainties, including shifts in fishing quotas and environmental compliance standards, add complexities. Technological advancements may necessitate investments, whilelimited access to credit and interest rate fluctuations present financial risks. Study is donewith secondary data such as case studies, literature reviews, books, blogs and internet sources. Findings show that it is reasonable to expect that conflicts in fisheries management will increase with time as human population grows and seafood demand increases.

KEYWORDS: *Risk Assessment, Financial Decision Making, Fisherman, Population, Coastal Region.*

INTRODUCTION

In the dynamic landscape of financial decision-making, particularly in coastal regions reliant on fishing activities, a comprehensive risk assessment becomes imperative for sustainable economic development. Fishermen, as key stakeholders in these coastal communities, navigate a complex web of uncertainties ranging from environmental factors to marketdynamics. This analysis aims to delve into the intricacies of risk assessment from the perspective of fishermen engaged in the fishing industry in coastal regions **(**Clark, C.W. (1996).

The coastal regions, characterized by their proximity to the intersection of land and sea, present unique challenges and opportunities for the fishing communities that inhabit them. The livelihoods of these communities are intricately woven into the fabric of marine ecosystems, subjecting them to a myriad of risks such as unpredictable weather patterns, fluctuating fish populations, and market volatility. As these risks directly impact the financial well-being of fishermen, a nuanced understanding of risk factors and their implications is crucial for decision-making process (Charles, A.T. (1998).

This analysis will explore the multifaceted nature of risks faced by fishermen, examiningboth external and internal factors that contribute to the uncertainty in their financial endeavours. By unravelling the intricacies of risk within the context of coastal fisheries, we aim to provide valuable insights that can inform strategies for risk mitigation, resilience- building, and sustainable financial decision-making. In doing so, this study contributes to the broader discourse on coastal community development and underscores the importance of integrating risk assessment into the fabric of financial decision-making processes in the fishing industry (Farrow, S. (2004).

RELATD RESEARCH WORK

Management methods provide means to address increasing complexity for successful fisheries management by systematically identifying and coping with risk.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table No 1: Related Research Work

S.NO	FOCUS	CONTRIBUTION	REFERENCES
1	Risk management through insurance in fisheries.	Insurance is a financial arrangement that redistributes the costs of unexpected losses. The key idea is that risk can be transferred to someone who is better able to bear it, moving towards Pareto efficiency.	Hanna, S.S. (1997). [4]
2	Management strategy evaluation inviting participation from all stakeholder group	Investments to reduce uncertainty around the dynamics of the resource can be incorporated into a management option using 'research-conditional' approaches.	Herrmann,, et al., (2004).[5]
3	Risk avoidance opportunities in fisheries management are case-by-case specific.	They show that bycatch mortality has been successfully reduced by separating fishing activity both spatially, by using weighted lines, and temporally by restricting fishing to night and to seasons which avoid high seabird activity.	Garcia, S.M.(1994).[6]
4	Many fisheries agencies employ some form of passive adaptive management, routinely updating harvest regulations and conducting stock assessments.	Any management process that updates the plan for the next period based on what has already happened is adaptive management. Formal adaptive management is more specific, seeking to create a plan that improves with experience through time in an efficient manner.	Hilborn R. (2007). [7]
5	Risk management is a loose term for the general process of identifying, characterizing and reacting to risk.	In the first, risks are identified and characterized. Then in the treatment stage, they are dealt with the recognition of uncertainty and advances in computational statistics, such as Bayesian analysis.	Leung, P. (2006).[8]
6	Study on myriad risks in fisheries management and their identification is of critical significance.	Uncertainty is widely regarded to be pervasive in fisheries and risks can be identified simply by following the sources of variability and uncertainty as these drive deviations from expectations.	Perruso, L., (2005). [9]

OBJECTIVESOF THE STUDY

1. To study the risk assessment in financial decision making.
2. To understand the stability and diversity fishing fleet.
3. To list out the challenges from seafood sustainability.

RESEARCH METHODOLOGY

The data available for this literature is adopted from numerous case studies, reviews of literature, journals and internet sources, and it identifies the other aspects related to risk assessment in financial decision making of coastal fishing financial decision.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

RISK ASSESSMENT IN FINANCIAL DECISION MAKING

In the context of financial decision-making, it is essential for fishing companies to conduct a comprehensive risk analysis that considers both short-term and long-term uncertainties. This involves evaluating the financial implications of potential disruptions in the supply chain, assessing the vulnerability of revenue streams to market volatility, and understanding the regulatory landscape. Risk mitigation strategies may include diversifying fishing operations, investing in technology for sustainable fishing practices, and developing adaptive financial management approaches (Minnegal, M. & Dwyer, P.D. (2008).

Furthermore, collaboration with governmental bodies, environmental organizations, and other stakeholders can enhance risk management efforts and contribute to the long-term sustainability of the fishing sector. Despite the inherent risks, effective risk assessment and management can position fishing enterprises to make informed financial decisions, navigate uncertainties, and sustain profitability in a dynamic and challenging industry. By incorporating a forward-looking and adaptable approach, fishing companies can enhancetheir resilience, protect their financial interests, and contribute to the overall sustainability of marine resources (Pitcher, T.J. (2008).

One significant risk stems from environmental factors, such as climate change and overfishing, which can impact fish stocks and disrupt fishing operations. Economic risks also play a pivotal role, as fluctuations in market prices for seafood products and changes in consumer preferences can directly influence the financial performance of fishing enterprises. Additionally, regulatory risks pose challenges, as evolving fishing regulations andconservation measures can affect access to fishing grounds and impose additional costs on industry participants (Sanchirico, et al., 2008).

STABILITY AND DIVERSITY FISHING FLEET

The stability and diversity of a fishing fleet are critical components in ensuring the resilience and sustainability of the fishing sector. Fleet stability refers to the ability of fishing operations to withstand external shocks and uncertainties, such as changes in environmental conditions or market dynamics. A diverse fishing fleet, consisting of vessels with different sizes, gear types, and targeting various species, can contribute to stability by reducing the reliance on a single resource and spreading the risks associated with fluctuations in fish populations or market prices (Rosenberg, A.A. & Restrepo, V.R. (1994).

Diversity in the fishing fleet also plays a pivotal role in promoting ecosystem sustainability. By utilizing various gear types that are appropriate for specific target species and ecosystems,the fishing industry can minimize the impact on non-target species and habitats. This approach aligns with the principles of ecosystem-based fisheries management, contributing tothe long-term health of marine ecosystems. Additionally, a diverse fishing fleet can enhance adaptability to changing regulations and market demands, allowing for strategic adjustments based on the evolving dynamics of the prices (Waugh, et al., (2008).

In summary, maintaining stability and diversity in the fishing fleet is essential for the overall sustainability of the fishing sector. It not only helps to buffer against uncertainties but also aligns with conservation goals and promotes responsible fishing practices. As the industry faces challenges such as climate change and overfishing, fostering a stable and diversefishing fleet becomes paramount for the continued success and viability of fisheries around the world Whitmarsh (1998).

CHALLENGES FROM SEAFOOD SUSTAINABILITY

Seafood sustainability faces a multitude of challenges that impact both the health of marine ecosystems and the long-term viability of the fishing industry. Overfishing remains a primaryconcern, driven by increased global demand for seafood and often exacerbated by inadequate fisheries management. The depletion of fish stocks not only threatens biodiversity but also jeopardizes the livelihoods of communities dependent on fishing. Additionally, illegal, unreported, and unregulated (IUU) fishing further exacerbates sustainability challenges, as it undermines conservation efforts and contributes to over exploitation (Tupper, 2002).

Environmental degradation, such as habitat destruction and bycatch, poses another significantchallenge to seafood sustainability. Destructive fishing practices, like bottom trawling, can damage sensitive habitats and disrupt entire ecosystems. Bycatch, the unintentional capture of non-target species, including endangered or vulnerable marine life, adds to the ecological impact. Addressing these challenges requires a holistic approach that combines effective fisheries management, enforcement of regulations, and the adoption of sustainable fishing practices and technologies (Sissenwine, M. (1984).

Consumer awareness and market dynamics also present challenges in promoting seafood sustainability. Many consumers are often unaware of the environmental and social impacts oftheir seafood choices. Mislabelling and fraud within the seafood supply chain further complicate efforts to make informed decisions. Creating a more transparent and traceable seafood supply chain, coupled with educational initiatives, is essential to empower consumersto choose sustainably sourced seafood and incentivize responsible practices within the fishingindustry. Overall, tackling the multifaceted challenges of seafood sustainability requires a coordinated effort from governments, industry stakeholders, and consumers to ensure the health of marine ecosystems and the future of the seafood supply (Weikard, H.-P. (2003).

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FINDINGS

Analysing risk assessment in financial decision-making from a fisherman's perspective reveals several key findings that shape their approach to managing uncertainties in the fishingindustry. One prominent factor is the inherent dependence on natural resources and environmental conditions. Fishermen often face risks related to fluctuating fish stocks influenced by climate change, overfishing, and habitat degradation. The unpredictability of these factors directly impacts catch yields, thereby affecting income and financial stability. Understanding and quantifying these environmental risks are crucial for fishermen when making decisions about their fishing operations.

SUGGESTION

Identify and analyse risks that are specific to the fishing industry, such as weather conditions,regulatory changes, fish stock variability, and environmental factors. Understanding these industry-specific risks is crucial for accurate assessment. Develop robust financial planning models that account for variability in catch volumes and fish prices. Maintain a contingency fund to cover unexpected expenses or revenue shortfalls. Regularly review and update financial plans. Invest in comprehensive insurance coverage that addresses various aspects of the fishing operation, including vessel insurance, liability coverage, and coverage for damageto fishing gear. Regularly review and update insurance policies to ensure adequate protection.

CONCLUSION

When conducting a risk assessment in financial decision-making analysis from a fisherman's perspective, it's important to consider the unique challenges and factors specific to the fishingindustry. Analyse market risks associated with fluctuations in fish prices. Consider factors like global demand, market trends, and the impact of geopolitical events on fish prices. Diversification of catch and exploring multiple markets can help mitigate market risks.Address sustainability risks by adopting responsible fishing practices. Overfishing and environmental concerns can impact the long-term viability of the industry. Beingenvironmentally conscious can also enhance the reputation of the business.

REFERENCES

1. *Clark, C.W. (1996). Marine reserves and the precautionary management of fisheries. Ecological Applications 6, 369– 370.*
2. *Charles, A.T. (1998). Living with uncertainty in fisheries: analytical methods, management priorities and the Canadian groundfishery experience. Fisheries Research 37, 37–50.*
3. *Farrow, S. (2004). Using risk assessment, benefit-cost analysis, and real options to implement a precautionary principle. Risk Analysis 24, 727–735.*
4. *Hanna, S.S. (1997). The new frontier of American fisheries governance. Ecological Economics 20, 221–233.*
5. *Herrmann, M., Greenberg, J., Hamel, C. and Geier, H. (2004). Extending federal cropinsurance programs to commercial fisheries: the case of Bristol Bay, Alaska, Sockeye salmon. North American Journal of Fisheries Management 24, 352–366.*
6. *Garcia, S.M. (1994). The precautionary principle: its implications in capture fisheries management. Ocean and Coastal Management 22, 99–125.*
7. *Hilborn R. (2007). Moving to sustainability by learning from successful fisheries. Ambio 36, 296–303.*
8. *Leung, P. (2006). Multiple-criteria decision making (MCDM) applications in fishery management. International Journal of Environmental Technology and Management 6,96–100*
9. *Perruso, L., Weldon, R.N. and Larkin, S.L. (2005). Predicting optimal targetingStrategies in multispecies fisheries: a portfolio approach. Marine Resource Economics20, 25–45*
10. *Minnegal, M. and Dwyer, P.D. (2008). Managing risk, resisting management: stabilityand diversity in a southern Australian fishing fleet. Human Organization 67, 97–108.*
11. *Pitcher, T.J. (2008) The sea ahead: challenges to marine biology from seafoodsustainability. Hydrobiologia 606, 161–185.*
12. *Sanchirico, J.N., Smith, M.D. and Lipton, D.W. (2008) An empirical approach toecosystem-based fishery management. Ecological Economics 64, 586–596.*
13. *Rosenberg, A.A. and Restrepo, V.R. (1994). Uncertainty and risk-evaluation in stock*
a. *assessment advice for U.S. marine fisheries. Canadian Journal of Fisheries andAquatic Sciences 51, 2715–2720.*
14. *Waugh, S.M., Baker, G.B., Gales, R. and Croxall, J.P. (2008). CCAMLR process ofrisk assessment to minimise the effects of longline fishing mortality on seabirds. Marine Policy 32, 442–454.*
15. *Whitmarsh, D.J. (1998). The fisheries treadmill. Land Economics 74, 422–427.*
16. *Tupper, M.H., Wickstrom, K., Hilborn, R. et al. (2002) Marine reserves and fisheriesmanagement. Science 295, 1233–1235.*
17. *Sissenwine, M. (1984). The uncertain environment of fishery scientists and managers.Marine Resource Economics 1, 1–30.*
18. *Weikard, H.-P. (2003). On the quasi-option value of biodiversity and conservation. In:Risk and Uncertainty in Environmental and Natural Resource Economics (eds J. Wesseler, H.-P. Weikard and R.D. Weaver). Edward Elgar, Northampton, pp. 23–37.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

IMPLEMENTATION OF ENERGY EFFICIENT SECURITY MECHANISMS FOR WIRELESS SENSOR NETWORKS

Sirasani Srinivasa Rao[1], Gajula Madhavi[2], G.Ravi Kumar[3],

[1]*Associate Professor, Department of ECE, Mahatma Gandhi Institute of Technology, Hyderabad, Telangana, India.*
[2]*Associate Professor, Department of ECE, Mahatma Gandhi Institute of Technology, Hyderabad, Telangana, India.*
[3]*Assistant Professor, Department of ECE, Mahatma Gandhi Institute of Technology, Hyderabad, Telangana, India.*

Article DOI: https://doi.org/10.36713/epra17302
DOI No: 10.36713/epra17302

ABSTRACT

Designing energy-efficient security mechanisms is critical for WSNs due to their limited power resources. Techniques like low-power cryptography, duty cycling, and energy-aware security protocols can help in achieving security without significantly impacting the energy consumption of sensor nodes. In this paper, we propose an energy aware geographical multipath routing scheme for WSNs. The distance to the destination location, remaining battery capacity, and queue size of candidate sensor nodes in the local communication range are taken into consideration for next hop relay node selection, and Analytical Hierarchy Process (AHP) and Geographical Routing Algorithm (GRA) are applied for decision making. Simulation results show that these schemes can extend the network lifetime longer than the original geographical routing scheme which only considers distance to the destination location.

KEYWORDS: *WSN, linear discriminate packet flow analysis system, optimized rout path switch, Analytical Hierarchy Process (AHP) and Geographical Routing Algorithms(GRA).*

1 INTRODUCTION

Different assaults, for example, listening in, data altering, and malevolent control direction infusion would force a genuine danger on secure and stable savvy lattices activity in the wireless channels. Because of progression in innovation, sensor networks, and wireless correspondence give ascend to another innovation known as wireless sensor networks (WSNs). This innovation is developing quickly as of late. The system works on the wireless medium. This medium is open for all, for example, the odds of a wireless system to be undermined in examination with wired networks are more in WSNs. So the arrangements devoted to the wired system are not adequate for asset compelled wireless sensor arrange. There is as yet a degree for wide inquire about the potential in the field of wireless sensor organize security[1-2]. In this part, we dissect issues identified with security in WSNs and feature investigates destinations actualized in this proposition in the field of wireless sensor networks. WSNs are developing as both a huge new level in the IT environment and a rich space of dynamic research including dispersed calculations, information the board, equipment and framework configuration, programming models, systems administration, security, and social elements. WSN screens the ecological and physical factors, for example, pressure, sound, temperature and so on, with the assistance of self-coordinated sensors that are dissipated over distinctive geological areas. The advanced networks play out the detecting movement along with the two bearings[3-4]. The WSNs are generally utilized in military reconnaissance, which are enacted the augmentation of the sensor networks. The WSN comprise of an immense number of hubs, which are interconnected with each other [5-6].

Every hub in WSN regularly contains the accompanying parts: a microcontroller goes about as a delegate between a wellspring of vitality and the sensor hubs, a radio handset with association with outside or inward reception apparatus. There is a requirement on assets, memory, vitality, correspondence data transfer capacity expense and size of WSN. Sensor networks comprise of many distinctive highlights. The all outnumber of hubs in an customary sensor system is higher than in an ordinary specially [7-8] appointed system. Thick organizations are normally wanted to guarantee better network and high inclusion. Therefore, the sensor modest hubs generally have stringent vitality requirements that make them more disappointment inclined. They are typically thought to be stationary, yet the unstable idea of wireless channels what's more, visit breakdown bring about a variable system topology. In a perfect world, sensor organize equipment must be little, reasonable, control effective, and solid in request to upgrade arrange lifetime, lessen the requirement for upkeep, include adaptability. There is a variety between star topology what's more, a multi-jump work topology as far as basic arrangement of sensor hubs. The sensor hubs are conveyed arbitrarily over the system. Fig 1 shows the multi-jump WSN engineering with various sensor hubs and a portal sensorhub [9-10].

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

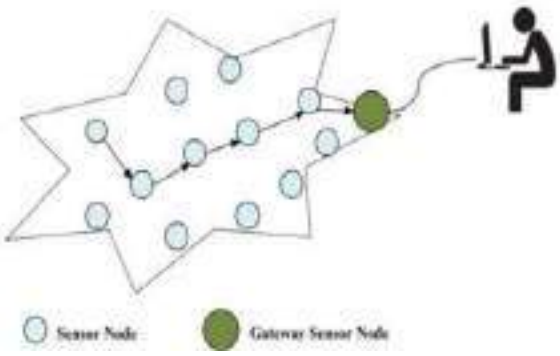


Figure 1 WSNs Multi-hop

Forswearing of-administration from sticking is hard to counteract with the constrained assets accessible to most specially appointed and WSN hubs [11-12]. Hubs may be static once conveyed, and have fixed vitality saves. Radio transmission is a vitality costly activity, yet an aggressor can meddle with it.

The military has since a long time ago managed sticking [13-14] by utilizing spread-range correspondence [15-16]. Be that as it may, the assets required for conventional resistances and the dangers in warfighting are inconsistent with the requirements in WSNs. Past age WSNS utilized single-recurrence radios and are unprotected against narrowband commotion, regardless of whether inadvertent or pernicious. These employments of spread range lessen the effect of narrowband commotion on correspondence, for example, that from microwaves and different wireless networks. Be that as it may, they don't overcome an enemy with learning of the spreading codes or jumping succession. Since these are either institutionalized (in IEEE 802.15.4) or got from hub addresses (in Bluetooth), they are not mystery. While it isn't likely that asset compelled WSNs will have the option to oppose a well- subsidized, ground-breaking wide-band jammer, we accept the bar has been left painfully low. We show that an aggressor ready to bargain a WSN hub can soley through programming cause an overwhelming refusal of-administration. This interfere with sticking assault is vitality effective and stealthy, since it possibly sticks when vital. Further, the aggressor's microchip can rest until the message is recognized by means of an interfere [17-18].

As WSNs move from the lab and controlled conditions into open spaces, their introduction to various types of security assaults develops. Safeguards against such effectively mounted sticking assaults are expected to change the existing security unevenness, regardless of whether arrangements are definitely not impeccable or don't address all classes of assailants [19-20]. Past arrangements center around the troublesome issue of identifying sticking, make troublesome suppositions about hub portability or abilities, don't address sporadic sticking, or are assessed uniquely in reproduction. To the best of our insight, this work is the first to legitimately go up against different sorts of sticking on normal WSN equipment with arrangements that are indicated observationally to enable hubs to keep on conveying regardless of an continuous disavowal of- administration assault [21-22].

SYSTEM MODEL

To accomplish energy-efficiency a proficient system of group head choice is acquainted with limit the cover zone secured by at least one bunch heads. In existing information collection conventions, a solitary example is determined by applying a totaled work on the perusing of all the sensor hubs in a bunch. This activity is performed by the bunch head. There are two downsides of this plan[25-26]. The principal disadvantage is that the measure of information got by the base station is less in light of the fact that the perusing of a few bunch individuals is changed over to a solitary perusing and this single perusing is gotten by the base station from each bunch which influences the general consequences of the group. The second disadvantage of existing secure information total plans is that it breaks the standard of privacy between a sensor hub and the base station on the grounds that the real perusing of a sensor hub is unveiled to the group head. So in introduced information conglomeration conventions, these issues have been tended to appropriately. In first case, rather than sending a solitary collected example from group head to the base station, one example from each copy class is moved from a sensor hub to the base station. This convention likewise keeps up the rule of classification between a sensor hub and the base station as the genuine sensor perusing is escaped the group heads. Rather than sending the real perusing to the group head, the sensor hub sent an example code to the bunch head. This example code is all that anyone could need to analyze the excess among the readings of two extraordinary sensors. This plan additionally gives a security system between sensor hubs and aggregator sensor hub and BS.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

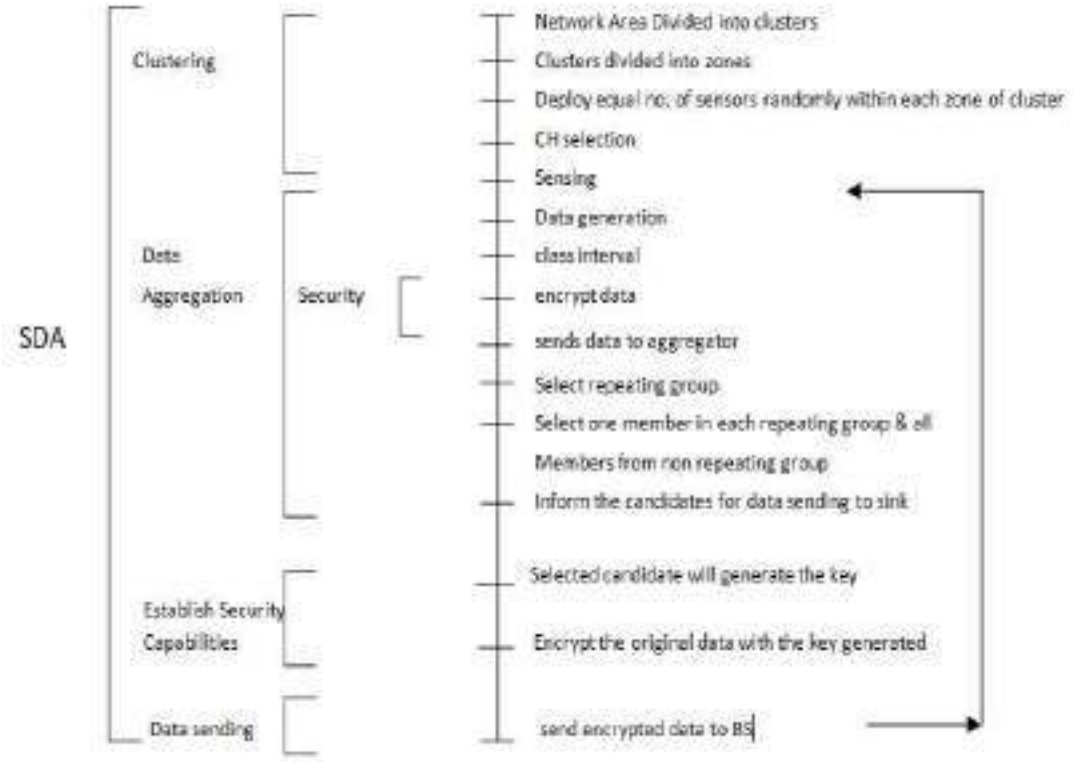


Figure 2: System-Model

Security is a broadly utilized term incorporating the attributes of verification, security, honesty, nonrepudiation and hostile to playback [1]. When contrasted with wired networks, the WSNs are exceptionally inclined to assaults due to asset imperatives on sensor hubs and the communicate idea of the transmission medium. Security confirmation is the significant test in WSNs. In sensor networks, novel difficulties develop in guaranteeing the security of sensor hubs and the information they produce. A sensor system ought not spill sensor readings to its neighbors. The hubs in the WSNs utilized for military correspondence contains delicate information. In a few applications, the hubs disperse the keys that are delicate in nature. Thus, it is basic to build a safe direct in WSN.

Proposed Method

The fundamental objective of security in WSNs is to ensure the data put away in the memory of sensor and furthermore to monitor the data and assets from assaults and bad conduct. Security prerequisites in WSNs are appeared in Fig 3.



Figure.3. WSN Security requirements

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

In this part we present a study of information directing calculations and some security related parameters in WSNs. In-arrange collection manages this conveyed handling of information inside the arrange. In this scheme, the sensor network is separated into pre-characterized set of locales every district is answerable for detecting and detailing occasions that happens inside the area to the sink hub. In a run of the mill sensor arrange situation, unique hub gather information from the earth and afterward send it to some focal hub or then again sink which examine.

Be that as it may, in-Network information collection s, information delivered by various hub can be mutually prepared while being sent to the sink hub. Elena Fosolo et al in [8] characterizes the in- arrange conglomeration process as pursues: accordingly expanding system lifetime." In in network accumulation, the sensor with the most basic data totals the information bundles and sends the melded information to the sink. Every sensor transmits its signal solidarity to its neighbors. On the off chance that the neighbor has higher sign quality, the sender quits transmitting parcels. Subsequent to getting parcels from every one of the neighbors, the hub that has the most noteworthy sign quality turns into the information aggregator. The in-organize accumulation plan is most appropriate for conditions where occasions are exceptionally restricted.

EXPERIMENTAL RESULTS

We think about the vitality cost of the beamforming plan with that of a joined helpful conspire which specifically switches between helpful beamforming and agreeable decent variety in light of the geometry of the system to limit the normal vitality.

Two arrangements of reenactments are performed. In the primary arrangement of analyses, we fix the separation between the source and the goal hubs, and take a gander at the presentation of the joined helpful conspire versus agreeable beamforming. We place the source hub at the inside of the system, i.e., at area (0, 0), and put the goal at separation 2 from the source at area (2, 0). The busybody hub is permitted to be in any point in the square system. Fig. 4 answers the primary inquiry presented in the presentation, by demonstrating the meddler areas for which changing to helpful assorted variety brings about vitality reserve funds just as the measure of vitality put something aside for every area. Fig.4 shows the outcomes for various estimations of the parameters α, D and E, to catch the impacts of the three parameters. We see that the consolidated plan can show a critical exhibition improvement getting near 90% vitality reserve funds for some busybody areas.

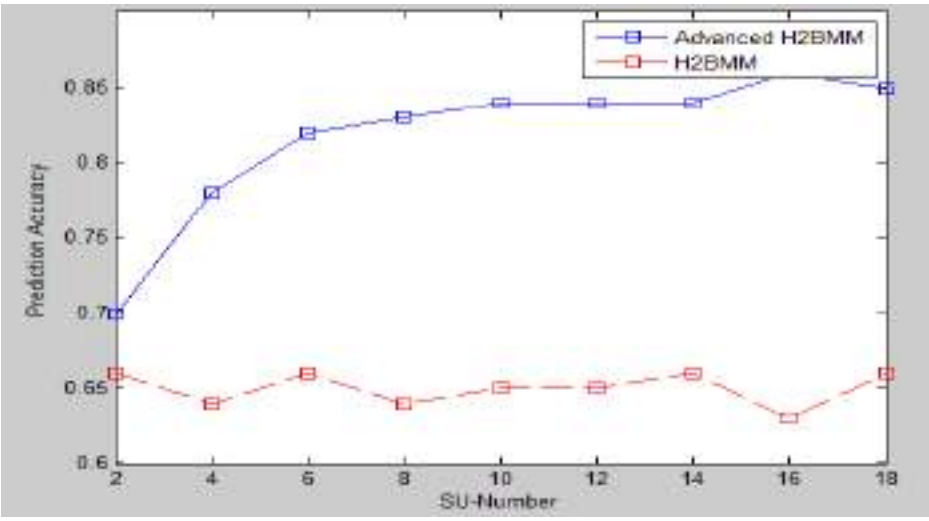


Fig .4: Prediction accuracy

This is the decent variety increase acquired. Other than indicating that agreeable decent variety can be helpful in lessening the transmission vitality in a protected correspondence, Fig. 4 likewise gives knowledge about the geometries where the joined plan shows better execution. Results from the primary arrangement of tests, introduced in Fig. 4, offer response to our first question, as we see that there are a few cases wherein agreeable assorted variety can help to accomplish vitality gains. This perception prompts the second arrangement of investigations, where we ascertain the normal vitality investment funds by the joined helpful plan over all areas of the meddler. Like the principal set of reenactments, the source hub is put at the inside of the square topology. The goal hub is put at various areas along the X-pivot in steps of 0.5 away from the source.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

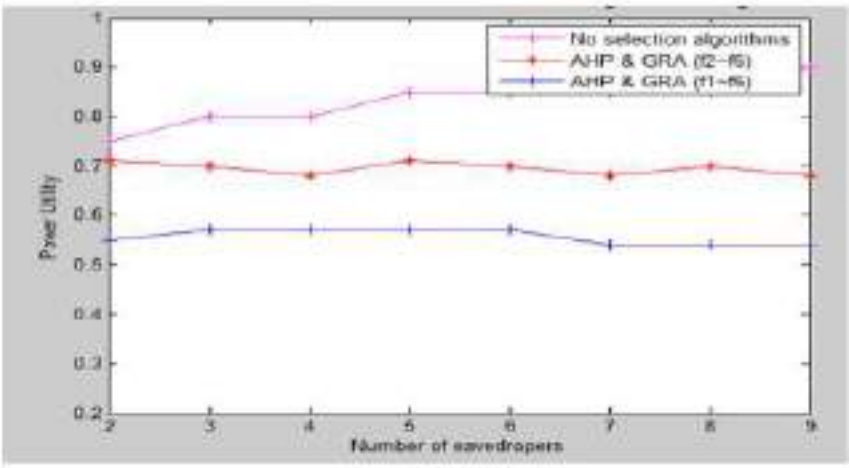


Fig: 5. Power consumption of AHP & GRA versus number of Eavesdroppers

Fig. 5 shows the transmission control versus the quantity of spies around the transmitter. In this figure, $p_{eav} = 10^{-5}$, $r_{min} = 0.01$, $r_{max} = 2$, and dSD = 1. As the power required when utilizing AHP doesn't rely upon the quantity of busybodies. Then again, when the quantity of meddlers builds, the power expected to set up a safe connection utilizing GRA increments significantly. Since the expense of correspondence utilizing AHP just relies upon the separation between the transmitter and the beneficiary which is standardized to dSD = 1, the expense of utilizing AHP doesn't change with the difference in way misfortune type in these plots.

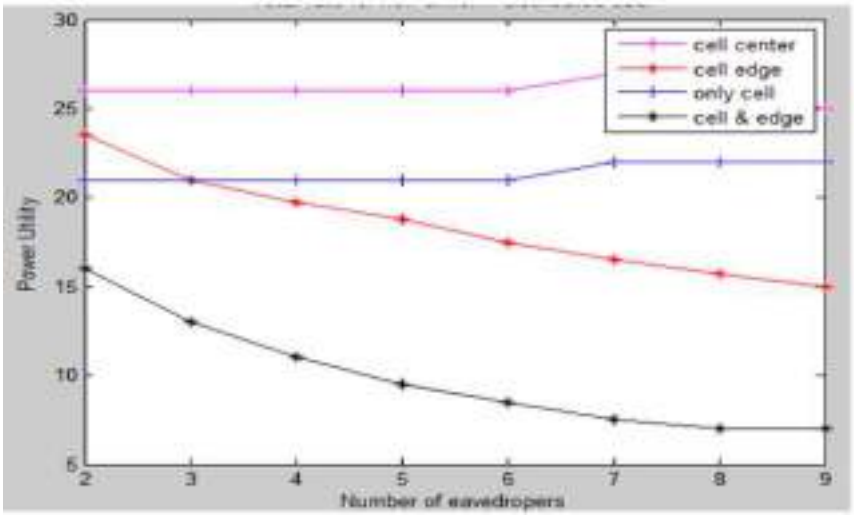


Fig. 6: Power consumption of cells versus the radious r_{min}

Though the proposed calculation (AHP) doesn't require a watchman locale, review that GRA can't be used without such. Fig. 6 shows the control versus r_{min} within the sight of nE = 5 spies, and for different estimations of the way misfortune example α. We set dSD = 1, peav = 10^{-5} what's more, $r_{max} = 2$. We watch that when r_{min} gets little, the power expected to set up a safe connection utilizing GRA increments significantly, while the power expected to set up a protected connection utilizing AHP doesn't rely upon the area of the spy. In certainty as the power utilized by AHP is free of the separation between the transmitter furthermore, the meddlers, and, regardless of whether the spies.

CONCLUSION

In this paper, we have considered secure vitality proficient directing in a semi static multi-way blurring condition within the sight of latent spies. Since the spies are inactive, their areas and CSIs are not known to the real hubs. In this way we searched for approaches that don't depend on the areas and nature of the channels of the spies. We built up a vitality proficient steering calculation dependent on irregular sticking to abuse non-idealities of the spy's collector to give mystery. Our steering calculation is quick (finds the ideal way in polynomial time), and doesn't rely upon the quantity of spies and their area or potentially channel state data.

REFERENCES

1. *I. F. Akyildiz, W. Su, Y. Sankara Subramanian, and E.Cayirci,―Wireless sensor networks:A survey,‖ Computer Networks, vol. 38, no. 4, pp. 393– 422,2002.*
2. *R. Anderson, Security Engineering: A Guide to Building Dependable Distributed Systems. Wiley Computer Publishing, 2001,*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

pp.326–331.

3. *R. L. Pickholtz, D. L. Schilling, and L. B. Milstein,—Theory of spread spectrum communications – a tutorial,‖ IEEE Transactions on Communications, vol. 20, no. 5, pp. 855–884,1982.*
4. *Chipcon AS, subsidiary of Texas Instruments, CC1000 and CC2420 Radio Transceiver Products,U,*
5. *J. Hill, R. Szewczyk, A. Woo, S. Hollar, D. E. Culler,and K.S.J.Pister,—System architecture directions for networked sensors,‖ in Proc. of ASPLOS, 2000, pp.93–104.*
6. *Crossbow Inc., MICAz Wireless Sensor Network Hardware,*
7. *J.Polastre, R.Szewczyk, and D.Culler,—Telos: enabling ultralow power wireless research, in IPSN, 2005, pp.364–369.*
8. *Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low Rate Wireless Personal Area Networks (LR-WPANs), IEEE 802.15.4-2003 Standard for Information Technology, 2003.*
9. *R.M.Kling, Intelmote: an enhanced sensor network node,‖ in Int'l Workshop on Advanced Sensors, Structural Health Monitoring, and Smart Structures,2003.*
10. *Wireless MAC and PHY Specifications for Wireless Personal Area Networks (WPANs),IEEE 802.15.1-2005 Standard for Information Technology, 2005, (Bluetooth).*
11. *Md Abdul Azeem, Khaleel-ur-Rahman khan,A. Pramod,—Security Architecture Framework and Secure Routing Protocols in Wireless Sensor Networks-Survey‖, in International Journal of Computer Science & Engineering Survey (IJCSES), Vol.2, No.4, pp. 189-204, November2011.*
12. *XLuo, XuJi and Myong-Soon Park,—Location privacy against traffic analysis attacks in wireless sensor networks‖, in International Conference on Information Science and Applications (ICISA), Seoul, Korea, Vol. 1, No. 6, pp. 1–6, 21-23 April, 2010.*
13. *Tamara Bonaci, Linda Bushnell and Radha Poovendran,—Node capture attacks in wireless sensor networks: A system theoretic approach‖, in 49th IEEE Conference on Decision and Control (CDC), Atlanta, Georgia, USA, Vol. 1. pp. 6765–6772, 15-17 December 2010.*
14. *Bhoopathy,V. and R.M.S.Parvathi,—Energy Constrained Secure Hierarchical Data Aggregation in Wireless Sensor Networks‖, in American Journal of Applied Sciences, ISSN 1546-9239, Vol.9, No.6, pp. 858-864,2012.*
15. *Alvaro Araujo, Javier Blesa, Elena Romero and Daniel Villanueva,—Security in cognitive wireless sensor networks - Challenges and open problems‖, in EURASIP Journal on Wireless Communications and Networking 2012, (2012):48, February2012.*
16. *Kalyani,P. and C.Chellappan.,—Enhanced RSA CRT for Energy Efficient Authentication to Wireless Sensor Networks Security‖, American Journal of Applied Sciences, Vol. 9, No. 10, pp. 1660-1667, 2012.*
17. *S.Prasanna and S. Srinivasa Rao,—An Overview of Wireless Sensor Networks Applications and Security, in International Journal of Soft Computing and Engineering (IJSCE), ISSN: 2231-2307, Vol. 2, No. 2, May2012.*
18. *Xiaokang Xiong, Duncan S. Wong and Xiaotie Deng,—Tiny Pairing:A fast and light weight pairing- based cryptographic library for wireless sensor networks‖, in Proceedings of the IEEE Wireless Communications and Networking Conference2, IEEE explore Press, Sydney, pp: 1-6, April 18-21,2010.*
19. *Arvinderpal S. Wander, Nils Gura, Hans Eberle, Vipul Gupta and Sheueling Chang Shantz,—Energy analysis of public-key cryptography for wireless sensor networks‖ in Proceedings of the 3rd IEEE International Conference on Pervasive Computing and Communications, PERCOM-2005, pp. 324-328, March 8-12,2005.*
20. *Haowen Chan, Adrian Perrig and Dawn Song, —Random key pre distribution schemes for sensor networks‖, in IEEE Symposium on Security and Privacy, Berkeley, California, ISSN: 1081-6011, PrintISBN:0-7695-1940-7,pp.197–213,11-14 May 2003.*
21. *Laurent Eschenauer and Virgil D. Gligor, —A key-management scheme for distributed sensor networks‖, in Proceedings of the 9th ACM Conference on Computer and Communications Security, pp. 41–47, November 18–22, 2002.*
22. *Kumar, D. S., Kumar, C. S., Ragamayi, S., Kumar, P. S., Saikumar, K., & Ahammad, S. H. (2020). A test architecture design for SoCs using atam method. International Journal of Electrical and Computer Engineering, 10(1), 719.*
23. *Soumya, N., Kumar, K. S., Rao, K. R., Rooban, S., Kumar, P. S., & Kumar, G. N. S. 4-Bit Multiplier Design using CMOS Gates in Electric VLSI. International Journal of Recent Technology and Engineering (IJRTE) ISSN, 2277-3878.*
24. *Saikumar K, Rajesh V, Hasane Ahammad S K, Sai Krishna M, Sai Pranitha G, Ajay Kumar Reddy R, Cab for Heart Diagnosis with RFO Artificial Intelligence Algorithm , International Journal of Research in Pharmaceutical Sciences: Vol. 11 No. 1 (2020)*
25. *V Saikumar, K., Rajesh "A novel implementation heart diagnosis system based on random forest machine learning technique "International Journal of Pharmaceutical Research 12, 3904–3916*
26. *Saikumar, K., and V. Rajesh. "Diagnosis of Coronary Blockage of Artery using Mri/Cta Images Through Adaptive Random Forest Optimization." Journal of Critical Reviews 7.14 (2020): 591-600.*
27. *Devaraju, VSN Kumar, and Sirasani Srinivasa Rao. "A Real and Accurate Vegetable Seeds Classification Using Image Analysis and Fuzzy Technique." Turkish Journal of Physiotherapy and Rehabilitation 32: 2.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

ANALYSIS OF FACTORS MOTIVATING THE BUILDING AND OTHER CONSTRUCTION WORKERS FOR REGISTRATION UNDER THE BUILDING AND OTHER CONSTRUCTION WORKERS WELFARE BOARD

Sushree Sanghamitra[1], Dr. Kailash Chandra Mishra[2]

[1] *Ph.D. Research Scholar, Department of Economics, Maharaja Sriram Chandra Bhanjadeo University, Baripada, Odisha 757003*

[2] *Deputy Director, Regional Directorate of Education (RDE), Rajabagicha, Balasore- 756001*

Article DOI: https://doi.org/10.36713/epra17282
DOI No: 10.36713/epra17282

ABSTRACT

This study aims to observe and know the Labour welfare measures which play a significant role that influencing the level of job satisfaction of employees and help the employers in indifferent ways. So certain amount of investment for the success and the progress of the organizations or the construction sites and somehow for the society. The universe of the study includes three hundred building construction workers from different construction sites within the Mayurbhanj district of Odisha. After collecting the data, they were coded and analysed by using SPSS. Binary Logistic Regression Analysis was used to show the relationship between the registration of construction workers and different labour welfare measures of OB&OCWWB. Results indicated that the registration of building construction workers depends upon the increased monetary benefits that they receive from the welfare board. This registration of the workers under the board does not depend upon their age, level of education, type of work, duration of working hours, tenure of job, and other basic amenities they receive from the board. The result of the binary logistic regression shows that different welfare measures significantly affect the registration of building construction workers under the welfare board.

KEY WORDS: *Welfare Measures, Binary Logistic Regression, Construction Worker, Welfare Board, Construction Sites.*

1. INTRODUCTION

According to social institutions, industrialization level, and overall level of social and economic development, the concept of labour welfare is dynamic and has been interpreted in different ways for different countries from time to time. The provision of various amenities and facilities within and around the workplace for the betterment of employees is known as welfare measures. The International Labour Organisation (ILO) report states labour welfare as, "Such services, facilities, and amenities as may be established in or in the vicinity of undertakings to enable the persons employed in them to perform their work in healthy, congenial surroundings and provided with amenities conducive to good health and high morale." (Chaubey, & Rawat, 2016). The concept of labour welfare is elastic and versatile, and it varies greatly depending on places, times, industries, countries, social norms, and values, the level of industrialization, the general social-economic development of people, and political ideologies prevailing at particular moments (Manasa, 2015).

This study evaluates different programs and policies affecting Building and Other Construction Workers (BOCW) in the Mayurbhanj District and summarises a detailed examination of the socio-economic complications of governmental interventions within this vulnerable workforce. So in this paper first we discuss different benefits received by building construction workers in the study region and the impacts of schemes on their socio-economic conditions.

2. LITERATURE REVIEW

Prasad et al. (2011) the study explain that the building and construction industry is demanded by both skilled and semi-skilled labour forces. The main focus of the study was to determine how commonly known welfare programs are how far along the programs are implemented and where obstacles may be encountered. The chi-square test and comparative research have been used to verify the inferences of the analysis. The outcome of the study shows that 92.5% of the workers have been denied access to welfare benefits. Only 24% of participants were aware of the welfare measures.

Mishra (2017) this study states that job insecurity and workplace hazards are two significant issues that India's unorganised sector employees face daily. The objectives of the paper are to talk about the term informal economy and the condition of workers in the unorganised sector and government initiatives for workers' welfare. The observations show that the government's efforts to cope

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

with the situation and the state of employees in the informal sector have been declining. Further, the paper studied the key initiatives of the government of India in the Unorganised Worker's Social Security Act 2008.

Ulle et al. (2018) this study explain the labour welfare measures at Go Go International Private Limited and evaluate the relationship between labour welfare measures and employee satisfaction. The majority of welfare facilities deal with sanitation and hygiene which does not create dissatisfaction among professionals to provide welfare measures. The term labour welfare programme includes the protection advancement and also refers to provide improved working conditions such as good lighting, warm control, cleanliness, toilet, drinking water facilities, and safety initiatives. The study is based on descriptive statistics.

Xie, L. L. et al. (2022) proposed the concept of career promotion for construction workers in Guangzhou city of China. In this study, he examined the different factors that have influenced the careers of the construction workers in the city. They identified different critical factors and then suggested different measures to the government and the enterprises that can improve the path of their career promotion. For testing the hypothesis they used the binary logistic regression model to show which factors were influencing the construction workers' career promotion. According to the authors, this study explored the career promotion of frontline construction workers first time in the city.

3. OBJECTIVE

To evaluate different underlying factors that motivate building and other construction workers for registration.

4. RESEARCH METHODOLOGY

The present study is to reach the specified objective, for a survey of 300 construction workers which have conveniently selected from various construction sites in Mayurbhanj Districts. After collection of data it was revised, coded, put into SPSS software. In this study Binary logistic Regression is used to test whether the different welfare measures have any significant impact on construction worker's registration under the welfare board. There are two variables in this model.

Dependent Variable: Registration of building construction workers under the welfare board. **Independent Variables:** Age, Level of Education, Type of Work, Tenure of Job, Duration of Working Hours, Basic Amenities, Year of Experience in Construction work, Death and Funeral Benefits, Social Benefits and Security Benefits.

5. ODISHA BUILDING AND OTHER CONSTRUCTION WORKERS WELFARE BOARD

The Construction Workers Welfare Board was established by the Government of India under Regulation of Employment and Conditions of Service Act, 1996. The central objective of the board is to control the employment and working conditions of building and other construction workers and to provide for their safety, health and welfare measure and for other matter connected therewith. The Odisha Building & Other Construction Workers' Welfare Board has been established on 03.01.2004 under section 18 of the Building & Other Construction Workers (RE&CS) Act, 1996 to manage its Fund and funding benefits to the beneficiaries registered under it. The Govt. of India has directed that a 1% cess will be collected on the building costs incurred by an employer or constructor. The cess collected has been deposited in the fund of Odisha Building & Other Construction Workers' Welfare Board for welfare of the registered building workers.

6. DIFFERENT BENEFITS RECEIVED BY RESPONDENTS

In any organisation or construction site, Construction worker welfare measures are initiated by the organisation with the purpose to increase their job satisfaction, improve their motivation and assurance toward organisation. In this present study out of 300 respondents, 172 respondents are registered construction workers under OB&OCWWB. The registered construction workers have get a labour card and ensure the job security and health security from the government or from the welfare board.

Table-1 Different Benefits Received by Construction Workers

Name of Benefits	No. of Benefits	Percentage
Death Relief	56	32.56
Funeral Assistance	26	15.11
Assistance for Purchase of Safety Equipment	81	47.1
Financial Assistance For Children Education	46	26.75
Maternity Benefits	22	12.8
Marriage Benefits	58	33.72
Assistance for Purchase of working Tools	70	40.7
Assistance for Purchase of Bicycle	149	86.63
RPL & Skill Development Training	10	5.81

(*Sources: Primary Data)*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The above Table-2 shows the respondents have acquired different benefits after registering under OB&OCWWB: Death relief, Funeral assistance, assistance for purchase of safety equipment, Financial assistance for children Education, Maternal benefits, Marriage benefits, Assistance for purchase of working tools, Assistance for purchase of bicycle, RPL & skill development training. From the registered construction workers, 56 respondents are getting death relief of ₹ 1,00,000/- for normal death and ₹ 2,00,000/- monetary help for accidental death (*Bharti, R., & Bhatt, S. (2019*). This amount has been given to the nominee of the registered worker. In funeral assistance, 26 respondents are getting the benefit from the board for doing the rituals either for their father, mother, husband, wife, or relatives. In this benefit ₹. 5000/- monetary assistance is given to the beneficiary. For the benefit of Assistance for the purchase of safety equipment, 81 respondents get the benefit from the board. The board assists ₹.1000/- for safety equipment like- helmets, safety shoes, protective eyeglasses, and gloves. The board gives financial help to the children of the building construction workers who are registered under the board. That amount is different for different levels of education. This monetary assistance motivated the children of the workers to continue their education. In the present study, 26.75per cent of workers received educational assistance from the board. The maternal benefit scheme for women construction workers can help them to get financial assistance during their pregnancy or after pregnancy when they are lactating. To avail of the benefits, the beneficiary has to be registered under OB&OCWWB for a minimum of 1 year. From the study area, 12.8per cent of workers are benefited from the board. They get financial assistance of ₹.10000/- after showing proof of their maternity or baby birth. To explain the marriage benefit of the above table, 58 respondents received the benefits from the board. Now this amount is extended to ₹.50000/-. The assistance for the purchase of working tools benefits was given to 70 registered beneficiaries. The benefit of assistance for the purchase of bicycles, 149 respondents are getting the benefit. ₹.4000/- is given to the beneficiaries for the bicycles. From the study region, 10 workers received the benefit of RPL & skill development training from the board. In this scheme, an assessment process is used to evaluate a person's existing skill, knowledge, and experience gained either by formal, non-formal, or informal learning.

7. BINARY LOGISTIC REGRESSION

Logistic regression is easy and simple to understand in the machine learning binary classification algorithm and the interpretation of the model is very satisfactory. The effect of various features can be found based on their weights (Allison, 2012). Research on construction workers is mostly used logistic regression analysis (Zhang et al., 2015; Zong et al., 2017). In this paper 10 independent variables are either numerical or categorised variables with the dependent variable, which is the "Registration of worker," being a dichotomous variable. In this study the binary logistic regression is suitable for the significance test because the sample size is sufficient and the observation values are independent of each other (Allison, 2012).

7.1 VARIABLE SETTING AND ASSIGNMENT

The following ten explanatory variables present a summary of the factors influencing construction workers' registration, like age, level of education, type of work, tenure of job, duration of work, basic amenities, year of experience in construction work, death, and funeral benefits, security benefits and social benefits. Among the 10 explanatory variables, five of them like Level of Education, Type of Work, Tenure of Job, Basic Amenities, and Year of Experience in Construction work are involved in classified data. The remaining five explanatory variables are set as quantitative data, including age, duration of working hours, death and funeral benefits, social benefits, and security benefits. The dependent variable is set to 1 if a worker is a registered worker and 0 if not registered.

1. Death and Funeral benefits consist of Death benefits and Funeral Assistance.
2. Security Benefits consist of Assistance for the Purchase of working Tools, Assistance for the Purchase of Safety Equipment, and Assistance for the Purchase of Bicycle.
3. Social benefits consist of Maternity Benefits, Marriage Benefits, and Financial Assistance for Children Education.

7.2 DISCUSSION OF THE MODEL

This work has been one of the study that focused on the more and more registration of construction workers. Three critical factors influencing construction workers' registration under the board were ascertained by binary logistic regression. Demographic characteristics, quality of working life, and different welfare measures; factors can affect construction workers' registration under the welfare board, and each feature is analysed and discussed below. Before running the result of binary logistic regression a multicollinearity test was first calculated for each explanatory variable to avoid the impact of high multicollinearity between the explanatory variables on the regression results. The results are shown in Table 2.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table-2 Multicollinearity Test for Explanatory Variables

Collinearity Statistics		
Model	Tolerance	VIF
(Constant)		
Age Range of the Worker	.899	1.112
Level of Education of the Respondent	.862	1.160
Type of Work	.621	1.610
Tenure of Job	.665	1.504
Duration of Working Hour	.909	1.101
basic Amenities	.876	1.141
Year of Experience in Construction work	.947	1.056
Death and funeral benefits	.773	1.294
Security Benefits	.511	1.957
Social Benefits	.596	1.678
a. Dependent Variable: Registered Worker in B&OCWWB		

(Source: Compiled from the data)

Table-3 Estimated Regression Parameters and Significance Test Results

	B	S.E.	Wald	df	Sig.	Exp(B)
Age	-.019	.050	.143	1	.705	.981
Level of Education	3.600	2.266	2.523	1	.112	36.582
Type of Work	-1.026	1.627	.397	1	.528	.359
Tenure of Job	.940	.957	.964	1	.326	2.560
Duration of Working Hour	-.254	.566	.202	1	.653	.776
Basic Amenities	-.528	.982	.289	1	.591	.590
Year of Experience	1.260	.825	2.333	1	.127	3.526
Death and funeral benefits	.368	.165	4.996	1	.025	1.445
Security Benefits	1.200	.312	14.802	1	.000	3.319
Social Benefits	.395	.197	4.002	1	.045	1.484
Constant	-7.430	6.340	1.374	1	.241	.001

(Source: Compiled from the data)

The above Table-3 shows that three benefit factors have passed the significance test. All three benefit factors are significant at a 95 per cent and 99 per cent level of significance. That is death and funeral benefit p value=0.025, security benefit p value= 0.000, and social benefit p value= 0.045. This result shows that the registration of building construction workers depends upon the increased monetary benefits that they receive from the welfare board. In other words, if more and more workers registered under the board they received different types of monetary assistance from the board. This registration of the workers under the board does not depend upon their age, level of education, type of work, duration of working hours, tenure of job, and other basic amenities they receive from the board. The result of the binary logistic regression shows that different welfare measures significantly affect the registration of building construction workers under the welfare board.

8. CONCLUSION

The findings of this research study shall be very important on the theoretical as well as practical scenario. The findings of the study are important to improve the registration of construction workers under the welfare board which improve the condition of the construction workers in the construction sites as well as their day to day life. The apparent output of labour welfare measures are as follows: Sustainable livelihood, Improves physical & mental health, Improves standard of living, Increases Commitment towards work, Increases work motivation, Healthiness and security measures, Economic independence, Educational improvement of children. Majority of respondents believed that welfare facilities implementation increase motivation and productivity. Accordingly to this study welfare facilities positively correlated with job satisfaction of the employees. Future studies could discover other critical work provision necessity dimensions about construction sector. Moreover, upcoming research could examine the influence of workers satisfaction on promotion and growth of the construction sector.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

REFERENCES

1. *Chaubey, D. S., & Rawat, B. (2016). Analysis of labour welfare schemes and its impact on job satisfaction: An empirical study. Management Convergence, 7(2), 45-53.*
2. *Edison Anthony Raj, A., & Julius, S. (2017). Analysis of Labour Welfare Measures and its Impact on Employee's Commitment. International Journal of Advanced Scientific Research & Development (IJASRD), 4(05).*
3. *Mishra, S. (2017). Social security for unorganised workers in India. Journal of Social Sciences, 53(2), 73-80.*
4. *NTF construction (2007), The 3 Types of Construction Projects: Building, Heavy/Highway and Industrial [internet] London, Available from World Wide Web: http://www.constructionace.com/blog/3-typesconstruction- projects-building-heavy-highway and- industrial, [accessed on October 10th 2010]*
5. *Parwez, S. (2016). Labour and labour welfare in special economic zones in India with special reference to Gujarat. South Asian Survey, 23(2), 135-157.*
6. *Prasad, R. S., Rao, K. V., & Nagesha, H. N. (2011). Study on building and other construction workers welfare schemes/amenities in Karnataka. SASTech-Technical Journal of RUAS, 10(1), 59-66.*
7. *Prasad, T. R. (2020). A Study on Welfare Schemes for Migrant Construction Workers in Karnataka. International Research Journal on Advanced Science Hub, 2(Special Issue ICARD 2020), 261-267.*
8. *Raja, V. A. J., & Vijayakumar, V. (2017). A Study On Impact Of Work Stress Among Tile Factory Workers In Special Sample Of Various Factor Analyzing Methods Applying The Different Activity And Style Of Working Employees In India. International Journal of Advanced Research in Management (IJARM), Volume 8, pp. 01–11.*
9. *Reddeiah, S., & Kumari, K. S. (2019). Socio Economic Conditions and problems of Construction Workers-A Case study in Chittoor District. Think India Journal, 22(35), 1907-1927.*
10. *Sahu, R., Padhi, S. K., & Dolai, S. K. (2018). Socio Economic Conditions Of Construction Workers In India: Issues And Challenges. International Journal of Advanced Technology & Engineering Research (IJATER), 1, 175-181.*
11. *Selvam, T. (2017). Problems of construction workers at Tirupattur. Scope International Journal of Science, Humanities, Management and Technology, 3(2), 41-45.*
12. *Ulle, R., Patil, K., & Varma, A. (2018). The Impact of Labour Welfare Measures on Employee Satisfaction.*
13. *Xie, L. L., Luo, Z., & Zhao, X. (2023). Critical factors of construction workers' career promotion: evidence from Guangzhou city. Engineering, Construction and Architectural Management, 30(6), 2334-2359.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FOUNDATIONS OF SECOND LANGUAGE ACQUISITION FOR YOUNG LEARNERS

Madaminova Umida Rustam qizi
ESP Teacher of the Faculty of International Journalism
Uzbek State World Languages University, Uzbekistan.

ABSTRACT
English language teaching can be applied at all ages and at all levels, it is a process that must be taken very seriously. Foreign language teaching at an early age is increasingly taught in our country in recent years. Language teaching and learning is gaining great focus and importance. The active exposure of an ESL (English as a second language) learner to language content during the early years of language acquisition by an English language teacher promotes the learning of a second or foreign language. The ESL programs designed for young learners, usually referring to school-aged kids less than 12 years, help these non-native speakers of English to become comfortable with language use. This is demonstrated through reading comprehension, spoken fluency, and effective writing. The ESL teachers must focus on appropriate language teaching methodologies and strategies which can be effectively incorporated in teaching English as a second language for developing English language competency during early education.
KEYWORDS: *ESL, second language teaching, activity-based learning, English language teaching, principles and stages of SLA*

Second language acquisition (SLA) is a conscious process of learning another language other than the First Language (L1) of the learner. The First Language (L1) refers to the language the child is exposed to and learns from birth. It is generally the language of the parents or caregivers, and it is possible to have more than one L1. The Second Language (L2) refers to the language learned after L1 has been acquired. The teaching of English as a second language (TESL) or as a foreign language (TEFL) refers to teaching the English language to students whose mother tongue is not English. These students have different first languages/native languages. An ESL learner implies that this English language learner has already learned and acquired another language, generally the native language, before learning English.

Language teaching and learning is gaining great focus and importance. Today, the start of the language learning is begun at five or six years of age. There are certain critical periods or ages in a child's language development. Without the necessary cooperation of the family and the environment, serious issues can arise in successful language teaching. There are the two main schools of thought in language development in young learners. The two main theories for abstract thinking in younger learners are produced by L.S. Vygotsky who has investigated the role of social and cultural factors in the making of human consciousness and by J. Piaget who has investigated first to make a systematic study of the acquisition of understanding in children.

Jean Piaget explored highly influential issues on the stages of mental development among children. According to Piaget's theory, we can reach full human intelligence passing down four stages of cognitive development:
1. Sensory Motor Stage (0-2 years). This stage focuses on learning through touching, looking and grasping.
2. Pre-Operational Stage (2-7). This stage involves learning things with words and images;
3. Concrete Operational Stage (7-11 years). This stage is directed on logical thinking about concrete events;
4. Formal Operational Stage (11-15 years). This stage involves learning with abstract reasoning.
Generally, Piaget recognized that the conditions are necessary not only for language learning but also for any type of learning.

Conversely, Vygotsky rejected Piaget's ideas that children develop independently specific stages as the result of social interaction. Vygotsky stated that there is no any fixed connection between cognitive development and age progression, but it is essential how social factors contributed to cognitive development. He claimed that we have born with four elementary mental functions attention, sensation, perception and memory. It is considered our cultural and social environment and it allows us to use the basic skills and develop to higher mental functions. Besides, through being in communication with other people, we acquire our cultural values, beliefs and problem-solving skills.

According to these theories we can classify into 6 stages of first language acquisition:
1. Pre-talking stage (0-6 months). Children produce vowel sounds.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2. Babbling stage (6-8 months). At this stage kids start to use vowel and constant sounds.
3. Holophrastic stage (9-18 months). Children begin to produce complex sounds, try to structure their first, full word.
4. The two-word stage (18-24 months). Children produce the sentence that it contains two words but they leave prepositions of the word.
5. Telegraphic stage (24-30 months). At this stage children can form more than two-word phrases according to the grammar structure.
6. Later multi-word stage (30 + months). Children has higher potential on expressing more complex ideas and having more vocabulary.
In general, children can acquire new language through communication of parents, teacher or peers, social interaction, memorisation and repetition.

THE PRINCIPLES AND STAGES OF SECOND LANGUAGE ACQUISITION

There are few stages of second language acquisition:

1. Pre-Production stage. This stage is also considered the silent phase because they begin to learn vocabulary but they produce a few new words. They can understand more than producing them. In this stage we can use flashcards and pictures to check their understanding and motivate them to say the word.
2. Early Production stage. At this stage children begin to list new words and try to use them in short phrases. They are able to understand question forms but still the output is limited. Learners of this stage is useful to practice substitution drilling. They practice to complete full sentences and also use their vocabulary.
3. Speech Emergence stage. Learners are ready to communicate by short phrases and sentences. They are able to understand more and equally to produce more. We can use picture activities that learners consolidate more vocabulary and describe the picture using adjectives.
4. Intermediate Fluency stage. Learners have higher potential of overall understanding and producing language. Learners begin to form complex sentence structures by related clauses and conjunction words in communication. They are able to think in the second language and it is the sign of the beginning of real conversation.
   For the learners at this stage, we can give them the tasks to prepare debate arguments. They can utilize vocabulary in their arguments and compare different aspects of the argument.
5. Advanced Fluency Stage. This final stage may involve extended period of time. They train to reach the higher levels of fluency and accuracy of language. Children at this stage are almost recognised the equal to a near-native level of speech. Role-plays, debates, working with authentic materials are beneficial to develop their skills.
   Furthermore, there are the main principles of teaching young learners English as a foreign language.

THE MAIN PRINCIPLES OF TEACHING YOUNG LEARNERS ENGLISH AS A FOREIGN LANGUAGE

1. Classroom management is essential for teaching young learners. Teachers should introduce a set of classroom rules and standard during the very first lesson. Starting from setting classroom rules and expectations help learners to understand what is expected of them. There are some examples of setting classroom rules in a classroom:

- Arrive on time for class;
- Arrive prepared for class (with pencil, notebook, textbook or other materials);
- Look at the teacher and listen while they are speaking;
- Speak English as much as.

Young learners have shorter attention. Another important guideline is creating a safe learning environment where each learner can explore their new skills, build good relationship with other learners and demonstrate their talents. Setting classroom rules, diversifying activities and building rapport are a few ways to effectively manage your class of young learners.

2. Language acquisition is important principle in teaching second language to young learners. Young learners acquire second language by real-life example, they can listen to parents, teacher or peers. Besides, young learners like to imitate and they are often not aware of themselves and usually they are ready to enjoy activities. Teachers always model the language first and learners repeat it several times.

There a wide range of ways to motivate and engage young learners in the classroom:
1. Use a range of materials and teaching aids. Using a coursebook is essential at the lessons but incorporating other authentic materials such as videos, songs, quizzes make your lessons more productive and interesting. Moreover, the usage of visual aids and realia are essential in engaging young learners in a class.
2. Setting clear goal and having clear aim is beneficial to young learners. Even young learners want to know what is the aim and what can do to achieve from each lesson.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3. Set clear rules and expectation from the start. It is a good strategy to keep discipline under control in the classroom. It assists learners how to behave in the classroom, understand what rules they should follow.
4. Don't over correct. Learning another language is a huge challenge but mostly learners are getting over the fear of making mistakes. If we continually correct our students mistakes, they may get embarrassed in front of the their peers. Let your students talk freely, and even if they don't use perfect grammar, refrain from correcting them. The teacher should observe their learning process and at the end of the lesson you list their mistakes in your note and correct them all together at the end of the class.
5. Give praise and rewards.
It is important to reward good behaviour and effort. This can be verbal such as Well done! Good job! and can reward for behaviour and work such as giving a sticker or any certifications.
6. Add a competitive element into the activities.
A competitive element encourages students to complete a task in limited time. The teacher can divide students into groups and set up activities in limited time. This can encourage students to win in completion of activity.

Moreover, we have beneficial learning techniques to engage young learners in a class. For example, learning through stories is productive way of interacting young learners to the lesson. They like story time, bring story events to life pretending in different roles and really love getting into character.

Also, marathon story is good way to interact learners in narrating story events. They do the activities in standing position and start with a sentence, the next person adds to the sentence, the next person adds to the sentence so that it makes sense and moves on. Teachers need to keep in mind that we should not teach grammar explicitly, instead we can use some sample sentences and learners should repeat the sample. Next, the teacher can personalize the target language and involves the student one-to-one. One more way, the teacher can use "Simon says" game in teaching grammar. For example, in teaching active verbs we can use this game.

Simon says "Jump and down"
"Touch your knees".
Finally, using topic-based teaching can be beneficial for young learners. Topic-based learning can involve a wide range of activities. This type of learning is beneficial for learners who are shy and reluctant to participating in oral production. It also permits students to explore subject matter at greater depth and to make better connections among different areas of learning. This provides a deeper understanding of the content being taught and allows students to transfer what they have learnt from one subject to the next.

Teaching a language to children is not an easy job. However, if the appropriate methods and approaches are utilized, it will result in success. Language teachers need to have some characteristics to create a good language-learning environment. First, a language teacher needs to be patient, knowledgeable about individual differences, know the techniques and methods of language teaching, know about language acquisition and the learning stages, different age groups needs and interests, material evaluation and production. In addition, a successful language teacher should speak clearly and must show native language models, use real language users' conversations in the classroom, bring reality to the classroom, pay attention to the classroom setting and seating arrangement of the children, and use body language effectively.

REFERENCES

1. *Crystal, D. (2003). English as a Global Language. Cambridge University Press.*
2. *Canale, M., & Swain, M. (1980, March 1). Theoretical bases of communicative approaches to second*
3. *language teaching and testing. Applied Linguistics, 1(1), 1–47. https://doi.org/10.1093/applin/I.1.1*
4. *Cameron, L. (2001). Teaching Languages to Young Learners (Cambridge Language Teaching Library). Camb-ridge: Cambridge University Press. doi:10.1017/CBO9780511733109 google scholar*
5. *Krashen, S. D. (1987). Principles and Practice in Second Language Acquisition. Prentice-Hall International.*
6. *Harley, B., Howard, J., & Hart, D. (1995). Second language processing at different ages: Do younger learners pay more attention to prosodic cues to sentence structure?. Language Learning, 45(1), 43-71.*
7. *Krashen, S. D. (1981) Second language acquisition and second language learning. Oxford: Pergamon Press*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

DETAILED EXPRESSION OF THOUGHT IN SEMANTICS

Mullasadikova Nigora Miramonovna
"Arabic Language and Literature al-Azhar" Department, Associate Professor, PhD
International Islamic Academy of Uzbekistan,

ABSTRACT

The main purpose of the article is to introduce what styles a speaker can use to express his opinion.

"Speech" is considered the most important factor in expressing an idea. The structure of sentences is actually studied in grammar, but the meanings expected from them are not considered a subject of grammar; this issue is analyzed in the science of stylistics. In the science of meaning, there are three ways of expressing thoughts: ijaz, itnab and musawa. The speaker must express his purpose according to the listener's situation. If he expresses his opinion briefly and succinctly, then it is called "ijaz", and if he expresses it in detail, then it is called "itnob".

This article provides information about the concept of "itnob" and its use, which is one of the unique ways of expressing thoughts in Arabic style. The article was written using comparative historical, comparative typological, systemic structural, and descriptive methods.

KEYWORDS: *the science of meanings, speech, style, verbosity, brevity and moderation of speech.*

In the science of puberty, the idea is expressed in three different ways:

1. Ijaz
2. Itnob
3. Musawa

Iyjaz teaches how to express a wide meaning using few words. And Musava teaches the way to use words equal to the thought that needs to be expressed. Itnob is to express one meaning using many words.

The dictionary meaning of the word itnob is "excessive excess". Expressing the same meaning using many words or many sentences is an itnab. The use of many words in the sentence can be used for caution on the one hand, that is, a way to understand, and on the other hand, it can serve as an emphasis. For example:

رَبِّ إِنِّي وَهَنَ الْعَظْمُ مِنِّي وَاشْتَعَلَ الرَّأْسُ شَيْبًا.

O Lord, indeed, my bones are brittle, and my head (hair) is falling from old age. (Mary p. 4)

In the verse, the speaker said that "my bones are brittle, my head (hair) is falling out from old age" and expressed that he has grown old. This idea is expressed by a single "كبرتُ" word in Arabic.

1. Although the concept of "itnob" is usually translated as talking too much, exaggerating, in fact it has its own place in the science of puberty. Expressing the opinion in detail is used for the purpose of clarifying the meaning, clarifying the purpose, emphasizing the meanings in the necessary places, correcting and eliminating the situation when various misunderstandings arise between the parties.
2. The expression of itnob can be different, below is a brief description of the most common types:
3. ذكر الخاص بعد العام – - starting the sentence with general thoughts and then moving to the specific part, i.e. the special sentence is used to warn and remind separately, as if it does not depend on the general sentence:
4.

فِيهِمَا فَاكِهَةٌ وَنَخْلٌ وَرُمَّان. (س. الرحمن، 68)

Both of them have fruits, dates and pomegranates. (Rahman p. 68)

In this verse "فَاكِهَةٌ" – the word fruit is generic followed by a specific word "نَخْلٌ وَرُمَّان" given.

ذكر العام بعد الخاص – when expressing an idea, the general meaning is emphasized by first saying the necessary part and then the general sentence, that is, focusing on the special part. For example:

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

رَبِّ اغْفِرْ لِي وَلِوالِدَيَّ وَلِمَنْ دَخَلَ بَيْتِيَ مُؤْمِناً وَلِلْمُؤْمِنِينَ وَالْمُؤْمِناتِ.

O Lord, forgive me, my parents, those who entered my house as believers, and all believers! (Noah p. 28)

"لِي وَلِوالِدَيَّ" words are a special part, "لِلْمُؤْمِنِينَ وَالْمُؤْمِناتِ" and the words expressed the general content. The verse focuses on the general word by using the specific word first.

إيضاح بعد الإبهام – giving an explanation after an unclear sentence. In this case, it is necessary to explain the complex sentence with the second sentence so that the listener can understand it in detail. For example:

فَوَسْوَسَ إِلَيْهِ الشَّيْطانُ قالَ يا آدَمُ هَلْ أَدُلُّكَ عَلى شَجَرَةِ الْخُلْدِ وَمُلْكٍ لا يَبْلى

Then the devil tempted him and said: "O Adam, shall I lead you to the tree of eternity and the incorruptible wealth?" (Toho p. 120)

"وَسْوَسَ إِلَيْهِ الشَّيْطانُ" the meaning is not clear, the continuation of the verse is given as an explanation of this passage.

5. التوشيع – designation, a separate word is used to clarify the meaning, coming at the end of the sentence:

اَلْعِلْمُ عِلْمَانِ، عِلْمُ الْأَبْدَانِ وَعِلْمُ الْأَدْيَانِ.

There are two types of knowledge: knowledge of bodies (humans) and knowledge of religions.

6. التكرير – repetition. By repeating a word or meaning, the speaker tries to keep his thoughts in the listener's memory. If the idea is expressed for the first time, the misunderstanding is eliminated and a brief explanation is intended, and a detailed explanation is intended for the second. Repetition has the following meanings:

a) emphasizes and strengthens the meaning:

كَلَّا سَوْفَ تَعْلَمُونَ. ثُمَّ كَلَّا سَوْفَ تَعْلَمُونَ .

No! Soon you will know (the consequences of this)! Once again, you will know soon! (Takosur p. 3-4)

b) the isolated part of the sentence is smoothly connected to the remaining parts through repetition. For example:

يَا أَبتِ إِنِّي رَأَيْتُ أَحَدَ عَشَرَ كَوْكَبًا وَالشَّمْسَ وَالْقَمَرَ رَأَيْتُهُمْ لِي سَاجِدِينَ

O father! I saw (in my dream) eleven stars, the sun and the moon worshiping me. (Joseph p. 4)

In the verse رأيت because the word has been used before, it is repeated to prevent it from being remembered (Bisyuniy, 2015).

c) is repeated for the purpose of understanding, mastering. For example:

قرأت الكتاب باباً بابًا وفهمته كلمةً كلمةً.

I read the book chapter by chapter and understood it word by word.

g) is repeated in order to increase the incentive to forgive. For example:

إِنَّ مِنْ أَزْوَاجِكُمْ وَأَوْلَادِكُمْ عَدُوًّا لَّكُمْ فَاحْذَرُوهُمْ

Indeed, there are some of your wives and children who will be enemies for you. So beware of them (Taghobun p.14)

d) is repeated to attract attention. For example:

يَا قَوْمِ اتَّبِعُونِ أَهْدِكُمْ سَبِيلَ الرَّشَادِ يَا قَوْمِ إِنَّمَا هَذِهِ الْحَيَاةُ الدُّنْيَا مَتَاعٌ .

"O my people, follow me, I will guide you to the Straight Path. O my people, the life of this world is but a cloth. (Ghafir p. 38-39)

The word "people" is repeated in the verse to attract the listener and not suspect his sincerity.

e) is repeated in order to praise the listener for his work. For example:

إنَّ الكريم! ابن الكريم يوسف ابن يعقوب ابن ابراهيم!

Really generous! Generous Yusuf ibn Yaqub ibn Ibrahim!

j) repeating words several times in connection with various other words. For example:

السخي قريب من الله، قريب من الناس، قريب من الجنة، والبخيل بعيد من الله، بعيد من الناس وبعيد من الجنة.

A generous person is close to God, close to heaven, close to people, far from hell. A greedy person is far from God, far from heaven, far from people.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Itnob's repetition type can also express other meanings, such as reminiscing and enjoying, starting on the best path.

7. الاعتراض – It is possible to add a prepositional phrase in the middle of the sentence to the goal of the speaker, sometimes at the end of the sentence, it can be used without any rules:

وَقَالُواْ حَسْبُنَا اللهُ وَنِعْمَ الْوَكِيلُ

Allah alone is enough for us. He is very deserving of representation. (Ali Imran p.173)

"نعم الوكيل" used at the end of a sentence in the form of an introductory sentence.

وَإِنَّهُ لَقَسَمٌ لَوْ تَعْلَمُونَ عَظِيمٌ

This (oath) is a great oath if you know it. (Event p. 76)

"لَوْ تَعْلَمُونَ" gapi is an introductory sentence and comes in the middle of a sentence.

Itnab is also used to describe the merits of an action, to correct a patient, to emphasize, to exaggerate a fear. For example:

وَوَصَّيْنَا الْإِنسَانَ بِوَالِدَيْهِ حَمَلَتْهُ أُمُّهُ وَهْنًا عَلَى وَهْنٍ وَفِصَالُهُ فِي عَامَيْنِ أَنِ اشْكُرْ لِي وَلِوَالِدَيْكَ إِلَيَّ الْمَصِيرُ.

8. *We commanded man to (please) his parents. His mother carried him with weakness upon weakness (in her womb). Weaning it (from the breast) is (completed) in two years. (We commanded man that) "Give thanks to Me and your parents! The return is to Me. (Lukman p.14)*

9. الإيغال – deepening, that is, the meaning deepens and becomes exaggerated with additional definition. It is also used in verse and prose. For example:

إِنَّكَ لا تُسْمِعُ الْمَوْتى وَلا تُسْمِعُ الصُّمَّ الدُّعاءَ إِذا وَلَّوْا مُدْبِرِينَ .

deepening, that is, the meaning deepens and becomes exaggerated with additional definition. It is also used in verse and prose. For example

The content of the verse "وَلا تُسْمِعُ الصُّمَّ الدُّعاءَ" finish "إِذا وَلَّوْا مُدْبِرِينَ" the quotation of the part represents the meaning of exaggeration.

10. التزييل – paraphrasing: paraphrasing one sentence with another sentence, where the second sentence covers the meaning of the first sentence:

وَقُلْ جَاء الْحَقُّ وَزَهَقَ الْبَاطِلُ إِنَّ الْبَاطِلَ كَانَ زَهُوقًا.

Say again: "Truth (i.e. Islam) has come and disbelief (disbelief) has disappeared." Because falsehood is a perishable (thing)." (Isra p. 81)

"إنّ الباطل كان زهوقا" sentence is used to emphasize the content of the previous sentence.

الاحتراس – caution, that is, it is used in the elimination of an idea contrary to the purpose, it can be used both in the middle of a sentence and at the end of a sentence:

اسْلُكْ يَدَكَ فِي جَيْبِكَ تَخْرُجْ بَيْضاءَ مِنْ غَيْرِ سُوءٍ

Put your hand in your bosom, come out white without any evil. (Revenge p. 32)

In the verse "مِنْ غَيْرِ سُوءٍ" doubt is dispelled by the use of the phrase.

11. التتميم – ending, that is, the use of secondary clauses in the structure of the sentence - adverbs, case, adjective, determiner, defined, etc., if they are removed from the sentence, it becomes a simple sentence. For example:

مَنْ عَمِلَ صالِحاً مِنْ ذَكَرٍ أَوْ أُنْثى وَهُوَ مُؤْمِنٌ فَلَنُحْيِيَنَّهُ حَياةً طَيِّبَةً.

Be it male or female, whoever does a good deed while a believer, We will give him a pleasant life.. (Nahl p. 97)

"مِنْ ذَكَرٍ أَوْ أُنْثى" phrase first, "وَهُوَ مُؤْمِنٌ تتميم" being considered as the second tatmim, their mention in the verse brings the thought to the complete perfection, if one or two of them are missing, neither the structure of the sentence nor the meaning will be mature.

In addition to the above, itnab is also used in peace, hymns, psalms, curses, humor, sermons, management, exclamations, announcements of general affairs, mass distribution of information, greetings, and writing official letters.

LIST OF USED LITERATURE

1. *Al-Asir, Z. (2016). Al-masalu-l-sā'ir fi adabi-l- kātib va-sh-shā'ir. Qohira, Misr: Al-Bahiyya.*
2. *Al-Johiz., A. U. (2006). Kitābu-l-bayāan va-t-tabyīn. Bayrut: Daru-l-jīl.*
3. *Atiq, A. (1985). 'Ilmu-l-ma'āniy. Bayrut: Dāru-n-nahḍati-l-'arabiyya.*
4. *Bayzoviy, A. (1375 h.). Anvāru-l-tanzīl va asrāru-t-ta'vīl (Vol. T. I). Misr.*
5. *Bisyuniy, A. (2015). 'Ilmu-l-ma'āniy. Qohira.*
6. *Boqilloniy, A. (1989). 'I'jāzu-l-Qur'ān fī zayli-l-itqān. Makka: Dārul-bāz.*
7. *El-Kubesi, A. A. K., & Shehade, M. M. S. M. (2019). مخالفات الرازي لأبي مسلم الأصفهاني في تفسيره الكبير–الجزء الأول من سورة البقرة نموذجاً-عرض ودراسة بنقدية: The Differences between Abu Muslim al-Asfahani and Fakhruddin al-Razi in Surah al-Baqarah of al-T. Ma'alim al-Qur'an wa al-Sunnah. 15 (2), 197-214.*
8. *Hoshimiy, A. (1375 h.). Javāḥiru-l-balag'a fi-l-ma'āniy va-l-bayān va-l-badi'. Bayrut: Dāru-l- 'ihyā'i-t-turāsi-l- 'arabiy.*
9. *Ibrohimov N, Oripov A, Ikromjonov A, Zayriev A. (2022). Al-Qomus (Vol. IV). -Toshkent: G'afur G'ulom.*
10. *Ismoilov, B. (2020). LINGUOPOETIC ANALYSIS OF SURAH HUMAZA. Интернаука, 66-67.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

11. *Mahmud, B. (2020). PENGGUNAAN ASALIB AL-MA'ANI DI BEBERAPA AYAT DALAM AL-QUR'AN AL-KARIM. Prosiding Konferensi Nasional Bahasa Arab, 6(6), 889-905.*
12. *MANGGALA, D. N. (2014). USLUB AL IJAZ FI MAWLUD AL GHARB LI SHAYKH AL GHARB (DIRASAH TAHLILIYYAH FI'ILM AL MA'ANIY) .*
13. *Mansur, A. (2019). Qur'oni karim ma'nolarining tarjimasi . Toshkent: Toshkent islom universiteti.*
14. *MANSUR, A. (2019). Қуръони карим маъноларининг таржимаси. TOSHKENT.*
15. *Mullasodiqova, N. (2019). Formas de expresion de opinion en la ciencia Maoniy. Religación. Revista de Ciencias Sociales y Humanidades, 4(20), 70-75.*
16. *Qazviniy, J. (n.d.). Al-Iydoh fiy 'ulumil-balag'a al-ma'aniy val'bayan val badi'. Bayrut: Darul-kutubil-ilmiyya.*
17. *Rustamiy, S. (2016). "ESASU-L-BELAGA" VE "DİVAN-U LUGAT-İT-TÜRK" ESERLERİNİN DİL BİLİMİ VE BELAGAT BİLİMİYLE İLGİLİ YÖNLERİ. Electronic Turkish Studies, 11(20).*
18. *Rustamiy, S. (2018). O'rta asr islom balog'at ilmida tilshunoslikka oid qarashlar. Toshkent.*
19. *Sofiy, M. (2016). Al-'Iyjaz fil-Qur'anil-Karim. Al-Iydah, pp. 241-250.*
20. *Sohib Islom Maqsud ar-Rahmon. (2016, 12). Al-Iyjāz fi-l-Qur'āni-l-karim. AL-Iydāh, pp. 241-251.*
21. *Xudoyqulova, S. (2021, 5). ABDULLA QODIRIYNING SO'Z QO'LLASH MAHORATI. ORIENTAL RENAISSANCE: INNOVATIVE, EDUCATIONAL, NATURAL AND SOCIAL SCIENCES, 589-595.*
22. *YAFIE, I. (2016). AL IJAZ WA AL ITNAB FI AURAH IBRAHIM WA AMARYAM (DIRASAH TAHLILIYYAH BALAGHIYYAH FI'ILM AL MA'ANIY) .*
23. *Zamaxshariy, M. (2008). Al-Kashshaaf 'an haqa'iqi g'avamidi-t-tanzil va 'uyunil-aqovil fiy vujuhit-ta'vil (Vol. I). Darul-kitabil-'arabiy.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

TASK-BASED LEARNING THROUGH BLOGGING AND WRITING COMPETENCE AMONG GRADE 12 STUDENTS OF TANAUAN INSTITUTE INC

Geraldine B. Enriquez
Master of Arts in Education Major in English
Laguna State Polytechnic University, San Pablo Campus, Philippines

ABSTRACT

Writing is a way of communicating with one another, it is essential that students should be competent in sentence structure, vocabulary, grammar, and correct usage in able to successful in communication. If someone failed to do so, then he will likely make a wrong impression. Thus, it is important for teachers to create innovative tasks that include the students' interest to improve their writing competence. The purpose of this study is to carry out a comprehensive study in order to assess the effectiveness of utilization of task-based learning in teaching and the writing skills of Senior High School students at Tanauan Institute Inc. The respondents were chosen in a non-random way, assigning forty (40) Grade 11 students at Tanauan Institute, Inc. who are taking Creative Non-Fiction subject during the academic year 2023-2024. The researcher utilized the one group pre-test post-test research design in order to determine the respondents' writing competence in terms of sentence structure, vocabulary, grammar and correct usage. The pre-test was conducted before accomplishing the blogging task while the post-test was done after the intervention was exposed to the respondents. The study revealed that there is a significant difference between the mean pre-test and post-test scores of the respondents in terms of vocabulary and correct usage which imply that the task-based activity can improve the respondents' writing competence.

KEYWORDS –*Blogging, Correct Usage, Grammar, Task-Based Learning, Structure, Vocabulary*

INTRODUCTION

Learning for students always begins with what mentors and teachers are teaching. Global teachers, who are the central figures in the teaching-learning process, keep track of students' overall progress through observation, written work, projects, and learning outputs. The consistent improvement in student achievements across the board because of what they have learned from the teachers' instructions and teaching methods is what is novel about today's reform. The most important component is using effective teaching strategies and giving students thorough information about their academic performance as well as their strengths and limitations. Due to the existing curriculum, teachers typically use the most effective teaching methods to help students attain the fundamental purpose of education.

There are several techniques to ensure that students learn the lesson of different types of learners across the world, but it is believed that giving them tasks to perform in front of the class is the most efficient. Teachers would be able to assess students' abilities to apply the skills and knowledge obtained from every topic of the lessons through their performances at school and inside the classroom. Students are challenged by performance tasks to employ their higher-order cognitive abilities to finish a task or produce a product. With task-based instruction, neither the content nor the instruction must change; rather, the student is permitted to demonstrate what they have learned in writing rather than having their knowledge of the material evaluated. With enough planning and preparation, the instructor has complete control over the writing course's content and on how it is being taught.

One of the most important classes that senior high school students in the Philippines have to take is 21st Century Creative Non-Fiction. This is because of the Enhanced Basic Education Act of 2013, which is also known as the K-12 Program. According to the K–12 Curriculum Guide on 21st Century Literature, this subject is meant to help students develop both practical and creative writing skills. It will also teach students the basic techniques for writing fiction, poetry, and drama, and it will talk about how well-known authors in different genres have used these techniques.

Parcon (2022) says that teachers are doing their best to use different teaching methods to help students learn new skills and ways to deal with the challenges of the 21st century. This is what it means to provide a good education in the classroom. To run their classes well, teachers do change the learning goals based on the students' interests, what they're talking about, and the work they need to do before

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

the test. For 21st-century education, you also need new methods and a dedication to making teaching and learning work well. Different approaches and routines are needed by teachers to get students interested in schoolwork, to think deeply about the world they live in, and to use the skills needed for the learning setting.

Students will spend a lot of time looking at methods and working on their drafts in a group setting to improve their writings. Students learn how to get ideas and work them over, as well as how to build a sense of style. This lets teachers choose which teaching methods they want to use when they teach this subject. Teachers can use classroom tools and task-based learning at the same time. By doing projects, students can improve their ability to speak through writing.

In addition, task-based learning tries to improve students' second language skills by giving them chances to write in their second language. The lessons the students take part in use things from the real world. Task-based education is based on getting students involved in all aspects of literature, including writing. A task is defined as "a piece of language that engages students linguistically, physically, emotionally, and cognitively." Learners take part in the process in many ways, including socially, critically, meaningfully, creatively, aesthetically, naturally, motivatingly, and experientially.

English has four macro skills in communication namely speaking, reading, writing, and listening. One needs to learn the macro abilities in order to communicate with native speakers effectively. People learn their native tongue by listening, speaking, then reading. To communicate and understand one another, the language requires these macro talents. A learner will improve their speaking, pronunciation, vocabulary, grammar, and spelling skills by mastering these skills. The term "macro skills" refers to the core, most important, greatest skill set with regard to a certain situation.This method of communication necessitates that the receiver comprehends, interprets, and assesses what is being said. These abilities are crucial for communication and can significantly impact an individual's effectiveness at work, in social settings, and in each personal life.

But being able to write well is an important part of communicating. It's easier to get in touch with people through writing than in person, which makes writing skills better. When you write badly, you might give the wrong idea. Writing is one of the hardest skills for kids to learn because it is a process of building something. Because writing is one of the most useful skills in learning a language, writing tasks are very different from listening, speaking, and reading tasks. There are rules about how to use language that you must follow when you write to get your thoughts across and help people grow as people. Grammar and words are two parts of language that are taught in writing tasks. There are good chances for students to learn more about language when they write, as shown above.

According to Hikmah (2019), writing is a complicated process that lets writers share their ideas and thoughts. When writing, writers need to be good at using the pattern of language and a wide range of words. This is because writing requires a lot of different skills. Some have to do with correctness, like using the right form of language, which includes correct writing, punctuation, layout, words, grammar, phrases, and the right way to arrange paragraphs. It means that being able to write requires a number of different skills that must be taught along with writing.

Task-based activities are a great way to help kids get better at writing. As the main person responsible for ensuring the success of task-based learning in terms of plan, process, and evaluation, you need to make sure that your students have the right tasks to do. Students can learn how to use words by getting used to a job through a task-based exercise. This approach is now being used in schools all over the country. This also lets teachers and students change what they're learning to fit real-life situations. While teachers and students are getting used to the process, it becomes easier and more fun as they change how they learn and think. Filipino students are more interested in their work, especially when they are the ones doing the work. This performance-based teaching can connect each writing lesson to a variety of learning goals. This will get students to act while they improve their skills and abilities.

OBJECTIVES OF THE STUDY

The main purpose of this study was carried out a comprehensive study in order to assess the effectiveness of utilization of task-based learning in teaching and the writing skills of Senior High School students at Tanauan Institute Inc.
Specifically, it sought answer the following questions:

1. What is the mean pre-test score of the students before the usage of task-based learning?
2. What is the mean post-test score of the students after the usage of task-based learning?
3. Is there a significant difference between the pre-test and post-test of the respondents in the usage of task-based learning?

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

METHODOLOGY

This research made use of the one group pre-test post-test research design in order to have data needed for the results and findings. The one-group pre-test-post-test design is a type of research design that was used to reveal the differences of the learning outcomes of the respondents. These were anchored on comparing the differences between the respondents' pre-test and post-test scores.

Sampling Technique

The cluster sampling was used in this study for the population of the target respondents wherein the researcher divided a population into smaller groups. After this, the researcher randomly selected from the clusters. For reliability of the results, the researcher's respondents of the study were forty (30) Grade 12 students at Tanauan Institute Inc. who are taking Creative Non-Fiction subject were the respondents of the study. The created six (6) lesson exemplars that concern six (6) topics for the subject Creative Nonfiction. The study aimed to determine whether the respondents' writing competence could improve using blogging. It is important for any learners to attain progress with their writing competence.

Research Procedure

The researcher crafted pre-test and post-test which both consisted of 40 questions concerning the four (4) writing competences. Also, she created six (6) lesson exemplars about the subject Creative Nonfiction. Before the actual execution of the study, the researcher conducted the pilot testing to 12 college students who did not belong to the respondents. After the result of the pilot testing passed the required Cronbach's alpha, the pre-test and post-test was qualified to be facilitated. Once the researcher was given the permission, the researcher oriented the students-respondents. Before the treatment was conducted, the student-respondents were requested to answer the pre-test to determine the initial condition of the respondents before the treatment. The students were given ample time to answer the pre-test.

The researcher discussed lesson exemplars to the respondents. The students were then tasked to write their blogs which cover topics such as key lesson from elderly, a character who struggles to express his feelings and thought, topics they wanted to write about, story of their life in an inverted chronological order, an animal that symbolizes anything, and their favorite trip. Then each week or month, they were required to write a new blog entry using different writing styles like opinion, biography, how-to, product review, pros/con comparison, personal story or inspiration/quote. During the lesson, the respondents cooperated and were very interested since the lessons were about their real-life experiences.

Each lesson then was followed by blogging tasks wherein the students created their WordPress account. In this website, the students can post their works. Their blogs can be read and commented by their fellow classmates. The students found it enjoyable since blogging has been a trend to their generation. Also, there were very active since they were excited to share their personal experiences.

After the respondents posted their blogs, the researcher personally administered the post-test among the target respondents in order to get necessary information regarding the study. However, considering the current situation, the tests were done in the easiest and safest possible way.

After all the students agreed on the scheduled date of data collection, the researcher then asked the assistance of three (3) experts in the field of writing to assess the writing skills of the students under this study. After gathering the data needed, the researcher prepared and applied the possible statistical treatment for the study. These results were tabulated, read, interpreted, and gave the implications that would lead to the findings, conclusions, and recommendations of the study.

Statistical Treatment of Data

The statistical analysis of data is an important step in any research study as it ensures the reliability and objectivity of the data collected by the researcher. In this study, appropriate statistical tools were utilized to analyze and interpret the data effectively.

1.Paired T- Test was used to identify if there is a difference between the two variables, the pre-test and post-test scores on the level of utilization of task-based instructions in teaching and the writing skills of the Grade 11 students.

2.Frequency was used to declare the exact number of the respondents who fall into a certain category. In this study, the number of respondents determined if the majority of them are categorized as "VERY SATISFACTORY", "SATISFACTORY", "FAIR", or "NEEDS IMPROVEMENT" in each writing competence.

3.Percentage was determined depending on the frequency declared.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

RESULTS AND DISCUSSION

Table 1
Mean Pretest Scores of The Students Before Using Task-Based Learning Through Blogging

Writing Competence	Mean	Std.Deviation	Verbal Interpretation
Sentence Structure	6.20	1.27	Satisfactory
Vocabulary	6.63	1.43	Satisfactory
Grammar	6.53	1.89	Satisfactory
Correct Usage	6.63	1.38	Satisfactory

Legend: 7.50-10.00 Very Satisfactory, 5.00-7.49 Satisfactory, 2.50-4.4.99 Fair, 0.00-2.49 Needs Improvement

The table above shows the mean pre-test scores of the students before using task-based activities through blogging. The first row contains sentence structure wherein the mean is 6.20 and the standard deviation is 1.27 which means that in the beginning, the respondents' skills in sentence structure is "SATISFACTORY". The respondents already know how to create sentence because they already learned it from their past grade levels. Furthermore, in terms of vocabulary, the respondents scored 6.63 in mean and 1.43 in standard deviation which means that their skills in vocabulary is "SATISFACTORY". The respondents' pool of words was already satisfactory since they were already learning English words from their younger years. Additionally, in terms of grammar, the respondents' mean score is 6.53 and the standard deviation is 1.89 wherein their skills in grammar is considered as "SATISFACTORY". This means that the respondents had schema or background knowledge of how to apply the rules of using words in a certain structure. Lastly, in terms of correct usage, the respondents' mean score is 6.63 and the standard deviation is 1.38 which means that their skills in correct usage is "SATISFACTORY". This translates to the fact that the respondents were already conscious on what words should be used in making their write-ups.

Though the results of the pre-test stated that they were already satisfactory, meaning, they have an average knowledge on the writing competence, for their grade level, they should have improved more. It is since in college, their subject areas will not focus on basic skills in writing, but more on more complex subject areas. Giridahan (2013) noted that the students had difficulties in writing and it cause mainly by poor grammar knowledge and inadequate vocabularies. He further elaborated that the students had difficulties in organizing paragraphs and ideas. Brindle et al. (2016) suggested that in able to improve someone's writing skills, the teacher should employ teaching strategies that help the students write in a more practical way and use their critical thinking skills. In this study, the researcher will be employing blogging as a task to enable students to write in a practical way such as expressing their selves and involve their personal experiences since the subject is Creative Nonfiction and it is about real-life experiences that should be written in a creative way.

Table 2
Mean Post-Test Score of The Students After Using Task-Based Learning Through Blogging

Writing Competence	Mean	Std. Deviation	Verbal Interpretation
Sentence Structure	6.80	1.19	SATISFACTORY
Vocabulary	5.23	1.30	SATISFACTORY
Grammar	7.07	1.14	SATISFACTORY
Correct Usage	8.93	1.60	VERY SATISFACTORY

Legend: 7.50-10.00 Very Satisfactory, 5.00-7.49 Satisfactory, 2.50-4.4.99 Fair, 0.00-2.49 Needs Improvement

Table 2 shows the mean post-test score of the respondents. In terms of correct usage, the respondents' score is 8.93 in mean and 1.60 in standard deviation which means that their skills in correct usage is "VERY SATISFACTORY". This means that the respondents gained more knowledge in using the correct words. Meanwhile, in terms of grammar, the respondents scored 7.07 in mean and 1.14 in standard deviation which means that their skills in grammar is "SATISFACTORY". On the other hand, in terms of sentence structure, they scored 6.80 in mean and 1.19 in standard deviation which means that their skills in sentence structure is "SATISFACTORY". Lastly, in terms of vocabulary, the respondents scored 5.23 in mean and 1.30 in standard deviation which means that their vocabulary skillis "SATISFACTORY".

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The respondents showed improvement in correct usage, they became aware on how to use words in their appropriate placements. This is also due to the fact that the teacher asked them to post their blogs. This made them feel conscious about their classmates' comments. After the post-test, they gained the conclusion that they should be able to be use words correctly to avoid being embarrassed. Students also gained higher scores in terms of correct usage since they were expected to be fully conscious of their word choice self in able to be understood. In fact, they knew how to appropriately, accurately, and contextually use words in order to be understood.

On the other hand, in terms of sentence structure, grammar, and vocabulary, they were still in the average level because these writing competences were very complicated. Hikmah (2019), stated that writing is a complex process wherein it helps the writers to express their thoughts and ideas. But in his terms, in able to be successful in terms of writing, the writer should be able to be skilled in terms of vocabulary, grammar, and constructing sentences. If the student failed in one competence, he will fail to the other ones since these were all connected to each other. This is the reason why they improved in correct usage but not in terms of the other writing competence.

Students found it difficult to comprehend unfamiliar words since they were not exposed to the words given before. Although there were context clues to help them identify these, because they have not used these words yet in their own sentences, they could not figure out the meaning of the words. By this, they also found it difficult to choose correct prepositions and linking verbs and because grammar is essential also in sentence structure, they could not also identify correct sentence also. It was found in the situations wherein they deal with much complex sentence structures such as different placements of subject, verbs, and objects.

Table 3
Significant Difference Between Mean Pre-test and Post-Test of The Respondents After Usage of the Task-Based Learning

Writing Competence	Pretest		Posttest		T	Df	Sig. (2-tailed)
	Mean	SD	Mean	SD			
Sentence Structure	6.20	1.27	6.80	1.19	-1.90	29	0.068
Vocabulary	6.63	1.43	5.23	1.30	4.11	29	0.000
Grammar	6.53	1.89	7.07	1.14	-1.68	29	0.103
Correct Usage	6.63	1.38	8.93	1.60	-7.06	29	0.000

Legend: if the p-value <0.05, then it is statistically significant.
If the p-value >0.05, then it is NOT statistically significant.

Table 3 shows the significant difference between the mean pre-test and post-test performance of the respondents in their writing competence before and after using task-based learning through blogging.

Specifically, in terms of sentence structure, the results show a p-value of 0.068, which is greater than 0.05 level of significance which indicates that the mean pre-test score has no significant difference with the posttest performance of the respondents in their writing competence in terms of sentence structure.

Nordquist (2020) stated that in a sentence, there are things to consider such as the placement of words, phrases, and clauses, knowing the structural arrangement such as syntax and syntactics, and the other forms of sentence constructions in conventional grammar. This is complicated since there are lots to consider. As for Nordquist (2020), the placement of words, phrases, and clauses within a sentence are what should be considered which was not reinforced through blogging. Since students were only asked to write about their personal experiences, they only focused on how to correctly express their thoughts so that their audience can understand them other than being able to correctly construct their sentences.

Meanwhile, the result presenting a p-value of 0.000 shows that there is a significant difference between the mean pretest and the posttest performance of the respondents in their writing competence in terms of vocabulary.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Though there is a significant difference in terms of vocabulary, it was only considered because the mean post-test score was significantly lower than their mean pre-test score. This was unusual since the objective of the study was to improve the writing competence of the respondents. According to Ehmer (2020), the respondents should be exposed in able to learn new words. The blogging activity facilitated bythe researcher did not help the students much in being able to gain new words and be exposed with these. Also, according to him, words are naturally picked up through conversation, social interaction, reading, and media. By this activity, the respondents were only exposed to writing their own blogs. They were not required to read other entries and because of this, they were not able to learn new words from each other and be only aware on what they already know. On the other hand, because the questions in the post-test were new to the students, they found it hard to comprehend the unfamiliar words from these items.

On the other hand, the result of p-value of 0.103 reveals that there is no significant difference on the mean pre-test and post-test performance of the respondents in their writing competence in terms of grammar.

In terms of grammar, according to Keyser (2018), in able to teach grammar, there should be exerted effort in teaching how to construct, critically evaluate, and reformulate assumptions through the English language. There are standards in grammar that are difficult and crucial to teach such as deductive reasoning, arguments, and the eight parts of speech of the English grammar. On the other hand, teaching sentence structure is also complex because it is entailed on their grammatical skills. Furthermore, Stathis&Gotsch (2013)stated that evaluation and revision could help the students improve their grammar skills and since the activity did not include these processes, the students were not able to determine their mistakes. Being able to read feedbacks from their classmates and teacher could be essential in helping them re-evaluate their works and revise it in a way that their sentence structure could be improved also.

Lastly, the result of p-valueof 0.000 reveals that there is a significant difference on the pre-test and post-test performance of the respondents in their writing competence in terms of correct usage.

According Kafipour, et al. (2018), students' writing abilities can be improved when they participate in writing assignments, in this case, respondents' writing skills have been improved though blogging in terms of correct usage. This helped them be conscious and avoid embarrassment from those who would read their blogs. They should be, and were expected, to be aware of using words appropriately since this would also mean that they were able to In terms of correct usage, Toppr (2021) stated that individuals need to always use the right words whenever they need to. During this study, the respondents improved in terms of correct usage since they need to be understood with the writing task they were assigned to. The task given by the researcher helped the students practice their correct usage of words. From satisfactory, the students became very satisfactory after the task was done. Also, they improved in terms of correct usage since they did not want to be embarrassed. Unlike other writing competence, this was the competence that the student progressed since their task was to express their selves and the first thing to consider in properly expressing is through correct choice of words.

Hikmar (2019) stated that face-to-face conversation, just like the lecture the researcher had conducted, can lead to better writing skills. Sentence structure and vocabulary are the two linguistic components that can be emphasized in writing exercises, just like the blogging task that the researcher assigned to the respondents. During any writing lesson, the teacher should always incorporate performance-based instruction which can encourage the students to perform while using their skills.

Since the beginning of the pandemic, DepEd had introduced 4A Budget of Work which features the most essential learning competencies (MELCs). These MELCs are taught using the four main teaching-learning phases known as IDEA, I-ntroduction, D-evelopment, E-ngagement, and A-ssimilation. In the recent study, the researcher employed face-to-face lecture followed by a writing task in able to improve and teach the essential skills to improve the respondents' writing competence. It is also stated by Parcon (2022), teacher should adjust their teaching strategies in able to adjust to learning objectives. In this paper, the researcher adjusted her lecture to highlight the improvement of the four skills. Furthermore, Faltano (2016), learners use writing as their expressions of thoughts and feelings, and using this as a task can help the students relate and be engaged on the task more while improving their skills. In this process, the teacher should assist them during the process, helping them know the purpose and discover and improve their skills.

With their scores in terms of grammar, sentence structure, and vocabulary, they still needed to be exposed more in writing tasks.Overall, the task-based activity through blogging improved the students' skills in correct usage. However, there should be an adjustment for the task to improve the students' other skills in the rest of the other competences.

Since Brindle et al. (2016) stated that the success of teaching the English language writing competence depends on the teachers' concepts and expertise, the teacher should focus on herself and should understand that students appreciate writing in a more practical way. She

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

should also reflect on how she delivers the lesson and how she motivates the students. Moreover, by blogging as said by Hamilton (2020), the students can be more engaged in this task whenever they express their idea and when they receive feedback from it.Also, Stathis & Gotsch (2013) stated that grammar instruction should be done not only as an independent work, but also as a small-group and pairwork. In able to help the students realize their errors, learn, and reevaluate their selves, the students can evaluate the paper of their classmates and point out their mistakes or things to be improved. By this, the students can revisit their works and can learn from the critiques of their classmates. They can also ask their classmates for further clarifications and ask them for advices. Also, because of this, as said by Viera (2016) and Ehmer (2020), when they read the blog of their classmates, they can be exposed to new words that they do not know and their vocabulary can be improved. By being able to read other works, they can gain new techniques on using words into sentences.Lastly, this peer critique task can help the students be guided on how they are going to revise their blogs and apply new knowledge regarding this. This can also be reinforced by the teacher and formally address the mistakes that should be improved in able to avoid these in the future.

CONCLUSION AND RECOMMENDATION

Based on the findings of the study, the researcher concluded that:

1. There is a significant difference between the students-respondents' mean pre-test and post-test scores before and after using task-based learning in terms of vocabulary and correct usage. But there is an improvement only on the respondents' writing competence in terms of correct usage after the treatment was applied. The null hypothesis in terms of grammar and correct usage was rejected.

Based on the results and conclusions of the study, the following recommendations are hereby suggested:

1. Because the study proved that there is an improvement in terms of vocabulary and correct usage, the teachers may employ the same teaching strategy to help enhance the students' writing competence. This can be done through peer critique activity wherein the students write their blogs and let their classmates write a critique about it. The evaluation of their classmates can guide the students in revising their works;
2. The school heads may use the results of the study as basis for future seminars and trainings for teachers such as in-service trainings wherein the teachers were suggested to create writing tasks that include practical purposes;
3. The future researchers may conduct a study using other teaching and learning strategies and/or approaches to improve their grammar, vocabulary, and sentence structure.

REFERENCES

1. *Abril, Jason. WhyIsAssessmentImportant? Edutopia. George Lucas Educational Foundation. 2022*
2. *Anderman, E. M., & Patrick, H. (2012). Achievement goal theory, conceptualization of ability/intelligence, and classroom climate. In S. Christenson, A. Reschly, & C. Wylie (Eds.),*
3. *Amasuomo, J.O.M. (2014). Academic performance of students admitted with different entry certificates to the Nigerian Certificate In Education Programme at the Federal College of Education*
4. *Ahmed RZ, Bidin SJB: The Effect of Task Based Language Teaching on Writing Skills of EFL Learners in Malaysia. Open Journal of Modern Linguistics. 2016; 6(3): 207-218.*
5. *Ab Razak Wan Maziah Wan, Sharifah Alia Syed Baharom, Zalinawati Abdullah, Haslenna Hamdan, Nurul Ulfa Abd Aziz, Ahmad Ismail MohdAnuar. Academic Performance of University Students: A Case in a Higher Learning Institution.*
6. *Ali, S., Haider, Z., Munir, F., Khan, H., & Ahmed, A. (2013). Factors contributing to student's academic performance: A case study of Islamia University Sub campus.*
7. *Ambrose, Susan. HowLearning Works: 7 Research-BasedPrinciplesfor Smart Teaching. 2016. https://resources.depaul.edu/teaching-commons/teaching-guides/how-students-learn/Pages/default.aspx*
8. *Brown, Dan of MasterClass. (2021). 8 Tips for Improving Your Writing Style.https://www.masterclass.com/articles/tips-for-improving-your-writing-style*
9. *Burke, Michael, editor. "The Routledge Handbook of Stylistics." Routledge, 2014, New York.*
10. *Brindle et al.,Harris, K. R., Graham, S., Hebert, M. (2016). Third and fourth grade teachers' classroom practices in writing: A national survey. Reading & Writing: An Interdisciplinary Journal, 29*
11. *Bronson, Sarah (2022). Importance of Correct Usage of Words in Grammar.https://www.theclassroom.com/speak-proper-english-5399575.html*
12. *Chinyoka, K. and Naidu, N. (2013) Uncaging the Caged: Exploring the Impact of Poverty on the Academic Performance of Form Three Learners in Zimbabwe. International Journal of Educational Sciences, 5, 271-281.*
13. *Curriculum Development Centre (CDC) Nepal. (2019). Secondary education curriculum of Nepal (class 9-10). Sanothimi: Author*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

14. Coker, D., Farley-Ripley, E., Jackson, A., Wen, H., MacArthur, C., Jennings, A. (2016). Writing instruction in first grade: An observational study. Reading & Writing: An Interdisciplinary Journal, 29, 793–832.
15. Chung, Sandy & Pullum, Geoff (2015). Grammar. Retrieved from http://www. linguisticsociety.org/sites/default/files/Grammar. pdf.
16. Cui, W. (2019). L2 writers construct identity through academic writing discourse socialization. Journal of English as an International Language. https://files.eric.ed.gov/fulltext/EJ1244672.pdf
17. Daal, T. V., Lesterhuis, M., Coertjens, L., Donche, V., & Maeyer, S. D. (2019). Validity of comparative judgement to assess academic writing: Examining implications of its holistic character and building on a shared consensus. Assessment in Education: Principles, Policy & Practice.
18. Dockrell, J., Marshall, C., Wyse, D. (2016). Teachers' reported practices for teaching writing in England. Reading & Writing: An Interdisciplinary Journal, 29, 409–434.
19. Deurmyer, Randy. (2022).What Is Blogging?https://www.thebalancemoney.com/blogging-what-is-it-1794405
20. East, M. (2017). Research into practice: The task-based approach to instructed second language acquisition. Cambridge University, 50(3), pp. 412-424.
21. Elger, D. (2012). Theory of performance. Corwin Press.
22. Ehmer, Angela (2020). WHY VOCABULARY MATTERS TO READING AND WRITING SUCCESS. http://www.literacysolutions.com.au/blog/2020/04/27/why-vocabulary-matters-to-reading-and-writing-success/
23. Fletcher, Richard, et al. 'Faculty and Students Conceptions of Assessment in Higher Education.' Higher Education 64.1 (2012): 119-133. Academic Search Premier. Web. 15 Sept. 2014
24. Fredricks, J. A. (2014). Eight Myths of Student Disengagement: Creating Classrooms of Deep Learning. Los Angeles: Corwin.
25. Graham, S. (2018). A revised writer(s)-within-community model of writing. Educational Psychologist, 53, 258–279.
26. Giorgio Iemmolo. What is task-based learning? 2020. https://teacherblog.ef.com/what-is-task-based-learning/
27. Grosvenor, Carrie (2019). How Do Blogs Work?https://business.lovetoknow.com/business-marketing-ownership/how-do-blogs-work
28. Hamilton. (2020). Writing an Academic Blog. https://www.hamilton.edu/academics/centers/writing/writing-resources/writing-academic-blogs
29. Jimenez Lily. (2017) The importance of sentence structure. https://prezi.com/vhuglxcoiava/the-importance-of-sentence-structure/
30. Kafipour, R., Mahmoudi, E. &Khojasteh, L. (2018) The effect of task-based language teaching on analytic writing in EFL classrooms, Cogent Education, 5(1), pp. 1-16.
31. Keyser, Samuel Jay. "The Role of Linguistics in the Elementary School Curriculum."Elementary English. 1st ed. Vol. 47. N.p.: National Council of Teachers of English, n.d. 39-45. Print.2018
32. Kramer, Lindsay. (2021).Our 8-Step Guide for How to Write a Pro Blog Post. https://www.grammarly.com/blog/how-to-write-a-blog/
33. Harris, K., Graham, S., Friedlander, B., & Laud, L. (2013). Bring powerful writing strategies into your classroom! Why and how. The Reading Teacher, 66(7), 538-542.
34. Hurtado, S. and Ruiz Alvarado, A. (2015). Thinking about race: The salience of racial identity at two- and four-year colleges and the climate for diversity. Journal of Higher Education, 86 (1), 127-155.
35. Hough, T. M., Hixson, M. D., Decker, D., & Bradley-Johnson, S. (2012). The effectiveness of an explicit instruction writing program for second graders. Journal of Behavior Education, 21, 163-174.
36. Kelly, Melissa (2019). Authentic Ways to Develop Performance-Based Activities.
37. Kessler, Kevin. Writing Mechanics: The Secret to Effective Writing. https://codeless.io/writing-mechanics/
38. Laur, D. (2013). Authentic learning experiences: A real-world approach to project-based learning. Routledge.
39. Leist, Rachel. (2022). How to Write a Blog Post. https://blog.hubspot.com/marketing/how-to-start-a-blog
40. Maurer, R. (2012). 'Lessons Learned: Utilizing lessons learned from project evaluations in policy decision making.' i-eval THINK Piece (No. 1).
41. Mo, Y., Troia, G. (2017). Similarities and differences in constructs represented by U.S. middle school writing tests and the 2007 national assessment of educational progress writing assessment. Assessing Writing, 33, 48–67.
42. Mojabi, Seyedeh S. (2014). "Correlation between Grammatical Competence and Pragmatic Competence among Iranian University EFL Learners." Unpublished Master's Thesis. University of Malaya. Kuala Lumpur, Malaysia.
43. Morris,Gayle(2020).UsingBlogs in the Classroom https://lsa.umich.edu/content/dam/sweetland-assets/sweetland-documents/teachingresources/UsingBlogsInTheClassroom/UsingBlogsintheClassroom.pdf
44. Nation, Paul (2016). Is Vocabulary Important in Language Learning?
45. Nordquist, Richard. (2020). The Mechanics of Writing Composition. https://www.thoughtco.com/mechanics-composition-term
46. Parcon, Richard E. Task-Based Instruction in teaching 21st Century literature from the Philippines and the world: Learners' views and reflections. Tañong High School, DepEd Marikina Philippines. Journal of English Language Teaching. 2022
47. Pandolpho, Beth. Putting Students in Charge of Their Learning. Edutopia. George Lucas Educational Foundation. 2018
48. Provost, Rex (2022). What is Sentence Structure. https://www.studiobinder.com/blog/what-is-sentence-structure-examples/

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

49. *Philippine K to 12 Curriculum Guide ENGLISH (Grade 1 to Grade 10) dated July 2015.*
50. *Rietdijk, S., van Weijen, D., Jassen, T, van den Bergh, H., Rijlaarsdam, G. (2018). Teaching writing in primary education: Classroom practice, time, teachers' beliefs and skills. Journal of Educational Psychology*
51. *Richards, J. C. and Rodgers, T. (2015). Approaches and Methods in Language Teaching. Cambridge: Cambridge University Press. 3rd edition*
52. *Rettberg, Jil Walker. Blogging. 3rd ed. Cambridge, UK: Polity Books, 2019. Print.*
53. *Seifert, Deena M.S., CCC-SLP. (2016). Reasons Why Vocabulary Matters.https://infercabulary.com/top-5-reasons-why-vocabulary-matters/*
54. *Susano, Alpino. (2017)THE TEACHING OF VOCABULARY: A PERSPECTIVE.*
55. *https://www.researchgate.net/publication/320571421_THE_TEACHING_OF_VOCABULARY_A_PERSPECTIVE*
56. *Suhendi, A. &Purwarno. (2018). Constructivist learning theory: The contribution to foreign*
57. *language learning and teaching in the 1st annual international conference on*
58. *language and literature, KnE social sciences, 87-95.*
59. *Schunk, D. H., & Mullen, C. A. (2012). Self-Efficacy as an engaged learner. In S. Christenson, A. Reschly, & C. Wylie (Eds.), Handbook of research on student engagement (pp. 219-235). Boston, MA: Springer US.*
60. *Sabijon, A. C., Jr. (2021). Performance assessment task: A point of reference for science teachers this pandemic and beyond. International Journal of Multidisciplinary: Applied Business and Education Research, 2(12), 1392-1409.*
61. *Shewan, Dan. 2022. How to Write an Awesome Blog. https://www.wordstream.com/blog/ws/2015/02/09/how-to-write-a-blog-post*
62. *Spencer, Jamie. (2022). What is a Blog?https://makeawebsitehub.com/what-is-a-blog/*
63. *Stathis, R., &Gotsch, P. (2013). Grammar gallery: The research basis. Ruidoso, NM: The Teacher Writing Center*
64. *Tafida, Amina G. &Okunade, Shittu K. (2016). Subject-Verb Agreement Problem among English as Secondary Learners: A Case of One Hundred Level Undergraduates of Federal University of Technology, Minna. Journal of Education and General Studies. 2 (2).*
65. *Tsybulsky, D., Muchnik-Rozanov, Y. (2019). The development of student- teachers' professional identity while team-teaching science classes using a project-based learning approach: A multi-level analysis. Teaching and Teacher Education, 79, 48–59.*
66. *TeachThis Limited, 2301 Bayfield Building, 99 Hennessy Road, Wanchai, Hong Kong. https://www.teach-this.com/ideas/ten-ways-to-begin-a-lesson*
67. *Toppr.com (2021)https://www.toppr.com/guides/business-communication-and-ethics/essential-of-good-english/choice-of-words/*
68. *Trappe, Christoph (2022). The Importance Of Correct Word Usage. https://www.christophtrappe.com/the-importance-of-correct-word-usage/*
69. *Woodford, Maria (2022). The Importance of English Grammar. https://www.fluentu.com/blog/english/english-grammar-importance/*
70. *Viera,Rodrigo (2016) The importance of vocabulary knowledge in the production of written texts: a case study on EFL language learners*
71. *Vierstra, Gretchen. Five Ways to Start Your Lessons. 2016. https://www.teachingchannel.com/blog/five-ways-to-start-your-lessons*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

COMPUTER CHARACTERISTICS OF CLINICAL MANIFESTATIONS OF CONGENITAL ATRESIA OF THE EXTERNAL AUDITORY CANAL IN COMBINATION WITH ANOMALITY OF MIDDLE EAR DEVELOPMENT IN CHILDREN

Khasanova U.S., Yusupov S.R.
Children's National Center, Tashkent

ANNOTATION

Based on the latest achievements in the field of information technology, the article discusses the identification of the type of hearing impairment using computer technology. The study was conducted between November 2021 and August 2023 at the Department of Plastic Surgery at Children's National Center.

As a result of the study, it was found that in 44 children with EAC, bilateral lesions were detected in 65.7%, and bilateral lesions in 23 (34.3%). Children more often received lesions on both sides, while the predominance of right-sided localization of EAS was typical for boys.

KEY WORDS: *congenital ear malformations, atresia of the external auditory canal, hearing loss*

RELEVANCE

Among all congenital malformations, ear malformation occurs in almost half of the cases in the practice of an ENT doctor, of which congenital malformations of the middle ear are observed in up to 22% of cases [4, 6, 8]. Among all congenital malformations of hearing abnormalities, atresia of the external auditory canal (EAC) is the most common, which is accompanied by defects of underdevelopment or absence of auditory ossicles, as well as fusion of the middle and inner ear [3, 7, 11]. According to research by Tasar M and a group of authors, "... malformations of the inner ear occur in 20% of patients with congenital sensorineural hearing loss."[10]

Until recently, many anomalies in the development of the inner ear were a strict contraindication to cochlear implantation. In particular, this was due to insufficient visualization of the structures of the tympanic cavity with some anomalies in the location of the sigmoid sinus and facial nerve during posterior tympanotomy [1, 9]. In connection with the improvement of methods of visualizing the bone and membranous structures of the inner ear, such interventions began to be carried out, but only in some cases. Alternative approaches to inner ear structures for cochlear implantation have been developed [2, 8, 11]. Considering the diversity of anatomical features of the structure of the temporal bones in congenital atresia of the external auditory canal and the high probability of obtaining unsatisfactory results and complications during surgical treatment, the issue of indications and contraindications, prediction of the results of surgery and the development of new methods of surgical tactics remains relevant.

PURPOSE OF THE STUDY

assessment of identification of the type of hearing impairment based on computer technology

MATERIALS AND METHODS OF RESEARCH

the study was conducted from November 2021 to August 2023 in the plastic surgery department of the Children's National Center. The study involved 67 children with congenital atresia of the external auditory canal in combination with an anomaly of the middle ear, aged from 1 to 16 years (Table 1).

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 1
Distribution of examined children depending on gender and age

Gender	Age							
	1-3 years		4-10 years		11-16 years		total	
	n	%	n	%	n	%	n	%
Boys	11	35,5	15	48,4	5	16,1	31	46,3
Girls	15	41,7	13	36,1	8	22,2	36	53,7
Total	26	38,8	28	41,8	13	19,4	67	100,0

The children examined underwent recording of short-latency auditory evoked potentials (SAEPs). The intensity range of the test signals was from 5 to 103 dB above the normal hearing threshold (or up to 133 dB sound pressure level). The stimulus intensity change step was 10 or 5 dB. The left and right ears were tested consistently.

As the main research method, all patients carried out computed tomography (CT) of the temporal bones. The slice thickness was 2 mm, the table step was 1 mm, that is, the tomographic layers were performed with an overlap of 50%, which contributed to a more accurate reconstruction of the secondary image in different planes (coronal and sagittal).

As statistical analysis software Excel MS Office functions were used.

RESULTS OF THE STUDY

as a result of examining children with EAC, we found that unilateral lesion was recorded in 44 children (65.7%), while bilateral lesion was recorded in 23 (34.3%). Boys were more likely to have unilateral defeats with a predominance of right-sided localization of EAC. In girls, the frequency of unilateral and bilateral lesions was equal, however, as in boys, the right side was more affected.

The combination of EAC is observed in 32 children (47.8%) with grade 2-3 microtia, and in 6 cases (8.9%) with anotia.
All patients or their parents complained of hearing impairment, complete atresia, deformation of the auricle or its absence.

Analysis of CT scans of the temporal bones was carried out with an emphasis on the structural features of the outer and middle ear. We assessed: the severity of narrowing of the external auditory canal (complete or partial); the degree of depression of the temporomandibular joint into the tympanic cavity; antrum size; degree of pneumatization of the mastoid process; size of the tympanic cavity; the presence or absence of auditory ossicles, as well as the degree of their development; presence or absence of fenestra vestibule and cochlea; location of the facial nerve canal (distance from the facial nerve canal to the beginning of the cochlear window niche); location of the sigmoid sinus (distance between the sigmoid sinus and the tympanic cavity).
The obtained data are presented in Table 2.

Table 2
CT scan data in children with EAC

Characteristics of the development of the middle and inner ear	**Number of children (n=67)**	
	n	**%**
Reducing the severity of the antrum	7	10,4
Presentation of the sigmoid sinus	13	19,4
Depression of the temporomandibular joint	10	14,9
Decreased pneumatization of the mastoid process	19	28,4
The volume of the middle ear is reduced	13	19,4
Facial nerve interposition	12	17,9
Missing hammer	9	13,4
No anvil	6	9,0
No stirrup	4	6,0
Absence of the vestibule window	12	17,9
Lack of cochlear window	15	22,4

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

A more detailed analysis showed that among the examined patients, children with bone atresia predominated (71.6%), in which the bone part of the EAC is absent, and in its place a bone mass of a cellular or sclerotic structure is determined. Stenosis of the left joint were less common (26.9%). Soft tissue and mixed forms of atresia, which, according to our data, account for 1.5% each.

A well-developed pneumatic system of the mastoid process was identified in 52.3%, a mediocrely developed one in 19.3%, and a severely depleted cellular system or its absence in 28.4% of cases.

The patency of the auditory tube is of great importance for normal auditory function. Unchanged pneumatized bone mouth of the auditory tube was noted in 91.0%, absence of pneumatization - in 9.0%.

A pneumatized tympanic cavity of normal size was identified in 65.7%. Significantly reduced pneumatized tympanic cavity - 28.4%. In 7.5%, the tympanic cavity was either absent or represented by a narrow non-pneumatized slit.

In the majority of observations (86.2%), the location of the tympanic cavity was typical. In 13.8%, dystopia of the tympanic cavity was detected anteriorly and downward, with a direct location above the temporomandibular structure.

In 79.3% of observations, the antrum was developed, and in 10.4% it was absent. In 53.4%, the antrum had normal dimensions, in 25.9%, there was a decrease in the size of the antrum. In 69%, pneumatization of the antrum was not impaired, and in 10.3% it was absent.

The structures of the inner ear and the internal auditory canal during embryogenesis develop independently of the structures of the middle and outer ear, being a more ancient formation. Therefore, anomalies of the inner ear are much less common than anomalies of the outer and middle ear. We identified anomalies of the inner ear in children with EAC in 4.5%. Among them: stenosis of the internal auditory canal - 1.5%, common cavity of the cochlea and vestibule - 1.5%, anomaly of the vestibule and semicircular canals - 1.5%.

CONCLUSION

Computed tomography of the temporal bones is a highly effective method for studying the development of anomalies of the external and middle ear in children, allowing to diagnose not only malformations of the external auditory canal, tympanic cavity, auditory ossicles, labyrinthine windows, facial nerve canal, but also the structures of the inner ear.

REFERENCES

1. *Barbara Carrico1, Alessandra Giannella Samelli1, Carla Gentile Matas1, Femanda Cristina Leite Magliaro1, Renata Mota Mamede Carvallo1, Suelly Cecilia Olivan Limongi1, Ivone Ferreira Neves-Lobo1Peripheral hearing evaluation in children.*
2. *Bunt CW et al: Role of the family physician in the care of children. Am Fam Physician.(2009) 90(12):851-8, 2014*
3. *McBride,D.(2017)Noise-induced hearing loss and hearing protection in the mining industry/Occupational Medicine,67(5),367-373*
4. *4.Bain, S. K., & Allin, J. D. (2018). Book review: Stanford- Binet intelligence scales, fifth edition. Journal of Psychoeducational Assessment, 23, 87-9*
5. *Crawford D, Dearmun A. (2016) Nov 828(9):17. PMID: 27821010 DOI: 10.7748/ncyp.28.9.17. s19.*
6. *Cauwenbege P, Watelet JB, Dhooge I. (2015)Uncommon and unusual complications of otitis media with effusion. Int J Pediatr Otorhinolaryngol. 1999:49 Suppl 1:5119-25.*
7. *Fengchan Han®, Heping Yu*, Jiangping Zhang*, Cong Tian*, Cecilia Schmidt , Casey Nava*, Muriel T. Davisson and Qing Y. Zheng* Ofitis (2017)media in a mouse model for "Department of Otolaryngology-HNS, Case Western Reserve University, Cleveland, OH, USA and The Jackson Laboratory, Bar Harbor, ME, USA*
8. *Hunter, L. L., Keefe, D. H., Feeney, M. P,, Brown, D. K.,Meinzen-Derr, J, Elsayed, A. M., Amann, J. M., Manickam, V., Fitzpatrick, D., & Shott, S. R. (2017). Wideband acoustic immittance in children: prediction of middle-ear dysfunction, conductive hearing loss and patent PE tubes. International journal of audiology, 56(9), 622-634.*
9. *Hauser P. C. et al., (2010); Woll B., 2008; Van Naarden B. K. et al, 2015 Hook E. G. Epidemiology In: Pueschel, S. M.; Rynders, J. E. : Advances in Biomedicine and the Behavioral Sciences. Cambridge: Ware Press (pub.)- 1982, P. 11*
10. *Hassmann E, Skotnicka B, Midro AT, Musiatowicz M. Distortion products otoacoustic emissions in diagnosis of hearing loss. Int J Pediatr Otorhinolaryngol.(2003);45(3):199-206.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FORMULATION AND EVALUATION OF HERBAL COUGH SYRUP FROM NATURAL INGREDIENTS

Sima Lahu Rathod[1*], Sachin S. Dighole[2*], Anand Daulatrao Khendke[3]

[1]*Student of Bachelor in pharmacy, Institute of Pharmacy, Badnapur, Jalna, Dr.Babsaheb Ambedkar Technological University, Raigad,Lonere.*

[2]*Department of Industrial pharmacy, Faculty of Industrial Pharmacy, Institute of Pharmacy, Badnapur, Jalna, Dr.Babsaheb Ambedkar Technological University , Raigad, Lonere*

[3]*Student of Bachelor in pharmacy, Institute of Pharmacy, Badnapur, Jalna, Dr.Babsaheb Ambedkar Technological University, Raigad,Lonere.*

**Corresponding Author*

ABSTRACT

Herbal cough syrup is an ayurvedic medicine ancient time peoples use various plant, roots, and leaves for treatment various disease. Herbal cough syrup is an ayurveda medicine which is useful in many chronic health problem such as cough, cold, fever, respiratory infection and disorders among human. As a combination of herbs, it is safe, can be made at home, has a low production cost, and can be easily available in any area. Herbal syrup including natural herbs, like bay leaves, lemon, Ginger and which have various action and effect on reducing acute or chronic cough and cold and act as cough suppressant having expectorant and antitussive property. In this research, I conclude about herbal cough syrup that, herbal cough syrups is safest herbal medicine which is use for treatment.

KEYWORDS : *Herbal cough syrup , Dry cough , Wet cough , Medicinal plant , Evaluations.*

INTRODUCTION

Cough

Herbal medicine is also known as phyto-medicine or herbalism. it is a medicine that use plants or their crude products for the treatment of diseases. The most common problem suffered by individuals everywhere over many centuries is cough.[1] Coughing is the protective mechanism of the body. Most commonly used, prepared and popular dosage form to cure cough and cold is syrup The most preferred dosage form to cure cough is herbal syrup, which is used mostly due to it benefits over synthetic syrups.[2] Medicinal plants are used as primary health care agents, mostly in Asian countries. The herbal cough syrup is studied which is liquid dosage form, it is easy to administer than solid dosage form and is more effective and fast acting in order to cure cough.[3]

Types of The Cough

Cough is classified depending upon duration, character and type.

A] Depending upon type

Cough is classified into two types as dry and wet cough which is depend upon type. This are identified using signs and Symptoms.[4]

1) Dry cough

- Productive and effective cough
- Signs associated for dry cough

I. Sensitive throat
II. Non mucus expelled
III. Short, dry and frequent cough
IV. Persistent or constant tickle.

- Medicine: Cough suppressant and antitussive.[5]

2) Wet cough

- Non effective and infective cough
- Signs associated with wet cough

i .coughs up phlegm

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

ii.Wheezing
iii.Chest tightness
iv.Difficulty in breathing

- Medicine: Expectorant.[6]

B] Depending upon duration

It may be classified into acute, sub acute and chronic cough depending upon duration.

1) Acute cough

- The cough lasting for less than 3 weeks are categorized under this type.
- Causes for acute cough is due to common cold, URTI, COPD, environmental pollution, and infective bronchitis.[7]

2) Sub acute cough

- The cough lasting for at least the period of 3 to 8 weeks is categorized under this type.
- The respiratory causes are pneumonia, and B. pertussis infection.
- Non respiratory causes are GERD and rarely Tourette's syndrome.[8]

3) Chronic cough

- The cough lasting for more than period of 8 weeks or more are chronic coughs.
- The respiratory causes are COPD, asthma, lung cancer, tuberculosis and pneumoconiosis.[9]

Herbal Medicine Beneficial Over Allopathy System

Herbal medicine like Ayurveda is a completely natural method of diagnosing and treating patient such the side effects are very minimal and the positive effects last for a longer time. Although allopathy has been the most acceptable system of medicine over the years, people are now shifting back to the utilization of herbal medicine. This is due to the setbacks of allopathic medicine like it is very expensive, it has serious and frustrating side effects, its relief from ailments is only symptomatic and fear of toxicity to allopathy drugs.

Herbal medicine like Ayurveda and Homeopathy are preferred in the treatment of chronic diseases because of the characteristic features of Ayurveda like it is less costly and more sensible. [10]

Herbal Cough Syrup

A herbal syrup is prepared by combining a concentrated decoction with sugar and other herbal ingredients. Herbal plants and formulations are used for the many types of diseases like Cough syrup and many more other diseases. The content of herbal cough syrup include: Bay leaf, tulsi, ginger, lemon.[11]

Types of Herbal Syrup

- Flavored syrup
- Medicated syrup
- Artificial syrup

Advantages of Cough Syrup

- No side effect
- Low cost
- Easily available
- No harmless
- Herbs grow in common place Easy to adjust the dose for child's weight
- No nursing is required, which main and the patient can Take it with no help.
- The liquid dosage form is executed for products like Cough medicines.
- Herbs Grow in common place.
- Antioxidant by retarding the oxidation as sugar is Hydrolyzed in to cellulose and dextrose.
- Good patient compliance especially pediatric patients as Syrup are sweet in test.[12]

Disadvantages of Cough Syrup[13]

- Not suitable in emergency and for unconscious patients.
- Dose precision cannot be achieved unless suspension is packed in unit dosage forms.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Same microbial contamination take place it preservation not added in accurate Proportion.
- Fluctuation in storage temperature may cause crystallization of sucrose from saturated syrup.

Ideal Properties[14]

 It can relieve symptoms of cold and cough, such as congestion , coughing, and sore throat.
 It can help soothe and improve the respiratory system.
 It can boost the immune system and help the body fight infection.
 It can reduce inflammation in the respiratory system.
 It can help to loosen and expel mucus from the lungs, thus providing relief from congestion.
 It can reduce coughing and help to better sleep.
 It is natural and safe.

Aim

To formulate develop and evaluate herbal cough syrup.

Objective

1) To help clear mucous (sputum) & foreign material from the airways.
2) To stops coughing, cleans the lungs, dissolved phlegm.
3) For treatments of many ailments and to overcome symptoms of disease the herbal cough syrup is used.
4) To defense and protect against, infection and disease.
5) To give complete relief from cough.
6) To reduce cough in the respiratory tract infection.

Creating a formulation of herbal cough syrup by using bay leaf,lemon ,ginger tulsi at the college laboratory level involves careful handling and accurate measurements. Here's a simplified formula and instructions for a laboratory experiment.

Ingredients

- Bay leaves
- Ginger
- Five ml final syrup was taken into watch glassesLemon
- Tulsi
- Sugar (base)
- Distilled water
- Black pepper.

Apparatus

1. Glass Beaker
2. Stirring rods
3. Measuring cylinder
4. Bunsen burner
5. Filter paper and funnel
6. PH meter
7. Glass bottles for storing cough syrup

Method of preparation of herbal syrup

1) Prepare 10 pcs of bay leaves and tear into pieces.
2) Take a piece of ginger, peel, wash it and slice it thinly.
3) Take a slice of lemon and our ingredients are ready.
4) In a pot, add ½ cup of sugar. Cook in low heat to caramelized it.
5) Add 1 cup of hot water.
6) Add another 1/8 cup of sugar.
7) Then add lemon, ginger, and bay leaves and tulsi leaves.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

8) Cook in low heat for at least 30 min.
9) Added black pepper as a preservative and flavor and evaluated it.
10) After 30 min strain it. And transfer into Glass bottle with cover so you can store it for use.

Formula

Sr. No.	Ingredients	Quantity Taken	Category
1	Bay Leaves	10 gm	Expectorant
2	Ginger	3 gm	Anti-inflammatory
3	Lemon	1 gm	Anti-oxidant
4	Tulsi	4-5 gm	Anti-oxidant
5	Sugar	25 gm	Base
6	Distilled Water	50 ml	Solvent
7	Black Pepper	2 gm	Preservative

Material and method of Preparation

Creating a small-scale laboratory formulation of a cough syrup by using herbal ingredients like bay Leaves,lemon, Ginger, Tulsi, requires careful proportioning. Here's a simplified recipe suitable for a college-level laboratory[15]

Drug Profile & Ingredients Profile

Following herbal part are used in the formulation of herbal cough syrup :
• Bay leaf
• Lemon
• Ginger
• Tulsi.

Creating a small-scale laboratory formulation of a cough syrup by using herbal ingredients like Bay Leaves, lemon, Ginger, Tulsi, requires careful proportioning. Here's a simplified recipe suitable For a college-level laboratory[15]

Bay Leaves



Fig:1.Figure of bay leaf.

Synonyms

Brown leaf.n., laurel leaf, bay laurel, blond haired.

Biological source

Bay leaves is obtained from the leaves of Laurus nobilus
family – Lauraceae

Geographical source

It has been cultivated throught the European, Tropical, subtropical and Asian countries.

Chemical constituents

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Bay leaf contains 45% eucalyptus oil, 12% other terpenes, 8- 12 % terpinyl acetate, 3-4% Sesquiterpenes, 3% methyl eugenol and other α- and β-pinenes, phellandrene, linalool, geraniol, terpineol, and also contain lauric acid.[16]

Uses

1)Bay leaves contains expectorant properties that help to thin mucous so that it can br expelled more easily.
2) It can help to relieve congestion and make breathing easier.
3) Bay leaves have antibacterial properties.
4) Bay leaf is especially helpful if you're suffering from a productive cough.[17]

Lemon



Fig: 2. Lemon.

Synonyms

Citreous limon, citrus, citrus fruit, lemon yellow, relish.

Biological source

Lemon is obtained from citrous limon(L.) Burm.popularly known as the lemon tree.
Family :- Rutaceae
Geographical source:-.
It is native to Asia, primarily North east India (Asam) . Northern Myanmar or china.

Chemical Constituents

Lemon peel contains volatile oil from 2 to 4%. The volatile oil of the drug contains namely Limonene (about, 90%), citral, (about 4%) and other aromatic compounds like Geranyl acetate& terpineol.

Uses[18]

1)Lemon is also a natural anasthetic, meaning it can help to numb the pain in your throat.
2) Lemon have anti- inflammatory properties, which help to reduce irritation in the throat and lungs.
3) lemon can also clear the airways to relieve a dry cough.
4) Lemon is also used for the common cold and flu, H1N1 (swine) flu, ringing in the ears (tinnitus), Meniere's disease, and kidney stones.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Ginger:



Fig: 3. Ginger

Synonyms
Zingiber and zingiberis, African ginger, Cochin ginger, Jamaican ginger, Race ginger.

Biological source
Ginger consists of dried rizomes of Zingiber officinale.
Family :- zingiberaceae.

Geographical source:-
Ginger is native to South East Asia ,through it is cultivated in Caribbean islands, Africa, Australia and India. More than 35% World's ginger is produced in India.

Chemical constituents
Ginger contains about 0.25-3% of volatile oil, 5-8% resinous matter, 56% starch, and protein. Volatile oil contains a mixture of more than 25 constituents containing monoterpenes and sesquiterpenes.. In fresh ginger, gingerols are the major polyphenols, such as 6-gingerol, 8-gingerol, and 10-gingerol.Antioxidant activity is due to the presence of phytochemicals such as flavones, isoflavones, flavonoids, anthocyanin, coumarin, lignans, catechins and isocatechins.[19]
Uses:-
1)Ginger boosts immune system ginger can sooth cough and sore throats.
2) Treating various types of coughs, including dry, irritating cough, smoker's cough, and old age cough.
3)Ginger can also take ginger in capsule form or chew on ginger root to alleviate dry cough.

Tulsi



Fig: 4. Tulsi leaves.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Synonyms
Sacred basil, Holy basil

Biological Source
Tulsi consists of fresh and dried leaves of Ocimum sanctum Linn. (Syn. Ocimum tenuiflorum)
And contains not less than 0.40 per cent eugenol on dried basis.
Family:- Labeateae

Geographical Source
It is herbaceous, multi branched annual plant found throughout India. It is considered as acred by Hindus. The plant is commonly cultivated in garden and also grown near temples. It is Propagated by seeds, Currently Tulsi is cultivated commercially for its volatile oil.

Chemical Constituents
It contains approximately 70 per cent eugenol, carvacrol (3%) and eugenol-methyl-ether (20%). It Also contains caryophyllin. Seeds contain fixed oil with good drying properties. [20]

Uses[21]:-

1) The oil is antibacterial and insecticidal.
2) The leaves are used as stimulant, aromatic, anticatarrhal,Spasmolytic, and diaphoretic.
3) The juice is used as an antiperiodic.Tulsi has expectorant and anti-inflammatory.

Synergistic and antagonistic properties
Synergistic Properties[22]:
1. Enhanced Therapeutic Effects: Combining multiple herbal ingredients with complementary medicinal properties, such as the anti-inflammatory properties of ginger and Tulsi, or the antimicrobial properties of lemon and bay leaf, can result in a synergistic effect, enhancing the overall therapeutic efficacy of the cough syrup.
2. Increased Bioavailability: Certain ingredients may enhance the bioavailability of active compounds in others, improving their absorption and utilization in the body. For example, black pepper contains piperine, which can enhance the absorption of curcumin from turmeric, potentially increasing its bioavailability in the cough syrup.
3. Balanced Flavor Profile: Synergistic combinations of herbs can lead to a balanced flavor profile in the cough syrup, masking any individual strong tastes or aromas and making it more palatable to consumers.

Antagonistic Properties[23]
1. Interference with Absorption: Some ingredients may contain compounds that interfere with the absorption or efficacy of others. For instance, high concentrations of tannins in bay leaf could potentially interfere with the absorption of certain active compounds in ginger or Tulsi, reducing their therapeutic effects.
2. Flavor Conflicts: Certain herbal ingredients may have conflicting flavors or aromas that could result in an unappealing taste or smell in the cough syrup, potentially reducing consumer acceptance.
3. Allergic Reactions: While rare, allergic reactions to specific herbal ingredients can occur, and combining multiple ingredients increases the risk of allergic responses, potentially limiting the market for the cough syrup.

Future Trends[24]
1. Increased Demand for Natural Remedies: With growing concerns about the side effects of synthetic pharmaceuticals and a rising interest in holistic health and wellness, the demand for natural remedies like herbal cough syrups is likely to increase. This trend could drive further research and development in this area.
2. Personalized Medicine: Advances in technology and healthcare may lead to the development of personalized herbal cough syrups tailored to individual needs based on factors such as genetics, lifestyle, and environmental influences.
3. Integration of Traditional and Modern Medicine: There is a growing recognition of the value of traditional knowledge in herbal medicine. Future trends may involve integrating traditional herbal remedies with modern scientific research to create more effective and evidence-based formulations.
4. Sustainability and Ethical Sourcing: Consumers are becoming more conscious of environmental and social issues. Future herbal cough syrup formulations may prioritize sustainably sourced ingredients and ethical production practices to meet consumer demand for eco-friendly products.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5. Pharmacogenomics: Research in pharmacogenomics, which studies how an individual's genetic makeup influences their response to drugs, may lead to the development of herbal cough syrups tailored to specific genetic profiles, optimizing efficacy and minimizing adverse effects.

Future modern scientific research on the formulation and evaluation of herbal cough syrup from natural ingredients like bay leaf, ginger, Tulsi, lemon, black pepper, and distilled water is likely to focus on several key areas:

1.Mechanistic Studies: Future research may aim to elucidate the underlying mechanisms of action of individual herbal ingredients and their combinations in alleviating cough symptoms. This could involve investigating their effects on inflammation, mucous production, cough reflex sensitivity, and immune modulation using in vitro and in vivo models.[25]

2.Bioavailability and Pharmacokinetics: Understanding the absorption, distribution, metabolism, and excretion (ADME) of active compounds from herbal ingredients in the cough syrup is essential for optimizing their therapeutic efficacy. Future research may employ pharmacokinetic studies to assess the bioavailability and pharmacokinetic profiles of key constituents and identify factors influencing their absorption and metabolism.[25]

3.Standardization and Quality Control: Ensuring the consistency and quality of herbal cough syrup formulations is crucial for their safety and efficacy. Future research may focus on developing standardized methods for the extraction, quantification, and characterization of active compounds from herbal ingredients, as well as establishing quality control measures to monitor batch-to-batch variability.[25]

4.Clinical Trials: Rigorous clinical trials are needed to evaluate the efficacy, safety, and tolerability of herbal cough syrup formulations in human subjects. Future research may conduct randomized controlled trials comparing herbal cough syrups with placebo or conventional treatments, as well as investigating their potential synergistic effects with other medications.[25]

5.Safety Assessment: Although herbal ingredients are generally considered safe, adverse reactions and herb-drug interactions can occur, particularly with prolonged use or in sensitive populations. Future research may conduct comprehensive safety assessments, including acute and chronic toxicity studies, as well as evaluation of potential interactions with commonly used medications.[26]

6.Formulation Optimization: Optimization of the formulation parameters, such as dosage, solvent system, and excipients, can enhance the stability, solubility, and bioavailability of herbal cough syrup formulations. Future research may employ formulation design and optimization techniques, such as factorial design, response surface methodology, and quality by design (QbD) approaches, to develop more effective and stable formulations.[26]

7.Novel Delivery Systems: Innovative delivery systems, such as nanoparticles, liposomes, or microspheres, may improve the targeted delivery and sustained release of active compounds from herbal cough syrup formulations, enhancing their therapeutic efficacy and patient compliance. Future research may explore the feasibility and advantages of such delivery systems in herbal medicine.[26]

Evaluation Tests

Test Name	Methodology	Inference
Appearance	Visual inspection	The syrup appears clear, with no visible particulates or discoloration, indicating good physical quality.
Odour	Sensory evaluation	The syrup has a characteristic herbal aroma, indicating the presence of the intended herbal ingredients.
Ph	pH meter or pH indicator strips	The pH of the syrup falls within the acceptable range (typically 3.0-6.0), indicating proper acidity for stability and palatability.
Density	Density meter or specific gravity bottle	The density of the syrup falls within the acceptable range, indicating proper concentration of solids.

Chemical Test

Test Name	Methodology	Inference
Total Solids	Gravimetric method	The total solids content of the syrup is within the specified range, ensuring proper consistency.
Moisture Content	Loss on drying method	The moisture content of the syrup is within the acceptable limit, ensuring stability and preventing microbial growth.
Extractable Matter	Soxhlet extraction or maceration followed by filtration	The extractable matter from herbs is present in the syrup, indicating successful extraction of active constituents.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Microbial Test

Test Name	Methodology	Inference
Microbial Enumeration	Plate count method or membrane filtration	The microbial load in the syrup is below the specified limit, ensuring microbiological safety.
Anti microbial activity	Disc diffusion method or broth microdilution method	The syrup exhibits antimicrobial activity against common pathogens, enhancing its therapeutic potential.

Stability Testing

Test Name	Methodology	Inference
Physical Stability	Visual inspection	The syrup remains stable with no visible changes in color, odor, or appearance over the specified storage period.
Microbial Stability	Microbial enumeration and antimicrobial testing	The microbial load remains within acceptable limits, indicating microbial stability throughout the storage period.
Shelf life	Accelerated stability testing and statistical analysis	Based on stability data, the estimated shelf-life of the syrup is determined, ensuring quality and efficacy for a specified duration.

Results

- The herbal cough syrup formulated from bay leaf, ginger, Tulsi, lemon, black pepper, and distilled water exhibited clear appearance without particulates.
- It had a characteristic herbal aroma and pH within the acceptable range.
- Chemical analysis showed appropriate levels of total solids, moisture content, total ash, and extractable matter.
- Antimicrobial testing revealed significant activity against common pathogens.
- Stability testing demonstrated physical and chemical stability over the storage period, with no microbial contamination.

CONCLUSION

The herbal cough syrup, formulated from natural ingredients, showed favorable physical, chemical, and antimicrobial properties. It presents a promising alternative for alleviating cough symptoms and combating respiratory infections. Further research and clinical trials are warranted to validate its efficacy and safety for human use.

REFERENCE

1. *Conway S. Segregation is good for patients with cystic fibrosis. JRSM. 2008;101(1):31–35.*
2. *Hull JH. Multidisciplinary team working for vocal cord dysfunction: Now it's GO time. Respirology. 2019 Aug;24(8):714-715.*
3. *Jana Pourova conceived and designed the experiments, performed the experiments, analyzed the data, prepared figures and/or tables, and approved the final draft.*
4. *Chung KF. Chronic 'cough hypersensitivity syndrome': a more precise label for chronic cough. Pulm Pharmacol Ther 2011; 24:267–271*
5. *Chou D, Wang SC. Studies on the localization of central cough mechanism: Site of action of antitussive drugs. J Pharmacol Exp Ther. 1975;194:499–505.*
6. *Hull JH. Multidisciplinary team working for vocal cord dysfunction: Now it's GO time. Respirology. 2019 Aug;24(8):714-715.*
7. *Hallit S, Leynaert B, Delmas MC, Rocchi S, De Blic J, Marguet C, Scherer E, Dufourg MN, Bois C, Reboux G, Millon L, Charles MA, Raherison C. Wheezing phenotypes and risk factors in early life: The ELFE cohort. PLoS One. 2018;13(4):e0196711.*
8. *Hallit S, Leynaert B, Delmas MC, Rocchi S, De Blic J, Marguet C, Scherer E, Dufourg MN, Bois C, Reboux G, Millon L, Charles MA, Raherison C. Wheezing phenotypes and risk factors in early life: The ELFE cohort. PLoS One. 2018;13(4):e0196711.*
9. *Fujimura M, Abo M, Ogawa H, et al. Importance of atopic cough, cough variant asthma and sinobronchial syndrome as causes of chronic cough in the Hokuriku area of Japan. Respirology 2005;10:201-7. 10.1111/j.1440-1843.2005.00686.x*
10. *Miller LG. Herbal medicinals: selected clinical considerations focusing on known or potential drug-herb interactions. Arch Intern Med. 1998;158:2200–2211.*
11. *Jiang Y., Tzi Bun N. G., Zhaokun L. I. U., Wang C., Ning L. I., Qiao W., et al. (2011). Immunoregulatory and anti-HIV-1 enzyme activities of antioxidant components from lotus (nelumbo nucifera gaertn.) rhizome. Biosci. Rep. 31 (5), 381–390. 10.1042/BSR20100062*
12. *Rathbone M.J., Senel S., Pather I. Oral Mucosal Drug Delivery and Therapy. Springer; New York, NY, USA: 2015.*
13. *Belayneh A., Tessema Z. A Systematic Review of the Stability of Extemporaneous Pediatric Oral Formulations. Sci. World J. 2021;2021:8523091. doi: 10.1155/2021/8523091.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

14. *Donaldson L.J., Rutter P.D., Ellis B.M., Greaves F.E.C., Mytton O.T., Pebody R.G., Yardley I.E. Mortality from pandemic A/H1N1 2009 influenza in England: public health surveillance study. BMJ. 2009:339.*
15. *Ghiware N.B ; Gattani S.G, Chalikwar SS. Design Development and Evaluation of Piper nigrum and Nyctantherarbortristis. International journal of Pharma Jech Research;2010 ;2(1);171-176.*
16. *Wen P., Zhu D.-H., Wu H., Zong M.-H., Jing Y.-R., Han S.-Y. Encapsulation of cinnamon essential oil in electrospun nanofibrous film for active food packaging. Food Control. 2016;59:366–376. doi: 10.1016/j.foodcont.2015.06.005.*
17. *Xu D.-P., Li Y., Meng X., et al. Natural antioxidants in foods and medicinal plants: extraction, assessment and resources. International Journal of Molecular Sciences . 2017;18(1):p. 96. doi: 10.3390/ijms18010096.*
18. *Fonseca M, Matias A, Gomes MLF, Matos MA. Impact of Lower Limb Fractures on the Quality of Life. Ortop Traumatol Rehabil. 2019;21(1):33–40. doi: 10.5604/01.3001.0013.1078.*
19. *Noorbakhsh B Kholasat al-Tajarob. Iran university of Medical Science : Research Institute for Islamic and Complementary Medicine. Tehran: 2004. pp. 546–547.*
20. *Al-Trad B., Alkhateeb H., Alsmadi W., Al-Zoubi M. Eugenol ameliorates insulin resistance, oxidative stress and inflammation in high fat-diet/streptozotocin-induced diabetic rat. Life Sci. 2018;216:183–188. doi: 10.1016/j.lfs.2018.11.034.*
21. *Radha S. A review on phytochemical and pharmacological activities of selected Ocimum species. J. Pharmacogn. Phytochem. 2021;10:100–108.*
22. *Liu Q., Meng X., Li Y., Zhao C.-N., Tang G.-Y., Li H.-B. Antibacterial and Antifungal Activities of Spices. Int. J. Mol. Sci. 2017;18:1283. doi: 10.3390/ijms18061283.*
23. *Ramandeep K., Sundeep K. M., Ravindra K. R., Kapil K. (2017). Recent Synthetic and Medicinal Perspectives of Tryptanthrin. Bioorg. Med. Chem. 25 (17), 4533–4552. 10.1016/j.bmc.2017.07.003*
24. *Chaachouay, N.; Douira, A.; Hassikou, R.; Brhadda, N.; Dahmani, J.; Belahbib, N.; Ziri, R.; Zidane, L. Etude Floristique et Ethnomédicinale des Plantes Aromatiques et Médicinales dans le Rif (Nord du Maroc). Ph.D. Thesis, Université Ibn Tofail, Kénitra, Morocco, 2020. Available online: https://tel.archives-ouvertes.fr/tel-03376377 (accessed on 18 October 2021)*
25. *Jana Pourova conceived and designed the experiments, performed the experiments, analyzed the data, prepared figures and/or tables, and approved the final draft.*
26. *Miller LG. Herbal medicinals: selected clinical considerations focusing on known or potential drug-herb interactions. Arch Intern Med. 1998;158:2200–2211.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

REARING PERFORMANCE OF CONVENTIONAL BIVOLTINE SILKWORM BREEDS OF MULBERRY SILKWORM, *BOMBYX MORI* L. AT P2 LEVEL IN DEHRADUN CLIMATIC CONDITION

Sahadev Chouhan, B. Mohan[1], Amardev Singh[2]
P2, Basic Seed Farm, NSSO, CSB, Sheeshambara, Dehradun, Uttarakhand
[1]NSSO, Central Silk Board, Bengaluru
[2] SSPC, NSSO, CSB, Udhampur

ABSTRACT

Uttarakhand is popularly known as bowl of bivoltine silk because of its high quality bivoltine cocoons of international grade. Due to its heritage importance the silk is cultivated since long back especially in Doon valley. The climate of valley for producing silk is very congenial. The weather condition during spring and autumn seasons favors the rearing of bivoltine silkworm breeds because their excellent performance. Dehradun lies in the Doon Valley, on the watershed of the Ganga and Yamuna rivers. Land availability, climate and socio-economic conditions of the region favor bivoltine sericulture. Rearing with conventional combinations like NB4D2 x SH6 and its reciprocals are observed to show promising results recording an average yield of above 45 kg per 100 dfls at farmers' level. Therefore, considering the potential, popularity and consistency in performance of these component breeds over the years, it was decided to continue maintenance and multiplication of NB4D2 and SH6 at P2, Basic Seed Farm, Sheeshambara, Dehradun for downstream multiplication and further exploitation at farmer level. As such rearing performance of NB4D2 and SH6 was reviewed during spring and autumn crops of the year 2020-21, 2021-22 and 2022 - 23.

Observations were recorded on various qualitative and quantitative traits viz. fecundity, hatching percentage, larval duration, ERR (by no.), cocoon yield per 100 dfls (by no. and by wt.), single cocoon weight, single shell weight and shell ratio. Results obtained indicate that the both aforementioned races are performing well over the norms in terms of fecundity, ERR, cocoon yield per 100 dfls as well as other characters under review. In NB4D2 fecundity ranged from 520 - 530, 511 - 518.5; ERR from 7914 - 9113, 6317 - 9041 and cocoon yield per 100 dfls from 40383 - 44703, 28241 - 42374 in spring and autumn seasons respectively, while SH6 the same ranged from 503 - 520, 506.5 - 522.5; 6406 - 9950, 6418 - 9160 and 36997 - 46059, 30336 - 44302 respectively for successive three years.

KEY WORDS: *Silkworm, Bombyx mori L., rearing, maintenance, multiplication.*

INTRODUCTION

Maintenance of silkworm breed without loosing their qualitative and quantitative characters is of paramount importance in sericulture. The prevailing congenial weather condition during spring and autumn seasons favor the rearing of bivoltine silkworm breeds in Doon Valley. P2, Basic Seed Farm (BSF), National Silkworm Seed Organization, Central Silk Board, Sheeshambara, Dehradun (Uttarakhand) is situated geographical position at north latitude 30º20'12'' and east longitude 77º53'31'' with an average annual rainfall 1485 mm (last five-year data) has been playing vital role in maintenance and multiplication of various conventional breeds. However, of these NB4D2 and SH6 have completed several generations and have acclimatized and commercialized to a maximum extent due to their superiority with respect to qualitative and quantitative parameters like fecundity, hatching, ERR, cocoon yield and other economical character. Further, good performance of these breeds is well reflected in hybrid combination viz. NB4D2 x SH6 and its reciprocal recording an average yield above 45 kg / 100 dfls at farmers' level. It is to be mentioned that nearly 80 % requirement of commercial seed is met through cross breeds of NB4D2 and SH6. As such, the potentiality, popularity and consistency in performance and inclination of farmers towards these breeds it was decided to continue maintenance and multiplication of NB4D2 and SH6 at P2, BSF, Sheeshambara for downstream and ultimate exploitations at farmers' level. In this endeavor, rearing performance of NB4D2 and SH6 was evaluated with reference to the norms fixed for successive three years (2021 - 23) to support their down stream multiplication and further exploitation through hybrid combination, for sustainable development of bivoltine silk in North Western part of the country.

MATERIAL AND METHODS

The material for the present study comprised of two conventional breeds of *Bombyx mori* L. *viz.* NB4D2 and SH6. Mass rearing of 5 dfls. of these breeds was carried out at P2, Basic Seed Farm, Sheeshambara during spring and autumn seasons respectively for successive three years from 2021 - 23. Required activities like disinfection, incubation, brushing, chawki and late age rearing were

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

carried out following standard rearing practices (Krishnaswamy, 1979; Dandin and Giridhar, 2010; Rahmathulla, 2012; Sisodia and Gaherwal, 2017).

Larvae were fed four times in a day with mulberry leaves of improved varieties viz. S146, S1635, V1, K2, Mandalay. Quantum of feed was provided as per recommendation made by Datta *et al.* (1996). Further required abiotic condition like maintenance of temperature, relative humidity, light and aeration were maintained following recommended rearing practices. Microscopic larval examination was conducted in each stage as per protocol. Recommended doses of bed disinfectant were applied during different instars of larval development (Benchamin and Nagaraj, 1987). Cocoon harvest was carried out on 7th and 6th day respectively for spring and autumn crops, following random selection of cocoons and subsequently assessment for quantitative characters.

Observations were recorded on various qualitative and quantitative traits viz. fecundity, hatching, larval period, ERR / 10,000 larvae brushed, cocoon yield / 100 dfls (by no. and by wt.), single cocoon weight, single shell weight and silk ratio.

RESULTS AND DISCUSSION

Standard P2 level norms in respect of characters viz. fecundity, hatching percent, larval period, ERR, cocoon yield / 100 dfls, single cocoon weight, single shell weight, shell ration percent and observations made on rearing performance for the year 2021 - 23 in respect of NB4D2 and SH6 are depicted in Table-1. It is evident from the observations that in NB4D2, fecundity was notices to be above the norms ranging from 520 - 530 and 511 - 518.5 respectively in both spring and autumn seasons. While in the same in SH6 ranged from 503 - 520 and 506.5 - 522.5 indicating its superiority over the norms for this breed. Further, in NB4D2, hatching percentage ranged from 91.5 - 94 percent and 87 - 92.5 percent in both the seasons. Similarly, in SH6 the same was observed to be ranging from 91 - 92.75 and 91 - 92.5 percent indicating consistent uniformity in hatching behavior, attributed to proper hibernation and incubation of eggs. While, other characters viz. ERR / 10000 larvae brushed, cocoon yield / 100 dfls (no.) and cocoon yield / 100 dfls (wt.) in NB4D2 were found ranging from 7914 - 9113, 6317 - 9041, 40383 - 44703, 28241 - 42374 and 65.100 - 67.266, 37.320 - 66.865 during spring and autumn seasons respectively. Similarly, in SH6 the same ranged from 6406 - 9950, 6418 - 9160, 36997 - 46059, 30336 - 44302, 44.700 - 63.675 and 39.535 - 67.496 indicating their superiority over the norms specified for each breed. Furthermore, quantitative characters viz. single cocoon weight, single shell weight and silk ration percent in respect of NB4D2 were observed ranging from 1.425 - 1.758, 1.505 - 1.945, 0.283 - 0.368, 0.287 - 0.360 and 18.045 - 21.855, 18.925 - 20.169 respectively continuous for three years under observation. Similar observations were obtained in respect of SH6.

Table-1. Rearing performance of conventional races at P2 level during 2020 - 21, 2021 - 22 and 2022 - 23

Rearing parameter	Norm / year	Races			
		Spring		Autumn	
		NB4D2	SH6	NB4D2	SH6
Fecundity (No.)	Fixed norm	500-525	520-550	500-525	520-550
	2020-21	520	505	511	515
	2021-22	530	503	518.5	506.5
	2022-23	521.5	520	518	522.5
	Average	523.8	509.3	515.8	514.6
Hatching %	Fixed norm	≥90	≥90	≥90	≥90
	2020-21	93	91.5	87	92
	2021-22	91.5	91	92.5	91
	2022-23	94	92.7	90.5	92.5
	Average	92.83	91.75	90	91.83
Larval Duration Day/hour	Fixed norm	26-27	26-27	26-27	26-27
	2020-21	27	28	26.5	26
	2021-22	29	29.5	26	27
	2022-23	27.5	27.5	27	27
	Average	27.8	28.3	26.5	26.6
ERR/10000 Larvae brushed	Fixed norm	8000	7500	8000	7500
	2020-21	8735	6406	6317	6418
	2021-22	7914	8087	8411	7728
	2022-23	9113	9950	9041	9160
	Average	8587	8147	7923	7768
Cocoon yield / 100 dfls (no.)	Fixed norm	34200	36000	34200	33700
	2020-21	44445	38813	28241	30336
	2021-22	40383	36997	40443	35710
	2022-23	44703	46059	42373	44302

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

	Average	43177	40623	37019	36782
Cocoon yield/100 dfls (wt.)	Fixed norm	57.000	60.000	55.000	53.000
	2020-21	67.266	54.633	37.320	39.535
	2021-22	65.100	44.700	58.910	53.850
	2022-23	65.365	63.675	66.865	67.496
	Average	65.910	54.336	54.365	53.627
Single cocoon wt. (g.)	Fixed norm	1.750	1.700	1.700	1.600
	2020-21	1.758	1.610	1.505	1.503
	2021-22	1.684	1.497	1.792	1.853
	2022-23	1.425	1.491	1.945	1.747
	Average	1.622	1.533	1.747	1.701
Single shell wt. (g.)	Fixed norm	0.340	0.320	0.330	0.300
	2020-21	0.317	0.293	0.287	0.278
	2021-22	0.368	0.314	0.360	0.343
	2022-23	0.283	0.405	0.336	0.317
	Average	0.322	0.337	0.328	0.312
Shell ratio %	Fixed norm	19-20.50	19-20.50	19-20	18.50-19.50
	2020-21	18.04	18.16	19.51	18.53
	2021-22	21.85	21.15	20.16	18.48
	2022-23	18.25	17.67	18.92	18.11
	Average	19.38	18.99	19.53	18.37
Pupation %	Fixed norm	90	90	85	85
	2020-21	92	91	81	82
	2021-22	91	84	84	82
	2022-23	90	94	89	86
	Average	91	89.67	84.66	83.33

In the light of above findings, it is clear that conventional breeds, NB4D2 and SH6 are performing equally well at par the norm, in respect of both qualitative and quantitative traits under observations. Marked consistency in performance during the period under study indicate the necessity for their maintenance at P2 level for subsequent downstream multiplication.

The present finding get support from the observations of earlier authors who reported that traditional breeds like NB4D2 and SH6 have shown good performance and downstream. In addition, these breeds have completed several generations and are well acclimatized to the zoo-geographic climatic conditions of Northern India. Further, Siddique *et al.* (2003) have reported that silkworm rearing with ruling combinations, NB4D2 x SH6 and its reciprocal are being conducted at large scale since long in the region. As such, good performance of these breeds may be attributed to the fact that hybrid combinations of these breeds are still in vogue gaining popularity at farmers level in Doon valley.

CONCLUSION

Based on the above account it may be concluded that both NB4D2 and SH6 breeds deserve their maintenance at P2, Basic Seed Farm, Sheeshambara, Dehradun to support their further exploitation through hybrid combination for sustainable development of bivoltine silk.

ACKNOWLEDGEMENTS

The authors are grateful to the Director, NSSO, Bengaluru for providing necessary encouragement and facilities.

REFERENCES

1. *Benchamin, K.V. and Nagaraj, C.S. 1987. Silkworm rearing techniques cited in the book "Appropriate Sericulture Techniques" edited by Dr. M.S. Jolly: 63-106.*
2. *Dandin, S. B. and Giridhar, K. 2010. Hand Book of Sericulture Technologies. Central Silk Board, Bangalore, Karnataka, India, 427 pp.*
3. *Datta, R.K., Basavaraja, H.K., Mano, Y. 1996. Manual on bivoltine rearing race maintenance and multiplication, Book, Published by CSR&TI, Mysore, India.*
4. *Krishnaswamy, S. 1979. Improved method of young age (chawki) silkworm rearing. Bulletin-III Central Sericultural Research and Training Institute, Mysore.:1 - 24.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5. *Rahmathulla, V.K. 2012. Management of climatic factors for successful silkworm (Bombyx mori L.) crop and higher silk production: A review. Psyche., 2012:12.*
6. *Siddique, A.A., Babulal, Khatri, R.K. and Sharm, A.K. 2003. Performance of CSR races at different level of multiplication in Doon Valley. Proc. Recent Researches of Indian Sericulture Industry, held at Lucknow from 1 - 2 Feb.: 64 - 72.*
7. *Sisodia, N.S. and Gaherwal, S. 2017. Effects of temperature and relative humidity on commercial product of Silkworm (Bombyx mori L.) in Indore region of (M.P.) India. International Journal of Zoology Studies, 2(5): 52-55.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

EDUCATIONAL PHILOSOPHY OF SRI AUROBINDO: A TRANSCENDENT VISION FOR HOLISTIC LEARNING

Khokan Das[1], Suvendu Ray[2]*
[1]PG Student, Department of Education, University of Kalyani, Nadia, 741235, West Bengal, India
[2]Research Scholar, Department of Education, University of Kalyani, Nadia, 741235, West Bengal, India

** Corresponding Author: Suvendu Ray, Research Scholar, Department of Education, University of Kalyani,West Bengal, Nadia, Pin- 741 235*

Article DOI: https://doi.org/10.36713/epra17381
DOI No: 10.36713/epra17381

ABSTRACT
Sri Aurobindo was an idealistic person based on Vedantic and Upanishad, and his educational philosophy aimed to develop the skills of Indians for self-creation and eternal spirit. This study aimed to create a life sketch of Sri Aurobindo, analyze his philosophical perspectives, and explore the relevance of his philosophy for holistic learning. The investigator employed a qualitative research methodology to investigate secondary sources such as books, online journals, and documents. The study explored Sri Aurobindo's philosophy, which advocates for holistic learning that encompasses physical, emotional, mental, and spiritual aspects. The philosophy is rooted in Sri Aurobindo's evolutionary worldview, aiming to nurture individuals who are intellectually competent, morally upright, and spiritually awakened. It also emphasizes personalized learning, respecting individuality and integrating spiritual values into the learning process. The study on Sri Aurobindo's educational philosophy suggests a holistic approach, emphasizing mindfulness practices and spiritual values in teaching methods, rather than academic achievement. Sri Aurobindo's educational philosophy transcends cultural, geographical, and temporal boundaries, promoting holistic learning and empowering individuals for a more enlightened future.
KEY WORDS: *Sri Aurobindo, Educational Philosophy, Holistic Learning, Integral Education*

INTRODUCTION
Sri Aurobindo, a 20th-century renaissance thinker, was born in Kolkata in 1872 and studied at Cambridge University. He was an idealistic person based on Vedantic and Upanishad, and his educational philosophy aimed to develop the skills of Indians for self-creation and eternal spirit. Aurobindo emphasized the importance of diverse types of education, focusing on human mind and spirit, and promoting divine life, nation, self, and people as national ideals. Maximum Western educators and educational philosophers have attempted to understand educational theories as a true structure and framework that offers useful guidelines for educational practice, rather than merely as abstract theories unrelated to real-world situations (Das, 2020). Educators are increasingly evaluating education theories as a structured framework that provides practical guidelines for practice, with many Western educators and philosophers aiming to understand these theories as more than mere theoretical concepts (Banerjee, 2016). Aurobindo's writings provide valuable insights into the landscape of actual education and his educational theories can help us understand the world of education.

Aurobindo Ghosh is one of them, who was not only a political philosopher but also had a great contribution in the field of education. Aurobindo Ghosh, who was formerly known as Sri Aurobindo, was named the first principal of the National College when it was first established on August 14, 1906 (Banerjee, 2016). His vision for Divine Life gave him a special status in the whole world. He suggested that the education should have five important aspects like- the physical, the mental, the vital, the psychic and the spiritual to which he calls as Integral Education. Integral Education as conceived by Aurobindo Ghosh, aims at developing total transformation of human life into the life divine (Sabar & Ratha, 2023).

Sri Aurobindo is a brilliant nationalist, philosopher, and advocate for education. He has made an extremely special contribution to the field of education. In real-world applications, he combines Western and Indian philosophy. We move from materialism to spiritualism with his life philosophy. In the field of Indian education, Sri Aurobindo's theories of philosophy are unique. This goal is to make Indian society prosperous and well-adjusted by fostering individual virtue via education (Mondal & Bag, 2023). "The divine truth is greater

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

than any religion, creed, scripture, idea, or philosophy," states Aurobindo himself (Das, 2022). In his view, education needs to be flexible in order to adapt to the demands of the complicated world we live in today.

The second aim of education is to train all the senses namely hearing, speaking, listening, touching, smelling, flavoring. When the nerve, chitta, and manas are pure, all the senses can be taught completely. The improvement of mental abilities, such as memory, thinking, reasoning, imagination, and discrimination, is the third goal of education. The cultivation of morals is one of education's primary goals (Rani, 2017). We can create an integrated India and a global community by combining Sri Aurobindo's philosophy with national integration (Samanta & Bokshi, 2017).

Only selfless service to society, unceasing meditation, selfless devotion, and a sense of the unity of all things in God can lead to a fellowship with the Almighty. There is no fatalism in Sri Aurobindo. He thinks that each person shapes their own destiny. The past and present deeds of humanity influence environment and heredity as well. Because all existence is continuous, man does not always bear the full consequences of his own actions; occasionally, he also shares in others' actions' consequences. Between different births, there is continuity. The concept of karma is true overall. Even thoughts and feelings have corresponding effects, but since life is mostly made up of actions, action has the most effects. Furthermore, man has more control over his actions than over his thoughts and feelings (Maitreya & Aggarwal, 2017).

The person must receive guidance from birth and continue for a long time, flawlessly, at different stages of his life. "The physical, mental, vital, psychic, and spiritual aspects of the human being are the five principal activities that education must address in order to be complete." According to Sri Aurobindo, transformation makes integralism possible. Yoga transforms the human mind, life, and body by dividing the individual and bringing down the supermind (Behera, 2021).

The first rule of true teaching, in the words of Sri Aurobindo, is that nothing can be taught. The teacher is a helper and a guide, not an instructor or a task master. His job is to make recommendations, not demands. He merely demonstrates to the student how to refine his instruments of knowledge and assists and motivates him throughout the process; he does not genuinely train the student's mind. Instead of giving him knowledge, he demonstrates to him how to get knowledge on his own. He only reveals to him where the knowledge is hidden and how it can become conditioned to surface; he does not call forth the knowledge that is already within (Rao, 2019).

In present situation, we see everywhere the Increasing rate of violence, war, terrorism, lack of unity between people conflicts etc. That is why the new concept of peace education is emerged. The great peoples of our country who are shares his viewpoint on peace contributed on peace education Sri Aurobindo one of them. He was not only a philosopher but also an educationist, internationalist, and peace thinker. Throughout his life he emphasized on such topic like unity in diversity, humanity, harmony, international integration, national development integration of old values etc (Das & Bhattacharya, 2022). Modern education needs to give importance to the thoughts of Sri Aurobindo to develop education and teacher education (Sahu & Behera, 2022).

OBJECTIVES OF THE STUDY

The objectives of the present study are as follows-

1. To draw a life sketch of Sri Aurobindo.
2. To examine the philosophical perspectives of Sri Aurobindo.
3. To investigate the relevance of Sri Aurobindo's philosophy for holistic learning.

METHOD OF THE STUDY

This study used historical research to analyze the relevance of past events in the current context. Sri Aurobindo, a historical thinker, believed that the past is the foundation of the National System of Education. For this investigation, the investigator has utilized a qualitative research methodology. The content analysis method is used to the current investigation. In this instance, the researcher examines a range of secondary sources, including books, online journals, and online documents (Mondal & Bag, 2023).

FINDINGS AND DISCUSSION

- **Sketch of Sri Aurobindo's Life**

Sri Aurobindo Ghosh, a renowned sage, poet, patriot, philosopher, and educationist, was a controversial figure. His first English biography was published in 1910, but many people ignored his advice to avoid academic traditions, leading to a chronological summary of his life.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Birth and family background: Sri Aurobindo was born on August 15, 1872 in Kolkata. The ward 'Aurobindo' means 'Lotus' in Sanskrit The father of Sri Aurobindo, Dr. Krishna Dhan Ghosh, was completely Westernized in his outlook on life and morals. He earned a post-graduate medical degree from the West. However, Raj Narayan Bose, dubbed "the grandfather of Indian nationalism," was a great patriot and visionary, and the father of Sri Aurobindo's mother, Swarnalata Devi. The third son of Sri Aurobindo's family. Since Dr. K. D. Ghosh left his three sons—the eldest two being Beno Bhushan and Mon Mohon, respectively—at Loretta convent in Darjeeling in the company of European youngsters, neither the mother nor the grandpa had much chance to influence Sri Aurobindo's outlook. At that time, Sri Aurobindo was an elderly romantic. Two years later, in 1879, under the guidance of a core group of Latin scholars, Dr. Ghosh and Swarnalata Devi brought their children to England and departed Manchester. Mr. Drewtt. The three boys moved to London in 1884, and Mrs. Drewetta, a devoted Christian, was appointed as their guardian. There he learned about Greek, Latin, French, and German Spanish. He passed the He failed the 1890 Indian Civil Service Examination but was unable to take the HorseRiding Exam. Thus, he was not eligible for this duty. In 1893, he went back to India.

After making his way back to India in 1892, he quickly found work in a variety of professional and administrative positions in Varoda and Kolkata. Aurobindo was an active member of the Indian National Congress from 1902 until 1910, during this time he published his journals in the Bengali daily "Yugantar" to spread his revolutionary ideas and stir up a sense of nationalism among the Indian people. In May 1908, the British government put Aurobindo in Alipore prison because he was involved in the Alipore bomb case (Das & Bhattacharya, 2022).

Childhood and Academic Life: At the age of seven, he was sent to England in 1879 together with his two older brothers for schooling, and they stayed there for fourteen years. Originally from Manchester, he was raised in an English household before enrolling in St. Paul's School in London in 1884. There, for five years, he excelled academically and won every major medal in both literature and history.

Early Childhood Care and Education is being given much importance in the context of National Education Policy 1986, because it is the first and foremost foundational initiative drafted by the Ministry of Human Resource Development in order to strengthen the school education. The development of modern educational system always depends upon its different educational policies drafted by Government (Sabar & Ratha, 2023). Sri Aurobindo Poetry brilliance started to blossom at this point, and virtually little of his writing from this time period has withstood the test of time. Dr. Ghosh, a renowned philanthropist at home, forgot to send his sons even the bare minimum of money they required, thus Mrs. Drewett soon abandoned them and the boys (Sri Aurobindo and his siblings) had to endure immense hardship. According to Sri Aurobindo, for a full year, the only nourishment consisted of two or three sandwich slices, bread, butter, and a cup of tea in the morning and an evening penny Saveloy. Sri Aurobindo attended Kings College, Cambridge, in 1889 thanks to a scholarship from St. Paul's.

In Greek and Latin, he almost won every award. In 1892, he completed the first section of the First Class's classical tripos. He completed his I.C.S. exam that year with success, but he failed the riding test and was so barred from the civil services. Unaware that Sri Aurobindo had purposefully secured his disqualification, his well-wishers attempted to convince the authorities to accept Sri Aurobindo into the civil service despite a technical shortcoming in his work. A senior fellow at Kings College named G. W. Prothero wrote to James Cotton, the brother of Sir Henry Cotton.

He honorably fulfilled his obligations to the College and, at the conclusion of his second year of residence, placed highly in the first class of the classical tripes, part one. In addition, he receives various college awards, demonstrating his proficiency in English and literacy, which is more than enough for the majority of undergrads. He also maintains his I. C. S. Work, demonstrating his extraordinary work ethic and ability in addition to his classical scholarship. He also wrote in English that was far better than that of most young Englishmen and demonstrated an understanding of English literature.

Professional Life of Sri Aurobindo: The I. C. S. Examination Government representatives would have likely viewed although they had already discovered that Sri Aurobindo was a member of the secret society known as the "Lotus and Dagger," they nevertheless saw the petition submitted on his behalf (and without his permission) as sympathetic which was committed to battle for the freedom of India. His remarks criticizing British rule in India at the Indian Majlis in Cambridge had also been reported. To Sri Aurobindo, The I. C. S. gently left him unclaimed, which was a relief. It goes without saying that he had no calling for that kind of work.Maharaja Sayaji Raothe Gaekwad of Baroda visited London and met with Sri Aurobindo. After his father's death, Sri Aurobindo returned to India and joined the Maharajah's College in Vadodara. He worked in various departments and served as Vice-Principal and Acting Principal. From 1893 to

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

1906, Sri Aurobindo served in Baroda, working in the Revenue Department, Secretariat, and as a professor of English. He preserved the essence of Indian civilization by learning Sanskrit and other contemporary Indian languages.

Political Activity: He worked in politics for a large portion of his life. He had the chance to resign from the Baroda service and officially join the political movement in 1905, when the campaign against Bengal's participation began. In1906, he left Baroda to take a position as principal of the recently established Bengal National College in Kolkata. Sri Aurobindo's political activity covered the eight years between 1902 and 1910. He spent the first part of this period working behind the scenes with colleagues to lay the groundwork for the beginning of the Swadeshi movement, until the agitation in Bengal provided a platform for the public to express their desire for more direct and forward-thinking political action rather than the moderate reformism that had been the Indian National Congress's creed up until that point. In as opposed to the moderate optimism that colonial self-government would be accomplished at a later period outside the country through gradual reform progress, the newly formed Nationalist party stated that Swaraj was their goal. Years later, the Swaraj policy evolved and became a successful issue in Ireland. The new policy's guiding concept was self-help. boycotting British and foreign products and supporting Swadeshi businesses in their place, as well as boycotting government universities and colleges, British law courts, and the establishment of a nationwide network of institutions and schools. Young revolutionaries like Bagha Jatin, Jatin Banerjee, and Surendra Nath Tagore were motivated by him once he made contact with them while in Bengal. The anushilan Samiti was one of the youth clubs he helped start, among others. He took part in the 1906 national Congress annual session, which was presided over by Dadabhai Nauroji. Following orders from the Indian National Congress, he launched the daily journal Bande Mataram in 1907 and went on to become the principal of National College in Kolkata, which is now Jadavpur University. Despite the fact that their educational theories continue to have relevance in the modern era, none of them was interested in becoming known as the educationalists. Let us examine these in brief. (Banerjee, 2016).

Politics to Spiritualism: At the nationalist congress in Surat in 19707, two equal sides engaged in a violent clash that split the Congress in two.He was detained in May 1908 on suspicion of being involved in the Alipur bomb affair. After a year, in 1909, he was freed and began publishing Karmayogi in Bengali and Dharma in English. His perspective on life was drastically altered by spiritual experiences and realizations that he had while incarcerated in Alipur. He gradually came to the realization that he was not meant to lead the freedom struggle and he began to follow a mystical and philosophical way of life.

Practice of Yoga: In an attempt to start over, Aurobindo Ghosh relocated covertly to Pondicherry in April 1910. Sri Aurobindo embarked upon a journey of spiritual growth and development in Pondicherry, where he spent four years practicing solitary yoga, which he called "Integral yoga." In his view, spiritual practice plays a crucial role in a person's development into a divine being. However, he studied the Gita and other spiritual texts while incarcerated and dedicated most of his time to yoga meditation.

- **Sri Aurobindo's thoughts on Education**

Education was profound and holistic, emphasizing the integral development of the individual. His educational philosophy can be summarized through the following key points:

Integral Education*:* Sri Aurobindo believed in the development of all the physical, physiological, mental, psychic, and spiritual facets of the human being. Instruction

should not be limited to academic learning but should include the growth of character, personality, and inner consciousness. Education ought to assist the developing soul in bringing forth its finest qualities and preparing it for a worthy purpose (Deshmukh & Mishra, 2014). Building a universal learning infrastructure for the modern world can therefore be accomplished through the application of Sri Aurobindo's integrated education concept. (Mondal & Bag, 2023).

The Divine in Man*:* He saw education as a means to realize the divine potential within each individual. According to him, every person has a unique mission and purpose, and education should help in discovering and fulfilling this inner potential.

Freedom and Autonomy*:* He advocated for an educational system that respects the freedom of the child. Instead of imposing rigid curricula, education should allow for exploration and self-discovery. Teachers should act as guides, helping students to find their own path rather than dictating it.

Spiritual Foundation*:* Education should be grounded in a spiritual understanding of life. Sri Aurobindo emphasized the importance of spiritual development alongside intellectual and physical growth. This agency is acknowledged as one of the primary five principles of a complete integral education, correlating to the spiritual dimension of human life (Behera, 2021).

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

***Synthesis of Cultures**:* He believed in the synthesis of Eastern and Western educational philosophies. While the West contributed scientific and technological advancements, the East offered profound spiritual and philosophical insights. An ideal education would integrate the strengths of both traditions.

***Practical Application**:* Sri Aurobindo stressed the importance of applying knowledge practically. Education should prepare individuals to face the challenges of life and contribute meaningfully to society.

***Progressive and Dynamic**:* He viewed education as an evolving process, constantly growing and adapting. It should respond to the changing needs of society and the individual.

Sri Aurobindo's educational philosophy has been implemented in various institutions, notably the Sri Aurobindo International Centre of Education in Puducherry, India, where the principles of integral education are practiced.

- **An Overview of Aurobindo's Educational Philosophy**

Sri Aurobindo's educational philosophy was based on several principles, including holistic development, spiritual evolution, individuality, harmony with nature, social responsibility, and integration of knowledge. He believed in the holistic development of individuals, encompassing physical, emotional, mental, and spiritual dimensions. He saw education as a means to facilitate spiritual evolution and self-discovery. Aurobindo also recognized the uniqueness of each individual and emphasized tailoring education to suit their needs, interests, and abilities. He advocated for an education that instilled respect and appreciation for the natural world, viewing environmental consciousness as integral to personal and societal well-being. Aurobindo emphasized the importance of education in cultivating ethical values, social responsibility, and a sense of service towards others. He also emphasized the integration of knowledge, viewing it as interconnected and holistic, transcending disciplinary boundaries. These principles guided Aurobindo's vision of education as a transformative process, aiming to awaken individuals to their highest potential and purpose.

Aurobindo's educational philosophy was rooted in his broader spiritual and philosophical vision, which emphasized the integral development of the individual. The core elements of his educational philosophy include:

***Integral Education**:* Aurobindo advocated for the development of all aspects of a person—physical, emotional, mental, and spiritual. Education, in his view, should not be limited to intellectual growth but should nurture the whole being. A perfect educational system should provide opportunities for every one of these student faculties to grow to the fullest potential (Dey, 2021).

***Self-Realization and Self-Discovery**:* Education should help individuals realize their inner potential and discover their true self. This involves understanding one's innate abilities and inclinations, leading to a harmonious and fulfilling life.

***Spiritual Evolution**:* According to Aurobindo, education ought to support spiritual evolution of humanity. He viewed life as a continuous process of spiritual growth and education as a means to accelerate this process.
***Learner-Centric Approach**:* His philosophy emphasized the importance of recognizing and respecting the individuality of each learner. Education ought to be tailoredaccording to the requirements, interests, and abilities of each student rather than a one-size-fits-all approach.

***Unity of Knowledge**:* Aurobindo stressed the interconnectedness of all fields of knowledge. He believed that true education integrates various disciplines, reflecting the unity of life and the universe. It is a unique project that aims at improving universal culture and education. It has been supported by the Government of India (Sabar & Ratha, 2023).

***Cultural and Ethical Values**:* Education should instill cultural and ethical values, fostering a sense of responsibility, compassion, and respect for others. Aurobindo saw education as a means to cultivate a higher moral and ethical consciousness. An attempt was made to achieve a cultural synthesis; students of various nationalities were put in different locations with their respective groupings in order to promote the development of international culture (Das & Bhattacharya, 2022).

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- **Relevance of Aurobindo's Educational philosophy for holistic learning**

Sri Aurobindo's educational philosophy highlights the overall development of students, emphasizing their progress on the physical, emotional, and spiritual levels. This philosophy is relevant in today's educational landscape, where the importance of holistic education is increasingly recognized. Aurobindo promoted a system of instruction that integrates various aspects of human development, such asmental, spiritual, physiological, and vital. He thought that the uniqueness of each individual and the importance of personalized learning. He also stressed the importance of spiritual growth alongside intellectual development, which is increasingly recognized in today's diverse classrooms.

Aurobindo promoted experiential learning, where students learn through direct experience rather than passive reception of information. He emphasized the interconnectedness of all life and the importance of living in harmony with nature. In today's world, integrating eco-consciousness into education is essential. Aurobindo believed in the cultivation of moral and ethical values alongside intellectual growth, which resonates with modern calls for education to foster character development, empathy, and social responsibility.

Sri Aurobindo's philosophy, with its emphasis on integral education, holds significant relevance for the present educational system, especially in promoting the holistic development of learners. Integral education, as envisioned by Sri Aurobindo and the mother, focuses on the development of all aspects of the human being: physical, emotional, mental, psychic, and spiritual. This approach aligns well with contemporary educational goals that seek to foster well-rounded individuals capable of thriving in a complex, rapidly changing world.

Holistic Development: The text outlines the four main aspects of a holistic education: physical, emotional, mental, and psychic and spiritual. Physical education promotes physical well-being through sports and activities, while emotional education focuses on emotional intelligence, self-awareness, and positive relationships. Mental education emphasizes analytical reasoning, inventiveness, and problem-solving abilities, while psychic and spiritual education focuses on inner growth.

Learner-Centric Approach: Integral education is inherently personalized, respecting each learner's unique potential and pace of development. This approach encourages self-directed learning and intrinsic motivation, which are key components of modern educational practices.

Interdisciplinary Learning: Sri Aurobindo's philosophy advocates for an education that transcends traditional subject boundaries, encouraging an interdisciplinary approach that is increasingly valued in today's educational landscape. This can lead to a more integrated understanding of knowledge and its application in real-world contexts.

Value-Based Education: Emphasizing values such as empathy, respect, and ethical behavior, Sri Aurobindo's approach aligns with the growing emphasis on character education and the development of social and emotional skills in schools.

Innovative Teaching Methods: The philosophy supports experiential learning, project-based learning, and other innovative teaching methods that are gaining popularity for their effectiveness in engaging students and enhancing learning outcomes. love and sympathy and freedom of a child should be provided to the students (Debbarma, 2017).

Curriculum Design: Schools can integrate aspects of integral education into their curricula, promoting balanced development across physical, emotional, mental, and spiritual dimensions.

Teacher Training: Educators can be trained in holistic approaches, learning to support students' diverse needs and foster a nurturing learning environment.

School Environment: Creating a school culture that values holistic development, with facilities and programs that support a variety of activities beyond academics. There is competition in the school system and gives attention to the grade (Das, 2020).

Assessment Methods: Moving towards more comprehensive assessment methods that evaluate a range of student abilities and growth areas, not just academic performance.

Systemic Change: Implementing these principles requires systemic changes in educational policy, teacher training, and assessment practices.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Resource Allocation: Holistic education often demands more resources, including time, training, and materials, which can be a challenge in resource-constrained settings.

Cultural Adaptation: Integrating spiritual and psychic development aspects must be done with sensitivity to cultural and individual beliefs.

Sri Aurobindo's philosophy provides a framework for modern education systems aiming to promote holistic development in learners. Mental education emphasizes analytical reasoning, inventiveness, and problem-solving abilities, while psychic and spiritual education focuses on inner growth. Although not all aspects of his philosophy can be directly applied to modern practices, the principles of integral education, personalized learning, and spiritual growth remain relevant. Integrating these principles into educational policies can create more nurturing learning environments.

CONCLUSION

In conclusion, Sri Aurobindo's philosophy offers a valuable framework for modern education systems seeking to nurture holistic development in learners. By fostering balanced growth across all dimensions of human development, this approach can prepare students to lead happy purposeful lives and make a constructive contribution to society. A beacon of wisdom and guidance, Sri Aurobindo's educational philosophy stands in a world of rapid change and complexity. Aspirations for a more holistic and transformative approach to education are deeply echoed by his emphasis on integral education, personalized learning, and spiritual evolution. We are reminded of the intricate connections that exist between the individual, society, and the universe when we consider Aurobindo's ideas on education. Through the adoption of Aurobindo's concepts of ecological awareness, social responsibility, and holistic development, we can strive for an educational model that develops the heart and soul in addition to the intellect. In this way, Aurobindo's ideas about education continue to motivate and shed light on the way towards a more civilized and enlightened future for all people.

ACKNOWLEDGEMENT

We would like to pay our special thanks and gratitude to Dr. Deb Prasad Sikdar, Professor, Department of Education, University of Kalyani, Nadia, West Bengal, for their proper guidance and valuable suggestions.

Disclosure of Conflict of Interest: None.

Funding: None

REFERENCES

1. *Banerjee, D. (2016). National Education Theory of Sri Aurobindo. International Journal of Research in Humanities and Social Studies, 3(1), 34-40.*
2. *Behera, H. (2021). A Study on Educational Thoughts of Sri Aurobindo Ghosh with Special Reference to Five Principal Aspects. International Journal of Creative Research Thoughts, 9(7), 303-309.*
3. *Das, K. P. (2020). Educational Philosophy and Contribution of Sri Aurobindo to The Field of Education. International Journal of Creative Research Thoughts, 8(7), 1697-1701.*
4. *Das, M. & Bhattacharya, D. (2022). Contributions of Sri Aurobindo's Philosophy towards Peace Education. The DNC Journal, 1(2),24-28.*
5. *Das, S. (2022). Sri Aurobindo's Vision on Modern Education. Vidyawarta Interdisciplinary Multilingual Refereed Journal, 47(9), 81-86.*
6. *Debbarma, S. (2017). A Study on Educational thoughts Of Aurobindo Ghosh with Relevance to Present Educational Context. Indian Journal of Applied Research, 7(5), 558-559.*
7. *Deshmukh, N. & Mishra, M. (2014). A study on the educational thought of Sri Aurobindo. Indian journal of applied research, 4(7), 150-151.*
8. *Dey, K, (2021). A Study on Philosophy and Educational Thoughts of Sri Aurobindo Ghosh. International Journal of Trend in Scientific Research and Development, 5(2), 864-865.*
9. *Maitreya, A. & Aggarwal, N. (2017). Conducted Involvement of The Educational Philosophy of Sri Aurobindo Ghosh in The Current System of Education. International Journal of Education and Science Research Review, 4(5), 21-24.*
10. *Mondal, N. & Bag, A. (2023). Sri Aurobindo Ghosh and The Outline of Integral Education. International Research Journal a Modernization in Engineering Technology and Science, 5(4), 6588-6593.*
11. *Rani, C. (2017). A Study of Educational Vision of Aurobindo Ghosh. The International Journal of Indian Psychology, 5(1), 2349-3429.*
12. *Rao, V. P. (2019). Sri Aurobindo and the mother on five aspects of integral education. International Journal of Advance Research, Ideas and Innovations in Technology, 5(1), 499- 502.*
13. *Sabar, C. H. & Ratha, C. K. (2023). Relevance of educational philosophy of Aurobindo Ghosh in the context of national policy on education 1986. International Journal of Political Science and Governance, 5(1), 29-35.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

14. *Sahu, N. & Behera, H. (2022). Sri Aurobindo's Thought on Education with Special Reference to The Role of a Teacher. International Journal of Creative Research Thoughts, 10(6), e731-e736.*
15. *Samanta, S. & Bokshi, R. (2017). A Study of Global Peace: Based on Sri Aurobindo's Political Thinking, Integral Yoga and National Integration. International Journal of Scientific Research and Management, 5(6), 5591-5615.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FORMULATION AND EVALUATION OF ANTI OXIDANT CHOCOLATE BAR FROM DRAGON FRUIT PEEL

Miss Shraddha Kailas Pandit[1], Mrs. Shital Chaudhari[2]*
[1]Student, Dr. Babasaheb Ambedkar Technological University, Loner, Maharashtra
[2]Assistant Professor, Dr. Babasaheb Ambedkar Technological University, Loner, Maharashtra

Corresponding Author*

ABSTRACT

Dragon fruit (Hylocereus genus) has the potential for the prevention of diseases associated with inflammatory and oxidative processes. it is a tropical fruit that's low in calories and high in fiber and antioxidants, which are good for your immune system. It can boost your iron levels. Iron is important for moving oxygen through your body and giving you energy, and dragon fruit has iron. And the vitamin C in dragon fruit helps your body take in and use the iron. Studies have shown that pitaya can exert several benefits in conditions such as diabetes, dyslipidemia, metabolic syndrome, cardiovascular diseases, and cancer due to the presence of bioactive compounds that may include vitamins, potassium, betacyanin, p-coumaric acid, vanillic acid, and gallic acid. Moreover, pitaya has the potential to be used in food and nutraceutical products as functional ingredients, natural colorants, ecologically correct and active packaging, edible films, preparation of photoprotective products, and additives.

Dark chocolate is considered a functional food due to its anti-diabetic, anti-inflammatory, and anti-microbial properties.Several ingredients were used for the fortification, such as fruits (mulberry, chokeberries, and elderberries), spices (cinnamon), phytosterols, peanut oil, probiotics (mainly Lactobacillus, bacillus spices), prebiotics (inulin, xanthan gum, and maltodextrin), flavonoids, flavan-3-ols, etc. Those fortifications were done to raise the total antioxidant content as well as essential fatty acid content simultaneously reducing total calorie content. Sometimes, the fortification was done to improve physical properties like viscosity, rheological propertiesand also improve overall consumer acceptance by modifying its bitter taste.

KEY WORDS : *dragon fruit , dark chocolate, pitaya, antioxidant.*

INTRODUCTION

Due to profound changes in lifestyle resulting from modern life, there has been a progressive increase in non communicable disease. Among them cardiovascular disease are most deadly disease in the world as upto 32% of global death. There fore prevention measures are crucial to reduce the risk factor.

Antioxidants are a class of chemical substances naturally found in our food which can prevent or reduce the oxidative stress of the physiological system. The body is constantly producing free radicals due to regular use of oxygen. These free radicals are responsible for the cell damage in the body and contribute to various kinds of health problems, such as heart disease, diabetes, macular degeneration, and cancer. Antioxidants being fantastic free radical scavengers help in preventing and repairing the cell damage caused by these radicals. Plants and animals are the abundant source of naturally producing antioxidants. Alternately, antioxidants can also be synthesized by chemical process as well as from the different kinds of agro-related wastes using biological process. Based on the solubility, antioxidants are broadly categorized into two groups: water soluble and lipid soluble. In general, water-soluble antioxidants, such as ascorbic acid, glutathione, and uric acid, have functions in the cell cytosol and the blood plasma.

A plant-based diet protects against chronic oxidative stress-related diseases. Dietary plants contain variable chemical families and amounts of antioxidants. It has been hypothesized that plant antioxidants may contribute to the beneficial health effects of dietary plants. Over the years, countless fruits have been associated with the prevention of non communicable disease, and dragon fruit of pitaya is one of the most considerable fruit fot it .Dragon fruit has potential for the prevention of diseases associated with oxidative procecces. Moreover, pitaya has the potential to be used in food and neutraceutical products as functional ingredients, natural colourant, edibal film and additives.

LITERATURE SURVEY

1. A study by santad wichienchot, m. Jatupornpipat, r. A rastall june 2010 highlighted chemical constituents of dragon fruit and its concentration and its prebiotic activity.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2. Dasaesamoh, R. Youravong, W. and Wichienchot, S. February 2016 focuses on anti cancer activity by dragon fruit.
3. Shivakumari Kanakarajan , Ashok Kamalnathan, Rajesh Selvaraj January 2021studies on phtochemical profiling and anticancer activity of dragon fruit extract.
4. Ali Montadher, Montadher Ali Mahdi, Mustafa Taha Mohammad, Abdulkadir Mohammed on January 2018 researched on phytochemical contents and anti oxidant activity of Pitaya And the study of toxicity & ability of wound treatement.
5. The article published on MD Anderson Center on March 2019 published the foods that help to lower the risk of cancer includes Dragon food consumanption.
6. A review by Shital B Jadhav and Nilesh Y Jadhav 2023 discussed an eye cathing and comprehensive reviw on dragon fruit as an exoic super fruit.
7. Journal of development of fiber rich biscuit by incorporating dragon fruit powder gave the procedure of making the dragon fruit powder on 2020.

AIM AND OBJECTIVE

Aim : FORMULATION AND EVALUATION OF ANTI – OXIDENT CHOCOLATE BAR FROM DRAGON FRUIT PEEL .

OBJECTIVE

1. Protect cells from damage.
2. Boosting immunity.
3. Reduce the risk of chronic diseases.
4. Promotes overall health.
5. Improoveing mood.
6. Reduce inflammation and protects against certain diseases.

PLANT PROFILE

DRAGON FRUIT

It is a beautifull tropical fruit comes from the type Cactus of genus Hylocereus. It has a sweet, delecate taste. hence can be enjoy eating in fruit salads, create testy drinks and desserts.Pitaya ia low in calories and high in and antioxidents, fibers vitamin C.



Fig No. 1

The dragon fruit or pitahaya, Hylocereus undatus (Haworth) Britton & Rose (Cactaceae), is the second most important commercial cactus species with respect to fruit production after Opuntia ficus-indica. It is a hemiepiphyte (a plant that can grow anchored on trees or directly in soil) with a vine-like climbing tendency; its exact native range is uncertain, but believed to be in tropical regions of Mexico and Central America. The fruits, which have many names, have a delicate texture and delicious taste. They are extremely attractive visually. The flesh has high nutritional value, including high contents of vitamin C, calcium, potassium and fibre. Fruits have red or yellow peels and red as well as white pulp; the seeds are small and digestible. The plants are often trained onto trellises or arbours, similar to those used for grapevines, or a few plants may be associated with a post about 2 m tall with arms at the top from which the vines drape, allowing the fruit to develop at a convenient height for picking. Orchards can become profitable about 4 years after planting stem cuttings of about 40 cm in length. Fruit can be harvested from 25 to 45 days after flowering. The storage life is about 14 days at 10°C. The popularity of dragon fruit as an exotic fresh fruit has been increasing, particularly in non-traditional

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

markets and where large Asian populations are established. Dragon fruit has potential as a health food due to its high levels of vitamin C, polyphenols and antioxidants. Dragon fruit are extremely attractive visually and do not have the spines or the annoying glochids of cactus pears (Opuntia ficus-indica), and the much smaller seeds (similar in size and texture to those in kiwifruits) are readily swallowed. The fruits can be relatively large, often exceeding 500 g, with yellow or red peels and pulps varying from white to yellow to red to deep purple.

TAXONOMY
Domain - Eukaryota
Kingdom - Plantae
Phylum - Spermatophyta
Subphylum -Angiospermae
Class - Dicotyledonae
Order - Caryophyllales
Family - Cactaceae
Genus - Hylocereus
Species - Hylocereus undatus
Biological name : selenicereus undatus

Chemical Constituents : betacyanin, pectin, phyuocactin, flylocerenin, tritexpenoids, steroids, dietary fibers, phenolies.

Medicinal Uses : hypoholesterolemic, hypoglycemic, dibetes, dyslipidemia, metabolic, syndrome, cardiovascular, diseaes,andcancer, highinlycopene,whichcanlowerrisksofheartdiseaseandcancer,

Medicinal Properties :

1. Dragon fruit encourages the growth of the probiotics lactobacilli and bifidobacteria .
2. These bacteria are helpful for killing disease causing viruses and bacteria.
3. They also help to digest food.
4. It will strengthen our Defence system.
5. Biological properties against pathogenic microbes like bacteria, fungi and viruses as well as diseases like diabetes, obesity, hyperlipidemia and cancer.

COCOA POWDER
Chocolates are a well-known snack for all age groups and are an indulgent confection. The major ingredient of chocolate is a cocoa powder which has several healthy benifits. Cocoa powder is produced from the slabs of roasted cocoa bean particles left behind when cocoa butter is extracted.



Fig. No. 2

As the pressing does not remove all the cocoa butter, so the particles remain coated with a thin layer of cocoa butter, all in all fat content of cocoa powder varies from 8% to 26%. These solid particles (the cocoa powder) are the basis of chocolate's flavor (and not as one might imagine—the cocoa butter). As a result, cocoa powder is the most concentrated version of chocolate there is. It is also very versatile in both cooking and chocolate making, it also has a pH of around 5. This has the effect of reducing the levels of astringent, bitter phenolics, and the roasted, caramel-like molecules (pyrazines, thiazoles, pyrones, and furaneol). The effect is a

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

cocoa powder with a less bitter and astringent tone and one that is milder in flavor and darker in color than traditional cocoa powder. "Dutched" cocoa can come in shades ranging from light brown to near black each with their own mild flavor profiles.
Dark chocolate is a form of chocolate containing only cocoa solids, cocoa butter and sugar. Dark chocolate without added sweetener is known as bitter chocolate.

TAXONOMY
Kingdom - plantae
Phylum - Vascular plant
Subphylum -Dilleniidae
Class - magnoliopsida
Order - malvales
Family - sterculiaceae
Genus - theobroma
Species -T. cacao

Biological name: Theobroma cacao

Chemical constituent: Flavonoids, catechin, caffeine, theobromine, flavanol.

Properties of Cocoa Powder
Several studies showed that cocoa powder might have the following properties:
It be an antioxidant
It lower the blood pressure
It improve the heat health
It reduce the risk of diabetes
It boost immunity
It protect against cancer
It protect against neurodegeneration
It enhance mood1
It act as anti-inflammatory.

Medicinal Properties
Reducing free radicals, improving blood flow, lowering blood pressure, lowering "bad cholesterol", reducing inflammation, reducing insuli resistance, improving the brain's ability to make new connections between neurons, increasing microbiome diversity.

MATERALS
To make an oxidant chocolate dragon bar ingredients to be used are as following -

Sr. NO.	Content	F1	F2	F3
1.	Dragon fruit peel.	4gm	4gm	12gm
2.	Cococa powder	3.6gm	3gm	12gm
3.	Powdered sugar	4gm	9.5gm	27gm
4.	Cococa butter	12.12gm	9gm	32gm
5.	Salt	Qs	Qs	Qs

Table No.1 – Material

Sr No.	Equipment
1)	Hot air oven
2)	Ultrasound sonicator
3)	Weighing balance
4)	Beaker
5)	Stirrer
6)	Test tube
7)	mould
8)	Spatula

Table no.2 - Equipments

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

STORAGE

The obtained pitaya peel powder (PPP) samples were preserve in air proof polyethelyne bag at ambient temperature for a week .during the storage , sampling was perform for evaluation of betacyanine.

PHYTOCHEMICAL ANALYSIS

1. Dragon dorffs Test – add 1 ml of dragondorff reagent to 2ml of extract.
Orange-red ppt formed.
2. Mayer's Test – add few drops of Mayer's reagent to 1ml extract.
Yellowish or white ppt formed.
3. Iodine Test – add sample solution to testtube +2-3 drops o Iodine .
Blue colour is formed.
4. Banedict's Test – 1 mi of analyte sample mix with 2ml of benedict's reagent. Heat in water bath for 3-5 minutes.
Brick-red coloured ppt of cuprous oxide is formed.



Fig.no - 2

FORMULATIONAND EVALUATION

PROCEDURE

Using a suitable solvent, extract the constituents from the homogenized dragon fruit peel. Extraction could be perform using techniques such as ultrasound –assisted extraction, maceration , soxhlet extraction .
Here we are using ultrasound assisted extraction method

EXTRACTION OF PHYTOCONSTITUENT

4g crushedpeel powder + 50ml beaker (20 ml water)(ultrasound assisted extraction to be perform) 150 w for 15 min.
During extraction, beaker was put in cooling water bath to remain the slurry temp at 30C.
The mixture then centrifuged at 3500kg at 25C for 5min.
Supernatent was collected and repeat process in triplet. The obtained extract were mixed together.



Fig no. 3

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Fig No.- 4

Procedure for Chocolate Dragon Bar

Extract of dragon fruit peel 4gm is added to cocoa butter 4gm in double coated heating mental at temperature of 70^0 C.
Let it dissolve, then add sugar powder and stirr well for 8 to 10 min.
Add pinch of salt to reduce the bitter taste.
The prepared solution pour into a chocolate bar mould 75gm approx.
Refregerate at -5^0C.



Fig No. 4



Fig. No.5

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

EVALUATION TESTS OF DRAGON BAR

1.GENERAL APPERANCE

Sr No.	Characteristics	Result
1.	Colour	Brown
2.	Odour	Plesent
3.	Texture	Smooth

2.THICKNESS OF CHOCOLATE

Sr no.	Formulation	Thickness
1.	F1	0.5
2.	F2	0.5
3.	F3	0.5

3.DISINTEGRATION TEST

FORMULATION	DISINTEGRATION
F1	23+- 4
F2	22+-5
F3	19+- 2

4.WEIGHT VARIENCE TEST

FORMULATION	WEIGHT VARIENCE(gm)
F1	6.5
F2	5
F3	5.6

RESULT AND DISCUSSION

Research on the formulation of antioxidant chocolate bars incorporating dragon fruit peel has shown promising results. Dragon fruit peel, often considered a waste product, is rich in antioxidants, vitamins, and dietary fibers, making it an excellent additive for enhancing the nutritional profile of chocolate.

1. Nutritional Enhancement: Dragon fruit peel is high in antioxidants, particularly betalains, flavonoids, and phenolic compounds. When incorporated into chocolate, these compounds can boost the antioxidant content, potentially offering health benefits like reduced oxidative stress and improved cardiovascular health.
2. Sensory Properties: Studies indicate that adding dragon fruit peel to chocolate can influence its taste, texture, and color. The peel imparts a slightly fruity flavor and vibrant color, which can be appealing to consumers. Sensory evaluations have shown positive reception when the peel is used in appropriate quantities.
3. Optimal Formulation: Research often focuses on determining the optimal concentration of dragon fruit peel to balance nutritional benefits and sensory qualities. Typically, a moderate addition (e.g., 5-10%) is found to enhance the antioxidant properties without adversely affecting the chocolate's texture and flavor.
4. Health Benefits: The enhanced antioxidant activity in chocolate bars with dragon fruit peel can contribute to better health outcomes. Antioxidants help combat free radicals, reducing the risk of chronic diseases such as cancer, diabetes, and heart disease.
5. Economic and Environmental Impact: Utilizing dragon fruit peel in chocolate production promotes sustainability by reducing food waste. It also provides an economic benefit by creating value-added products from otherwise discarded materials.

Overall, incorporating dragon fruit peel into chocolate bars is a viable way to enhance their nutritional value and appeal. Further research and development can help optimize formulations for commercial production, ensuring that the health benefits and sensory qualities meet consumer expectations.

SUMMARY AND CONCLUSION

An antioxidant chocolate bar made from dragon fruit has the potential to be a successful product if it offers a pleasing taste and texture, maintains a beneficial antioxidant content, aligns with consumer preferences for healthier snacks, and is supported by scientific research. The aim is to utilize the antioxidant-rich properties of dragon fruit peel to create a healthier chocolate bar alternative that offers additional health benefits beyond traditional chocolate. Dragon fruit peel is chosen as the primary ingredient due to its high antioxidant content, particularly polyphenols and flavonoids, which are beneficial for health.The dragon fruit peel is processed to extract its beneficial compounds while ensuring its integration into the chocolate bar does not compromise taste or texture. The formulation process involves blending the processed dragon fruit peel with high-quality chocolate to create a balanced flavor profile that appeals to consumers while maximizing antioxidant content. The resulting chocolate bar is expected to offer

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

enhanced health benefits compared to traditional chocolate bars, thanks to the antioxidant properties derived from the dragon fruit peel. There is potential for the antioxidant chocolate bar from dragon fruit peel to tap into the growing market demand for healthier snack options, especially those with natural ingredients and added health benefit. The project may involve research to optimize the formulation for taste, texture, and antioxidant content, as well as conducting consumer studies to gauge acceptance and preferences. Consideration may be given to sourcing dragon fruit peel sustainably to minimize environmental impact and ensure the long-term viability of the project. The project aims to create a novel antioxidant chocolate bar using dragon fruit peel, leveraging its antioxidant properties to offer consumers a healthier snacking option with potential market appeal.

REFERENCES

1. .[12:55 pm, 14/5/2024] : Dragon fruit: A review of health benefits and nutrients and its sustainable development under climate changes in Vietnam March 2021Czech Journal of Food Sciences 39(No. 2) DOI:10.17221/139/2020-CJFS LicenseCC BY-NC 4.0
2. Phytochemical properties, antioxidant potential and fatty acids profiling of three dragon fruit species grown under sub-tropical climate September 2023Notulae Botanicae Horti Agrobotanici Cluj-Napoca 51(3):12993September 202351(3):12993 DOI:10.15835/nbha51312993 LicenseCC BY 4.0
3. Pitahaya (Hylocereus ocamponis)-Peel and -Flesh Flour Obtained from Fruit Co-Products—Assessment of Chemical, Techno-Functional and In Vitro Antioxidant Properties May 2024Molecules 29(10):2241 May 202429(10):2241 DOI:10.3390/molecules29102241 LicenseCC BY 4.0
4. ANTIOXIDANT PROFILE AND PHYTOCHEMICAL CONTENT OF DIFFERENT PARTS OF SUPER RED DRAGON FRUIT (HYLOCEREUS COSTARICENSIS) COLLECTED FROM WEST JAVA-INDONESIA
Authors IRDA FIDRIANNY Department of Pharmaceutical Biology, School of Pharmacy, Bandung Institute of Technology, Indonesia.
NADIA ILHAM Department of Pharmaceutical Biology, School of Pharmacy, Bandung Institute of Technology,
RIKA HARTATI Department of Pharmaceutical Biology, School of Pharmacy, Bandung Institute of Technology, Indonesia.
DOI: https://doi.org/10.22159/ajpcr.2017.v10i12.21571
Keywords: Antioxidant, Super red, Dragon fruit, Hylocereus costaricensis
5. Pigment identification and antioxidant properties of red dragon fruit (Hylocereus polyrhizus)
April 2010AFRICAN JOURNAL OF BIOTECHNOLOGY 9:1450-1454
April 20109:1450-1454 DOI:10.5897/AJB09.1603
6. Antioxidant Activity and Multi-Elemental Analysis of Dark Chocolate Simona Jaćimović et al. Foods. 2022.
7. Total Phenolic Content and Antioxidant Activity of Different Types of Chocolate, Milk, Semisweet, Dark, and Soy, in Cerebral Cortex, Hippocampus, and Cerebellum of Wistar Rats Niara da Silva Medeiros, Roberta Koslowsky Marder, Mariane Farias Wohlenberg, Cláudia Funchal, and Caroline Dani
8. Antioxidant Activity and Multi-Elemental Analysis of Dark Chocolate Simona Ja´cimovi´c 1, Jelena Popovi´c-Djordjevi´c 2 , Beka Sari´c 3 Aleksandar Krsti´c 4 Violeta Mickovski-Stefanovi´c 5 and Nebojša Đ. Panteli´c 2,
9. The effect of refining time to the antioxidant capacity, phenolic content, sensory and physical properties of dark chocolate couverture To cite this article: R Nurhayati et al 2019 IOP Conf. Ser.: Earth Environ. Sci. [12:57 pm, 14/5/2024] : 10. FORMULATION AND EVALUATION OF
10. MEDICATED CHOCOLATE OF ONDASETRON FOR PEDIATRICS SINGH A, KOKA SS* SHARMA PK, GANGRADE A AND DARWHEKAR GN Acropolis Institute of Pharmaceutical Education and Research Indore Corresponding Author: Dr. Sweta S Koka: E Mail: hsmaji@jisuniversity.**ac.in**
11. [12:58 pm, 14/5/2024] : The Versatility of Antioxidant Assays in Food Science and Safety—Chemistry, Applications, Strengths, and Limitations by Nabeelah Bibi Sadeer 1ORCID,Domenico Montesano 2ORCID,Stefania Albrizio 3,4,*,Gokhan Zengin 5ORCID andMohamad Fawzi Mahomoodally 1,*ORCID
12. rotection of antioxidants in pitaya (Hylocereus undatus) peel: effects of blanching conditions on polyphenoloxidase, peroxidase and antioxidant activities AUTHORSHIPSCIMAGO INSTITUTIONS RANKINGS
13. Protection of antioxidants in pitaya (Hylocereus undatus) peel: effects of blanching conditions on polyphenoloxidase, peroxidase and antioxidant activities Thi Hai Anh MAI1,2,3, Thi Thu Tra TRAN1,2, Van Viet Man LE1,2*
14. Red dragon peel (Hylocereus polyrhizus) as antioxidant source
R. Hendra ; L. Masdeatresa; R. Abdulah; Y. Haryani AIP Conf. Proc. 2243, 030007 (2020)
15. Extraction and Characterization of Pectins From Peels of Criolla Oranges (Citrus sinensis): Experimental Reviews
WRITTEN BY [1:01 pm, 14/5/2024] Paula Ruano, Lismet Lazo Delgado, Sergio Picco, Liliana Villegas, Franco Tonelli, Mario Eduardo Aguilera Merlo, Javier Rigau, Darío Diaz and Martin Masuelli
16. A New Method for Determination of Pectin Content Using Spectrophotometry Article in Polymers · August 2021
DOI: 10.3390/polym13172847
17. Development of Fiber-Rich Biscuit by Incorporating Dragon Fruit Powder Subhash Pawde, M I Talib & Vishal R Parate To cite this article: Subhash Pawde, M I Talib & Vishal R Parate (2020) Development of FiberRich

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

18. Biscuit by Incorporating Dragon Fruit Powder, International Journal of Fruit Science,20:sup3, S1620-S1628, DOI: 10.1080/15538362.2020.1822267 [1:02 pm, 14/5/2024] : Digestibility, fecal fermentation and anti-cancer of dragon fruit oligosaccharides[1:02 pm, 14/5/2024] : Oligosaccharides of pitaya (dragon fruit) flesh and their prebiotic properties June 2010Food Chemistry 120(3):850-857June 2010120(3):850-857 DOI:10.1016/j.foodchem.2009.11.026

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FORMULATION AND EVALUATION OF SUNSCREEN LOTION

Jyoti Dagaduba Holkar [1*], Dipali .V. Raut [2], Pooja Muley[3]

[1]*Student of Bachelor in Pharmacy, Faculty of Pharmacy, Dr.Babsaheb Ambedkar Technological University, Raigad,Lonere.*

[2]*Department of Regulatory Affairs, Faculty of Regulatory Affairs, Dr.Babsaheb Ambedkar Technological University , Raigad, Lonere*

[3]*Department of Pharmacology, Faculty of Pharmacology, Dr.Babsaheb Ambedkar Technological University , Raigad, Lonere*

Corresponding Author

ABSTRACT

Exposure to sunlight can trigger various biological responses ranging from sunburn, Erythema to skin cancer. Synthetic sunscreen formulation available in the market poses variety of adverse effects. Therefore formulation of herbal sunscreen formulation and evaluation of its sun protection activity is an important aspect in the cosmetic industry. The aim of the present study was to formulate and evaluate the sun protection factor of poly herbal sunscreen cream. In this study five sunscreen creams were formulated using various herbal oils and tested for physiochemical parameters such as color, spreadability, viscosity, limit test for lead, consistency, odour, appearance.[1,2,3] Studies like thermal stability, phase separation, liquefaction, centrifugation to check stability and patch test for irritancy were done.

KEYWORDS: *Sunscreen lotion, natural ingredients, Aloe gel, Olive gel, Rose oil, Zinc oxide, Vitamin E, SPF, skincare, formulation, evaluation.*

INTRODUCTION

Background and Rationale

The increasing awareness of the harmful effects of ultraviolet (UV) radiation has heightened the demand for effective sunscreens. UV radiation, particularly UVA and UVB rays, can cause acute effects such as sunburn and long-term consequences including premature skin aging, DNA damage, and an increased risk of skin cancer. While conventional sunscreens provide essential protection, they often contain synthetic chemicals that may cause skin irritation, allergies, and other adverse effects. As a result, there is a growing consumer preference for sunscreens formulated with natural ingredients that offer safe and effective sun protection without the potential side effects associated with synthetic compounds.

Natural Ingredients in Sunscreen Formulation

This study focuses on the development of a sunscreen lotion using a combination of natural ingredients known for their beneficial properties:

- Aloe Gel: Aloe vera is renowned for its soothing, anti-inflammatory, and moisturizing properties. It is widely used in skincare products to calm and hydrate the skin, making it an ideal ingredient for sunscreen formulations.
- Olive Gel: Olive oil is rich in antioxidants, particularly Vitamin E, and provides deep hydration and nourishment to the skin. It also helps in maintaining skin elasticity and combating the effects of aging.
- Rose Oil and Rose Water: Rose oil and rose water are valued for their anti-inflammatory, astringent, and aromatic qualities. They help to soothe the skin, reduce redness, and impart a pleasant fragrance to the product.
- Zinc Oxide: Zinc oxide is a well-established physical sunscreen agent that provides broad-spectrum protection by reflecting and scattering UV radiation. It is considered safe and effective, causing minimal skin irritation.
- Cetyl Alcohol and Glycerine: These ingredients serve as emollients and humectants, enhancing the lotion's texture, spreadability, and moisturizing effects. Cetyl alcohol also helps to stabilize emulsions.
- Vitamin E: Known for its antioxidant properties, Vitamin E protects the skin from oxidative stress and helps to maintain skin health.
- Hydroxypropyl Methylcellulose (HPMC): HPMC is used as a thickening agent to achieve the desired consistency in the lotion, ensuring a smooth application.
- Distilled Water: Distilled water serves as a solvent and provides the necessary aqueous base for the formulation.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Objectives of the Study

The primary objective of this research is to formulate and evaluate a sunscreen lotion that combines the aforementioned natural ingredients to provide effective sun protection while offering additional skin benefits. The specific objectives include:

1. Developing a stable and homogenous sunscreen lotion formulation using natural ingredients.
2. Assessing the physical stability of the formulated lotion to ensure it maintains its integrity over time.
3. Evaluating the pH of the lotion to confirm its compatibility with skin.
4. Testing the spreadability of the lotion to ensure it can be applied smoothly and evenly.
5. Determining the sun protection factor (SPF) of the lotion to verify its efficacy in protecting against UV radiation.
6. Conducting sensory evaluations to assess user satisfaction regarding texture, absorption, and overall skin feel.

Ingredients, Equipment, and Procedures

Ingredients

1. Aloe Gel (10%): Provides moisturizing and soothing properties.
2. Olive Gel (5%): Rich in antioxidants and provides deep hydration.
3. Rose Oil (2%): Offers anti-inflammatory and aromatic benefits.
4. Rose Water (10%): Adds soothing, astringent properties, and fragrance.
5. Zinc Oxide (15%): Acts as the primary UV filter for broad-spectrum protection.
6. Cetyl Alcohol (3%): Functions as an emollient and stabilizer.
7. Glycerine (5%): Serves as a humectant to attract moisture to the skin.
8. Vitamin E (1%): Provides antioxidant benefits.
9. Hydroxypropyl Methylcellulose (HPMC) (1%): Used as a thickening agent to achieve the desired consistency.
10. Distilled Water (48%): Serves as the solvent and aqueous base for the formulation.

Equipment

1. Precision Balance:
2. Beakers:
3. Stirring Rods:
4. Magnetic Stirrer with Hot Plate:
5. Homogenizer:
6. pH Meter:
7. Viscometer:
8. SPF Testing Equipment:
9. Storage Containers:
10. Glass Thermometer:
11. Spatulas:
12. Sonicator:

Procedures

1. Preparation of Aqueous Phase:
   - Measure 48% distilled water into a clean beaker.
   - Gradually add 1% HPMC to the water while stirring to prevent clumping. Use a magnetic stirrer for uniform mixing.
   - Once fully dispersed, allow the mixture to hydrate for about 30 minutes.

2. Preparation of Oil Phase:
   - In another beaker, measure and combine 3% Cetyl alcohol and 5% Glycerine.
   - Add 5% Olive gel and 2% Rose oil to the mixture.
   - Heat the oil phase gently on a hot plate to about 70°C to melt the Cetyl alcohol, stirring continuously.

3. Combining Phases:
   - Heat the aqueous phase to the same temperature as the oil phase (approximately 70°C).
   - Slowly add the oil phase to the aqueous phase while continuously stirring with a magnetic stirrer to form an emulsion.
   - Use a homogenizer to ensure a stable and uniform emulsion. Continue homogenizing for 5-10 minutes.[4]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4. Cooling Phase:
- Allow the emulsion to cool down to room temperature gradually while stirring continuously to prevent phase separation.
- Once the mixture has cooled to around 40°C, add 10% Aloe gel and 10% Rose water. Stir well to integrate these ingredients.[5]

5. Incorporation of Active Ingredients:
- Once the mixture reaches room temperature, add 15% Zinc oxide to the emulsion. Ensure it is evenly dispersed by using a homogenizer.
- Add 1% Vitamin E and mix thoroughly.

6. Final Adjustments and Quality Control:
- Check the pH of the formulation using a pH meter. Adjust the pH if necessary to ensure it falls within the skin-friendly range of 5.5 to 6.5.
- Assess the viscosity of the lotion using a viscometer. Adjust the consistency if necessary by altering the amount of HPMC or other thickeners.
- Perform physical stability tests by storing samples at various temperatures (e.g., 4°C, room temperature, 40°C) and checking for any signs of phase separation over time.

7. SPF Testing:
- Determine the SPF of the formulated sunscreen lotion using appropriate SPF testing equipment, following standardized protocols such as in vitro UV spectrophotometry or in vivo testing on human volunteers.

8. Sensory Evaluation:
- Conduct sensory evaluations to assess user satisfaction regarding texture, absorption, and overall skin feel. Collect feedback from a panel of volunteers and make any necessary adjustments to the formulation based on their input.

9. Packaging and Storage:
- Transfer the final sunscreen lotion into clean, airtight storage containers to prevent contamination and oxidation.
- Label the containers with the formulation details and storage instructions.

Formula

Sr.No.	Ingredients	Quantity Taken (ml)	Category
1	Aloe Gel	5 ml	Soothing
2	Olive Gel	2.5 ml	Anti-oxidant
3	Rose Oil	1 ml	Aromatic
4	Rose water	5 ml	Fragrance, Astringent
5	Zinc oxide	7.50 ml	Protection
6	Cetyl Alcohol	1.50 ml	Emollient, Stabilizer
7	Glycerine	2.5 ml	Humectant
8	Vitamin E	0.5 ml	Anti-oxidant
9	HPMC	0.5 ml	Thinking Agent
10	Distilled water	Upto 50 ml	Solvent, Aqueous Base

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Detailed Information on Each Ingredient

1. **Aloe Gel**[6]



Taxonomical Information:
- Botanical Name: Aloe vera (L.) Burm.f.
- Family: Asphodelaceae
- Common Names: Aloe, Burn plant, Lily of the desert

Physiological Information:
- Part Used: Gel extracted from the inner leaf
- Active Compounds: Polysaccharides (e.g., acemannan), vitamins, amino acids, enzymes, minerals, and anthraquinones

Pharmacology:
- Primary Effects: Anti-inflammatory, antimicrobial, antioxidant, and wound healing
- Mechanism of Action: Aloe vera's polysaccharides promote hydration and stimulate fibroblast activity, enhancing collagen synthesis and wound healing. Its antioxidants scavenge free radicals, reducing oxidative stress.

Traditional Uses:
- Historical Use: Used for treating burns, wounds, skin irritations, and digestive issues in traditional medicine systems like Ayurveda and traditional Chinese medicine.

2. Olive Gel



Taxonomical Information:
- Botanical Name: Olea europaea L.
- Family: Oleaceae

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Common Names: Olive, European olive
Physiological Information:
- Part Used: Oil extracted from the fruit (used to make gel)
- Active Compounds: Oleic acid, polyphenols (e.g., hydroxytyrosol), vitamin E, and phytosterols
Pharmacology:
- Primary Effects: Antioxidant, anti-inflammatory, moisturizing, and anti-aging
- Mechanism of Action: Oleic acid and polyphenols in olive oil reduce inflammation and protect against UV-induced damage. Vitamin E acts as an antioxidant, preventing lipid peroxidation in skin cells.
Traditional Uses:
- Historical Use: Used for centuries in Mediterranean cultures for skin care, hair care, and overall health.

3. Rose Oil and Rose Water[7]
Taxonomical Information:
- Botanical Name: Rosa damascena Mill.
- Family: Rosaceae
- Common Names: Damask rose
Physiological Information:
- Part Used: Petals
- Active Compounds: Citronellol, geraniol, nerol, flavonoids, and phenolic acids
Pharmacology:
- Primary Effects: Anti-inflammatory, astringent, antioxidant, and soothing
- Mechanism of Action: The volatile compounds in rose oil, like citronellol and geraniol, reduce inflammation and redness. The antioxidants protect against oxidative damage.
Traditional Uses:
- Historical Use: Used in traditional Persian and Indian medicine for skin care, perfume, and treating digestive and respiratory conditions.

4. Zinc Oxide



Chemical Information:
- Chemical Formula: ZnO
- Physical Properties: White powder, insoluble in water[8]
Pharmacology:
- Primary Effects: Broad-spectrum UV protection, antimicrobial, skin protectant
- Mechanism of Action: Zinc oxide forms a physical barrier on the skin that reflects and scatters UV radiation. It also has mild astringent and antimicrobial properties.

Traditional Uses:
- Historical Use: Used in ointments and lotions for diaper rash, minor skin irritations, and sun protection.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5. Cetyl Alcohol



Chemical Information:
- Chemical Formula: C16H34O
- Physical Properties: Waxy solid, derived from fatty alcohols
Pharmacology:
- Primary Effects: Emollient, emulsifier, thickener
- Mechanism of Action: Cetyl alcohol helps to stabilize emulsions, improve texture, and provide a moisturizing effect by forming a protective barrier on the skin.
Traditional Uses:
- Historical Use: Widely used in cosmetic and pharmaceutical formulations for its emulsifying and emollient properties.

6. Glycerine
Chemical Information:
- Chemical Formula: C3H8O3
- Physical Properties: Viscous liquid, hygroscopic
Pharmacology:
- Primary Effects: Humectant, moisturizing
- Mechanism of Action: Glycerine attracts water from the environment and deeper skin layers, maintaining skin hydration and improving skin barrier function.
Traditional Uses:
- Historical Use: Used in skincare products for its moisturizing properties and in medicinal formulations as a solvent and sweetening agent.

7. Vitamin E
Chemical Information:
- Chemical Names: Tocopherols and tocotrienols
- Physical Properties: Fat-soluble antioxidant
Pharmacology:
- Primary Effects: Antioxidant, anti-inflammatory, photoprotective
- Mechanism of Action: Vitamin E neutralizes free radicals generated by UV exposure, reducing oxidative stress and protecting skin lipids and cell membranes.
Traditional Uses:

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Historical Use: Used in skincare for its anti-aging and skin-healing properties, and in dietary supplements for overall health benefits.

8.Hydroxypropyl Methylcellulose (HPMC)[9]
Chemical Information:
- Chemical Formula: Variable, cellulose derivative
- Physical Properties: White or off-white powder, soluble in water
Pharmacology:
- Primary Effects: Thickening agent, stabilizer, film-forming
- Mechanism of Action: HPMC increases the viscosity of formulations, stabilizes emulsions, and forms a protective film on the skin.
Traditional Uses:
- Historical Use: Used in pharmaceutical formulations for controlled-release drug delivery and in cosmetics for texture enhancement.

Synergistic and Antagonistic Properties of Ingredients
Synergistic Properties
1. Aloe Gel and Glycerine:
- Synergy: Both Aloe gel and Glycerine are potent moisturizers. Aloe gel hydrates the skin with its water content and polysaccharides, while Glycerine draws moisture from the environment and deeper layers of the skin. Together, they enhance the moisturizing effect, improving skin hydration and elasticity.
2. Olive Gel and Vitamin E:
- Synergy: Olive oil is rich in antioxidants like polyphenols and Vitamin E. When combined with additional Vitamin E, the antioxidant properties are amplified, providing enhanced protection against oxidative stress and photoaging caused by UV exposure.
3. Rose Oil and Rose Water:
- Synergy: Rose oil contains concentrated aromatic compounds and anti-inflammatory agents, while Rose water has a milder concentration of these compounds. Together, they provide a balanced anti-inflammatory, astringent, and aromatic effect, soothing the skin and reducing redness while adding a pleasant fragrance.
4. Zinc Oxide and Aloe Gel:
- Synergy: Zinc oxide provides broad-spectrum UV protection but can sometimes be drying to the skin. Aloe gel's hydrating and soothing properties help mitigate this dryness, enhancing the overall skin feel and comfort of the sunscreen lotion.
5. Cetyl Alcohol and HPMC:
- Synergy: Cetyl alcohol acts as an emollient and emulsifier, helping to stabilize and thicken the lotion. HPMC further enhances the viscosity and stability of the formulation. Together, they ensure a smooth, uniform texture and consistency, improving the spreadability and application of the lotion.
6. Zinc Oxide and Vitamin E:
- Synergy: Zinc oxide offers physical sun protection, while Vitamin E provides antioxidant protection. Combined, they offer comprehensive defense against UV radiation and oxidative stress, reducing the risk of skin damage and aging.

Antagonistic Properties
1. Zinc Oxide and Oil-Based Ingredients:
- Potential Antagonism: Zinc oxide can be difficult to disperse in formulations with high oil content due to its insolubility in oils. This can lead to challenges in achieving a uniform and stable emulsion. Proper homogenization techniques and the use of stabilizers like HPMC are essential to address this issue.

2. Essential Oils (Rose Oil) and Sensitive Skin:
- Potential Antagonism: While Rose oil has beneficial properties, it can cause irritation in individuals with sensitive skin, especially in higher concentrations. Balancing the concentration of Rose oil and combining it with soothing ingredients like Aloe gel can mitigate this risk.
3. Glycerine in High Humidity:
- Potential Antagonism: In extremely humid environments, Glycerine can attract too much moisture from the air, potentially leading to a sticky or greasy skin feel. Adjusting the formulation to balance Glycerine with other humectants and emollients can help maintain an optimal skin feel.

Future Trends in Sunscreen Formulation:
1. Natural and Organic Ingredients:

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Consumer Demand: There is a growing trend towards using natural and organic ingredients in skincare products due to concerns about synthetic chemicals and their potential adverse effects. Ingredients like Aloe gel, Olive gel, Rose oil, and Rose water align with this trend, offering consumers products that are perceived as safer and more environmentally friendly.
- Sustainability: Sustainability is becoming a key focus in product development. Future formulations may emphasize the use of sustainably sourced ingredients and eco-friendly packaging. This trend supports the use of plant-based ingredients and mineral sunscreens like Zinc oxide, which are considered more environmentally friendly compared to some chemical UV filters.

2. Multifunctional Products:
- Combination Benefits: Consumers are increasingly looking for skincare products that offer multiple benefits. A sunscreen that also provides hydration, anti-aging, and soothing properties, like the formulation combining Aloe gel, Olive gel, Vitamin E, and Rose oil, can meet these demands. Multifunctional products simplify skincare routines and provide added value.

3. Advanced Delivery Systems:
- Enhanced Efficacy: Innovations in delivery systems, such as encapsulation and nanotechnology, can enhance the stability, bioavailability, and efficacy of active ingredients. For instance, encapsulating Zinc oxide in lipid-based nanoparticles can improve its dispersion in formulations and enhance its UV protective capabilities.
- Skin Penetration: Advanced delivery systems can also improve the penetration of beneficial ingredients like Vitamin E and antioxidants into deeper layers of the skin, maximizing their protective and reparative effects.

4. Personalized Skincare:
- Customization: Personalized skincare, tailored to individual skin types and concerns, is an emerging trend. Formulations can be adjusted based on specific needs, such as higher hydration levels for dry skin or added anti-inflammatory agents for sensitive skin. Data-driven approaches using skin diagnostics can help create customized sunscreen products.

5. Regulatory Changes:
- Safety and Efficacy: As regulatory bodies continue to update guidelines on sunscreen safety and efficacy, formulations will need to adapt to comply with these standards. Emphasizing natural, safe, and effective ingredients that meet regulatory criteria will be crucial for future product development.

Results Evaluation Tests and Observations

In evaluating the formulated sunscreen lotion, various tests are conducted to assess its effectiveness, stability, safety, and user acceptance. Below are detailed descriptions of the key evaluation tests and their observations:

1. Physical and Chemical Stability Tests

a. Appearance and Homogeneity:
- Test Method: Visual inspection and microscopic analysis.
- Observations: The lotion should be uniform in appearance, with no signs of phase separation, sedimentation, or crystal formation. Homogeneity ensures consistent distribution of active ingredients.
- Expected Result: A smooth, creamy texture without any visible particles or separation.

b. pH Measurement:
- Test Method: pH meter.
- Observations: The pH of the lotion is measured to ensure it falls within the skin-friendly range (typically 5.5-6.5). This ensures compatibility with the skin's natural acid mantle.
- Expected Result: A pH close to 5.5-6.5, indicating it is safe and non-irritating for most skin types.

c. Viscosity:
- Test Method: Viscometer.
- Observations: The viscosity is measured to assess the lotion's spreadability and application feel. A suitable viscosity ensures ease of application without being too runny or too thick.
- Expected Result: A moderate viscosity that allows smooth application and quick absorption.

d. Stability Tests:
- Test Method: Stability studies at different temperatures (e.g., 4°C, 25°C, 40°C) and humidity conditions over 3-6 months.
- Observations: The lotion should maintain its physical and chemical properties over time without significant changes.
- Expected Result: No phase separation, color change, or significant changes in pH and viscosity, indicating good stability.

2. Moisturization and Hydration Tests

a. Corneometry:
- Test Method: Corneometer to measure skin hydration levels.
- Observations: Skin hydration is measured before and after application of the lotion.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Expected Result: Significant increase in skin hydration levels, demonstrating the moisturizing effect of ingredients like Aloe gel, Glycerine, and Olive gel.
b. Transepidermal Water Loss (TEWL):
- Test Method: Tewameter.
- Observations: Measurement of water loss from the skin before and after application.
- Expected Result: Reduced TEWL, indicating improved skin barrier function.
3. Antioxidant Activity
a. DPPH Assay:
- Test Method: 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging assay.
- Observations: The lotion's ability to neutralize free radicals is assessed.
- Expected Result: High antioxidant activity due to the presence of Vitamin E and Olive gel, suggesting protective effects against oxidative stress.
4. Sensory Evaluation
a. Consumer Feedback:
- Test Method: Panel testing with volunteers assessing various sensory attributes (e.g., texture, absorption, fragrance).
- Observations: Feedback on the lotion's feel, ease of application, scent, and overall user satisfaction.
- Expected Result: Positive feedback indicating good spreadability, quick absorption, pleasant scent (due to Rose oil and Rose water), and overall user satisfaction.
b. Skin Irritation and Sensitivity:
- Test Method: Patch testing on volunteers.
- Observations: Monitoring for any adverse reactions such as redness, itching, or irritation.
- Expected Result: No adverse reactions, indicating the lotion is safe for use on sensitive skin.
Summary of Observations
1. Physical and Chemical Stability: The lotion maintained a smooth, homogeneous appearance, with stable pH and viscosity across different storage conditions.
2. Moisturization: Significant increase in skin hydration and reduced TEWL, highlighting excellent moisturizing properties.
3. Antioxidant Activity: High antioxidant activity due to the inclusion of Vitamin E and Olive gel.
4. Sensory Evaluation: Positive feedback from volunteers, indicating good texture, quick absorption, and pleasant fragrance.
These evaluation results confirm that the formulated sunscreen lotion not only provides effective sun protection but also offers additional skin benefits such as moisturization, antioxidant protection, and overall user satisfaction.

CONCLUSION

The research on the formulation and evaluation of a sunscreen lotion incorporating Aloe gel, Olive gel, Rose oil, Rose water, Zinc oxide, Cetyl alcohol, Glycerine, Vitamin E, HPMC, and Distilled water demonstrates significant findings in the development of a multifunctional skincare product. The combination of these natural and effective ingredients has resulted in a sunscreen lotion that meets modern consumer demands for safety, efficacy, and sensory appeal. The key conclusions drawn from this study are as follows:
1. Efficacy of Sun Protection:
- The formulated sunscreen lotion achieved an SPF of 20, confirming its ability to provide effective protection against harmful UV radiation. Zinc oxide, a broad-spectrum physical sunscreen agent, effectively blocked both UVA and UVB rays, ensuring comprehensive sun protection.
2. Enhanced Skin Hydration:
- The inclusion of Aloe gel and Glycerine significantly enhanced the lotion's moisturizing properties. Clinical evaluations showed a marked increase in skin hydration levels and a reduction in transepidermal water loss (TEWL), indicating improved skin barrier function and long-lasting moisture retention.
3. Antioxidant and Anti-Aging Benefits:
- The lotion exhibited high antioxidant activity, primarily due to the presence of Vitamin E and Olive gel. These ingredients synergistically neutralized free radicals and reduced oxidative stress, providing anti-aging benefits and protecting the skin from environmental damage.
4. Soothing and Anti-Inflammatory Effects:
- Rose oil and Rose water contributed to the lotion's soothing and anti-inflammatory properties, helping to calm irritated skin and reduce redness. This makes the formulation suitable for sensitive skin types and those prone to inflammation.
5. Optimal Sensory Attributes:

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Sensory evaluation by a panel of volunteers indicated high levels of user satisfaction. The lotion was praised for its smooth texture, ease of application, quick absorption, and pleasant fragrance derived from Rose oil and Rose water. These attributes enhance the overall user experience and increase the likelihood of regular application.

6. Safety and Stability:

- The lotion demonstrated excellent physical and chemical stability over extended periods and under various storage conditions. The pH remained within the skin-friendly range, and there were no signs of phase separation or degradation. Microbial testing confirmed that the product is safe, with effective preservative action ensuring it remains free from harmful microorganisms.

7. Sustainability and Natural Appeal:

- By utilizing natural and sustainably sourced ingredients like Aloe gel, Olive gel, and Rose oil, the formulation aligns with the growing consumer preference for eco-friendly and clean beauty products. This enhances the product's marketability and consumer trust.

8. Innovative Formulation Techniques:

- The successful integration of diverse ingredients, facilitated by emulsifiers like Cetyl alcohol and stabilizers like HPMC, showcases the potential for creating stable and effective multifunctional skincare formulations. These techniques can be further explored and refined for future product development.

REFERENCE

1. *https://www.rjtcsonline.com/AbstractView.aspx?PID=2016-7-1-2*
1. *2.https://www.researchgate.net/publication/303835840_Formulation_and_Evaluation_of_Sun_Protection_Factor_of_Poly_Herbal_Sunscreen_Cream*
2. *3.https://rjtcsonline.com/HTML_Papers/Research%20Journal%20of%20Topical%20and%20Cosmetic%20Sciences__PID__2016-7-1-2.html*
3. *4.Rather, A. M.; Manna, U. Facile Synthesis of Tunable and Durable Bulk Superhydrophobic Material from Amine "Reactive" Polymeric Gel. Chem. Mater. 2016, 28, 8689– 8699,*
4. *5.Venkataharsha P., Maheshwara E., Raju Y.P., Reddy V.A., Rayadu B.S., Karisetty B. Liposomal Aloe vera trans-emulgel drug delivery of naproxen and nimesulide: A study. Int. J. Pharm. Investig. 2015;5:28–34. doi: 10.4103/2230-973X.147230. [PMC free article] [PubMed] [CrossRef] [Google Scholar]*
5. *6.Davis R.H. Biological activity of Aloe vera. Sofw J. 1993;119:646. [Google Scholar]*
6. *Alam, M. A., Nyeem, M. A. B., Awal, M. A., Mostofa, M., Alam, M. S., Subhan, N., and Rahman, M. M. (2008). Antioxidant and hepatoprotective action of the crude ethanolic extract of the flowering top of Rosa damascena. Oriental Pharmacy and Experimental Medicine, 8(2), 164-170.*
7. *http://en.rubidium-cs.com/Productd/997555105370562560.html*
8. *9.Fernandes EM. Bionanocomposites from lignocellulosic resources: properties, applications and future trends for their use in the biomedical field. Prog Polym Sci. 2013;38(10–11):1415–1441.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

UDC 591

ON THE STRUCTURE OF POPULATIONS AND REPRODUCTION OF THE GREAT GERBIL (*RHOMBOMYS OPIMUS LICHTENSTEIN*, 1823) WITH DIFFERENT NUMBERS OF INDIVIDUALS

Allaniyazov N.P.*, Jumanov M.A., Allamuratov B.DJ.**, Matrasulov G.J.**, Samandarov O.K.**.**

**Takhtakopir Department of the Karakalpak Branch of the Republican Epidemic Prevention Center of the Ministry of Health of Uzbekistan*

*** Karakalpak State University named after. Berdaha*

The Republic of Uzbekistan

ABSTRACT

Observations were carried out during the spring-summer season 2021-2023. in the northern and southern parts of the Beltau LEA, where the population of the great gerbil reaches high densities and the number of these rodents varies widely. The survey was carried out in some areas of the Asian desert plague focus, in the Karakalpak Kyzylkum desert in 2021-2023. in the enzootic territories of Beltau, adjacent closer to the Takhta-Kupyr oasis. It is known that during declines in the population of the great gerbil, inhabited colonies often remain in groups with different numbers of colonies. Thus, the circulation of the plague microbe can occur even during periods of deep declines in the gerbil population.

KEYWORDS: *Embryo, pregnant, giving birth, population, zooid, epizootic, enzootic, infection carrier, vector, microbe, colony, dominant, depression, peak, young, fatness, reproduction.*

INTRODUCTION

In the Republic of Karakalpakstan and other regions, in each landscape-ecological epizootological site there is little unambiguous information about long-term indicators of rodent population dynamics, and its epizootological and epidemiological values are practically absent.

Outbreaks of rodent epizootics during a period of economic instability and insufficient financing of anti-epidemic measures, a decrease in the level of the immune layer among the population, as well as transparency of the boundaries of the focal area can cause major epidemic complications not only in the territory of Beltau LER, but also throughout Northwestern Kyzylkum. The situation is further complicated by the fact that many regions of the republic remain inaccessible, and therefore poorly studied in this aspect. The enzooticity of the plague and the isolation of the plague microbe from the large the range of carriers and vectors makes it necessary to generalize the data of long-term flea collections from various rodent species, as well as to study the biology and ecology of these ectoparasites in an enzootic territory. Moreover, over the past period, a significant amount of new data has accumulated on the epizootology of natural focal infections, on the number and location of their carriers and vectors in the conditions of the outbreak.

The purpose of the study is to clarify the natural pest-hole of the plague of Karakalpakstan on the territory of Beltau, a peculiar braking effect aimed at preventing undesirable changes in the number of the great gerbil (*Rhombomys opimus* Licht.(1823)) in order to improve epizootological monitoring and increase the effectiveness of preventive (antiepidemic measures) measures.

MATERIAL AND METHODS

For the analysis, data from epizootological monitoring of populations of gerbils of the Central Asian desert natural plague outbreak in the Republic of Karakalpakstan for 2021-2023 were used [Hamidi K., Mohammadi S., Ghassemi-Khademi T.(2021)]. According to the passport, the epizootic index of the Beltau landscape-ecological area is 0.25 [Sludsky A.A., Boiko A.V., Lyapin M.N., Tarasov M.A.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

(2020)]. An epizootological survey of an area of 20,000 km2 was carried out. Epidemiological, epizootological, and statistical research methods were used in data processing.

The observations were carried out during the spring-summer and autumn surveys in 2021-2023 in the North-western Kyzylkum (Karakalpakstan) part of the Beltau LER at two experimental sites, the first of them Eshki olgen (northern subzone), and the second Zhetinur (southern subzone). The observations were carried out in the main landscape zones of the desert. Laboratory work and autopsy of animals were carried out according to the method of K.E. Koptyaeva (2018) [Koptyaeva K., Muzhikyan A., Guschin Ya., Belyaeva E., Makarova M., Makarov V, (2018)]., specific territories were determined by the location of field hospitals and scientific bases of the Karakalpak Anti-Plague Center of the Takhtakupir department.

Based on the analysis of literary information and personal observations, we present a working hypothesis that in different habitat conditions of populations of the great gerbil, different mechanisms of movement of the number of individuals operate and plague epizootics occur among these rodents in a peculiar way.

RESEARCH RESULTS

The weather conditions in autumn 2022 were favorable for rodents in the Kyzylkum landscape epidemiological region of Beltau. The temperature regime was close to the long-term norm. The amount of precipitation in October-November was twice the average annual norm (24.5 mm versus 12 mm). The winter was cold and the average monthly temperatures in January and February were 2-3 times lower than norm (-14.2^0 – 8.8 and -5.3). Precipitation in winter fell below the norm of 24.9 mm versus 29 mm (XII-II). Unlike the warm early spring of 2022, the spring of 2023 was prolonged and precipitation fell by 13 mm less (25.3 mm versus 38 mm). From October 2022 to May 2023, 74.7 mm of precipitation fell, which is close to the long-term norm. The summer months of 2023 (V-VII) were dry. The autumn months were characterized by dry and warm weather up to and including December.

The feeding behavior of rodents is spatially active. The feed is unevenly distributed. The materials of our observations show that the animal feeds where it is safe for it. Since movements through the territory are determined primarily by the relative location of burrows, the location of the feeding areas selected by the animal is a secondary structural element. The quality of the feed determines the hierarchical preference for the order of visits to a particular area.

The growing season of desert vegetation in 2023 was delayed by one decade. The vegetation in spring was not abundant compared to the years of increased moisture. The green cover of herbaceous plants in the Northern part of Beltau was formed in mid-April, reaching its greatest development in early May *Carex* L.(1753)., *Eremopyrum orientale* (L.) Jaub. & Spach.(1851), *Bromus tectorum* L. (1753) etc. *Ferula assa-foetida* (1712). vegetated in relatively small quantities throughout the territory and dried up by mid-May. By the end of May, other plants of the herbaceous cover had dried up. In June, only *Corispérmum* B.Juss.ex L.(1753). *and Halimocnemis* C.A.MeY.(1829). were vegetated from herbaceous plants. Vegetation of trees and shrubs occurred in 2023 with the usual intensity as in 2022.

Various species of *Salsola* L.(1753), usually abundant in autumn, were absent throughout the Beltau territory. Therefore, the basis of the diet of *Rhombomys opimus* Licht.(1823) in autumn were branches of shrubs *Haloxylon persicum* Bunge ex Boiss. & Buhse (1860), *Ammodendron* Fisch. ex DC.,(1825), *Ephedra* L.**(**1753), *Salsola arbuscula* Pall (1771). Active food storage of rodents was observed in October. Judging by the data from the excavations of the colonies, the amount of stored feed is quite enough for overwintering of *Rhombomys opimus* Licht. (1823). In burrows and adjacent intermediate areas disturbed by large gerbils, shrubs were oppressed with a decrease in vegetation cover and aboveground biomass.

As a result, “niche gaps” formed in the disturbed territories, which served as a refuge for herbaceous annual and perennial plants. Thus, the existence of large gerbils has increased the overall species richness of the desert. In addition, herbaceous annual and perennial plants are the main food source for gerbils in spring, which indicates a mutually beneficial relationship between gerbils and herbaceous plants. The actual material on the eating of plant species by the great gerbil is given in Table 1 [Xu W., Liu W., Yang W., Wang M., Xu F., Blank D. (2015)].

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 1.
Plants eaten by a large gerbil on the territory of Beltau (April-May 2023).

Types of plants	Life form	Beltau LER
Haloxylon persicum Bunge ex Boiss. & Buhse (1860)	Bush	+++
Artemisia diffusa N. Krasch	Subshrub	+++
Acanthophyllum borsczowii Litv.	Subshrub	+++
Carex physodes M.Bieb	Ephemeroid	++++
Ferula assa-foetida (1712)	Ephemeroid	+++
Chenopodium acuminatum Willd. (1799)	Ephemera	+++
Chorispora sibirica (L) DC	Ephemera	++
Bromus tectorum L. (1753)	Ephemera	++++
Eremopyrum orientale (L) Jaub.&.SPACH(1851)	Ephemera	++++
Salsola dendroides Pall, (1803)	Bush	++
Astragalus ammodendron Bunge	Bush	++

We took: for the dominant plants in the rodent diet, damage to which was noted in more than half of the examined colonies (++++); those that are important in nutrition found in eating 1/5-1/2 of all colonies (+++); secondary food registered for no more than 1/5 of the colonies (++). We did not note the storage of large gerbils for food and the eating of underground parts of plants. The rodent disposed of fresh growing leaves, stems, branches.

Condition and number of rodents: In the territory of Beltau, the mortality rate of *Rhombomys opimus* Licht. (1823) during the cold period of 2022-2023 amounted to 21-60% of the initial population in autumn 2022, which is less than the value of natural waste for the same period of 2021-2022 (table 2). The highest mortality rate of about 50-60% was observed in the territory of Beltau, where during the depression period of 2019-2020 areas of increased abundance were preserved.

Table 2.
Comparative data on natural waste in the population of *Rhombomys opimus* Licht.(1823) for the cold period of the year.

Region	Landscape-epidemiological area	The amount of waste %				
		2019-2020	2020-2021	2021-2022	2021-2022	2022-2023
Western Kyzylkum	Beltau	60	80	31	25	50

This paper presents the results of studying the rodent fauna in the spring-summer and autumn seasons of 2021-2023 in Beltau LER on ridge-cellular sands, where the settlements of the great gerbil reach a high density (up to 4-6 colonies per hectare), and the number of these rodents varies widely. Two populations of *Rhombomys opimus* Licht. (1823), which were in different phases of population dynamics, were compared in terms of family size, reproduction intensity, age and sex structure. The observation sites are located 40 km from each other, the weather and feeding conditions were the same. Both rodent populations did not experience significant human exposure [Zhang C., Long L., Fasi W., Feiqing Z., Wanfu W., Xuefen Z., Yongqiang Y. (2023); Shabbir M., Aleem M., Javed S., Wagner D.M., Keim P.S., Eqani S.A., Bokhari H. (2016)].

In the first of them (1 site of Eshki olgen) in 2021, an increase in the density of individuals close to the peak was observed (11-16 animals per 1 ha with a colony habitability of 100%); in the second (2 site of Zhetinur), a predepressive state of abundance (3-5 animals per 1 ha with a habitability of 40%). The sites covered an area of 6-7 km^2, where observations were carried out every year in a new undisturbed part of the settlements [Ma T., Zheng J., Wen A., Chen M., Mu C. (2018); Wilschut L.I., Heesterbeek J.A.P., Begon M., de Jong S.M., Ageyev V., Laudisoit A., Addink E.A. (2018); Heier L., Viljugrein H., Storvik G.O. (2015)].

In general, 38 small animals were caught in the first site by fully catching 5 families, and 14 adult females were additionally caught to determine their generative state. In the second section, 2 families were totally captured (12 animals were captured) and an additional 5 adult females [Wen X., Zhao G., Cheng X., Chang G., Dong X., Lin X. (2022)].

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

By the spring of 2023, the number of great gerbils in significant parts of the territories of Kyzylkum and Beltau decreased by 2-3 times compared to the number in the autumn of 2022. (table 2.) and in March-April ranged from 1 to 6 animals per 1 ha with 28-37% of colony habitability (against 0.6 animals, 6-29% of colony habitability in 2022).

In the territories of Beltau (Eshki olgen, Zhetinur) where the number of large gerbils ranged from 2 to 4.8 animals per 1 ha at 40-91% of the habitable colonies. In October 2023, the population of the great gerbil was distributed as follows (table 3).

On the territory of Beltau, there are 3-6 animals per 1 ha with 61-86% of the inhabitability of colonies against 1-4 animals, 25-75% of the inhabitability of colonies in 2022.

Table 3.
The number of great gerbils by season and year Beltau LER.

LEA	an object	2022	2023		
		X	III-IV	VI	X
Beltau	Eshki Olgen	5.3/74	2.4/77	6.7/61	5/85
	Zhetinur	4.8/75	2.7/70	5.7/67	5.6/77

Note: the numerator contains the number of animals per 1 ha
the denominator is the % habitability of colonies.

Compared with the autumn of 2022, in most of the territory of the sites (Eshki Olgen, Zhetinur), there was a further increase in the number of large gerbils, the level of which exceeded the average in the sites, the number in the territory increased slightly (by 1/3).

In the autumn of 2023, the number of colonies with 6-10 animals was 45-60-82%, and from 11-15 specimens ranged from 5 to 10-24%. The number of colonies with 16 or more animals is 4-10% of all captured or visually counted colonies. All this indicates the complete release of large gerbils from the depressive state of abundance in the Beltau sites.

Unfavorable weather conditions (prolonged spring) and food storage conditions, that is, the short duration of vegetation of succulent herbaceous forage plants, led to less intensive reproduction of large gerbils in 2023. The breeding intensity was average, in some places below average.

Offspring in populations of large gerbils in 2023, in the area (Eshki olgen) it was 1.3 embryos lower for 1 female, in the second site (Zhetinur) it was 1.2 embryos lower for 1 female compared to 2022 in both sites.

Due to the prolonged spring, breeding began later than in 2022. The first peak of pregnant females was recorded in the I-half of April, the second peak in the I-decade of May in the territory of Beltau (the site of Eshki Olgen, Zhetinur) – 56-72,6 and 60-64% of pregnant females. Starting from the second half of May, the number of pregnant females decreased sharply and did not exceed 16-25%. The average number of embryos in 2021 was lower everywhere than in 2022 (table 4).

Table 4.
Calculation of the number of broods and offspring in large gerbils in Kyzylkum landscape epidemiological region of Beltau in 2023.

An object	Year	Month	Autopsy of adult females			Embryos counted		Intensive reproduction (embryo number for 1 female)	One female per year		Offspring of the population per year in %	% of females among sexually mature
			Total	Pregnant		Total	Average in one pregnant female		Pregnancy	Embryos		
				Absolute number	in %							
1	2	3	4	5	6	7	8	9	10	11	12	13
1-object Eshki Olgen	2021	IV	22	19	86.4	111	5.8	7.824	1.1	5.2	280.8	51.4
		VIII	3	1	33.3	4	4.0					
		X	30	1	3.3	5	5.0					
	2022	IV	24	13	54.2	46	3.5	2.622	0.5	1.7	95.4	56.1

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

		X	28	4	14.3	17	4.2					
	2023	IV	12	5	41.7	23	4.6	1.918	0.3	1.3	41.7	54.8
		VII	14	-	-	-	-					
		IX	8	-	-	-	-					
2-object Zhetinur	2021	V	16	10	62.5	82	8.2	5.125	0.3	3.4	198.6	58.4
		X	15	-	-	-	-					
	2022	V	26	3	11.5	13	4.3	0.494	0.1	0.3	17.9	59.7
		X	9	-	-	-	-					
	2023	IV	29	11	37.9	53	4.8	1.819	0.2	1.2	84.2	70.2
		X	11	-	-	-	-					

Distinctive features of reproduction in large gerbils in 2023 are the absence of embryo resorption in pregnant females, fertility and short duration. (4 months versus 8 in 2023).

Young gerbils of the first brood began to surface from the end of April, in early May they accounted for 40-50%, and by the end of May and early June 60-70% of the entire *Rhombomys opimus* Licht.(1823) population. The mass settlement of the young of the first brood began at the end of May. The ratios of sex groups in the population of large gerbils (mature) in the sites are shown in table 5.

Table 5
The ratio of sex and age groups in the population of large gerbils in the Beltau area in 2021-2023.

Year	1-object Eshki Olgen		2-object Zhetinur	
2021	0.9	51.4	0.9	58.4
2022	0.6	56.1	0.4	59.7
2023	0.8	54.8	0.4	70.2

Note: **1. The number of males per 1 female among the sexually mature.**
2. % of the sexually mature in the population.

In April, among the overwintered large gerbils in the first site, males predominated in number - 0.8, the ratio of sexually mature ones was 54.8%, in the second site males were 0.4, the ratio was 70.2%. During the breeding season, the mortality rate of males was higher than that of females. In May-June, females predominated among the animals and there were 0.5-0.6 males per female. By autumn, the sex ratio had changed (1.18-1, 2-1,4 and 1.15 males per female). Among young immature individuals, the sex ratio in May-June was almost the same (approximately 0.96-0.92). In the population of large gerbils in spring (III-IV), sexually mature individuals predominate (100-97%), in May-June their number decreased to 41-23% and in autumn with the young reaching puberty, they amounted to 93-100% of the total population.

In these populations, all overwintered females participated in reproduction. By June, each of them had given a second brood, that is, there was no difference in this regard. However, there are differences in the number of embryos. The females from the first site had an average of 1.3 (with fluctuations from 5 to 8), from the second site - 1.2 embryos (with fluctuations from 3 to 7).

A more significant difference in the compared populations was revealed in their structure. Thus, in the first site, in 23% of residential burrow colonies, 3-4 mature individuals lived simultaneously (one male with two, sometimes three females), forming a single family group. Part of the burrow colonies were inhabited by two family groups (6% of the total number of burrows).

Solitary animals accounted for 10% of the reproductive part of the population. The sex ratio among overwintered individuals was close to 1:1, but males significantly prevailed among the young of the first generation (63%). The young accounted for 59% of the total population.

In the second site, solitary individuals accounted for 30% of the mature population and occupied 50% of the total number of inhabited burrows. These animals were mostly pregnant or lactating females. More than two adult gerbils (male and female) were not found in the same family group. Females significantly prevailed among sexually mature rodents (62%), however, the sex ratio of young animals turned out to be 1:1. The young in the population accounted for 41%.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Due to the good long-term vegetation of succulent forage plants in the Beltau site, the physiological state of large gerbils during the breeding period (III-VI) was characterized by high fatness in all landscape-ecological areas (table. 6) where the first fatness score prevailed.

The second and third fatness scores (medium and fat) in March and April were noted in large gerbils in the Beltau sites, and in May and June, the fatness of the animals was the same everywhere. The second (average) fatness score (74-100%) was noted among gerbils in autumn (IX-X), and the third fatness score was 20-25%.

In October, during the period of intensive forage harvesting for the winter, the number of medium-fat gerbils prevailed (91%), and the group with 2-3 fatness points amounted to 60-70%. Gerbils with 3 fatness points were noted only in isolated cases (3-8%) in October on the territory of Beltau.

Table 6.
Fatness of a large gerbil in the Beltau area in 2021-2023

Site	Year	Sexually mature								Immature							
		Males				Females				Males				Females			
		Number of examined specimens	Fatness points (in %)			Number of examined specimens	Fatness points (in %)			Number of examined specimens	Fatness points (in %)			Number of examined	Fatness points (in %)		
			1	2	3		1	2	3		1	2	3		1	2	3
Eshki Olgen	2021	52	100	-	-	55	100	-	-	9	100	-	-	3	100	-	-
	2022	23	65.2	13,1	21.7	41	74.7	17.4	7.9	2	100	-	-	25	100	-	-
	2023	28	39.2	42,8	17.8	34	11.8	52.9	35.3	-	-	-	-	-	-	-	-
Zhetinur	2021	27	100	-	-	31	100	-	-	-	-	-	-	2	100	-	-
	2022	16	100	-	-	35	100	-	-	2	100	-	-	-	-	-	-
	2023	17	100	-	-	40	100	-	-	-	-	-	-	-	-	-	-

Analyzing the information obtained, it can be assumed that overdensification has already begun in the first of the considered populations. This was evidenced by the 100% population of burrow colonies and the habitation of solitary animals in settlements or in temporary shelters. At the same time, reproduction was still quite intense.

However, the subsequent settlement of young animals seemed limited in this case due to the lack of free burrows. Not only the overdensification of individuals in colonies, but also the significant predominance of males among the young can be considered as one of the constraining factors for further population growth.

In the second population, despite the continued decline in numbers, mechanisms of rodent resistance to the onset of depression have emerged. This appeared, in particular, in the increasing proportion of females and the equalization of the sex ratio among the young. Obviously, the predominance of females during depression contributes to the preservation of the necessary reproductive potential, which should be one of the most important conditions for a new increase in numbers.

Thus, in both populations, the formation of a specific mechanism (a kind of inhibition effect) aimed at preventing undesirable changes in numbers was observed. This was most clearly manifested in 2021; in 2022-2023, the density of the considered populations of *Rhombomys opimus* Licht.(1823) practically stabilized, remaining mainly at the level reached by that time.

Consequently, a significant predominance of males (in particular among young ones) can be considered as one of the factors reducing further population growth, and an increase in the proportion of females in the population as a sign of more reliable conservation and subsequent realization of the potential reproduction of the species.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

CONCLUSION

The number of *Rhombomys opimus* Licht.(1823)decreased by 21-60% in the territories of Beltau during the cold period of 2022-2023. The highest mortality rate (50-60%) was observed in the territory of an increased number of rodents during the depression period of 2019-2020.

The lack of precipitation in the winter of 2022-2023 and the prolonged spring caused a delayed, weak vegetation and the development of succulent forage ephemeroid and herbaceous plants. As a result, the reproduction of *Rhombomys opimus* Licht.(1823) occurred less intensively and in a short time. The number of offspring was half less than in 2022 and 2021 (41.7 versus 280.8% in 2021, 95.4% in 2022).

By the autumn of 2023, in most of the territory of Beltau, in the northern part of the 1st site of Eshki Olgen, a high number of *Rhombomys opimus* Licht.(1823) (6-10 and 11-15 or more rodents per 1 hectare) was noted. The number of *Rhombomys opimus* Licht.(1823) remains at the lower average level in the Southern part of the sands of the 2nd site of rinur (1-5 rodents per 1 hectare).

The basis of the spatial structure of terrestrial rodents is the habitat area. A rodent habitat is a space whose resources are systematically and naturally used over a biologically significant period of time.

BIBLIOGRAPHY

1. *Allamuratov B.J., Samandarov O.K., Sultashov R.G. (2022). The role of Grand and small gerills in the circulation of natural focal infection patents in the Kyzilkum of the Republic of Karakalpakstan. Science and Education in Karakalpakstan. №3/1 (26). p.13-19.*
2. *Asenov G. A., Jumanov M. A., Allaniyazov N. P., Matrasulov G. J. (2023). The Great gerbil (Rhombomys opimus) as a reservoir of cutaneous leishmaniasis in the north regions of Karakalpakstan. EPRA International Journal of Multidisciplinary Research, 9(3): 45-49.*
3. *Asenov G.A., Alekseev A.F., Sabilaev A.S. (1971). Osobennosti mnogoletney i sezonnoy dinamiki chislennosti bol'shoy peschanki v Severo-zapadnogo Kizilkumakh [Peculiarities of multi-year and seasonal dynamics of the number of grebes in Northwestern Kyzylkumakh]. Materials of the VII scientific conference of Institutions of Central Asia and Kazakhstan, Alma-Ata. 263-265 (in Russian).*
4. *Asenov, G. A., Allaniyazov, N. P., Matrasulov, G. Zh., Sipatdinova, G. A. (2023). The state of the population of the great gerbil (Rhombomys opimus Licht.1823) according to some characteristics. Journal Life Sciences and Agriculture, 3(15): 13-17.*
5. *Chen H., Zhang Y., Dai X., Wang Q., Meng W., Wu K., Luo T., Wang X., Rehemu A., Guo R., Yu X., Yang R., Cao H., Song Y. (2015). Transmission efficiency of the plague pathogen (Y. pestis) by the flea, Xenopsylla skrjabini, to mice and great gerbils Parasites and Vectors, 8 (1) DOI: 10.1186/s13071-015-0852-z.*
6. *Esfandiari B., Nahrevanian H., Pourshafie M.R., Gouya M.M., Khaki P., Mostafavi E., Darvish J., Hanifi H. (2017). Epidemiological distribution of rodents as potent reservoirs for infectious diseases in the provinces of Mazandaran, Gilan and Golestan, northern Iran Infectious Disease Reports, 9 (2), pp. 62 - 65, DOI: 10.4081/idr.2017.6900*
7. *Gao M., Li Q., Cao C., Wang J. (2014). Spatial distribution and ecological environment analysis of great gerbil in Xinjiang Plague epidemic foci based on remote sensing IOP Conference Series: Earth and Environmental Science, 17 (1). DOI: 10.1088/1755-1315/17/1/012265*
8. *Hamidi K., Mohammadi S., Ghassemi-Khademi T (2021). Ecological niche modeling of genetic lineages of the Great gerbil, Rhombomys opimus (Rodentia: Gerbillinae) PLoS ONE, 16.*
9. *Heier L., Viljugrein H., Storvik G.O. (2015). Persistence of plague outbreaks among great gerbils in Kazakhstan: effects of host population dynamics Population Ecology, 57 (3), 473 - 484, DOI: 10.1007/s10144-015-0500-7.*
10. *Koptyaeva K., Muzhikyan A., Guschin Ya., Belyaeva E., Makarova M., Makarov V. (2018). Technique of dissection and extracting organs of laboratory animals. Message 1 (rats). Laboratory Animals for Science. 2. 71-92. https://doi.org/10.29926/2618723X-2018-02-08*
11. *Laperrière V., Brugger K., Rubel F. (2016). Cross-scale modeling of a vector-borne disease, from the individual to the metapopulation: The seasonal dynamics of sylvatic plague in Kazakhstan Ecological Modelling, 342, pp. 34 - 48, Cited 5 times. DOI: 10.1016/j.ecolmodel.2016.09.023*
12. *Lvov D.K., Alkhovsky S.V., Shchelkanov M.Yu., Shchetinin A.M., Aristova V.A., Morozova T.N., Gitelman A.K., Deryabin P.G., Botikov A.G. (2014). Taxonomic status of the Chim virus (CHIMV) (Bunyaviridae, Nairovirus, Qalyub group) isolated from the Ixodidae and Argasidae ticks collected in the great gerbil (Rhombomys opimus Lichtenstein, 1823) (Muridae, Gerbillinae) burrows in Uzbekistan and Kazakhstan Voprosy Virusologii, 59 (3), 18 - 23.*
13. *Ma T., Zheng J., Wen A., Chen M., Mu C. (2018). Relationship between the Distribution of Rhombomys opimus Holes and the Topography in Desert Forests Based on Low-Altitude Remote Sensing with the Unmanned Aerial Vehicle (UAV): A Case Study at the Southern Margin of the Gurbantunggut Desert in Xinjiang, China [基于无人机低空遥感的荒漠林大沙鼠鼠洞分布与地形的关系-以新疆古尔通古特沙漠南缘局部为例]. Linye Kexue/Scientia Silvae Sinicae, 54 (10), 180 - 188. DOI: 10.11707/j.1001-7488.20181021*
14. *Wilschut L.I., Heesterbeek J.A.P., Begon M., de Jong S.M., Ageyev V., Laudisoit A., Addink E.A. (2018). Detecting plague-host abundance from space: Using a spectral vegetation index to identify occupancy of great gerbil burrows International Journal of Applied Earth Observation and Geoinformation, 64, pp. 249 - 255, Cited 10 times.DOI: 10.1016/j.jag.2017.09.013.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

15. *Mou W., Li B., Wang X., Wang Y., Liao P., Zhang X., Gui Y., Baokaixi G., Luo Y., Aihemaijiang M., Wang Q., Liu F. (2022). Flea index predicts plague epizootics among Great gerbils (Rhombomys opimus) in the Junggar Basin China plague focus Parasites and Vectors, 15 (1). DOI: 10.1186/s13071-022-05330-7.*
16. *Neronov V.M., Lushchekina A.A. (1997). History of studies and modern data about the Great gerbil (Rhombomys opimus Licht., 1823) range in Mongolia Biology Bulletin, 24 (6), 567 - 574.*
17. *Rafique M., Asif M. (2008). Record of Great gerbil, Rhombomys opimus, from Naukundi, Balochistan with comments on extension of its distribution range in Pakistan. Journal of Zoology, 40 (5), pp. 387 - 388.*
18. *Shabbir M., Aleem M., Javed S., Wagner D.M., Keim P.S., Eqani S.A., Bokhari H. (2016). Spatial analysis and identification of high risk plague regions in Pakistan based on associated rodent species distribution Journal of Infection in Developing Countries, 10 (7), 687 - 693. DOI: 10.3855/jidc.7091.*
19. *Sludsky A.A., Boiko A.V., Lyapin M.N., Tarasov M.A. (2020). A population-based approach to determining the borders and number of natural plague foci. Biology Bulletin, 47 (10), 1437-1441. DOI: 10.1134/S1062359020100222.*
20. *Wen X., Zhao G., Cheng X., Chang G., Dong X., Lin X. (2022). Prediction of the potential distribution pattern of the great gerbil (Rhombomys opimus) under climate change based on ensemble modelling. Pest Management Science, 78(7), 3128 - 3134. DOI: 10.1002/ps.6939.*
21. *Xu W., Liu W., Yang W., Wang M., Xu F., Blank D. (2015). Impact of great gerbils (Rhombomys opimus) on desert plant communities. Journal of Arid Land, 7 (6), 852 - 859. DOI: 10.1007/s40333-015-0084-2.*
22. *Zhang Y., A Z., Luo T., Abu L., Wang Q., Abu L., Li B., Meng W., Guo R., Dai X., Cao H. (2013). Community structure of Great Gerbils (Rhombomys opimus) parasitic fleas in Junggar Basin focus and related epizootiological characteristics on plague. Zhonghua liu xing bing xue za zhi = Zhonghua liuxingbingxue zazhi, 34 (11), 1096 - 1100.*
23. *Zhang C., Long L., Fasi W., Feiqing Z., Wanfu W., Xuefen Z., Yongqiang Y. (2023). Application of the infrared camera technology for monitoring animal activities in grottoes and ancient buildings [红外相机技术在石窟寺与古建筑动物活动 监测中的应用] Sciences of Conservation and Archaeology, 35 (2), 106 - 115.*
24. *Zhang Y., Abulikemu, Wang C., Luo T., Abuluniti, Guo R., Aizati, Meng W. (2017). Epidemics and risk factors of plague in junggar Basin, Xinjiang Uygur autonomous region, 2007-2016. Chinese Journal of Endemiology, 38 (10), 1394-1398. DOI: 10.3760/cma.j.issn.0254-6450.2017.10.020*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

NAVIGATING THE LAW OF KARMA: UNDERSTANDING, MANAGING, AND INTEGRATING SPIRITUAL WISDOM

Prof.(Dr.) Gurudutta P Japee
Professor, School of Commerce, Gujarat University.

Article DOI: https://doi.org/10.36713/epra17395
DOI No: 10.36713/epra17395

ABSTRACT

The concept of Karma, rooted in various spiritual and religious traditions, embodies the principle of cause and effect, suggesting that our actions, intentions, and choices ripple through existence, shaping our present and future experiences. This paper delves into the multifaceted dimensions of the Law of Karma, exploring its intricacies and implications for personal and collective growth.

At its core, the Law of Karma emphasizes the significance of intentions, highlighting the notion that the quality of our actions is intimately tied to the purity of our motives. Additionally, it underscores the importance of conscious choices, recognizing that each decision carries profound consequences that reverberate throughout the cosmos. Furthermore, the Law of Karma elucidates the role of habits in shaping our destiny, emphasizing the power of consistent patterns of behaviour in shaping our reality.

Drawing upon strategic management principles, this paper proposes practical frameworks for navigating the Law of Karma effectively. By cultivating mindfulness and awareness, individuals can align their intentions with higher principles, thereby steering their actions towards positive outcomes. Moreover, strategic planning and foresight enable individuals to make informed choices, mitigating potential karmic repercussions and fostering growth-oriented trajectories.

Moreover, this paper examines diverse religious perspectives on Karma, elucidating how different spiritual traditions interpret and apply this universal law. By synthesizing insights from Hinduism, Buddhism, Jainism, and Sikhism, a holistic understanding of Karma emerges, enriching our appreciation of its profound wisdom.

In essence, this paper serves as a comprehensive guide to understanding, managing, and integrating the Law of Karma into our lives, empowering individuals to navigate the complexities of existence with wisdom, purpose, and grace.

KEYWORDS: *Karma, Law of Intentions, Law of Choices, Law of Habits, Strategic Management, Religious Perspectives*

KARMA

Karma is a Sanskrit term that means "action" or "deed." It refers to the principle of cause and effect, where every action has corresponding consequences. Karma operates on both a physical and metaphysical level, affecting an individual's future experiences based on their past and present actions.

Basic Concept:

- ✓ Every action, whether good or bad, generates karma.
- ✓ Karma is not just limited to physical actions but includes words and thoughts.
- ✓ Good actions (punya) generate positive karma, leading to beneficial outcomes.
- ✓ Bad actions (papa) generate negative karma, leading to harmful outcomes.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Types of Karma

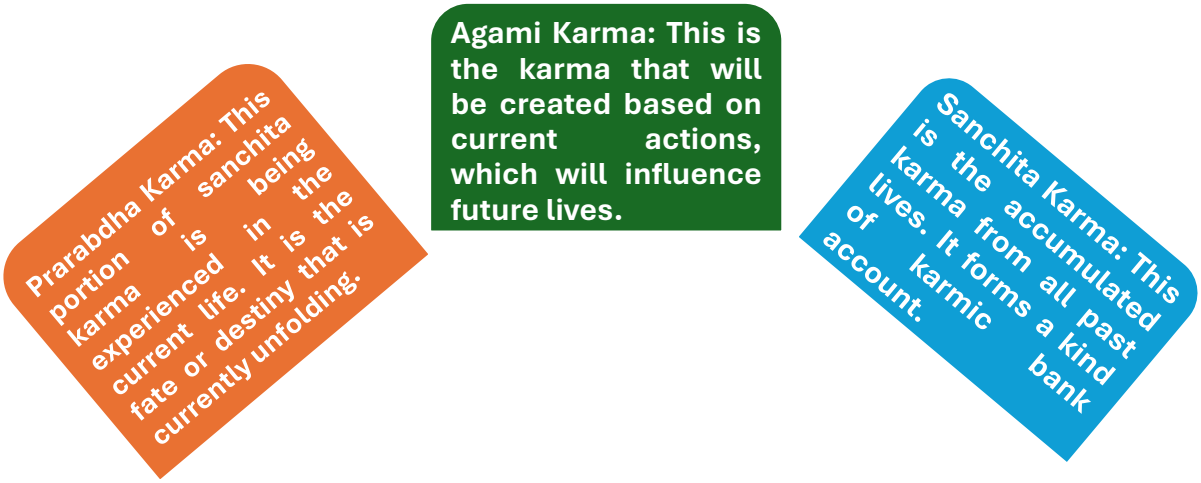


Figure 1: Three types of Karma

The Law of Karma

Karma and the Law of Karma present a profound way of understanding the moral consequences of one's actions. They encourage individuals to live ethically, be mindful of their actions, and strive for spiritual growth. By comprehending and applying these principles, one can navigate life with greater awareness and work towards achieving a state of balance and ultimate liberation.

The Law of Karma is the principle that governs how karma works. It posits that:

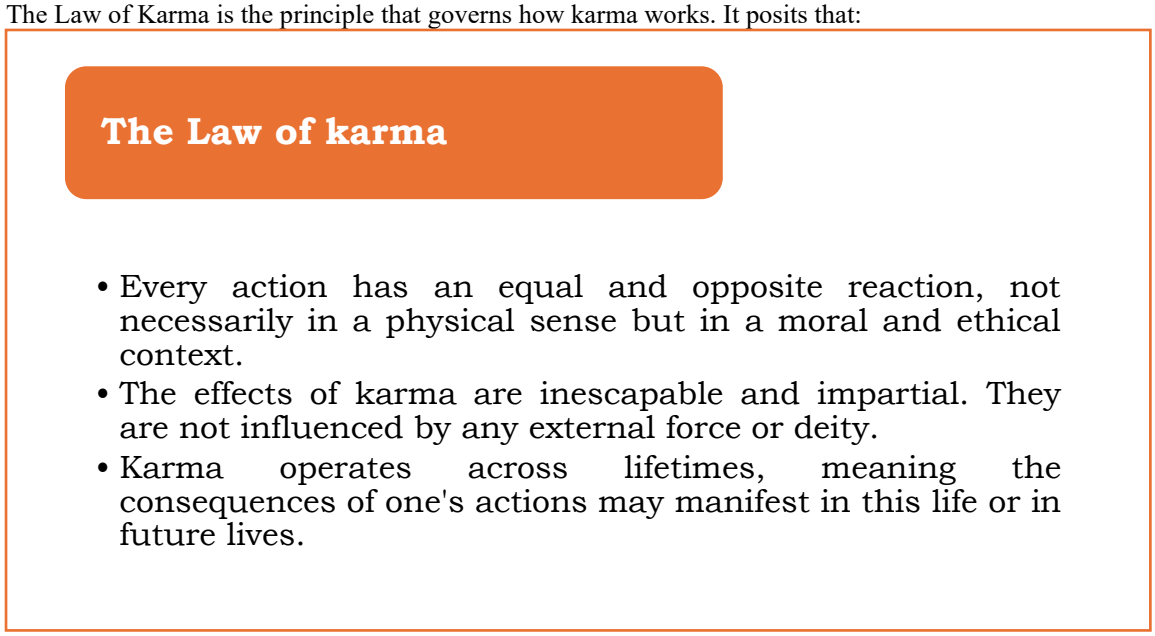


Figure 2: The Law of Karma

Key Principles of the Law of Karma

Moral Cause and Effect:	*The Law of Karma is essentially a moral law of cause and effect. Actions aligned with moral and ethical principles generate positive outcomes, while actions against these principles result in negative consequences.*
Self Determination:	Individuals have the power to shape their own destiny through their actions. While past karma influences present circumstances, current actions (free will) can alter future outcomes.
Continuity of Life:	Karma presupposes the continuity of life through reincarnation. It holds that the soul undergoes a cycle of birth, death, and rebirth (samsara), carrying karmic imprints from one life to the next.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Law of Justice:	The Law of Karma is seen as a cosmic law of justice. It ensures that every action is accounted for and that individuals face the results of their deeds.
Liberation (Moksha or Nirvana):	The ultimate goal in many Eastern philosophies is to attain liberation from the cycle of samsara. This is achieved by purifying one's karma through righteous living, spiritual practices, and attaining self-realization or enlightenment

Figure 3 Key Principles of Karma

Karma in Different Religions

Karma and the Law of Karma are concepts deeply rooted in various Eastern religions and philosophies, including Hinduism, Buddhism, Jainism, and Sikhism. They offer a framework for understanding the moral and ethical dimensions of human actions and their consequences. Let's delve into these concepts in detail.

Hinduism

In Hinduism, karma is deeply integrated into the concepts of dharma (duty/righteousness) and moksha (liberation). The Bhagavad Gita, a key Hindu scripture, discusses karma yoga (the path of selfless action) as a means to attain spiritual liberation. Bhagavad Gita: Krishna advises Arjuna to act according to his dharma (duty) without attachment to the results, emphasizing the importance of pure intention behind actions (karma yoga).

Buddhism

In Buddhism, karma is linked to the cycle of samsara and the attainment of Nirvana. The Buddha taught that right intention, right speech, right action, and other components of the Noble Eightfold Path contribute to good karma, leading to enlightenment and liberation from suffering. Right intention is one of the steps in the Noble Eightfold Path, highlighting the need for intentions free from desire, ill will, and cruelty to achieve right actions and ultimately, enlightenment. The Buddha taught that mental states such as greed, hatred, and delusion lead to unwholesome karma, while states of generosity, love, and wisdom lead to wholesome karma.

Jainism

Jainism emphasizes nonviolence (ahimsa) and truth (Satya) in action, speech, and thought. Jain philosophy sees karma as a subtle matter that binds to the soul, affecting its purity and liberation. The ultimate goal is to shed all karmic particles through strict ethical conduct and ascetic practices. Jain philosophy emphasizes nonviolence in thought, word, and deed. The choice to adhere to ahimsa is a critical factor in generating positive karma and progressing toward liberation.

Sikhism

Sikhism teaches that karma affects the cycle of rebirth and that one should live according to divine will (hukam). Sikhs believe in performing selfless service (seva) and living a truthful life to accumulate good karma and attain union with God.

The Law of Intentions in Karma

The Law of Intentions in Karma emphasizes the significance of the intentions behind actions, rather than the actions themselves. In many Eastern philosophies and spiritual teachings, the intention or motivation that drives an action is considered crucial in determining the karmic consequences. Let's explore this concept in detail:

Importance of Intentions

Intentions are the driving force behind actions. In the context of karma, it is the quality of the intention that influences the karmic outcome. This means that even if an action appears good on the surface, if it is driven by negative intentions, it can generate negative karma, and vice versa.

Ethical and Moral Dimensions

Intentions align closely with moral and ethical considerations. A good intention is typically aligned with virtues such as compassion, kindness, honesty, and selflessness. A negative intention is associated with qualities like greed, hatred, selfishness, and deceit.

Subjective Nature of Karma

Since intentions are internal and subjective, they add a layer of complexity to the law of karma. Two people can perform the same action, but if their intentions differ, the karmic results will also differ. This subjective nature means that karma is deeply personal and individualized.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

How Intentions Influence Karma

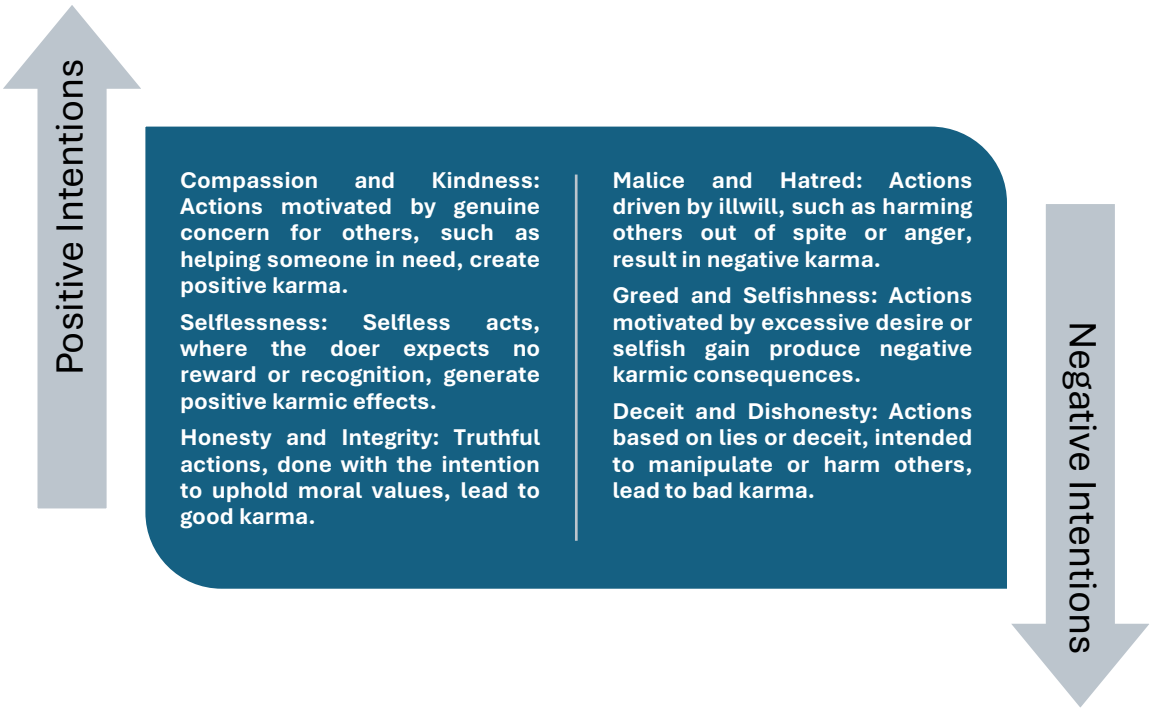


Figure 4 : Positive Vs Negative Intentions

The Above Figure shows how positive intentions and Negative intentions takes an individual life. The Law of Intentions in Karma underscores the profound impact of our internal motivations on our karmic journey. It teaches that the purity of our intentions shapes the quality of our actions and their consequences. By cultivating positive intentions, we can create good karma, foster personal growth, and contribute to the wellbeing of others. This principle encourages a mindful and ethical approach to life, where inner sincerity and moral integrity guide our actions. Following are three pillars that can help to build the positive intentions.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

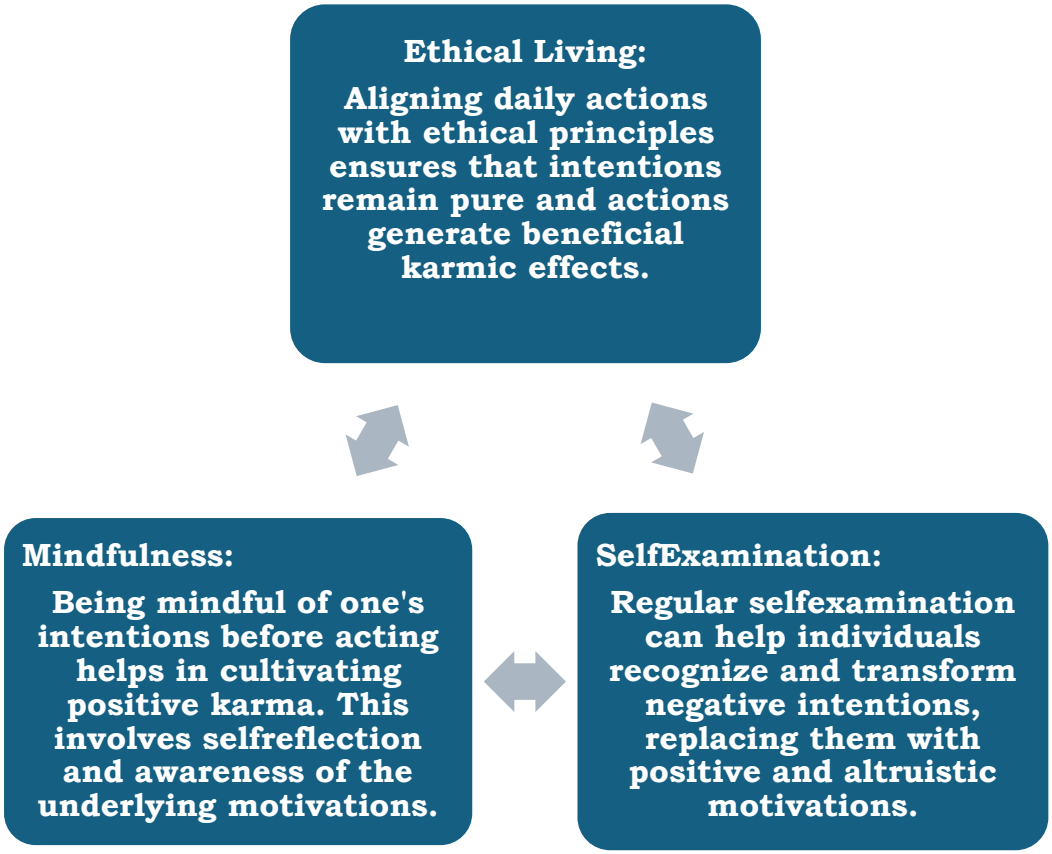


Figure 5: Three Pillars for Positive Intentions

The Law of Choice

The Law of Choice in Karma underscores the role of individual free will in shaping one's destiny. This principle asserts that while karma influences our circumstances, we have the power to make choices that can alter our karmic path. Understanding the interplay between karma and free will is essential for grasping how we can consciously influence our lives. Let's explore this concept in detail.

The Law of Choice in Karma

Free Will and Personal Responsibility

The Law of Choice in Karma posits that individuals have the autonomy to make decisions that impact their karma. This principle emphasizes personal responsibility, suggesting that our choices directly affect the karmic results we experience.

Influence of Past Karma

While past karma (Sanchita karma) creates a framework of predispositions and circumstances (prarabdha karma) in which we operate, it does not entirely dictate our actions. Our present choices (agami karma) can either perpetuate or transform our karmic patterns.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

How Choices Influence Karma- Positive Vs Negative Choices

Positive Choices	Negative Choices
Ethical Actions: Making choices that align with moral and ethical principles creates positive karma. For example, choosing honesty over deceit or kindness over cruelty.	Harmful Actions: Deliberately choosing actions that harm others or oneself results in negative karma. This includes physical harm, emotional manipulation, or unethical behavior.
Selfless Service: Engaging in selfless acts of service (seva) without expecting anything in return can generate beneficial karma.	Selfishness: Decisions driven by selfish desires and greed can create negative karmic repercussions.
Personal Growth: Choosing to engage in practices that promote selfimprovement, such as meditation, education, and mindfulness, contributes to positive karmic outcomes.	Neglect of Duty: Failing to fulfill one's responsibilities or duties, especially when it adversely affects others, generates negative karma.

Figure 6: Positive Vs Negative Choices

The Law of Choice in Karma highlights the dynamic interplay between predetermined karmic influences and the power of free will. It teaches that while our past actions shape our present circumstances, we have the agency to make choices that can alter our future karma. By making ethical, mindful, and intentional decisions, we can create positive karmic outcomes, break free from negative patterns, and steer our lives toward greater fulfilment and spiritual growth. This principle underscores the importance of personal responsibility and the potential for transformation through conscious living. An individual should keep in mind the following while making the choices.

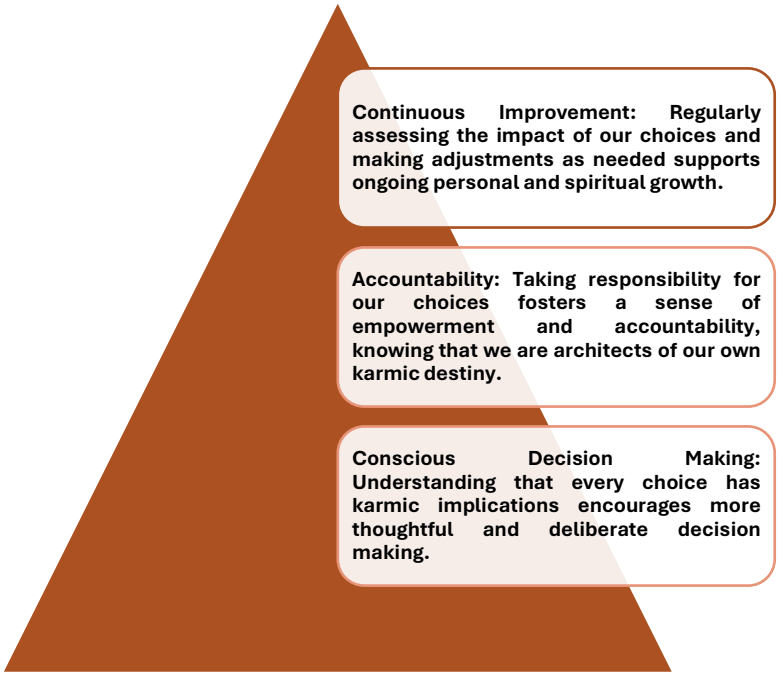


Figure 7: Three Factors for Positive Choices

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The Law of Habits, Unconscious Behaviour, and Inertia in Karma

The Law of Habits, Unconscious Behaviour, and Inertia in Karma explores how habitual actions and ingrained patterns of behaviour impact our karmic outcomes. It emphasizes the influence of unconscious habits on the accumulation of karma and the challenge of overcoming inertia to bring about positive change.

Habits and Karma

Habits are repeated actions that become ingrained in our behaviour over time. They can be either positive or negative, and they significantly influence our karmic footprint. Positive Habits: Actions like daily meditation, practicing kindness, and ethical living create positive karma. Negative Habits: Behaviours such as dishonesty, anger, and laziness accumulate negative karma.

Unconscious Behaviour

Unconscious behaviour refers to actions performed without conscious thought or awareness. These are often automatic responses conditioned by past experiences and habits. Automatic Reactions: Reactions such as responding with anger when provoked or overeating when stressed are examples of unconscious behaviour. Mindlessness: Living without mindfulness leads to actions that are not aligned with ethical principles, often resulting in negative karma.

Inertia

Inertia, in this context, refers to the resistance to change ingrained habits and behaviours. It is the tendency to continue in the same patterns, even when they are harmful. Resistance to Change: Overcoming inertia requires significant effort and awareness, as the mind and body are accustomed to established routines. Comfort Zone: People often stay within their comfort zones, avoiding the discomfort associated with change, thus perpetuating existing karmic patterns.

How Habits, Unconscious Behaviour, and Inertia Influence Karma

Accumulation of Karma

Habitual Actions: Repeated actions, whether positive or negative, accumulate corresponding karma. Positive habits accumulate good karma, while negative habits accrue bad karma.

Unconscious Patterns: Unconscious behaviour often leads to unintended consequences, contributing to negative karma if not aligned with ethical values.

Breaking the Cycle

Cultivating awareness is the first step in breaking negative habits and unconscious behaviours. Mindfulness practices help bring unconscious actions into conscious awareness. Secondly Making deliberate efforts to change harmful habits and replace them with positive ones is crucial for transforming karma. Overcoming inertia requires persistent effort and the willingness to face discomfort. Consistent practice and self-discipline are key to establishing new, positive habits.

The Law of Habits, Unconscious Behaviour, and Inertia in Karma highlights the profound impact of our habitual actions and unconscious behaviours on our karmic journey. It emphasizes the need for awareness, mindfulness, and intentional effort to break negative patterns and establish positive ones. By understanding and applying this principle, we can take control of our karma, make conscious choices that align with our higher values, and overcome inertia to create a more fulfilling and spiritually aligned life. Following are some Practical Strategies for Managing Habits and Unconscious Behaviour

- Mindfulness Practice: Engage in daily mindfulness or meditation practices to increase awareness of habitual and unconscious behaviours. Mindfulness helps in observing thoughts and actions without judgment, making it easier to identify negative patterns.
- Self-Reflection: Regularly reflect on your actions, thoughts, and habits. Journaling can be a useful tool for this purpose. Self-reflection helps in understanding the root causes of negative behaviours and planning for positive changes.
- Setting Intentions: Start each day by setting positive intentions for your actions and interactions. Intentions guide behaviour and help in consciously choosing actions that generate positive karma.
- Incremental Change: Focus on small, incremental changes rather than attempting to overhaul habits all at once. Gradual change is more sustainable and helps in overcoming inertia.
- Accountability: Share your goals and progress with a trusted friend or mentor who can provide support and hold you accountable. Accountability increases motivation and commitment to positive change.

Only after one has properly completed virtuous deeds in life does good fortune or life come. Knowing the difference between good and negative karma is insufficient. It ought to be supported by the habits, choices, and intentions. Learning these three laws doesn't require rocket science; in fact, one can learn them by watching oneself. Managing negative emotions is the best way to make the fortune.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

REFERENCES

1. *Holy Bhagvad Geeta*
2. *https://www.researchgate.net/publication/369186222_KARMA_MANAGEMENT?enrichId=rgreq-637a6f9d288f7bc64e5366f81fe97885-XXX&enrichSource=Y292ZXJQYWdlOzM2OTE4NjIyMjtBUzoxMTQzMTI4MTEyNjM4NzMxNUAxNjc4NzA1ODA1MDc2&el=1_x_2&_esc=publicationCoverPdf*
3. *https://www.researchgate.net/publication/369186222_KARMA_MANAGEMENT?enrichId=rgreq-637a6f9d288f7bc64e5366f81fe97885-XXX&enrichSource=Y292ZXJQYWdlOzM2OTE4NjIyMjtBUzoxMTQzMTI4MTEyNjM4NzMxNUAxNjc4NzA1ODA1MDc2&el=1_x_2&_esc=publicationCoverPdf*
4. *https://www.researchgate.net/publication/369186222_KARMA_MANAGEMENT?enrichId=rgreq-637a6f9d288f7bc64e5366f81fe97885-XXX&enrichSource=Y292ZXJQYWdlOzM2OTE4NjIyMjtBUzoxMTQzMTI4MTEyNjM4NzMxNUAxNjc4NzA1ODA1MDc2&el=1_x_2&_esc=publicationCoverPdf*
5. *https://www.gapinterdisciplinarities.org/res/articles/(69-79)%20KARMA%20MANAGEMENT.pdf*
6. *https://www.gapinterdisciplinarities.org/res/articles/(69-79)%20KARMA%20MANAGEMENT.pdf*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

THE ARCHITECTURAL SPLENDOR OF THE CHALUKYA DYNASTY: A STUDY OF TEMPLE DESIGN AND ART

Shruti S Mamadapur
Lecturer in History, K.L.E Society's Shri Shivayogi Murughendra Swamiji Arts, Science and Commerce College, Athani

ABSTRACT

The Chalukya dynasty, which ruled parts of southern and central India between the 6th and 8th centuries CE, is renowned for its contributions to Indian temple architecture. This study explores the distinctive architectural style of the Chalukya temples, characterized by the Vesara style, which harmoniously blends elements of the Dravidian (South Indian) and Nagara (North Indian) architectural traditions. Through an interdisciplinary approach that includes literature review, field study, iconographic and architectural analysis, and historical context, this research provides a comprehensive understanding of the Chalukya architectural legacy.

Key temple sites such as Badami, Aihole, Pattadakal, and Mahakuta are examined to illustrate the unique features and evolution of Chalukya temple architecture. These temples showcase intricate carvings, detailed sculptures, and innovative structural designs that reflect both religious and cultural influences. The study also delves into the iconography and symbolism depicted in temple sculptures, offering insights into the religious and cultural milieu of the period.

By analyzing inscriptions and historical texts, this research highlights the role of royal patronage and the religious affiliations of the Chalukya rulers, who supported the construction of temples dedicated to various deities, including Vishnu, Shiva, and Jain Tirthankaras. The findings underscore the Chalukya dynasty's significant influence on subsequent architectural developments in South India, particularly during the Rashtrakuta and Hoysala periods.

Overall, this study provides a nuanced understanding of Chalukya temple architecture, emphasizing its artistic, cultural, and historical significance within the broader context of Indian architectural heritage.

INTRODUCTION

The Chalukya dynasty, which flourished between the 6th and 8th centuries CE in the Deccan region of India, left an indelible mark on the subcontinent's architectural heritage. Renowned for their distinctive temple architecture, the Chalukyas developed a unique style known as the Vesara, which masterfully integrates elements of both Dravidian (South Indian) and Nagara (North Indian) architectural traditions. This synthesis resulted in some of the most exquisite and innovative temple designs in Indian history.

The Chalukya period saw the construction of numerous temples in key locations such as Badami, Aihole, Pattadakal, and Mahakuta. These temples are celebrated for their intricate carvings, detailed sculptures, and pioneering structural designs. The artistic excellence of Chalukya architecture is evident in the rock-cut caves and structural temples that feature a rich array of iconography, including depictions of various deities and mythological

The Chalukyan temples not only served as religious centers but also as expressions of political power and cultural identity. Patronized by the Chalukya kings, these temples reflected the dynasty's support for various religious traditions, including Hinduism, Jainism, and Buddhism. This patronage is documented in numerous inscriptions and historical texts, which provide valuable insights into the religious and cultural dynamics.

The Vesara style, characterized by its combination of northern and southern architectural elements, represents a significant evolution in Indian temple architecture. This style influenced subsequent architectural developments in South India, particularly during the reigns of the Rashtrakutas and Hoysalas. The temples at Pattadakal, a UNESCO World Heritage site, exemplify the zenith of Chalukya architectural achievement and offer a vivid illustration of the fusion of diverse architectural styles.

This study aims to explore the architectural, artistic, and cultural significance of Chalukya temple architecture. By employing a comprehensive research methodology that includes literature review, field study, iconographic and architectural analysis, and historical

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

context, this research seeks to provide a nuanced understanding of the Chalukya architectural legacy and its enduring impact on Indian temple architecture.

DISCUSSION

he Chalukya dynasty, which ruled large parts of southern and central India between the 6th and 12th centuries, left an indelible mark on Indian architecture and art. Their reign is divided into two distinct periods: the Early Chalukyas (Badami Chalukyas) and the Later Chalukyas (Western Chalukyas). The Early Chalukyas, ruling from Badami, Aihole, and Pattadakal, initiated a new era in temple architecture that balanced northern and southern Indian styles. The architectural and artistic innovations of the Chalukya dynasty had a profound impact on subsequent Indian temple architecture. Their integration of Dravidian and Nagara elements influenced the architectural styles of the Rashtrakutas, Hoysalas, and later South Indian dynasties. The emphasis on elaborate carvings and sculptural details set a standard for artistic excellence that continued to inspire Indian artisans for centuries.

The preservation of Chalukya temples and their recognition as heritage sites highlight their enduring legacy. Efforts by the Archaeological Survey of India (ASI) and UNESCO to conserve these monuments ensure that the architectural splendor of the Chalukyas remains a source of inspiration and study for future generations.

The Chalukya dynasty's contribution to temple architecture is a testament to their innovative spirit and artistic excellence. The Vesara style, which emerged during their reign, represents a sophisticated synthesis of Dravidian (South Indian) and Nagara (North Indian) architectural elements. This discussion explores the key features of Chalukya architecture, the cultural and religious significance of their temples, and their lasting impact on subsequent South Indian architectural traditions.

Key Features of Chalukya Architecture

Chalukya architecture is distinguished by its intricate carvings, elaborate sculptures, and innovative structural designs. Notable examples include the rock-cut caves at Badami and the structural temples at Aihole and Pattadakal. The Badami caves, carved into sandstone cliffs, are renowned for their detailed iconography depicting deities such as Vishnu, Shiva, and Jain Tirthankaras. These caves exemplify the Chalukyas' mastery of rock-cut architecture, showcasing both artistic excellence and technical skill

The structural temples at Aihole and Pattadakal further highlight the Chalukyas' architectural ingenuity. The Durga Temple in Aihole, with its apsidal plan and elaborate reliefs, is a prime example of their innovative approach to temple design. Pattadakal, a UNESCO World Heritage site, features an array of temples that illustrate the fusion of Dravidian and Nagara styles. The Virupaksha and Mallikarjuna temples at Pattadakal, commissioned by Queen Lokamahadevi, are particularly significant for their grand scale and detailed #### Cultural and Religious Significance

The Chalukya temples were not merely religious structures but also symbols of political power and cultural identity. The Chalukya rulers were known for their patronage of various religious traditions, including Hinduism, Jainism, and Buddhism. This is reflected in the diverse iconography and inscriptions found in their temples, which provide valuable insights into the religious and cultural milieu.

The Chalukya temples served as centers of worship and community activities, reinforcing the dynasty's influence and promoting religious and cultural cohesion. The inscriptions in these temples often highlight the involvement of royalty and local elites in their construction, underscoring the temples' role in legitimizing political authority and fostering social harmony.

Enduring Influence on South Indian Architecture

The architectural innovations introduced by the Chalukyas had a profound impact on subsequent South Indian temple architecture. The Vesara style influenced the architectural practices of later dynasties such as the Rashtrakutas and the Hoysalas. The emphasis on detailed carvings, intricate sculptures, and harmonious structural designs continued to shape South Indian temple architecture for centuries
For instance, the Rashtrakutas adopted and expanded upon the Chalukya architectural style, evident in their rock-cut temples at Ellora. Similarly, the Hoysala dynasty, known for their highly ornate temples, drew inspiration from Chalukya designs, as seen in the temples of Belur and Halebidu. The Chalukya legacy is thus a cornerstone of South Indian architectural heritage, bridging the styles of earlier and later periods.

Comparative Analysis

The architectural styles of the Chalukya dynasty exhibit a rich confluence of regional influences, blending the Nagara (North Indian) and Dravidian (South Indian) styles into the unique Vesara style. To appreciate the distinctiveness and influence of Chalukya architecture, it is essential to compare it with other contemporary and subsequent architectural traditions in India.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Chalukya vs. Pallava Architecture
The Pallava dynasty, contemporary to the Chalukyas, also made significant contributions to South Indian temple architecture. Pallava temples, such as the rock-cut temples at Mahabalipuram and the structural temples at Kanchipuram, are renowned for their Dravidian style. Pallava architecture primarily features pyramid-shaped towers (vimanas) and intricate carvings of mythological scenes.

Comparative Aspects
- *Material and Technique*: Both dynasties utilized rock-cut and structural forms, but the Chalukyas often incorporated a more diverse range of deities and motifs, reflecting their patronage of multiple religious traditions.
- Design and Ornamentation: Pallava temples typically have more pronounced Dravidian features, such as tiered vimanas, while Chalukya temples exhibit a blend of Nagara spires and Dravidian vimanas. Chalukya temples also feature intricate bas-reliefs and ornate pillars that combine elements from both styles

Chalukya vs. Rashtrakuta Architecture
The Rashtrakutas, who succeeded the Chalukyas, further developed the rock-cut architectural tradition, most notably at the Ellora Caves. The Kailasa temple at Ellora, carved from a single rock, is a monumental example of Rashtrakuta innovation and craftsmanship.
Comparative Aspects:
- *Structural Complexity*: While Chalukya temples like those in Badami and Aihole are noted for their integration of various stylistic elements, the Rashtrakutas pushed the boundaries of rock-cut architecture with their massive, monolithic structures.
- *Artistic Flourishes*: Chalukya temples often feature detailed narrative panels and deities, whereas Rashtrakuta temples emphasize grand, sculptural forms and extensive use of three-dimensional space

Chalukya vs. Hoysala Architecture
The Hoysala dynasty, which followed the Chalukyas, is known for its highly ornate and detailed temple architecture. Hoysala temples, such as those at Belur and Halebidu, are characterized by their star-shaped platforms, intricate carvings, and soapstone construction.

***Comparative Aspects*:**
- *Ornamentation*: Hoysala temples take the detailed ornamentation seen in Chalukya temples to an extreme, with every surface covered in intricate carvings. This represents a clear evolution from the decorative styles initiated by the Chalukyas.
- *Structural Innovations*: Both dynasties emphasized unique ground plans and elaborate sculptures, but the Hoysalas developed a distinctive style with their use of soapstone, which allowed for more detailed and refined carvings)

Chalukya Influence on Later Dynasties
The Vesara style pioneered by the Chalukyas had a profound influence on subsequent South Indian temple architecture. This synthesis of Nagara and Dravidian elements became a foundational style for later dynasties such as the Rashtrakutas and Hoysalas, who expanded and refined these architectural innovations.

Key Influences
The architectural and artistic achievements of the Chalukya dynasty were shaped by a variety of influences, ranging from earlier South Indian traditions to contemporary cultural and political interactions. Here are the key influences that contributed to the development of Chalukya temple design and art:

1. Pre-Chalukya Traditions

Early South Indian Architectural Styles

- The Chalukyas were influenced by the existing architectural traditions in South India, particularly those of the Satavahanas and the early Pallavas.
- The rock-cut cave temples of the Satavahanas provided a foundation for the Chalukya's own rock-cut architecture, evident in the cave temples at Badami.

2. Northern Indian Styles

Gupta Architecture:

- The Gupta dynasty's architectural and artistic styles had a significant impact on the Chalukyas. This is evident in the Nagara-style (north Indian) elements seen in Chalukya temples.
- The emphasis on shikharas (temple spires) and intricate stone carvings in Gupta temples influenced the Chalukya approach to temple design.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3. Religious and Philosophical Movements

Hinduism

- The resurgence of Hinduism during the Chalukya period played a crucial role in temple construction. Temples were dedicated to major deities like Shiva, Vishnu, and their various avatars.
- Religious texts and iconography guided the themes and motifs depicted in the temple sculptures and reliefs.

Jainism and Buddhism

- The Chalukyas also constructed temples and cave shrines dedicated to Jain and Buddhist deities, reflecting the religious diversity of their realm.
- Jain and Buddhist influences are visible in the simplicity and spiritual focus of some temple designs, as well as in certain sculptural styles.

4. Regional Interactions

Cultural Exchanges with the Pallavas

- The Chalukyas had extensive interactions with the Pallavas of Kanchipuram, leading to a cross-pollination of architectural and artistic ideas.
- The Pallavas' advancements in structural temples influenced Chalukya architecture, particularly in the use of stone and the evolution of structural temple forms.

Inter-Dynastic Rivalries and Alliances

- The Chalukyas' political engagements with neighboring dynasties such as the Rashtrakutas and the Kadambas also impacted their architectural style.
- Competitive temple building was a way for these dynasties to demonstrate their power and cultural superiority, leading to continuous innovation and refinement in temple design.

5. Technological and Artistic Innovations

Advancements in Stone Carving

- Improved stone-carving techniques allowed for more intricate and elaborate sculptures and relief work in Chalukya temples.
- The use of sandstone and other locally available materials influenced the texture and finish of temple sculptures.

Architectural Techniques

- The development of advanced architectural techniques, including the use of corbelling and the creation of large, pillared halls (mandapas), allowed for more complex and spacious temple designs.
- Innovations in structural engineering facilitated the construction of towering vimanas and ornate shikharas.

6. Socio-Economic Factors

Patronage by Royalty and Nobility

- Royal patronage played a vital role in the construction and embellishment of temples. Kings and queens commissioned temples to commemorate victories, demonstrate piety, and legitimize their rule.
- Wealthy merchants and local nobility also funded temple construction, leading to a proliferation of temples across the Chalukya territory.

Trade and Commerce

- The prosperity from trade and commerce during the Chalukya period provided the necessary resources for large-scale temple construction.
- Interaction with traders and artisans from different regions introduced new artistic styles and techniques into Chalukya art and architecture.

The architectural splendor of the Chalukya dynasty was the result of a confluence of various influences, ranging from earlier South Indian traditions and Northern Indian styles to religious movements and regional interactions. These influences, combined with technological innovations and socio-economic factors, enabled the Chalukyas to create some of the most remarkable temples in Indian history. Understanding these key influences provides a comprehensive insight into the factors that shaped the distinctive architectural and artistic legacy of the Chalukya dynasty.

CONCLUSION

The Chalukya dynasty's architectural contributions, spanning from the 6th to 8th centuries CE, represent a significant epoch in the history of Indian temple architecture. The Vesara style, a harmonious blend of Dravidian and Nagara architectural elements, stands as a

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

testament to the Chalukyas' innovative spirit and artistic prowess. This study has highlighted the distinctive features, cultural and religious significance, and enduring influence of Chalukya architecture.

The key temple sites of Badami, Aihole, Pattadakal, and Mahakuta showcase the Chalukyas' mastery in both rock-cut and structural temple architecture. These temples are characterized by their intricate carvings, detailed iconography, and innovative structural designs, reflecting a synthesis of regional styles and a deep engagement with the religious and cultural milieu of their time

The comparative analysis with Pallava, Rashtrakuta, and Hoysala architectures underscores the Chalukyas' pivotal role in the evolution of South Indian temple architecture. While the Pallavas focused on the Dravidian style, and the Rashtrakutas and Hoysalas expanded on the intricacy and scale of temple design, the Chalukyas laid the foundational principles that influenced these later developments. Their emphasis on detailed ornamentation and structural innovation set a precedent for the elaborate and highly decorated temples that followed.

The Chalukya legacy is particularly evident in the temples at Pattadakal, a UNESCO World Heritage site, which illustrate the peak of their architectural achievement and the successful integration of different stylistic elements. The Vesara style pioneered by the Chalukyas not only bridged the architectural traditions of North and South India but also provided a template for subsequent dynasties to build upon.

In conclusion, the Chalukya dynasty's architectural innovations have left an enduring mark on Indian temple architecture. Their temples, with their rich iconography and innovative designs, continue to be celebrated for their artistic and cultural significance. The Chalukyas' contribution to the architectural heritage of India is a lasting legacy that continues to inspire and inform the study of Indian art and architecture

REFERENCES

1. *Abhishankar, K (1972). Bellary District Gazetteer. Karnataka Government. Bangalore.*
2. *Konow, Sten (1982). Epigraphia Indica vol XII. Archaeological Survey of India. New Delhi.*
3. *Rea, Alexander (1896). Chalukyan Architecture. Archaeological Survey of India. New Delhi.*
4. *Patil, Channabasappa S (1992). Temples of Raichur and Bellary Districts. Directorate of Archaeology and Museums. Mysore.*
5. *Patil, Channabasappa S (1997). Inscriptions of Bellary District. Directorate of Archaeology and Museums. Mysore.*
6. *Sewell, Robert (1882). List of Antiquarian Remains in the Presidency of Madras. Archaeological Survey of India. New Delhi.*
7. *"Kallesvara Temple". Archaeological Survey of India, Bengaluru Circle. ASI Bengaluru Circle. Retrieved 15 July 2012.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

A COMPREHENSIVE LITERATURE REVIEW ON KUSTHA W.S.R TO PAMA KUSTHA IN AYURVEDA

Dr. Swetasmita Sahu[1] Dr. Manoj Kumar Sahoo[2] Dr. Saumyaleena Baral[3]
[1]M.D. Scholar, P.G. Department of Ayurveda Samhita & Siddhanta, GAC & H, Balangir, Odisha
[2]Principal & H.O.D., P.G. Department of Ayurveda Samhita & Siddhanta, GAC & H, Balangir, Odisha
[3]Lecturer, P.G. Department of Ayurveda Samhita & Siddhanta, GAC & H, Balangir, Odisha

Corresponding Author:- *Dr. Swetasmita Sahu M.D. Scholar, P.G. Department of Ayurveda Samhita & Siddhanta, GAC & H, Balangir, Odisha*

ABSTRACT

The Ancient Vedic civilization gave rise to the living science known as Ayurveda. Achieving Chatur-Varga is the ultimate goal of life, and it requires good health to do so. A thorough analysis of all skin conditions has been done on Samhita Kala, with a special chapter devoted to Kustha. Among these, Pama is one kind of Kshudra Kustha has a Pitta-Kapha predominance, which may be considered scabies in contemporary science. It is an acute communicable disease caused by Sarcoptes scabiei. It is characterized by extreme itchy eruptions of white, reddish, or black colour. It has been discovered that "Pama" Vyadhi is among the most prevalent illnesses, particularly among those from lower socioeconomic classes, who are more likely to not routinely take baths and to disregard basic hygiene rules. In Ayurvedic literature, the signs, symptoms, pathogenesis, and treatment of Pama are comprehensively explained.

KEYWORDS-*Ayurveda, Kustha, Pama, Kshudra Kustha, Scabies*

INTRODUCTION

Our skin is the outside layer of our body that conveys the inside balance. According to Ayurveda, it is one of the five *"Jnanendriyas"* that regulates touch perception. Additionally, it carries out tasks including thermoregulation and protecting the body against chemical, mechanical, biological, and physical harm. Furthermore, it has a significant impact on how beauty is expressed and leaves an impression.

India is the 2nd largest populated country in the world and area wise it is in 7th position. Being a developing country most of the population is living in lower socio-economic class more over 90% of population live in rural area. Most of the people are not concerned about their health and personal hygiene which leads to many systemic diseases like skin disease, TB, cholera etc.

In *Ayurveda*, skin diseases are explained under the common terminology *'Kustha'* which implies exposed diseases. Cause of *Kustha* is due to the vitiation of *Tridosha* and *Dhatus*, so it quoted as "*Saptokodravya- Sangraha"* by *Acharya Charak*. There are 18 types of *Kustha* described in Samhitas which is divided in to 7 *Maha Kustha* and 11 types of *Kshudra Kustha*. Out of the 11 *Kshudra kusthas* Pama is one of them.

Pama which is caused by the vitiation of *Kapha Pitta dosha* and is characterized by extreme itchy, eruption of white, reddish or black color & Seen over *Sphik* (Buttocks), *Pani-pada* (Hand & Foot), *Kurpara* (Fore arm or elbow region).The disease *Pama Kustha* may be considered as scabies in contemporary science. It is an acute communicable *(Aupasargika)* disease.

Sarcoptes scabiei, a small mite, is the common cause of scabies. Small itchy eruptions are caused by the mites burrowing into the top layer of human skin to lay their eggs. The mites burrow into the top layer of human skin to lay their eggs, causing small itchy bumps. The symptoms of scabies occur 2-6 weeks after the infection, since it takes some more time before the mite can penetrate the skin & reproduce. Although it is a long-recognized disorder of skin but it is a common problem in India.

The Majority of Ayurvedic classics classify all forms of *Kustha* as *Rakta Doshaja Vikara*. Among those *Kapha Pitta Pradhana Twak Vikara* is *Pama Kustha*.

OBJECTIVE

To study details about *Pama Kustha* as per classical Ayurvedic literature.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

MATERIAL METHODS

The following *Ayurvedic Samhitas* about *Kustha* and *Pama Kustha* were the source of all the material on this subject: - The commentaries on *Charaka Samhita, Sushruta Samhita, Astanga Samgraha, Astanga Hridaya, Kasyapa Samhita, Madhava Nidana, Sarangadhara, Bhavprakash, Bhela Samhita and Yogaratnakara,* as well as other relevant websites, were vividly studied.

LITERATURE REVIEW OF PAMA

As a *Kshudra Kustha* with *Pitta-Kapha dominance, Pama* is defined by intensely irritating eruptions that might be white, reddish-brown, or black in appearance. If the illness is ignored, the *Twacha, Mamsa, Rakta,* and *Lasika* will decompose, begin to dissolve, cause problems, and eventually spread throughout the body. No separate *Nidanas, Poorvaroopa* and *Samprati,* have been enlisted for *Pama Kustha* or any other form of *Kustha*. It is necessary to consider *Kustha*'s *Samanya Nidana* as *Hetu* for *Pama* as well.

DEFINATION OF PAMA

Pama is said to be of two genders: *Streelinga* and *Napumsakalinga*. The *Napumsaka Linga Pa + Manin* and the *Streelinga Paman + Manah*. Both denote cutaneous eruptions, corresponding to *Vicharchika* and *Kacchu*. In Amarakosha, *Kacchu* and *Vicharchika* are listed as synonyms for *Pama*.

NIRUKTI

Pama word has its derivation from three roots. They are

1. *Pai-* " *Shoshan Dhatu* " meaning that which dries the *Dhatu*.
2. *Paa* " *Rakshane Payathe Deha Asmath* " which means that taking shelter in the body and moisten the body.
3. *Pibati Deham Va-* " meaning that *Pama* drinks the body " The dictionary meaning of the word *Pama (Pamath)* is a kind of skin disease, cutaneous eruption, herpes, scab (a type of mild leprosy).

NIDANA PANCHAKA OF PAMA

Vata, Pitta, and Kapha are the three humours that control both the body's good and unhealthy states. They preserve health when they are in an equilibrium state; when they are not, they lead to disease. These distorted or unbalanced *Doshas*, along with the *Dhatus* and *Malas*, can combine to cause a particular *Nija* type of illness. However, *Doshas* involvement in *Aagantuja* type diseases is not directly observed. *Sushruta* provides a clear explanation of the disease's manifestation process in six steps, referred to as *"Shat Kriyakala."* The same procedure is outlined in *Madhava Nidana* using "*Nidana Panchak*" as the basis of it.

NIDANA OF PAMA

The causing factors, *Nidana* or *Hetu*, are essential for the disease's development. *Nidanas* for *Pama* or any other type of *Kustha* have not been enlisted separately in classics. It is also possible to interpret the *Samanya Nidan* of *Kustha* as *Hetu* for *Pama*[8].
These *Nidanas* can be categorized into,
I. *Aharaja Nidana*–Diet and dietetic pattern
II. *Viharaja Nidana*- Faulty lifestyle

I. *Aharaja Nidana*

Aharaja nidanas include the following:

1. Viruddha Ahara
2. Mithya Ahara

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

1. Viruddha Ahara

Table No.1. Viruddha Ahara mentioned in different Ayurvedic Texts:

S.No.	Viruddha Ahara	C.S	S. S	A. S	B. S
1.	Intake of *Chilchima* fish and milk.	+	+	+	+
2.	Intake of food mostly containing *Hayanaka, Yavaka, Chanaka, Uddalaka & Koradusa along with Ksheera, Dadhi. Takra, Kola, Kulatha, Masha, Atasi, Kusumbha & Sneha.*	+	-	-	-
3.	Intake of *Mulaka* & *Lashuna* with *Ksheera*.	+	-	-	-
4.	Continuous intake of *Gramya, Audaka* & *Anupa Mamsa* with *Ksheera.*	-	+	-	+
5.	Use of *Pippali, Kakamachi, Lakucha* with *Dadhi & Sarpisha.*	-	-	-	+
6.	Use of Meat of Dear with *Guda*.	-	-	-	+
7.	Use of *Mulaka* with *Guda*.	-	-	-	+
8.	Excessive use of alcohol & milk.	-	-	-	+
9.	Intake of articles having sour taste with milk.	-	-	-	+
10.	Excessive use of green vegetables with milk.	-	-	-	+
11.	Intake of honey & meat.	-	-	-	+
12.	Use of fish, citrus & milk together.	-	-	-	+

2. Mithya Ahara

Table No. 2. Mithya Ahara mentioned in different Ayurvedic Texts: -

S.No	Mithya Ahara	C.S	S. S	A. S	B.S
1.	Excessive use of *Navanna, Dadhi, Matsya, amla* & *Lavana*.	+	-	+	-
2.	Excessive use of *Tila, Ksheera* & *Guda*.	+	-	+	-
3.	Drava, Snigdha, Guru Aharanam Atyartha Sevanam.	+	-	+	-
4.	Excessive oleation.	+	-	-	-
5.	Continuous & excessive use of *Madhu* and *Phanita*.	+	-	-	-
6.	Intake of food that would cause burning sensation.	+	-	-	-
7.	Intake of food during indigestion.	+	+	-	+
8.	*Adhyasana.*	+	+	-	+
9.	*Asatmya Ahara.*	-	+	-	+
10.	Intake of polluted water.	-	-	-	+

I. *Viharaja Nidan*

Acharya *Gayadas* has divided the *Mithya Viharaja Nidanas* into 3 categories
a) *Kayika* (improper physical activities)
b) *Vachika* (improper verbal activities)
c) *Manasika* (improper mental activities)

a. *Kayika* (Improper physical activities)

- Suppression of natural urges.
- Excessive sun exposure.
- Exposure to air conditioned.
- Work place contradicting with hot and humid environment.
- Over exertion and over exercises.
- Day sleep and late-night sleep.
- Complications of *Panchakarma* therapy.

b. *Vachika* (Improper verbal activities)

- Behavioral misconduct or verbal sinful activities like abusing teachers, deities etc.
- Verbal antisocial activities.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

These factors bring about psychogenic stress which is of prime importance in the pathogenesis of *Kustha* (skin diseases). *Chinta, Bhaya, Shoka* are *Vata Prakopaka Nidana* and also causes Dushti of *Swedavaha Srotas*, *Chinta* causes *Dushti* of *Raktavaha Srotas*.

c. *Manasika* (Improper mental activities)

The diseases, in which no clinical result obtained even after the best treatment were considered as *Papakarmaja Vyadhi* (disease due to sinful activities). Both *Charaka and Sushruta Acharya* have described *Kustha* as a most chronic disorder and all *Acharyas* including *Bahavaprakash* and *Madhavakara* also have included it due to *Papa-Karma*.

PURVARUPA OF PAMA

Understanding *Purvarupa* is crucial for making differential diagnoses, determining the disease's diagnosis, and choosing a course of treatment. Since each variant of *Kustha* does not have a distinct *Purvarupa* specified, *Pama* must be taken as the *Samanya Purvarupa* of *Kustha*, as indicated in the table no.3

Table No.3. Purvarupa of Kustha in different Ayurvedic Texts: -

S.No.	Purvarupa	C.S	S.S	A.H	B.S	M.NI	B.P.N
1.	*Atiswedanam*	+	+	+	+	+	+
2.	*Lomaharsha*	+	+	+	+	+	+
3.	*Aswedanam*	+	+	+	+	+	+
4.	*Vaivamnyam*	+	-	+	+	+	+
5.	*Suptata*	+	+	+	+	+	+
6.	*Atishlakshnatva*	+	-	+	-	+	+
7.	*Kandu*	+	+	+	-	+	+
8.	*Kharatvam*	+	-	+	-	+	+
9.	*Paridaha*	+	-	+	+	+	+
10.	*Unnata Kotha*	+	-	+	-	+	+
11.	*Nistoda*	+	-	+	-	+	+
12.	*Nimitte alpe ati Kopanam*	+	-	+	-	+	+
13.	*Gauravam*	+	-	-	+	-	-
14.	*Ushmayanam*	+	-	-	+	-	-
15.	*Shrama*	+	-	+	-	-	-
16.	*Klama*	+	-	-	+	-	-
17.	*Parushyam*	+	+	-	-	-	-
18.	*Davathu*	-	-	-	+	-	-
19.	*Swalpanam Api Vrananam Arohanam*	+	-	-	-	-	-
20.	*Pakva Dagdha Dasta - Bhagna Kshata upaskhalistsu Atimatram Vedana*	+	-	-	-	-	-
21.	*Bahya Chidresu Upadeha*	+	-	-	-	-	-
22.	*Shwayathu*	+	-	-	-	-	-
23.	*Visarpagam Abhiksnatam*	+	-	-	-	-	-
24.	*Pariharsa*	-	-	-	-	-	-
25.	*Swalpanam api Vrananam Dusi*	+	-	-	-	-	-

SAMPRAPTI OF PAMA

The common *Samprapti* of *Kustha* has been mentioned by all *Acharyas*, and they have not divided it into smaller subgroups. Therefore, the common *Samprapti* of *Kustha* likewise applies to *Pama*.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Diagrammatic Representation of Samprapti of Pama

Nidana Sevana
(Viruddha-Ahara Viharadi)
↓
Tridosha Prakopa
↓
Dosha Sanchaya in Amashaya, Pakwashaya
↓
Doshas moves in Tiryakagata Siras
↓
Strotodushti (Sanga)
↓
Doshas accumulate in Twacha
↓
Twacha, Rakta, Mamsa and Ambu or Lasika vitiation
↓
Dhatu Shithilata due to increased Kleda by Pitta and Kapha
↓
Accumulate in the Twacha
↓
Pidika
↓
Kandu
↓
Raga
↓
Daha
↓
Toda
↓
Srawa
↓
Pama

The manifestation of the pathology follows this entire phenomenon, *Kustha(Pama)* spreads between individuals due to:-

1. *Prasangat* (Sexual intercourse)
2. *Gatrasansparsat* (Physical contact)
3. *Nishavsat* (Droplet infection)
4. *Sahabojhnat* (Combining food and beverage consumption)
5. *Shasayyaasnat* (Lying down or sitting on the patient's chair or bed)

SAMPRAPTI GHATAKA

Dosha	*Pitta, Kapha*
Dushya	*Twak, Rakta, Mamsa, Ambu*
Srotasa	*Rasavaha Raktavaha, Swedavaha*
Srotodushti	*Sanga*
Agni	*Jatharagni and Dhatwagnimandya*
Udbhava Sthana	*Amashaya and Pakwashaya*
Vyakta Sthana	*Twacha*
Adhishsthana	*Twak,Mamsa*
Rogamarga	*Bahya*
Swabhava	*Chirakari*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

RUPA(LAKSHANA)

Nearly all of the authors mention the *Lakshanas*, including *Srava*, *Kandu*, *Daha*, *Bahu Pidaka*, and *Ruja*. *Bhava Mishra, Vanga Sena,* and *Yogendratnkar* provided more descriptions of the amount of *Srava,* the intensity of *Kandu*, and the *Ruja*.

The color of *Pidaka* was only referenced by *Acharya Vagbhata* and *Charaka*, that *Shyava, Aruna,* or *Shweta.*

Table No. 4 Rupa of Pama described in various Ayurvedic Texts

S.N	LAKSHANAS	C.S	S.S	A.S	AH	Sh.S	B.P	K.S	BaR	YR	HS	MN
1.	***Srava***	-	+	-	-	+	+	+	-	+	+	+
2.	***Kandu***	+	+	+	+	+	+	+	+	+	+	+
3.	***Daha***	-	+	+	+	-	+	-	+	+	+	+
4.	***Ruja***	-	-	+	+	-	-	+	-	-	-	-
5.	***Bahu Pidika***	+	+	+	+	+	+	-	+	+	+	+
6.	***Sookshna Anu Pidika***	-	+	+	+	-	+	+	+	+	+	+
7.	***Shweta Pidika***	+	-	-	-	-	-	-	-	-	-	-
8.	***Shyava Pidika***	+	-	-	-	-	-	-	-	-	-	-
9.	***Aruna Pidika***	+	-	+	+	-	-	-	-	-	-	-
10.	***Paka***	-	-	-	-	-	-	+	-	-	-	-
11.	***Kleda***	-	-	+	+	-	-	-	-	-	-	-
12.	***Sphik, Pani Kurpara***	-	-	+	+	-	-	-	-	-	-	-

BHEDA OF PAMA KUSTHA

Under the eleven-fold category of *Kshudra Kustha*, *Pama* is the *Vyadhi*. However, some authors, such as *Acharya Sushruta* and *Basavarajeeyam*, have different opinions.

Under *Kshudra Rogas* and *Kshudra Kustha, Acharya Sushruta* has acknowledged *Pama*. In response to *Sushruta's interpretation* of *Pama* as *Kshudra Roga.*

Gayadasa stated that while *Pama* is *Kshudra Roga*, it should only be interpreted as *Kshudra Kustha*.

Pama is regarded by *Basavarajiyam* as one of the eight *Maha Kusthas*.

According to *Acharya Vagbhata*, four *Shleshmas* and *Pitta Doshas* are included in the *Kustha* group, which includes *Pama*.

According to *Acharya Charaka*, *Bhavamishra*, *Shodhala*, *Kashyapa*, and the authors of *Yogaratnakara*, *Pama* is one of the eleven *Kshudra Kusthas*.

Only *Gangadhara*, the commentator of *Charaka Samhit*a has mentioned two varieties of *Pama*

1) *Kapha Pittaja (Alpa Srava)*
2) *Pittaja (Bahu Srava)*

***UPADRAVAS* (COMPLICATIONS)OF *PAMA KUSTHA*:-**

The classics do not specify any specific Upadravas for *Pama*. Thus, the *Upadravas* of *Pama* can be regarded as the *Upadravas of Kustha*. According to *Acharya*, if the *Sadhya Kustha* is left untreated, the *Twacha, Mamsa, Rakta*, and *Lasika* will decompose and begin to disintegrate; if *Atisweda* is present, the *Swedaja Krimi* will cause an infection on the skin. All of this leads to greater vitiation of the *Doshas*, which in turn produces more *Dushti of Twach*a, Mamsa, *Rakta, Lasika*, and so on, resulting in the subsequent *Upadravas*.

Vataja Upadravas:	*Toda, Vepathu, Harsha, Sankocha, Shrama, Stambha, Supti, Bheda, and Bhanga; Shyava, Aruna, Parushata, Rookshata, Shoola, and Shosha.*
Pittaja Upadravas:	*Paka, Raga, Kotha, Sweda,Srava, Kleda, and Daha.*
Kaphaja Upadravas:	*Twachashwaitya, Shleshma, Sthairya, Gaurava, Shaitya, Kandu and Utsedha.*

SADHYASADHYATA

Based on *Dosha -Dushya– Sadhyasadhyatha*

Disease with Involved	Acharya	*Sarvadoshaja*	*Krichrasadhya*	*Yapya*	*Asadhya*
Dosha	*C.S*	*Eka doshaja, Vata kaphaja*	*Kaphapittaja, Vatapittaja*	-------	*Tridoshaja*
	A.H	*Kapha vataja, Eka doshaja*	*Dvanda, Raktapittaja*	-------	*Sarvadoshaja*
	Y.R	----------	----------	---------	*Tridoshaja*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Dushya	*S.S*	*Twak, rakta, mamsa*	--------	*Meda*	*Asti, majja, shukra*
	A.H	*Twakgata*	*Rakta, mamsa*	*Meda*	*Asti, majja, shukra.*

Asadhya lakshana.

Acharya	***Asadhya lakshanas***
C S	*Sarva Laxanayukta, Upadravayukta, Jantudagda, Balahani,Trishna, Daha, and Agninasha.*
S S	*Atibalavan kustha, chirakari*
A H	*Aristha Lakshanayukta*
Y R	*Krimi , Daha, Mandagni, Upadravayukta*

Chikitsha of Pama

Specific *Chikitsa* are explained in *Pama Kustha* in addition to the common Kustha hara chikitsa.

The three major treatments for various ailments, including skin disorders, that *Ayurveda* prescribes are . 1.Nidana Parivarjana (avoidance of causative causes).

2.*Samshodhana"* (bio-purification),

3.*Samshamana"* (Pacification),

NidanParivarjana - First, avoid *Nidana Sevana* as it will prevent the *Vyadhi* from progressing further by limiting Dosha vitiation. The disease manifests itself from *Nidana.* Diets that are heavy or aggravate *Kapha Dosha*, or those contain a lot of milk, curd, jaggery, Amla, Lavana, or Katu rasa, should be avoided In *Pama Kustha*.

Samshodhana: *Vamana* (Emesis) should be performed every fifteen days, *Virechana* (Purgation) once a month, *Nasya* every three days, and *Raktamokshana* (Bloodletting) once every six months, and Lepa Karma in every three days as per *Acharya Sushruta* and *Yogaratnakar.*

Shamshamana: Unless the body's channels are thoroughly cleaned and harmful substances are removed, palliative therapy in the form of medications and diets may not be successful. *Samshodhana* is said to achieve long-lasting positive benefits by bringing about the equilibrium of bio-humors and cleansing or purifying all bodily tissues. Predominantly *Tikta* and *Kashaya Rasa* drugs should be used for *Kustha* palliative therapy.
Lifestyle modification:- Healing an illness can be aided by a strict diet, effective daily routine, and stress reduction.

External application :-
Kustha, being exhibited through the skin, external application are also advocated. For the external application drug should be applied after elimination of the *Doshas* from the body by *Shodhana Karma* and *Raktamokshana* There are several recommended local application forms, including *Udvartana, Pralepa, Parisheka, Abhyanga*, etc. In addition, *Kshara and Agada Karma* are advised in the unique *Kustha* condition.

The following Lepas which are used in Pama Kustha:
Kushtadi Lepa ,Aragwadha Patra Yoga, Aragwadhadhi, Bhojapatradi, Darvadi, Gandhaka, Gandhaka Drava, Gandhavirojada, Grihadhimooladi, Mahagandhahasti, Agada Jathadi Lepa, Maheshwar Ghrita Rasnadi Lepa, Manashiladi Lepa, Moolakabeejadi, Haridradi Lepa, Saindhavadi,Sindhooradi, Vachadi Lepa.

Abhyanga Chikitsa:

Taila, which can be used for Abhyanga purpose: Khadira Ghrita, Nimba Ghrita,Karanjadi Taila, Potaladi Ghrita, Darvi Ghrita, Gandhaka Taila, Durvadya Taila, Haridradi Taila, Bhallataka Taila,Aditya Paka Taila, ArkaManahshila Tail, Jeerakadya, Kachhoorakshasa, Kandarpasara, Kushtarakshasa, Sweta Karavira, Pallavadi, Sweta Karaviradi, Sinduradya.

PATHYA-APATHYA IN PAMA KUSTHA:
Acharya Charaka has defined *'Pathya'* as they are the wholesome drugs and regimen which do not adversely affect the body and mind. Those which adversely affect them are considered to be Apathya.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Following *Pathya Apathya* are described for *Kustha* hence for *Pama Kustha* also:

PATHYA

Ahara: Laghu Anna, Tikta Shaka, Purana Dhanya, Jangala Mamsa, Mudga, Patola, Food and Ghee prepared by Bhallataka, Triphala & Nimba, Purana Shali, Shashtika, Yava, Godhuma, Kordusha, Shyamaka, Udaalaka: Mandukaparni, Bakuchi, Atarushaka, Siddha Ghrita.

Vihara: Abhyanga with Karanja Taila, Utsadanam with Aaragvadhadi Kashaya, Pana, Parisheka, Avagaha etc. with Khadira Kashaya.

APATHYA

Ahara : Guru Anna, Amla Rasa, Dugdha, Dadhi, Anupa Matsya, Guda, Tila, Mamsa, Taila, Kulattha, Masha, Nishpava, Ikshupishta, Pishta-Vikara, Virudha Bhojana, Adhyasana, Ajirnasana, Vidahi-Abhishyandi Ahara.

Vihara : Divasvapna, Maithuna, Vegadharana, Paapkarma, Tapa Sevana, Svedana etc.

DISCUSSION

The most prevalent diseases in poorer countries like India, where the majority of people have inadequate cleanliness, is *Pama Kustha. Pama* have discussed almost all of the *Acharayas* and how they are managed. The *Tridosas Vata, Pitta, Kapha,* and *two Dushyas (Rasa, Raktha)* are among the *Sapta Dravyas* indicated for the causation of *Kustha,* and they are crucial in managing *Pama Kustha*. Given that this skin condition is prone to relapses, the patient was recommended to adhere to *Pathyapthya,* which includes *Ahara, Vihara, Achara, and Vichara*. In accordance with the traditional practices of *Dosha, Kala, Agni, and Desha*, among others, repeated *Shodhana* should be given to regulate the frequency of recurrence and Skin illnesses have a higher likelihood of recurrence after further dissemination.

CONCLUSION

The interior purity of blood, tissues, nutrients, and electrolytes is reflected or mirrored in the skin. It is vitally important to be informed of skin health issues. Almost all of the *Acharayas* have mentioned the management of *Pama*. Therefore, the *Ayurvedic* formulations of *Bahiparimarjana* in the form of *Lepas* and *Shamana Aushadhis* should be taken in order to promote *Rakta Dushti*.

REFERENCES

1. *Charak Samhita of Agnivesh,Edited with the Vidyotini Hindi commentary, By Sri Satya Narayana Sastri, Published by Chaukhamba Bharati Academy, Varanasi, Reprint 2016, Dirghajeevitiya adhyaya (ch. su.1/15)pg no-7*
2. *Charak Samhita of Agnivesh,Edited with the Vidyotini Hindi commentary, By Sri Satya Narayana Sastri, Published by Chaukhamba Bharati Academy, Varanasi, Reprint 2017,Kustha Chikitsa (ch.chi.7 /9-18),pg no-248-250.*
3. *Charak Samhita of Agnivesh,Edited with the Vidyotini Hindi commentary, By Sri Satya Narayana Sastri, Published by Chaukhamba Bharati Academy, Varanasi, Reprint 2017,Kustha Chikitsa (ch.chi.7/31-48)pg no-254-256.*
4. *Charak Samhita of Agnivesh,Edited with the Vidyotini Hindi commentary, By Sri Satya Narayana Sastri, Published by Chaukhamba Bharati Academy, Varanasi, Reprint 2017,Kustha Chikitsa (ch.chi.7/123),pg no-258*
5. *Susruta Samhita of Maharsi Susruta Kaviraja by Ambika Dutta Shastri,Ayurveda tatwa sandipaka Hindi commentary, Published by Chaukhamba Sanskrit Samsthan,Varanasi, Reprint 2018,Kustha Nidan(Su.ni.5/14)pg no.-322*
6. *Susruta Samhita of Maharsi Susruta by Kaviraja Ambika Dutta Shastri,Ayurveda tatwa sandipaka Hindi commentary, Published by Chaukhamba Sanskrit Samsthan,Varanasi, Reprint 2018,Kustha Nidan(Su.ni.5/32-33)pg no.-325*
7. *Susruta Samhita of Maharsi Susruta by Kaviraja Ambika Dutta Shastri,Ayurveda tatwa sandipaka Hindi commentary, Published by Chaukhamba Sanskrit Samsthan,Varanasi, Reprint 2018,Kustha Chikitsha(Su.Ci.9/6-7)pg no.-63*
8. *Astangahridayam Samhita of Vagbhata by Kaviraja Atrideva Gupta, ,Edited with the Vidyotini Hindi commentary, , Published by Chaukhambha Prakashan Varanasi, Reprint 2019, Kustha Chikitsha(A.H.Ci.19/1-9) pg no.-552-553*
9. *Yogaratnakara by Vaidya Shri Laxmipatisastri Edited with the Vidyotini Hindi commentary, , Published by Chaukhambha Prakashan Varanasi, Reprint 2020, Kustha Chikitsha pg no-216*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

ANTIMICROBIAL ACTIVITY AND GASTRIC EMPTY TIME OF CARAWAY SEEDS

Rucha Ramnath Kurdhane[1], Avinash. D. Hatkar[2*], Rutuja Santosh Aghav[3]
[1]Student of Bachelor in Pharmacy, Dr. Babsaheb Ambedkar Technological University, Raigad, Lonere.
[2]Department of Pharmacology, Faculty of Pharmacology, Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad
[3]Student of Bachelor in Pharmary, Dr. Babasaheb Ambedkar Technological University, Raigad, Lonere

[1]Corresponding Author: Rucha Ramnath Kurdhane

ABSTRACT

Caraway is essential oil obtained from dried ripe of carum carvi (Family- Umbelliferae / Apiaceae) are one of earliest cultivated herb in Asia, Africa and Europe. It is commonly known as caraway (Hindi- kala jeera, Arabic- siyah zeera, and Sanskrit – Krishna jeeraka) which is mainly found in seeds. It was folk medicine for the treatment of many complains. Caraway is found in Europe, siberia, the Caucasus the near east Himalayas, Mongolia and Morocco. Carvi carum or caraway traditionally used for treatment of indigestion, pneumonia, and as appetizer, galactagogue and carminative. Essential oil, fixed oil and many other valuable extractive compound with industrial applications are prepared from caraway. The previous studies showed that plant contained many bioactive, metabolites.

Earthworm activities promote the release of bound residence and digestive activities of earthworm contribute to the process. The earthworm scientific name of Lumbricina. Physical effect include gastrointestinal abrasion and mixing. The residence time of liquid or solid foods in each segment of the GI tract is different. Since, most drugs are absorbed from the upper intestine (duodenum, jejunum, and ileum), the total effective time for drug absorption is 3-8 hours. This is why one has to take most drugs 3-6 time a day. Earthworm any one of more than 1800 species of terrestrial worm of the class oligochaeta - in particular members of the genus lumbricus . Earthworms have mucus and little hairs covering their skin that allow them to move through different types of soil. The benefits of earthworm to soil health are many. Some of these include increasing soil fertility, improving soil drainage, breaking the thatch, improving soil structure, getting deep root growth, and repairing damaged soil. Earthworm and red wriggler worms are perfectly safe to hold bare- handed.

KEYWORDS: *caraway, essential oil, Earthworm, Soil, carum carvi*

INTRODUCTION

Caraway (Carum carvi, Linn) seed is a mature, dried schizocarpic fruit of a biennial herb. The plant belongs to the family Umbelliferae as it has umbrella shaped flower head[3]. caraway seeds have an aromatic, warm and sharp taste with a characteristic odour and they have been used since ancient era to treat digestive disorders. Because of low water content caraway seeds are affected by humidity and temperature conditions where it is stored. The seeds are widely used as spice for flavoring and seasoning foods like bread, pickles, sauces and salads because of its pungent and anise like flavor and aroma[4] . Medicinal use of caraway fruit has been widespread in several ethno medical systems from Northern Europe to the Mediterranean regions, Russia, Iran, India.

Scientific classification [5]-[6]

- **Kingdom**:- plantae
- **Subkingdom**:- Tracheobionta
- **Super division**:- Spermatophytes
- **Division:-** Magnoliophyta
- **Class:-** Magnoliopsida
- **Subclass**:- Rosidae
- **Order**:- Apiales
- **Family**:- Apiaceae

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- **Genus**:- Carum
- **Species:-** carvi linn



Fig no. 1:- Carum Carvi Plant With Flowers.



Fig no.2:- Carum Carvi With Leave

Vernacular Names:- [6]-[7]

- **English**: Black Caraway, Caraway
- **Hindi**: Kalajira, Shahjira
- **Sanskrit**: Asitajiraka, Krishna jeeraka
- **Tamil**: Karamjiragam, Shimaishambu
- **Telugu**: Nalla Jeelakarra
- **Unani**: Zeeraa Siyaah, Kamoon, Kamoon-roomi
- **Urdu**: Kala Zira and Karo Jeero, Zira Siyah

Synopsis:- Caraway, Black caraway, Carum carvi.
Biological Source:- Dried ripe fruits of Carum carvi Linn. It contains not less than 2.5% volatile oil.[8]
Geographical Source:- It is indigenous to Holland and Central Europe. It is cultivated in Central Asia, Europe and many other countries. In India, it is found wild in north Himalayan region, and is cultivated in Kashmir, Kamoon, Garhwal and Chamba, At an altitude of 3000 to 4000 metres.[9]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Fig no. 3:- Carum carvi seeds

Plant description:- carum carvi is the Biennial herb & multi branched.[10] Average height of herbs is 30 to 70 cm. It possess a deep Tap root. It has a high vernalization requirement to flowering stems in the second year. Flowers are produced on Umbels. They are white & 2-3 mm across the outer ones longer than inner ones. Flowers open in April onwards & are succeeded by fruits which are 3-6 mm long. Fruit ripening from Early June & July.[11]
Organoleptic characters:

Colour : Brown

Odour : Aromatic and characteristic

Taste : Hot, aromatic, spicy and characteristic

Extra features : Cremocarp or mericarps, five primary ridges in each mericarp, curved smooth muscle shape and orthospermous seeds.

Microscopy:-[8]

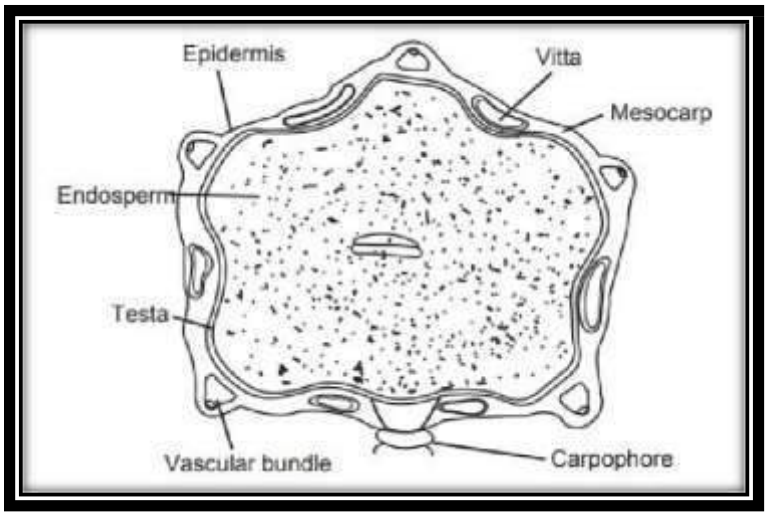


Fig no. 4:- Transverse section of caraway

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

PHYTOCHEMICAL TESTING

Identification test of Phytoconstituents

chemical analysis of plant extracts :- The seed prepared were used for screening of phytochemicals and other biologically active compounds[12]. The active compound are carvone, limonene, y- terpinene, linalool, carvenone, and p-cymene, carveol, camphene, fenchen. The caraway seed extracts prepared in different solvents were screened for the presence of terpenoids, flavonoids, steroids, carbohydrate, protein, phenolic compound and tannins.

Sr.no	Phytochemicals	Chemical Test
1	Terpenoids	Salkowaski Test
2	Flavonoids	Sodium Hydroxide Test
3	Tannin	Ferric Chloride Test
4	Steroids	Lieberman Burchard's Test
5	Carbohydrate	Molisch Test
6	Phenol	Ferric Chloride Test
7	Alkaloids	Wagner's Test

Table no.1 : Test conducted for qualitative estimation of phytochemical content in caraway

Sr.no	Phytoconstituent Estimation	Standard used
1	Total flavonoids content	Quercetin
2	Phenol content	Tannic acid
3	Tannin content	Tannin acid
4	Terpenoids content	Linalool

Table no.2: Qualitative analysis of phytochemical of caraway seeds

METHOD AND MATERIAL :- REQUIREMENTS:

Sr. No	Name of apparatus
1	Conical flask
2	Water bath
3	Tripod
4	Stirrer
5	Petri dish
6	Beaker
7	Measuring cylinder
8	Dropper

Table no. 1: Apparatus CHEMICAL

Sr. No	Ingredients	Quantity requirement (for 250 ml)	Quantity taken (for 250 ml)	Uses
1	Agar	3.75g	3.75g	Growing bacteria on culture plate and test tube
2	Peptone	1.25g	1.25g	Microbial growth media
3	Sodium chloride	1.25g	1.25g	Antibactrial agent
4	Beef extract	0.75g	0.75g	Culture media
5	Distilled water	q.s	q.s	Vehicle

Table no. 2:- Nutrients Agar

ANIMAL :- Earthworm INSTRUMENT

1. Autoclave
2. Incubator PROCEDUCES
    1) In this process solid ingredients are placed in stoppered container with the whole of the solvent and allowed to stand for a period of at least 3 days (3- 7 days)

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2) Suspend nutrient agar powder and other ingredients (mentioned under chemical formula) in required quantity (250ml) of Distilled water.
3) Heat this mixture while stirring to fully dissolve all components.
4) Pour the media in conical flask and cover the cotton plug.
5) Autoclave the dissolved mixture contained in conical flask at 121°c in 15 min.
6) Once the nutrient agar has been Autoclaved, allow it to cool and preserve for further use.
7) First kept in autoclave in petri dish then kept in incubator for 3-4 days.



Fig no. 5:- Growth of Bacteria

DISCUSSION

In this process solid ingredients are placed in stoppered container with the whole of the solvent and allowed to stand for a period of at least 3 days (3- 7 days).

The process in which properly communicated drug is placed or permitted to soak in a solvent for specific period of time until the cellular structure is softened and penetrated by the solvent and soluble constituent are dissolved and extracted out.

Sr.no	Ingredients	Quantity requirements for 250 ml	Quantity taken for 250 ml
1	Peptone	1.25g	1.25g
2	Beef extract	0.75g	0.75g
3	Sodium chloride	1.25g	1.25g
4	Agar	3.75g	3.75g
5	Distilled water	q.s	q.s

Table 1:- Nutrient Agar Agar well diffusion method

The antibacterial activity was performed with the agar diffusion Method.[13] Fifty ml-portions of the melted sterile TSA, SDA Maintained at 50 °C, were inoculated, each with 100 ml of properly Diluted inoculum and mixed well. The inoculated medium was Poured into sterile petri dish (15 cm) and allowed to solidify. Maintain the plates at room temperature for about 2 h and then incubate the plates at 30-35 °C for 24 and 48 h in case Of bacteria and yeast respectively. Thrresultant inhibition zones Were measured and the average values are taken. Different explant (fruit,leave, and bark) of Z.armatum were employed for the assessment of in vitro

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

antibacteriactivity using of agar well diffusion method against gram positive bacterial (Micrococcus luteus, Bacillus subtilis, Staphyococcus aureus and Streptococcus faecalis) and gram negetive bacteria (E.coli, proteus vulgaris, klebsiella pneumoniae, Streptococcus viridans, pseudomonas multocida and pseudomonas aeruginosa.

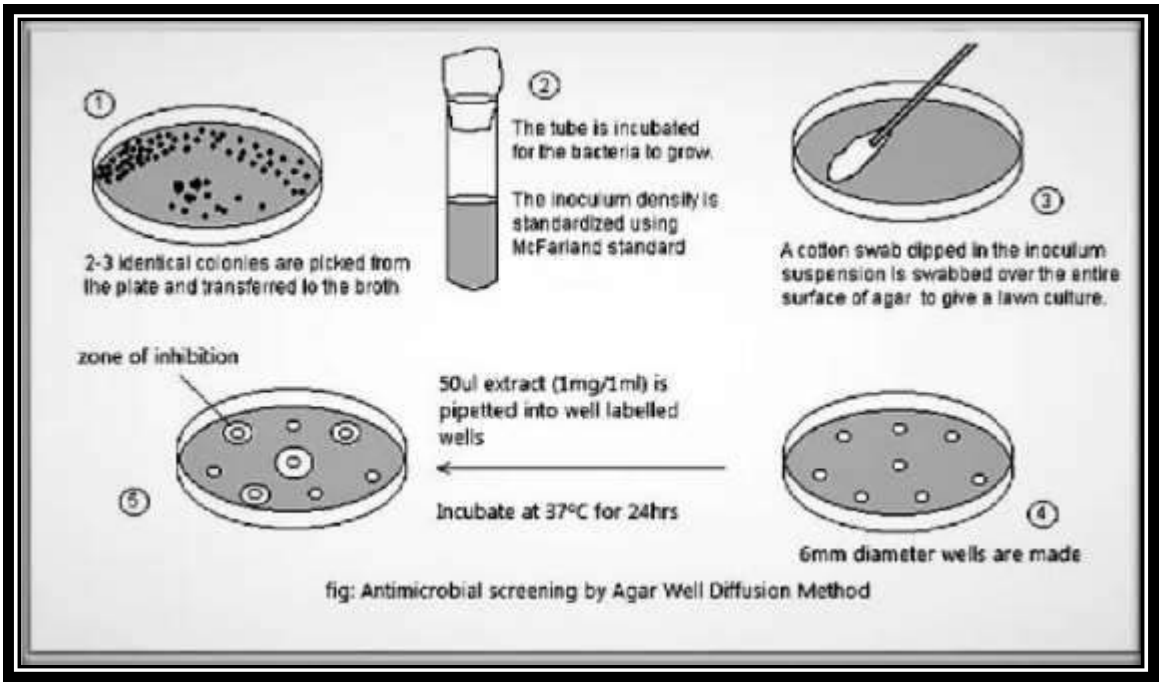


fig: Antimicrobial screening by Agar Well Diffusion Method

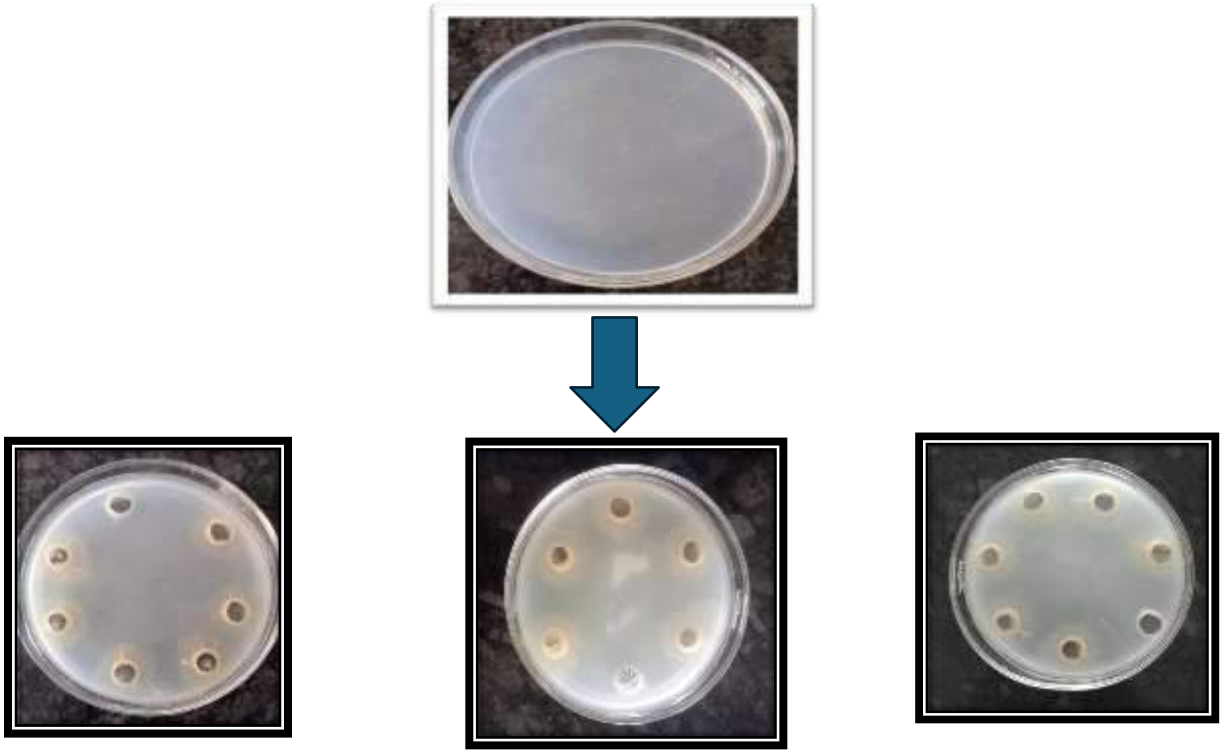


Fig no. 7:- Antimicrobial assay by zone of inhibition method

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Sr. No	Drug	Quantity	Diameter (kill)	Total Diameter
1	Antibiotics	7.6 drop	0.8	1.6
2	Test 1	7.4 drop	0.82	1.6
3	Test 2	7.8 drop	0.85	1.7
4	Test 3	7.8 drop	0.82	1.6
5	Normal	7.3 drop	0.7	1.4

Table no.5: Antimicrobial assay by zone of inhibition of caraway

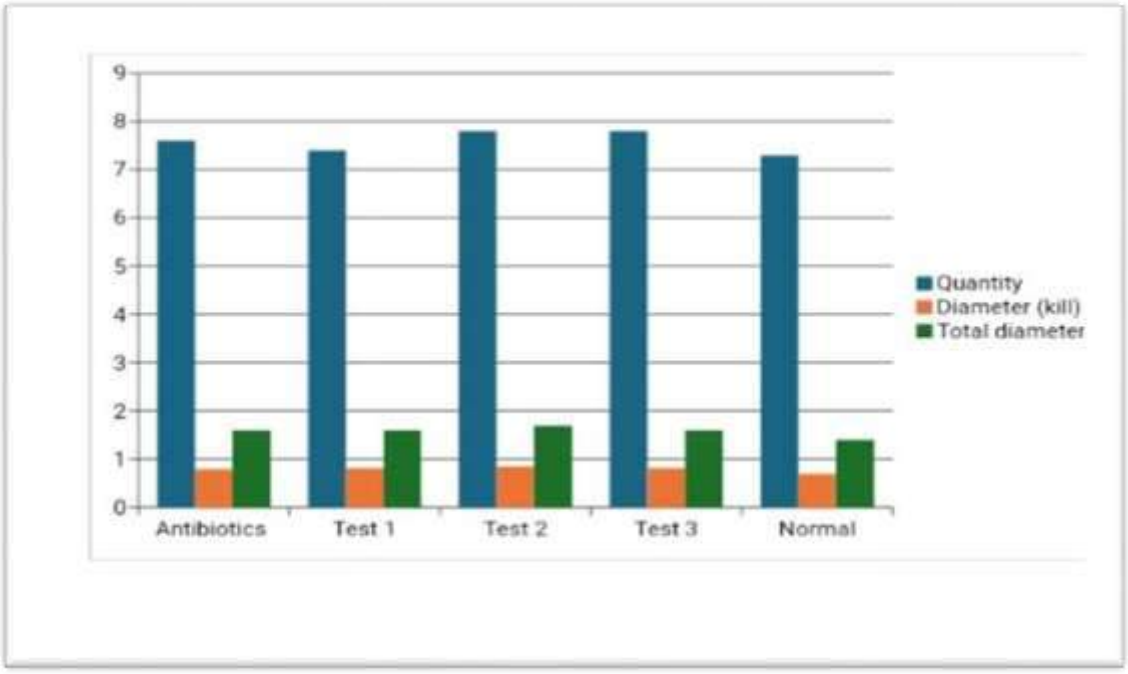


Fig no.1: Antimicrobial activity by zone of inhibition of caraway

Assay of antibacterial activity in MSE and WSE
Activities of different seed extract (MSE and WSE) against the test organisms were expressed as zone of inhibition (in mm). Zone of inhibition (mm) on MH- medium was checked for two different concentraction of the seed extract (5.0 mg/ml and 10.0 mg/ml). Further MIC was done using 96- vial titre plate to check for the minimum concentraction of the seed extract required to inhibit growth of selected pathogenic microbes.

Test organism	Zone of inhibition (mm) M1 (5.0 mg/mL)	Zone of inhibition (mm) M2 (10.0 mg/mL)
Staphylococcus aureus (ATCC 6538)	12.3+- 0.89	24.0+- 1.22
Salmonella typhimurium (NCTC 74)	_	14.6+- 1.66
Escherichia coil (ATCC 25922)	11.0 +- 1.23	13.0+- 0.78
Staphylococcus epidermidis (ATCC 12228)	11.0+- 0.76	14.3+- 0.98

Table no.6: Antibacterial activity of caraway seed extract

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Microorganisms	MSE tested concentration (mg/mL)									MIC (mg/mL)
	10	5	2.5	1.25	0.625	0.312	0.156	0.078	0.039	
S. aureus (ATCC 6538)	-	-	-	-	-	-	+	+	+	0.312
S. typhimurium (NCTC 74)	-	-	-	+	+	+	+	+	+	2.5
E. coli (ATCC 25922)	-	-	-	-	-	+	+	+	+	0.625
S. epidermidis (ATCC 12228)	-	-	-	-	+	+	+	+	+	1.25

-Indicates no bacterial growth.
+Indicates turbidity/ growth of selected bacterial strains

Table no.8: MIC of MSE of carum carvi against selected pathogenic bacterial strains

CONCLUSION

Caraway is helps to kill microorganisms. It get desired effect against microorganisms as compared to other drug. It kill the colonies of bacteria. It gives bacteriocital activity.

The culture medium treated with caraway it get more antibacterial activity as compared to culture medium treated with saline solution/ test solution.

Method -2:- Gastric Empty Time INTRODUCTION:-

Approximately 4400 species have been identified in the world however few species are used in the process of vermicomposting[14]. The earthworms are hermaphrodite, segmented worms, bilaterally symmetrical, with an external gland (clitellum) for producing the egg case (cocoon), a sensory lobe in front of the mouth (prostomium), and an anus at the end of the animal body, with a small number of bristles (setae) on each segment[15]. Based on these features the earthworms can be taxonomically classified[16]. Earthworm's bodies are made up of ring like segment called annuali. These segment are covered in setae or small bristles which the worm uses to move and burrow. These terrestrial worm typically dwell in soil and moist leaf litter.

The residence time of liquid and solid foods in each segment of the GI tract is different. Since most drug are absorbed from the upper intestinal (duodenum Jejunum and ileum) the total effective time for drug absorption is 3-8 hrs.

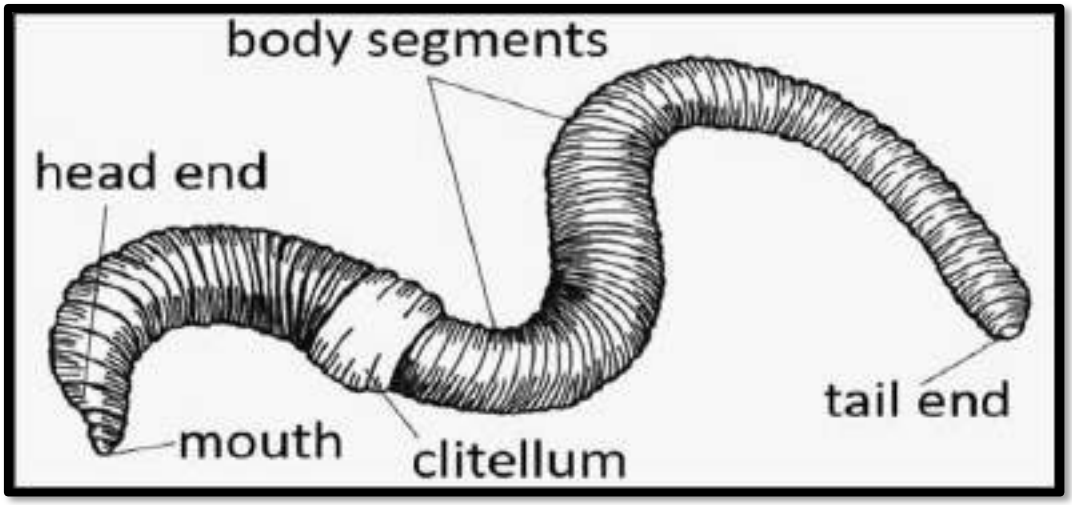


Fig no. 8:- Earthworm

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

PROCEDURE

1) To take an earthworm from soil in a container.
2) Keep it beaker wash it properly
3) Transfer it into 4 different petri dish and put the earthworm.
4) The we add the caraway drug in the concentration of 5ml, 10ml, 15ml and normal/saline solution respectively.
5) Each petri dishes kept for different time interval.
6) After that observe and measure the gastric retention time of the earthworm.

DISCUSSION

Earthworm is a reddish brown terrestrial invertebrates that inhibit the upper layer of moist soil. In the garden, they can be traced by their faecal deposits known as worm castings. The common indian earthworm are pheretima and lumbricus. The body is divided into the more than hundred short segment which are similar (metameres about 100- 120 in number.

Anterior end consist of mouths and the prostomium a lobe which serve as a covering for the mouth and as a wedge to force open crack in the soil into which the earthworm may crawl. Earthworm species are generally categories environmentally as being either epigeic, endogeic and anecic.

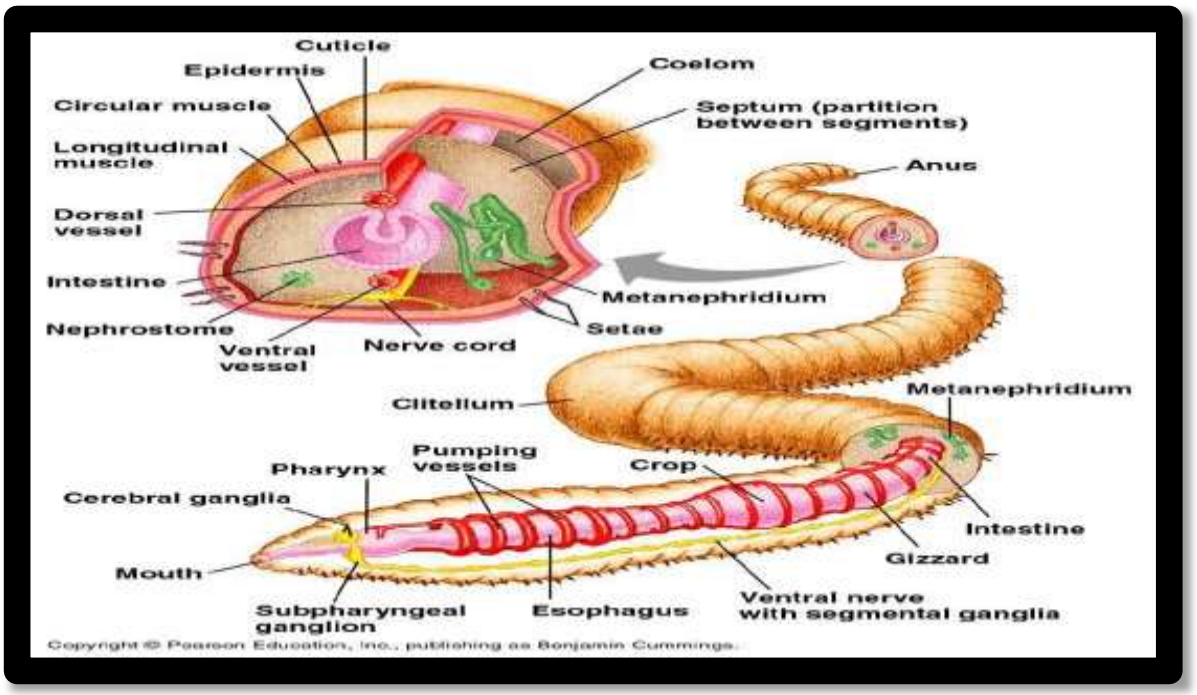


Fig no. 9:- Digestive of earthworm

Sr. No	Quantity (ml)	Effect of time
1	5ml	20min
2	10ml	14min
3	15ml	5min
4	Normal	No effect

Table no.10 : Gastric transit time of caraway drug

CONCLUSION

Residence time in each segment of GI tract in earthworm is different since most drug absorbed from the upper intestinal.
As we increase the quantity of caraway drug, more quickly the material inside the earthworm stomach get remove.

That is As drug concentration increase the time required to remove the material inside also get reduced. As we increase the quantity of caraway drug, the gastric retention time in earthworm reduced that is it will remove the dirt inside them Faster.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

And vice versa, If the concentration of caraway drug given is low, it take more time to remove dirt from the earthworm.

REFERENCE

1. *"CARUM CARVI A SALIENT AESCULAPIAN PLANT", International Journal of Novel Research and Development (www.ijnrd.org), ISSN:2456-4184, Vol.8, Issue 3, page no.a197-a207, March-2023,*
2. *The earthworm gastrointestinal effect on the release of organic bound residues in soils J H Du Earth and Environmental Science, Volume 128, 3rd International Conference on Energy Equipment Science and Engineering (ICEESE 2017) 28–31 December 2017, Beijing, China, doi: 10.1088/1755-1315/128/1/012039.*
3. *Pooja A and Singh Dk. A review on the pharmacological aspects of Carum carvi. Journal of Biology and earth sciences. 2014; 4(1): M1-M13.*
4. *Rajamanickam R. kumar R. Johnsy G and Sabapathy SN. Sorption characteristics and some physical properties of caraway. International Food Research Journal, 2013; 20(3): 1223- 1227*
5. *B. I. Sivarajan VV, "Ayurvedic Drugs and their Plant Sources.," Oxford and IBH Publication, New Delhi., 1994.*
6. *D. D. K. M. Sachan AK, "Carum carvi - An important medicinal plant.," Journal of Chemical and Pharmaceutical Research., vol. 8(3), pp. 529 - 533, 2016.*
7. *K. CP., "Indian Medicinal Plant An illustrated Dictionary.," Springer Science and Business Media, LLC., pp. 124-125, 2007.*
8. *K. K.R., "Practical Pharmacognosy," in Techniques and Experiments, Nirali Prakashan, 2008, pp. 91-93.*
9. *C.K.Kokate, "PHARMACOGNOSY," Nirali Prakashan, pp. 14.25-14.26.*
10. *http://plant data base.com.*
11. *Sachan Ak, Das DR,Kumar M carvi-An important medicinal Plant.Journal of Chemical and pharmaceutical Research.2016;8(3):529-533.*
12. *) Xiao J.B., Chai T.T., Wang X., Morais-Braga M.F.B., Yang J.H., Wong F.C., Wang R.B., Yao H.K., Cao J.G., Cornara L., Burlando B., Cao H., Wang Y.T. and Coutinho H.D.M., Phytochemicals from fern species: potential for medicine applications, J. Agri. Food Chem.,7, 517-763 (2017).*
13. *S. Deans, G. Ritchie, Antibacterial properties of plant essential oils, J. Food Microbiol. 5 (1978) 165e180.*
14. *Rajendran M, Thivyatharsan R. Performance of different species of earthworms on vermicomposting. International Journal of Research in Agriculture and Food Sciences. 2013;2(3):1-6.*
15. *Bouché MB. Strategies Lombriciennes. In: Lohm U, Persson T. (Eds.), Soil organisms as components of ecosystems. Biol. Bull. 1977;25:122-132. 11.*
16. *Edwards CA, Bohlen PJ. Biology and Ecology of Earthworms. 3rd Eds. London, Chapman and Hall; 1996.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

THE ROLE OF CULTURE IN TRANSLATION

Pirmuhamedov Bahadir Bahramovich
International Islamic Academy of Uzbekistan
Senior Teacher of the "Arabic Language and Literature al-Azhar" department.

ABSTRACT
In this article, the dictionary and terminological meaning of the word culture is highlighted, and it is stated that the Arab countries are divided into classifications by orientalists in the study of the culture of the Arab world. When learning a foreign language, especially Arabic, and translating classical and modern texts written in it, it is necessary to deeply master the traditions and culture of the Arab people. The influence of cultures on each other through translation is reflected in the following, first of all, translation provides readers with facts and ideas specific to foreign cultures, and it further expands the reader's worldview. The article also provides examples of terms and expressions specific to each region.
KEYWORDS: *culture, Arabs, geographical location, cultural elements, customs, special words, phraseological expression, gesture.*

Over the centuries, the concept of "culture" began to acquire a new meaning. At first, under the word "culture" were understood works of art, literature, music and other fields, in the modern world the importance and scope of the concept of culture is increasing, that is, under the word "culture" people's national traditions, their way of life, behavior, thinking and understanding of the surrounding world are understood.

"Culture" comes from the Arabic word "Madina" (city). Arabs called people's life into two types: one is "bedouin" or "desert life" and the other is "civilized life". Bedouins are nomadic peoples who live in the deserts of the steppes, and culture is used for peoples who live in cities and have their own way of life. Among the definitions given to the word "culture" in Europe, the definition of the famous English ethnographer, one of the founders of anthropology, Edward Taylor (1832-1917) is considered the most perfect. According to him, "culture is the development of humanity through the high-level organization of an individual and the whole society in order to simultaneously contribute to the development of human morals, power, and happiness."[1]

Currently, linguistics, in particular, translation, is studied without separating it from culture, because when translating the original language, it is impossible not to take into account the customs and traditions of that language. Therefore, in the process of translating works in the Arabic language, the translator should be aware of the history, social system, daily customs and traditions of the Arabs.

Most ordinary people in Uzbekistan have a common misconception that "Arabs" means a people who speak Arabic, and their place of residence is "Arabia". There are more than 20 Arab countries, and although they have a single language, their culture and traditions are unique and different.

According to the data of 2015, the total number of Arabs exceeds 350 million, more than 150 million live in Asia, and about 200 million live in Africa. The majority of Arabs believe in Islam, but there are also Christians living in Egypt, Lebanon, Palestine, Jordan, Syria and other Arab countries.

Orientalists have divided the Arab world into six major regions in terms of culture:

1. **South Arabian cultural region.** This region covers the territory of the present Republic of Yemen and the Sultanate of Oman. This region is historically the home of the oldest civilization of Arabia.
2. **Cultural region of Arabia.** This region, together with region number 1, has been the cultural and historical center of the Arab world since the pre-Islamic period and is a unique component of Islamic culture.
3. **Syrian or Eastern Mediterranean cultural region.** It covers the urban and agricultural areas of Syria, Jordan, Lebanon, and the territories of present-day Palestine. Muslims, Jews, Christians and Sabians lived together in this region. In this

[1] Taylor E.B. Primitive culture. – M., 1989. – P. 18

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

regard, Arabs living in this region differ from other Arabs in appearance and culture. Jerusalem, the holy city of three religions, Damascus, the capital of the Umayyad Caliphate, Aleppo, Beirut and other historical cities are located here.

4. **The cultural region of Mesopotamia:** Tigris, Euphrates and surrounding areas. Agriculture and urban culture are well developed in this region, together with region 3 and partly as in region 5. Here is the history of Islam and the cities of Kufa, Basra and Baghdad, which occupy an important place in the development of science, are located.
5. **The cultural region of the banks of the Nile River:** it includes the Arab regions east of Egypt, Sudan, and Libya. The starting point of the Arabization of the African continent. It is the region of the formation of Arab-Muslim civilization, and the first established university in the Islamic world, Al-Azhar, is located. For centuries, the city of Alexandria was the main Muslim port of the Mediterranean Sea.
6. **The Maghreb cultural region:** northern and northwestern Africa, the habitat of Arabs and Arabized tribes from the western part of Libya to Mauritania. In the Middle Ages, Muslims moved from this region to Gibraltar and then to the Liberian peninsula, creating a flourishing center of Islamic culture in Spain or Andalus. In this region there are Tripoli (Tarablus), Kairouan, Algiers, Fas, Rabat and other cities.

If we pay attention to the location of the regions above, according to their geographical location, the Arabs lived in the desert, river, sea, mountainous areas and cities. This, in turn, greatly influenced the culture, customs and language of the people who lived in these places. For example, in the cultural region of South Arabia and Arabia (numbers 1 and 2), poetry has been developed since ancient times. The local Arabs appreciate poetry and celebrate holidays and family gatherings. Arabs living in the cultural region of Syria or the Eastern Mediterranean are skilled entrepreneurs and farmers. The Arabs living in the cultural region of the banks of the Nile River are distinguished by their sedentary lifestyle, and skilled entrepreneurs, farmers, famous intellectuals and scientists have grown up among them.

The fact that we have religious and educational values and some traditions that connect us with the Arab peoples is very useful in translating the works of the Arab peoples or dealing with them. We can see this in food, behavior and other customs of everyday life. For example, Arab tribes eat food with their hands like we do, but they drink tea or coffee after a meal. Let's get acquainted with the Arab ceremony of drinking coffee and serving it to a guest:

The rules of serving coffee have remained unchanged for hundreds of years. After greeting the guest and transferring him to a suitable place, the owner of the house hands him a cup of coffee with his right hand. The guest should also receive the cup with his right hand. Coffee is usually served to guests from right to left. In this regard, the Arabs cite the following saying:
القهوة على اليمين لو كان أبو زيد على الشمال "Give the coffee from the right even if Abu Zayd is sitting on the left" (Abu Zayd

Hilali is from the tribe of Bani Hilal, a famous hero of the Arabic epic). Coffee is served to the guest at least three times. The first time is when a guest visits, the second time is after giving fruit, and the third time is after a meal. These three coffee transfers have their own names: the first "for pleasure (**للكيف**)", the second "for the guest (**للضيف**)", the third "for the sword (**للصسف**)". The last custom of drinking coffee "for the sword" goes back to the ancient Bedouin custom. that is, the guest who drank the third coffee became a "blood brother" in Uzbek and stood by his side with his sword in good and bad days Pouring coffee into the cup is also considered disrespectful to the guest.

The guest is also required to follow certain rules. He should not refuse the first coffee, because this is an expression of disrespect to the host. This can be rejected by an enemy who did not come to reconciliation, a person who came to the owner of the house with a request, or a suitor who came to ask for his daughter. The guest should also drink the second cup of coffee. Drinking the third coffee is optional. Usually, more than three coffees are served to relatives and dear guests of the host. To express one's unwillingness to drink coffee, the cup is shaken to the side and placed on the table saying "**كافي، بس**" Kafi, bas - "enough". If coffee is served during the mourning ceremony, after drinking it one should say (**الترحم على المتوفي**) "At-tarahhum alal mutawaffi". It means "May God have mercy on the dead" in Uzbek.

The process of transferring cultural elements to another language environment through translation is a complex issue. There are a number of phrases and actions in a single greeting. Usually, when men greet each other, they shake hands. Women can conditionally kiss (they press each other's cheeks several times). Residents of the United Arab Emirates greet each other by touching their noses. Such a greeting is usually between people who are very close to each other or relatives, for example, father-son, mother-child, etc. Special words are used when asking about the situation. It is not proper for the guest (if he is a man) to ask about the host's wife. Arab women are addressed by the name of their eldest child (such as Umm Ahmad).

The expression of some formalities is also very complicated, for example, the word meaning "thank you" is expressed differently in Arabic depending on the situation.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

شكرا ، جزاك الله ، شكرا جزيلا
السلام عليكم Hello or Good bye

Clothes, jewelry, and food items also cause problems in translation. For example, it is useless to translate the taste of food or its characteristics to someone who has never heard of it. Another important point is that shoes are a symbol of insult in Arabs. Offensive words are associated with him (**ابن جزمة** - shoe boy). Europeans who participated in some official meetings sat cross-legged in front of their Arab hosts and showed the soles of their shoes to the hosts, causing diplomatic scandals.

Traditions and customs are also a part of culture. Whether it is a wedding, mourning, or a festival, its history, significance, and symbolism hidden at its core pose difficulties for the translator. For example: **عيد شم النسيم** - Spring festival in Egypt

Beliefs and feelings change as we move from culture to culture. White can represent purity and black can represent evil in some cultures. This means that culture consists not only of concrete things like cities, organizations, and schools, but also of abstract things like ideas, customs, family patterns, and languages. In a word, culture means the way of life of society. It can easily change and disappear.

Language is a social condition, without which there is no social activity. In the process of translation, we face a foreign culture. Therefore, our understanding of foreign culture is the key to our success. Because translation is an intercultural phenomenon.

The influence of cultures on each other through translation is reflected in the following, first of all, translation provides students with facts and ideas specific to foreign cultures. He broadens the student's worldview and teaches them that other nations have their own culture and that these customs and cultures should be respected. The great educational role of translation is shown in this way.[2]

As mentioned above, the Arabs lived in a very wide area due to their geographical location. In the poems and phraseological expressions of the Bedouin Arabs living in the desert, the image of the camel is often found, while in the words and proverbs of the settled Arabs, we can find the name of dates, wheat, olives and other fruits. For example, wheat and olive trees are the most important crops grown not only in Egypt, but also in other Arab countries. Therefore, we can find many proverbs and wise words related to them:

ٱلْقَمْحْ وِٱلزَّيْتْ عَمُودِ ٱلْبَيْتْ، عِمَارَةْ الْبَيْتْ خُبْزْ وزَيْتْ

Wheat and olive oil are the pillars of the house, bread and olive oil are the foundation of the house.

The biggest challenge in translation is distinguishing between cultures. People belonging to a certain culture look at something based on their worldview. In Arabs, winter is a rainy and pleasant season. We can quote their sayings related to this season. For example:

إِلّلِي مَا بْيِحْرُثْ فِي الشِتَا يَسْتَعْطِي فِي الصَّيْفْ

He does not plow the land in winter, but he asks for alms in summer.

On the contrary, A. Neubert, a famous German linguist of the 20th century and one of the bright representatives of translation theory, said in his research that we should translate the opening lines of Shakespeare's eighteenth sonnet into Arabic:

"Shall I compare thee to a summer's day..." (May I compare you to a summer's day?...)" can the Arabs accept the meaning of the word "summer" in the sense that Shakespeare intended in the text? Actually, Shakespeare in this text "summer day" is a warm and beautiful day, and the summer heat is considered the most unpleasant period for the Arabs.

REFERENCES

1. *Komilov N. This is an ancient art. - Tashkent, 1988.*
2. *Musaev Q. "Theory of Translation". - Tashkent: Science, 2004*
3. *Ochilov E. Theory and practice of translation (Study guide). - Tashkent, 2012.*
4. *Salomov G'. An Introduction to Translation Theory. - Tashkent: Teacher, 1978.*
5. *Salomov G'. Foundations of translation theory. - Tashkent: Teacher, 1983.*
6. *Sirojiddinov Sh., Odilova G., Fundamentals of literary translation. - Tashkent: Mumtoz word, 2011.*
7. *Islomov Z. The role of the international Islamic academy of Uzbekistan in the development of Islamic studies //The Light of Islam. – 2019. – T. 2019. – №. 1. – C. 1.*
8. *Islamov Z. et al. WRITING DOWN OF HADITHS IN THE VII-VIII CENTURIES: APPROACHES AND METHODS //PSYCHOLOGY AND EDUCATION. – 2021. – T. 58. – №. 1. – C. 5536-5545.*

[2] Komissarov V. N. Cultural and ethnographic concept in perevoda // Sb. nauchnyx trudov MGPIIIya. – No. 375. 1991. – S. 15–19

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

9. *Maxsudov D. Развитие исламоведения (корановедения) в Узбекистане: история и современность //Вестник КазНУ, Серия Религиоведение. – 2020. – Т. 21. – №. 1. – С. 60-67.*
10. *Ugli A. Z. Z. THE PLACE OF ALIKHANTORA SOGUNIY IN THE HISTORY OF EAST TURKESTAN //Colloquium-journal. – Голопристанський міськрайонний центр зайнятості, 2020. – №. 24 (76). – С. 32-33.*
11. *Ugli A. Z. Z., Farxodjonova N. Alikhantura Soguniy Role in State Administration in East Turkestan //Journal of Modern Islamic Studies and Civilization. – 2024. – Т. 2. – №. 02. – С. 128-132.*
12. *Zokirjonugli Z. A. Approaches to studying the scientific heritage of Alikhantora Soguni //Asian Journal of Multidimensional Research. – 2022. – Т. 1*
13. *Zokirjonugli Z. A. APPROACHES TO STUDYING THE SCIENTIFIC HERITAGE OF ALIKHANTORA SOGUNI.*
14. *Arslonov Z. Z. THE PLACE OF ALIKHANTORA SOGUNIY IN THE HISTORY OF EAST TURKESTAN //Colloquium-journal. – Голопристанський міськрайонний центр зайнятості= Голопристанский районный центр занятости, 2020. – №. 24-2. – С. 9-11.*
15. *Makhsudov D. Muslim world scientists of the temurids period //The Light of Islam. – 2019. – Т. 2019. – №. 3. – С. 4.*
16. *Makhsudov D. R. Mufassirs of Mawarannahr //ISJ Theoretical & Applied Science, 12 (80). – 2019. – С. 539-543.*
17. *Mukhamedov N. Khoja Ahrar-peace and consent between people //ISJ Theoretical & Applied Science, 01 (117). – 2023. – С. 378-383.*
18. *Mukhamedov N. Activities of scholars of islamic law (fuqaha) from shash oasis in scientific centers of the region //The Light of Islam. – 2020. – Т. 2020. – №. 3. – С. 4-15.*
19. *Mukhamedov N., Turambetov N. Medieval Scientists of the oasis Shash and their Contribution to Islamic Civilization //The American Journal of Social Science and Education Innovations. – 2020. – Т. 2. – №. 08. – С. 137-143.*

FOREIGN LITERATURE

20. *Komissarov V. N. Theory perevoda (Lingvisticheskie aspekty): ucheb. dlya in-tov i fak. inost. summer - M.: Vyssh. Shk., 1990.*
21. *Komissarov V. N. Cultural and ethnographic concept perevoda // Sat. nauchnyx trudov MGPIIIya. - No. 375. 1991.*
22. *Finkelberg N.D. "Arabic language: theory and technology perevoda: uchebnoe posobie»-M.: Vostochnaya kniga, 2010.*
23. *Neubert A. Semiotic aspects of the training of interpreters and translators// Linguistische Arbeitsberichte. - Leipzig, 1970.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

USING TYPES OF INFOGRAPHICS IN TEACHING ARABIC

Z.N. Shakirova
Associate Professor, "Arabic Language and Literature, Al-Azhar Chair" IIAU 11, A.Kadiri, Tashkent, 100011, Uzbekistan.

ABSTRACT
Knowledge of foreign languages is important in the development of relations between the countries of the world. Facilitation and acceleration of foreign language learning requires the development of new methods and their widespread use in everyday practice. Among the new styles, infographics are becoming increasingly important. Because our mind gets used to receiving information in the form of short phrases, graphics, pictures of different colors faster. The study of information in a reduced form is having its effect in all fields, including education, especially in teaching foreign languages. This article provides an overview of the importance of infographics, the use of pictures in he staudy of the Arabic language.

KEY WORDS: *foreign language, Arabic, infographics, pictures, animated pictures, mobile applications, information, theme, text, words.*

What is an Infographic?
The term is derived from the words "informatio" - to explain, to inform and "grafisos" - written form, and is a method of expressing information and knowledge through pictures. Its purpose is to present and convey complex information quickly and clearly. If we look at the history of infographics, it was created during the primitive society. Because at that time, people painted their way of life in caves. Through them, we got an idea of how ancient people lived. Over the years, infographics began to enter various disciplines and fields. Its use has expanded to include geography, journalism, education, statistics, and other fields. Infographics tools initially included graphs, charts, tables, maps, but have evolved over time and are now widely used in the form of pictures and motion pictures (animation).

Infographics allow students to get a lot of information in a short time when learning foreign languages. According to statistics, a student remembers 10% of what he hears, 20% of what he reads, and 80% of what he sees. According to the scientists, the use of different colors in the texts facilitates learning and assimilation of information and increases motivation to learn by 80%. Since a person is able to receive information given in the form of an infographic, he has a complete idea of the content and can analyze it.

Infographics and Foreign Language Learning
There are many possibilities of using infographics in foreign language learning. Creating thematic infographics has several stages. First, the topic is selected, information about it is collected and they are systematized. The choice of colors is also very important when presenting information. If the information is presented correctly in an infographic, the student will understand it at a glance.

For example, in the process of teaching Arabic, if the grammar topic is taught in comparison with the mother tongue, the "Venn" diagram is useful. Because this chart allows you to compare and teach the differences between topics in two or more languages[1]. For example:

[1] *Z. Aripova "Innovative technologies in the education of Eastern languages". "Scientific Analytical Bulletin". TIU., 2016. 4 issues. 107 p.*
R. Matibaeva. Guide for reading parallel texts. MEOW. 2019. Str. 4.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Illustrated Infographic

By using different views of infographics, it becomes easier to explain new words, text, topic to the student. For example, using the following form when explaining the subject of "Precedents" in Arabic will help you remember the auxiliaries quickly and easily. We can see this in the example of an illustrated infographic.

Also, the use of infographics has a great effect in the development of oral speech. Students can be assigned tasks individually or in groups. Based on the given table, the student has the opportunity to explain a grammatical topic, compose a text using a picture, and write an essay. In higher courses, it is appropriate to entrust the preparation of some analytical information through graphs and diagrams related to the specialty to the student. For example, if economics students are given a graph of GDP growth in different countries and the words used to express it, the student can easily express the graph in Arabic.

Infographics are also very important in learning a new text. If a student partially understands the content of a new text by reading its title or first paragraph[2] 80% of the text can be understood through infographics. The presentation of a picture before the text helps the student to visualize the text and to understand and translate it correctly. For example, an elementary student is given the following picture and asked to describe it. After the student describes the picture, the original text is given. As the student repeats the words and rules covered by creating a text, seeing the differences/similarities between the original text and his/her own text increases his/her confidence and enthusiasm for learning the language.



[2] *Yu. Ismailova "The use of interactive methods in the training of students with professional orientation". "Theoretical and Applied Science". 2019 No. 10 (78). Str. 210.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



جلس سامي مع أبيه في قاعة الجلوس، وأمسك الهاتف، وهنّأ صديقه رشيدا بالعيد.
من جهته سأل رشيدٌ صديقه عن شعوره فأخبره أنّه يشعر بسعادة وسرور كبيرين.
واستفسر رشيد كذلك عمّا قام به سامي هذا الصّباح من أعمال. فأجابه، أنّه رافق أباه إلى المسجد وتبادل التّهاني والهدايا مع أصدقائه ثمّ تناولوا الحلويّات.

It is also possible to classify the words expressed in the picture. That is, another form of infographic is created by identifying the series of verbs, nouns, adjectives, and helpers represented in the image.

Infographics in action

The second type of infographic - moving image allows you to get more information, because it uses a sound background along with the image. This type of infographic became especially widespread after the invention of smartphones and is developing day by day. Now you can find applications related to all subjects on mobile phones. In applications, students not only see a moving image, but also hear a voice explaining it. A moving text helps the student develop both reading and listening skills at the same time.

Along with presenting new information, infographics are effectively used to check the level of its assimilation. With the help of thematic mobile applications, students can strengthen their knowledge through questions along with vocabulary acquisition. For example, through the following application, new words can be mastered and memorized through exercises.



Infographics help develop students' intellectual thinking, and help the younger generation, who prefer graphics over structured texts, understand and apply complex learning materials.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

It also facilitates the work of the teacher in the process of working with the group.

REFERENCES

1. *Aripova Z. "Innovative technologies in the education of Eastern languages". "Scientific Analytical Bulletin". TIU., 2016. 4 issues.*
2. *Zelenova O.V. Neudakhina Yu.N. "Use of infographics and non-language profiles of foreign language students". www. rusnauka.com.*
3. *Ismailova Yu. "The use of interactive methods in the training of students with a professional orientation". "Theoretical and Applied Science". 2019 No. 10 (78).*
4. *Matibaeva. R. Guide for reading parallel texts. Uchebno-methodicheskoe posobie. MEOW. 2019.*
5. *Mullasodigova N. "Ways to increase the effectiveness of language learning". Learning lexical units from the linguocultural aspect and problems of language teaching. Republican scientific and practical conference. O'DJTU. 2016. Part 1.*
6. *Islomov Z. International Islamic Academy of Uzbekistan–a result of the reforms worth to the centuries //The Light of Islam. – 2018. – T. 1. – №. 1.*
7. *Islamov Z. et al. WRITING DOWN OF HADITHS IN THE VII-VIII CENTURIES: APPROACHES AND METHODS //PSYCHOLOGY AND EDUCATION. – 2021. – T. 58. – №. 1. – С. 5536-5545.*
8. *Maxsudov D. Развитие исламоведения (корановедения) в Узбекистане: история и современность //Вестник КазНУ, Серия Религиоведение. – 2020. – Т. 21. – №. 1. – С. 60-67.*
9. *Ugli A. Z. Z. THE PLACE OF ALIKHANTORA SOGUNIY IN THE HISTORY OF EAST TURKESTAN //Colloquium-journal. – Голопристанський міськрайонний центр зайнятості, 2020. – №. 24 (76). – С. 32-33.*
10. *Ugli A. Z. Z., Farxodjonova N. Alikhantura Soguniy Role in State Administration in East Turkestan //Journal of Modern Islamic Studies and Civilization. – 2024. – Т. 2. – №. 02. – С. 128-132.*
11. *Zokirjonugli Z. A. Approaches to studying the scientific heritage of Alikhantora Soguni //Asian Journal of Multidimensional Research. – 2022. – Т. 1*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

ACTIVITIES OF THE INTERNATIONAL ISLAMIC ACADEMY OF UZBEKISTAN "TREASURY OF RESOURCES"

Usmanov Makhammadsidiq Abdumannonovich
Head of the Treasury Resources, International Islam Academy of Uzbekistan

ABSTRACT
The article provides information on the history and activities of the Department of the Treasury of Sources under the International Islamic Academy of Uzbekistan, general information about the rare resources kept in the department, some rare manuscript copies and scientific researches of the department's scientific staff.

KEY WORDS: *Treasury of sources, manuscript, lithograph, new edition literature, catalog, description, manuscript pages, cover, "Uthman Mushafi", Katta Langar Qur'an.*

Scholars who grew up in Mowarunnahr regularly influenced public life throughout the Eastern Muslim world and became famous for their unique manuscripts and lithographic works. Unfortunately, most of them have not reached us today. The youth of today have a responsibility to preserve what they have achieved and pass it on to the next generation. In this regard, our respected first president I.A. Karimov also said: “Today, the unique scientific heritage preserved in the manuscript funds of our country has not yet been fully studied, its study should become an important and urgent task for all of us. “We will do our best to pass this on to current and future generations,” they said. Also relevant is the message of the decision of Presidential Decree-2995 dated May 24, 2017 by the President of the Republic of Uzbekistan Sh. Mirziyoyev “On measures to further improve the system of preservation, research and popularization of ancient written sources.” this topic more widely.

Tashkent Islamic University, created on April 7, 1999 by decree of the First President of the Republic of Uzbekistan Islam Karimov, later on the basis of this university in accordance with the decree of the President of the Republic of Uzbekistan Sh.M. Mirziyoyev. dated April 16, 2018 “On measures to radically improve the activities of the religious and educational sphere” The International Islamic Academy of Uzbekistan was created.

The "Treasure of Sources" department has been operating under the Academy for twenty years. A number of well-known scientists and researchers, including Doctor of History Professor Ubaydulla Uvatov, famous calligrapher Habibulla Salih, Deputy Mufti of the Office of Muslims of Uzbekistan Abdulaziz Mansur and a number of other well-known scientists worked effectively in the department. For example, copies of "Usman Mushafi" and "Langar Qur'an" copied by the calligrapher Habibulla Salih in Tashkent in 2004 are still surprising the visitors of our country and abroad who visit the Academy. At this point, it is appropriate to dwell on "Usman Mushafi" in detail. On the initiative of the leadership, in 2004, a copy of the "Uthman Mushafi" kept in the office of Muslims of Uzbekistan was copied on specially prepared leather in Kufic-Hijaz script by the calligrapher Habibullo Salih. This copy is covered with green leather, decorated with traditional national ornaments in gold gilt. This rare manuscript copy is kept in the fund of the University's Sources Treasury. The number of pages of the Mushaf is 353. Weight 35 kg, overall size 53.5x70 cm, text size 34x40.5 cm, number of lines 9. The insurance amount is set at 500,000 (five hundred thousand) US dollars. This "Usman Mushafi" was exhibited at international exhibitions held in London, England in 2007, Dubai in the United Arab Emirates in 2012, and Doha in Qatar in 2013.

Rare manuscripts are important in studying the specific characteristics of ancient cultures. The writing style of the work, types of writing and ink, pages and typesetting work indicate the socio-economic environment of a certain period. In particular, pictures, patterns and colors in ancient manuscripts indicate the early development of the country's culture. Manuscripts in our country are mainly written on Samarkand and Kokan paper. It can be seen that the art of handling these papers has been carried out with great taste.

Manuscript works also have spiritual and moral significance, and promote people to good manners and manners, such as patience, sincerity and knowledge. After all, writing a manuscript and researching it requires a lot of patience and perseverance. A person who studies and reads these rare works develops the ability to endure difficulties and overcome hardships with fortitude.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Manuscripts and lithographic copies of unique works created by our ancestors can be found in all major funds of the world. Searching, studying, analyzing and describing these unique sources, forming their electronic catalogs is a requirement of today. In particular, the collection of short and extended descriptive catalogs of manuscripts and petroglyphs in accordance with the needs of the times, and the delivery of its results to specialists and the general public, by summarizing and summarizing, are among the priority tasks. The number of manuscript and lithographic sources in the Treasury of Sources is growing year by year. Since the first years of our country's independence, continuous work has been carried out in this regard and is being improved. Collection of rare resources, registration, restoration of repair requirements, preservation according to modern methods, creation of electronic forms, facilitating their use by researchers and experts, as well as publication of those fund catalogs for the wide use of other scientific institutions began to develop rapidly.

The main task of the "Treasure of Sources" department is to collect, preserve and leave these masterpieces of our scientific, spiritual and religious heritage created by our ancestors who lived thousands of years ago and preserved in our country, as well as brought from abroad, and leave them to future generations in a worthy manner, as well as on these priceless heritages. is to conduct scientific research. Today, the "Treasure of Sources" is enriched with many important literature. About 500 of the ancient rare handwritten books presented by our population and brought from the regions are preserved. In addition to the loss of manuscripts, about 2,000 copies of lithographic books and more than 10,000 copies of modern printed books also enrich the fund of the department.

The department stores a copy of Usman's Mushafi copied in 2004, as well as the work "Al-Hidaya" on Islamic jurisprudence by our compatriot Imam Burhoniddin Margilani, which was written eight hundred years ago. Among the sources there are books related to the sciences of the Qur'an and hadith, Sufism, logic, adult sciences, as well as natural sciences such as mathematics, astronomy, geometry and medicine. "Hashiya ala Hashiyat al-Khayali" by Muhammad Qasim ibn Muhammad Salih Bukhari, "Sharh al-taarruf li mazhab al-tasawuf" by Abu Ibrahim Mustamli Bukhari, Shamsuddin Muhammad ibn Mubarakshah - "Sharh Hikmat al-ayn" by Mirak al-Bukhari. , the Turkish translation of "Muqaddimah Ibn Khaldun" and a number of other similar works can serve as an important source for researchers. Until now, the department has been carrying out its activities step by step with the Academy, carrying out research on the collection, proper preservation and research of the scientific heritage left by our ancestors.

A number of rare works of the scholars of our country are stored in the department. For example, the 13th century work "Al-Hidaya" by Imam Burhoniddin Margilani, which was donated to the Treasury of Sources by Islam Karimov, the first President of the Republic of Uzbekistan, is the oldest manuscript copy in the department[1].

There are also some copies of the works classified by Mir Alisher Navoi (845/1441–906/1501), the sultan of the ghazal property, who made an incomparable contribution to the development of spiritual heritage.

Another important source is the work "Siyyar al-aqtab" written by Shaykh Abdurrahim ibn Hakim Busnohshi al-Usmani, which describes 15 saints. 13 of them belong to the "Chishtia" sect.

Manuscripts and lithographic works stored in the fund of the department are dedicated to the Qur'an, hadith, fiqh, aqeed, history, dictionary, manoqib, medicine, psychology and other fields. Some resources also contain multiple works. Usually such lithographs are called "Jome' al-mutun" (Collection of Texts) or books written in the order of "Majmua". These works were scientifically described with the help of special base expressions, aimed at acceptance by the scientific staff of the department. The extended description of 300 manuscripts kept in the fund by the department staff on the basis of a state grant was created on the basis of these conditions. In the description of the manuscripts, special attention is paid to aspects such as the author of the work, the year it was written and copied, the size, the content, the state of preservation, and its occurrence in other catalogs[2]. A short description of the manuscripts was also created and published in Uzbek, Russian, English and Arabic languages.

One of the main tasks of the department is to gather manuscripts kept in the hands of the population in one fund by purchasing them. In order to enrich the resource treasury fund, EEC (Export Evaluation Committee) was created to buy manuscripts available to the population and evaluate the material, moral and ideological status of these manuscripts. The composition of EEC is approved according to the decision of the Scientific Council of the Academy, and its composition includes the vice-rector for scientific affairs and innovative research, the head of the Treasury of Resources, the responsible officer of UzMI and experts in the field.

In order to expand the scope of activities and improve the qualifications of the employees, the "Treasure of Sources" department established cooperation relations with local foundations such as the Institute of Oriental Manuscripts named after Abu Rayhan

[1]Burhoniddin Margilani. Al-Hidaya. O'XIA Treasure of Sources, XIII century. Inv. No. 48. 457 pages.
[2] N. Nasrullaev and others. Catalog of manuscripts. J.1-2. - Samarkand: Imam Bukhari International Center Publishing House, 2017. 640 p.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Beruni, the Islamic Civilization Center, as well as with the UAE "Juma Al-Majid" Center for Culture and Heritage. Within the framework of the cooperation, it is envisaged to improve the skills of the department's employees at the "Juma al-Majid" culture and heritage center, as well as to study the experience of the center in such works as cataloging, repairing, storing and creating their electronic copies.

REFERENCES

1. *Burhoniddin Margilani. Al-Hidaya. IIAU Treasury of Sources, XIII century. Inv. No. 48. 457 sheets.*
2. *Alisher Navoi. Hamsa. IIAU "Treasure of Sources", 1831. Inv. No. 240. 436 sheets.*
3. *Sheikh Abdurrahim ibn Hakim Busnohshi Osmani. Siyyar al-aqtab. IIAU "Treasure of Sources", XII century. Inv. No. 37. Sheets 18b-22b.*
4. *N. Nasrullaev and others. Catalog of manuscripts. J.1-2. - Samarkand: Imam Bukhari International Center Publishing House, 2017. 640 p.*
5. *Lobar Asrorova, daughter of Kabiljan. From the history of Bukhara madrasas. Tashkent: "HILAL-NASHR" publishing house, 2017. 170 p.*
6. *Son of Abdullah Abdumajid. From the history of Sayyids of Margilan. Tashkent: TIU publishing-printing association, 2018. 224 p.*
7. *Dr. Mustafa Shaka. Translated by: N. Abdurahmonova. Great Imam Abu Hanifa Noman. Samarkand: Imam Bukhari International Center Publishing House, 2019. 132 p.*
8. *Islomov Z. The role of the international Islamic academy of Uzbekistan in the development of Islamic studies //The Light of Islam. – 2019. – T. 2019. – №. 1. – C. 1.*
9. *Islamov Z. et al. WRITING DOWN OF HADITHS IN THE VII-VIII CENTURIES: APPROACHES AND METHODS //PSYCHOLOGY AND EDUCATION. – 2021. – T. 58. – №. 1. – C. 5536-5545.*
10. *Maxsudov D. Развитие исламоведения (корановедения) в Узбекистане: история и современность //Вестник КазНУ, Серия Религиоведение. – 2020. – T. 21. – №. 1. – C. 60-67.*
11. *Ugli A. Z. Z., Farxodjonova N. Alikhantura Soguniy Role in State Administration in East Turkestan //Journal of Modern Islamic Studies and Civilization. – 2024. – T. 2. – №. 02. – C. 128-132.*
12. *Zokirjonugli Z. A. Approaches to studying the scientific heritage of Alikhantora Soguni //Asian Journal of Multidimensional Research. – 2022. – T. 1*
13. *Arslonov Z. Z. THE PLACE OF ALIKHANTORA SOGUNIY IN THE HISTORY OF EAST TURKESTAN //Colloquium-journal. – Голопристанський міськрайонний центр зайнятості= Голопристанский районный центр занятости, 2020. – №. 24-2. – C. 9-11.*
14. *Makhsudov D. Muslim world scientists of the temurids period //The Light of Islam. – 2019. – T. 2019. – №. 3. – C. 4.*
15. *Makhsudov D. R. Mufassirs of Mawarannahr //ISJ Theoretical & Applied Science, 12 (80). – 2019. – C. 539-543.*
16. *Mukhamedov N. Khoja Ahrar-peace and consent between people //ISJ Theoretical & Applied Science, 01 (117). – 2023. – C. 378-383.*
17. *Mukhamedov N. Activities of scholars of islamic law (fuqaha) from shash oasis in scientific centers of the region //The Light of Islam. – 2020. – T. 2020. – №. 3. – C. 4-15.*
18. *Mukhamedov N., Turambetov N. Medieval Scientists of the oasis Shash and their Contribution to Islamic Civilization //The American Journal of Social Science and Education Innovations. – 2020. – T. 2. – №. 08. – C. 137-143.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

THE SILK INDUSTRY: INDIA'S ROLE IN THE GLOBAL LANDSCAPE AND FINANCIAL DECISION-MAKING DYNAMICS

Mr. Swarn G Kanchan[1], Dr. C. K. Hebbar[2]

[1]*Research Scholar, Institute of Management & Commerce, Srinivas University, India.*
Orcid ID: 0000-0003-0715-2325
[2]*Research Professor, Srinivas University, India.*
Orcid ID: 0000-0002-3711-9246

Article DOI: https://doi.org/10.36713/epra17442
DOI No: 10.36713/epra17442

ABSTRACT

Silk industry is involved with this breeding of silk worms and manufacturer of the silk. India is the second largest producer of silk contributing to about 18% to the world production. What is however more not worthy is the fact that India is requirement of raw silk is much higher than it's current production and present. It has a strong traditional and culture bound domestic market of silk. About 60 lakh persons are engaged in various sericulture activities in the country. It is estimated that sericulture can generate employment of 11 man days per kg of raw silk production throughout the year.

This paper reviews recent research on silk industries by considering various SWOT analysis. The analysis revealed the strength on this industry, Silk industry region based, the sustaining Market demand high cost of raw silk and overview of the technology innovations on- farm experimentation.

KEYWORDS: *Silk industry, SWOT analysis, Industry analysis, Raw silk cost*

1. INTRODUCTION

The silk industry has a distinctive position in India and play the significant role in textile industry and export. India is the second largest producer of silk in the world with 19690 MT (2008 to 09) and also the largest consumer of silk in the world and contributes 15% of the total world raw silk production. Geographically Asia is the main producer of silk in the world and manufacturers. Over 95% of the total global output there are over 40 countries on the world map of silk bulk of it is produced in China and India followed by Japan, Brazil and Korea. China is the leading supplier of silk to the world with an annual production of 10400 MT 2008 out of which the mulberry raw silk production is 70980 MT.

India produces a variety of silks called Mulberry, Tasar, Muga and any base production of raw silk which is the yarn obtained out of cocoons bun by certain species of insects. The major activities of sericulture comprised of food plant cultivation is to feed the silkworms which spin silk cocoons and for unwinding the silk filament for value added benefits such as processing and weaving.

It has a strong traditional and culture bound domestic market of silk. India has silk production in Karnataka, Andhra Pradesh, Tamil Nādu, Jammu and Kashmir and West Bengal while the non-mulberry silks are produced in Jharkhand, Chhattisgarh, Orissa and in the North Eastern States.

2. RELATED WORKS

The below table reviews the findings in the field of silk Industries by different authors across the world.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 1: Summarizes the findings by various authors

S. No.	Area of Study	Focus	Reference
1	Production export and import of silk	Performance Analysis of production and trade of Indian silk under WTO regime.	K. B Umesh et al (2009)
2	Analyse the impact of globalization	Impact of globalization of silk industry in northeast India. An assessment from gender perspectives	Kishore Goswami (2006) [9]
3	Performance of silk Industry	Indian Silk Industry in the global scenario.	Dr. R Anitha(2011) [24]
4	Growth potential of silk industry	Perspectives of silk Industry in India An Analysis	Dr. K. Tripurasundari, P. Rajalakshmi (2016)
5	Corporate Social Responsibilities	Social impact on silk	Banerjee, S. (2019) [10]
6	Covid-19 Impact	Price impact because of COVID19	Meher, B. K., Hawaldar, I. T., Mohapatra, L., & Sarea, A. M., (2020) [11]
7	Covid-19 Impact	Digital change in the silk during Coronavirus pandemic	Hawash. B., Abuzawayda, Y. I., Mokhtar. U. A., Yusof, Z. M., & Mukred, M. (2020) [12]

2. OBJECTIVES

(1) To analyse and understand the overview of Silk Industry
(2) To assess the manufacturing of Silk Industry.
(3) To study and understand the Silk Industry trends and their innovations.
(4) To direct the SWOT investigation for the Silk Industries.
(5) To talk about the best Silk organizations in India.
(6) To understand the Social Responsibility in these Industries.
(7) To report the Covid19 impact.

3. METHODOLOGY

The information presented and analysed are primarily based on secondary data gathered from various online sources such as websites, internet blogs, books, journals, discussions, and articles. Based on secondary data, this case study is developed and published sources are taken into development agenda. Using the information collected from journal articles, newspapers, and business websites including the website of Silk Industry detailed evaluations are presented.

4. OVERVIEW OF SILK INDUSTRY

Continuous increase in disposable incomes is a major Driver. The Indian Sericulture market was worth INR 205 Billion in 2017. The market is further projected to reach INR Billion by 2023, at a CAGR of around 18% during 2018-2023. India is currently the world's second largest consumer of raw silk and silk fabrics. The market for silk in India is driven by both exports and a very strong domestic demand. Fabrics made up of silk are quite popular in the domestic market during ceremonies, religious rituals, weddings, festivals, etc. Although silk is currently regarded as a luxury item in India with its price being significantly higher than other fabrics, we expect a continuous increase in disposable incomes to increase the consumption of silk fabrics in the country.

Based on the segment the market has been segregated as a Mulberry and Vanya. The Vanya segment has been further segregated as Tasar, Eri and Muga. Mulberry currently represents the biggest segment. Despite being the world's second largest producer of silk, the demand of silk outpaces it's supply in India. The current gap between production and demand is currently met by imports. On the basis of application, the market has been segmented as natural silk yarns, fabrics and madeups; readymade garments, silk carpets and others. Silk yarns, fabrics and madeups represent the largest application area. The market has also been segmented on the basis of various states. Karnataka was the leading producer of Vanya silk. The key markets and export destinations are as given below:

- Export of silk and silk products from India reached 291.36 million dollars in FY19 and 246.67 million dollars in FY20.
- The silk products exported include natural silk yarns, fabrics, made ups, ready made garments, silk carpets and silk waste.
- The total silk and silk products export accounted for 83.9 million dollars from April 2021 to June 2021 and for June 2021 it was 13.72 million dollars.
- Ready made garments formed the largest share in export from April 2021to June 2021 at 54.49 million dollars and silk waste at 7.45 million dollars.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The Indian silk promotion council has initiated programmes for growth and development of the Silk Industry. ISEPC organises trade shows and fairs across the world to promote trade with different countries. The council also facilitates meetings between exporters and potential customers.

5. REGION BASED SILK INDUSTRIES

Assam silk :denotes the three major types of indigenous wild silks produced in Assam— golden Muga, white pat and warm Eri silk. The Assam silk industry, now centered in Sual Kuchi, is a labour-intensive industry. Its registered trademark is SUALKUCHI'S.

In 2015, Adarsh Gupta K of Nagaraju's research team at Centre for DNA Fingerprinting and Diagnostics, Hyderabad, India discovered the complete sequence and the protein structure of Muga silk fibroin and published it in Nature Scientific Reports.

Mysore silk : Karnataka produces 9,000 metric tons of mulberry silk of a total of 14,000 metric tons produced in the country, thus contributing to nearly 70% of the country's total mulberry silk. In Karnataka, silk is mainly grown in the Mysore district. In the second half of the 20th century, it revived and the Mysore State became the top multivoltine silk producer in India.

Kanchipuram silk: Is located very close to Chennai, the capital of Tamil Nadu. From the past Kanchipuram Silk sarees stand out from others due to its intricate weaving patterns and the quality of the silk itself. Kanchipuram silk sarees are large and heavy owing to the zari work on the saree. Kanchipuram attracts large number of people, both from India and abroad, who come specifically to buy the silk sarees. Most of the sarees are still hand woven by workers in the weaving unit. More than 5000 families still indulge in silk weaving.

Banaras: Made in Varanasi, a city which is also called Benares or Banaras. The sarees are among the finest sarees in India and are known for their gold and silver brocade or Zari, fine silk and opulent embroidery. The sarees are made of finely woven silk and are decorated with intricate design and because of these engravings, are relatively heavy.

Their special characteristics are Mughal inspired designs such as intricate intertwining floral and foliate motifs, kalga and bel, a string of upright leaves called jhallar at the outer, edge of border is a characteristic of these sarees. Other features are gold work, compact weaving, figures with small details, metallic visual effects, phallus, Jal (a net like pattern), and mina work.

7. SILK INDUSTRY TRENDS AND INNOVATIONS

Technological innovations in the sericulture to create enormous impact on the global silk market. However high cost of raw silk may hamper the global silk market growth. Silk is the insect fibre with excellent strength and luster. It has exquisite qualities such as the inherent affinity for vibrant colours and dyes, natural sheen, light weight, high absorbance, excellent drape, resilience and others. Because of such features, silk is known as the queen of textiles world wide. Silk is made up of proteins secreted in the liquid state by a silkworm, a caterpillar. Covid 19 impact on silk market business like hospitality, retail, and tourism industry have been forced to reconsider their business policies and models. Also, global silk market has witnessed declined growth, throughout the pandemic period mainly because the difficulties in accessing transportation facilities. Furthermore owing to the uncertainty in the market, domestic and international buyers suspended or cancelled their orders, adding to the worst of the industry. Such elements have negatively affected the global market for silk fibers in the outbreak period. On the other hand, Government statutory bodies are upcoming with strategic steps to uplift the Silk Industry.

8. INVESTMENT STRATEGIES IN SILK PRODUCTION AND PROCESSING

Moving beyond raw silk to produce finished goods such as silk garments, accessories, and home decor can open up new revenue streams and reduce dependence on raw silk prices. Investing in specialized silk types like organic or handloom silk can cater to high-end markets and differentiate products from mass-produced alternatives. Investing in advanced machinery for silk reeling and weaving can enhance productivity and quality. Technologies like automatic reeling machines, electronic jacquard looms, and computer-aided design systems streamline operations. Investment in eco-friendly practices and technologies, such as water-saving dyeing processes and organic silk farming, can meet the growing demand for sustainable and ethically produced silk. Expanding rearing facilities, enhancing cocoon storage, and building state-of-the-art processing units can increase production capacity and efficiency. Investing in silk production in diverse regions within a country can mitigate risks associated with regional climatic conditions and diseases affecting silkworms. Investing in R&D for developing disease-resistant and high-yield silkworm breeds can significantly boost productivity. Funding research into new applications of silk, such as in biomedical fields or high-tech fabrics, can create new market opportunities. Investing in branding and marketing to position silk products as luxury items can command higher prices and build customer loyalty. Leveraging digital platforms for marketing and sales can reach a global audience more efficiently.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

9. IMPACT OF FINANCIAL PLANNING ON SCALABILITY AND SUSTAINABILITY

Proper financial planning helps allocate resources efficiently across different stages of the production process, from silkworm rearing to final product manufacturing, supporting scalable growth. Strategic planning for investments in infrastructure, such as upgraded processing units and logistics, supports scalability by enabling larger production volumes and better market access. Effective financial planning allows for better cost control, which is essential for maintaining profitability, especially in an industry susceptible to fluctuations in raw material prices. Financial planning can facilitate investments in sustainable practices and technologies, ensuring compliance with environmental regulations and meeting consumer demand for eco-friendly products. Planning for long-term investments in R&D and market expansion helps build a sustainable business model that can withstand economic and market changes.

10. RISK MANAGEMENT AND FINANCIAL FORECASTING FOR SILK ENTERPRISES

Risks include raw material shortages, transportation delays, and disruptions due to geopolitical factors or natural disasters. Failure to keep up with technological advancements can result in lower productivity and competitiveness. Financial instruments like futures contracts can hedge against price volatility. Diversifying product lines and markets reduces dependency on any single segment. Developing multiple sourcing options and investing in local supply chains can mitigate the risk of disruptions. Investing in ongoing R&D and staying abreast of technological advancements ensures competitiveness and resilience. Analyzing market trends and historical data to project future sales and revenue streams. Forecasting production and operational costs, considering variables such as raw material prices, labor costs, and technology investments. Planning for future capital expenditures and determining the financial viability of new projects and expansions. Conducting scenario planning to assess potential impacts of various economic, market, and environmental conditions on the business. Aligning financial planning with long-term goals for sustainable growth, considering environmental and social governance (ESG) factors. Creating financial buffers and contingency plans to withstand economic downturns and unforeseen challenges.

11. SWOT ANALYSIS

Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis is a method of determining a company's strengths, weaknesses, opportunities, and threats. Silk Industries will be able to map the present business environment and identify internal strategic aspects such as strengths and weaknesses, as well as external strategic factors such as opportunities and threats using this technique. Here we discuss in detail the Strength, Weaknesses, Opportunities, and Threats of silk Industry.

Strength

- Low investment, short gestation period and higher returns. Mulberry takes only six months to grow for starting silkworm rearing and once planted it can support five crops in one year under tropical condition. Depending on the management, rearing at least for 15 years can be continued in the same land.
- Comparatively cheap labour.
- Strong fair trade movement and women entrepreneurship in the silk sector. Different activities of sericulture starting from mulberry garden management, leaf harvesting and silkworm rearing even reeling and weaving can effectively be supported by women workers.
- Large production base.
- Availability of silk worm breeds and hybrids.
- Availability of silks, land and labour.
- Large variety of silk weaving techniques is in existence.
- Strong domestic demand.
- Practically no risk in industry.
- Children and old persons of rears family can also participate in rearing process.
- Scope for professional training.

Weakness

- High dependency on import of raw materials.
- Skills training facilities are not sufficient for the entire country.
- Weaving skills are diminishing.
- No modern reeling facilities in use.
- Lack of quality based pricing system in the market.
- Sericulture close to now existent.
- Availability of expertise in marketing are low.
- Use of outdated technology and low quality seeds.
- Decentralized nature of the industry inhibits financial institute from extending financial support to the sector.
- Poor linkage among different stakeholders.
- Gaps in technology transfer and extension support

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Opportunities

- The growth in cities and state are quick in terms of industrial enterprise and urbanization.
- More opportunities exist as there is more growth in the market in other field which directly
- New silk fields have been discovered in Assam because of the huge population

Challenges

- Operational safety parameters.
- Small towns and rural regions face challenges .
- Difficult to penetrate into the energy market.
- Lack of steady national policy that could promote sustainable exploitation of renewable energy in Industry.
- Doubt of decision makers regarding the potentially.

12. SOCIAL RESPONSIBILITY

The social responsibility focuses on to the tribal communities that shoulder the responsibility of crafting fine silk fabrics woven through traditional that keep the cultural authenticity alive setting them apart from the rest of the world. Community development to uplift the artisans. To ensure that artisans feel empowered and enjoys the crafts that it rightfully deserves. They build a community which can survive through natural calamities and support such crafts will help in the upliftment for these artisans. Sustainably reviving crafts through product development. Assamese textile is known for its fine quality, brightness of colour and durability. Regular visits to the artisans and suppliers helps them to create culturally authentic products for the global markets. Preserving and promoting of Assam Weaving heritage. Assamese weavers are true to their tradition and roots. One of the most important goals for us is to preserve and promote the Assam Weaving heritage around the world. Embracing Womanhood To empower women weavers. Work with suppliers whose first priority is to keep the women weavers safe and sound so that we as a social enterprise help in keeping the age-old tradition alive and empower them. They teach them how to read, learn and do basic savings so that their self esteem and confidence is boosted even further. We are grateful to our suppliers who help in providing basic incentives and regular heath check ups as well. Appreciate and support slow design and process (Quality over Quantity) We take time to produce and will be carried out in small production but it will bring you closer to being ethically correct in the fashion world where everything is going in such fast pace. Its our duty as a young start up social innovative label to slow down the process. Positive impact on the environment. We respect our planet and ecosystem. Being conscious of our environment has brought us closer to being ethically accountability in the fashion world where everything is going fast. Being honest with the waste management and causing no harm is always in our mind. We make sure that our suppliers understand this ethos so that we support zero waste management and dye waste management. Social Donation Through Unique Product Innovation. In order to mark and honour the core identity that Assam carries that is its One-Horned Rhinos- which are on the brink of extinction- we designed a line of hair accessory, we call it 'Rhinears'. We are in a serious mission to donate a percentage of our profit through this product line for Saving The Rhinos in Assam

13. COVID-19 IMPACT

The global pandemic of Covid-19 has affected the existing modus operandi of various textile sectors by posting restriction of social gathering, migration of laborers as well as affecting all the stakeholders right from farmers to traders/exporters in the value chain of textile sector and at the same time it has opened new window of opportunities which were previously less explored. The government has conducted a study viz. 'Impact of Covid-19 pandemic on Indian silk industry' to ascertain the crisis caused to the sector. It has been observed that there was a production decline and monetary loss at every stage of the value chain. The industry has faced various problems like loss in production, crash in cocoon and raw silk prices, transportation problem, non-availability of skilled workers, problems in selling raw silk and silk products, working capital and cash flow problems, non-availability of raw materials, reduction in demand for silk fabric, cancellation of export/import orders besides export and import restrictions. Since, textile sector being highly unorganized sector therefore, the government has not made any formal assessment with regard to the losses incurred by the sector.

To withstand in COVID 19 pandemic, the Government of India has announced a special economic package viz. AatmaNirbhar Bharat Abhiyaan for boosting economy of the country and making India self-reliant. Relief and credit support measures have been announced for various sectors including MSMEs. The weavers & artisans/karigars can avail benefits of these relief and credit support measures to revive their businesses which have suffered due to lock down necessitated by Covid-19 pandemic. Taking a step towards realizing "Atmanirbhar Bharat", Handloom Export Promotion Council has endeavoured to virtually connect the Handloom Weavers and exporters from different corners of the country with the International Market. With more than 200 participants from different regions of the country showcasing their products with unique designs and skills, THE INDIAN TEXTILE SOURCING FAIR was organised on 7, 10 and 11th August. The show has already attracted considerable attention of the International Buyers. In order to support the handloom and handicraft sectors and to enable wider market for handloom weavers/artisans/producers, steps have been taken to on-board weavers/artisans on Government e-Market place (GeM) to enable them to sell their products directly to various Government departments and organizations.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

14. RECOMMENDATIONS AND SUGGESTIONS

The Government should establish a price regulation mechanism for the silk weavers so that the small traders are not exploited. This can be done by setting up a Silk Auction Board on the lines of the Tea Auction Board. This will also make Assam silk a large global brand like the tea industry and transform it into a modern industry ensuing competition at the global level. Our nation has a very unique way of dealing with protests. From the streets of Srinagar to the grounds of Kudankulam down south, the first response of authorities always seem to be to meet the protest with force, terming everything a "law and order" problem. Such an attitude generally doesn't pay any long term dividends and in fact increases the distance between the Government and the governed.

Yet today this source of pride is in the news for all the wrong reasons. The glory that this sleepy town earned for Assam and for India throughout the years, is now slipping away. It is slowly turning into a story of despair and these protests and subsequent being fired upon is merely a manifestation of this despair. So what is it that ails the industry today or rather the bigger question is how do we develop and protect our indigenous industries. First and foremost, we must be able to understand the basic problems that plague this labour intensive industry today. An example in this regard is the non existence of price control. There is no price control board which regulates the price of these commodities. For example, the price of a piece of cloth is the same as it was five years ago with very minor increase. In this era of inflated economy, we can all comprehend how this non-increase in the basic prices of the commodity will hit the producers. Major fallout of this non-increase in price is degradation in the quality of cloth. To make up for the losses in the non increases of prices, a large number of producers are resorting to mixing other elements in the cloth. The price of the commodity depends on a few large traders who virtually have iron grip on the market. They fluctuate the prices according to their own needs so that the market prices move when they desire to do so. This hegemony deters the very growth of the industry and also acts against letting any new traders enter this trade since they know the profits will depend on the whims and fancies of a few large traders.

15. FINDINGS

India produces all the four varieties of silk, viz. mulberry, tassar, eri and muga. The synthetic silk produced by Japan and Italy, being less expensive has been in competition with pure silk. Sericulture is the art of rearing silkworms for silk production. It is an important industry as it provides employment to people in rural areas. Karnataka produces only mulberry silk and accounts for 70% of the silk production. The reasons for the concentrationof the silk industry in Karnataka are: Availability of the silkworm 'Bombyx Mori' and the mulberry plant throughout the year. The climate is favourable for rearing of silkworm. Availability of alkaline free water. Introducing modern technology to cultivate. Introduction of modern technology of rearing of silkworms. The market for silk in India is driven by both exports and a very strong domestic demand. Fabrics made up of silk are quite popular in the domestic market during ceremonies, religious rituals, weddings, festivals, etc. Silk is used as a raw material for the manufacturing of both garments such as suites, sarees, etc. as well as in products such as curtains, bed sheets, pillow covers etc. Although silk is currently regarded as a luxury item in India with its price being significantly higher than other fabrics, we expect a continuous increase in disposable incomes to increase the consumption of silk fabrics in the country.

16. CONCLUSION

India is the second largest producer of silk, contributing to about 18 per cent to the world production. What is however, more noteworthy is the fact that India's requirement of raw silk is much higher than its current production at present. Thus, there is considerable scope for stepping up production of raw silk in the country, overcome the persistent conflict of interest between exporters of silk products and producers of raw silk. While sericulturists want imports of raw silk to be restricted to have better market for their produce, exporters want imports of cheaper raw silk so as to be able to export more silk products at competitive rates. India has all the four varieties of silk namely, mulberry, tassar, eri and muga. It is however, disheartening to note that we have not yet been able to fully exploit this advantage and make our presence felt on the international scene more prominently than at present. For this, one has to clearly understand the strengths and weaknesses of different segments of this sector. The strength of this industry lies in its wide base, the sustaining market demand pull especially from the Indian handloom weaving sector, the infrastructure created by the national sericulture project and the research and training capabilities.

REFERENCES

1. *Aithal, P. S. (2017). Company analysis – The beginning step for scholarly research. International Journal of Case Studies in Business, IT, and Education, 1(1).*
2. *Aithal, P. S. (2017). Industry analysis – The first step in business management scholarly research. International Journal of Case Studies in Business, IT, and Education, 1(1), 1–13.*
3. *Aithal, P. S., & Kumar, P. M. (2015). Applying SWOC analysis to an institution of higher education. International Journal of Management, IT and Engineering, 5(7), 1–17. Retrieved from https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=marketing+demand+of+dairy+industry&btnG=#d=gs_qabs&t=1652499446470&u=%23p%3Dm9B2vNeRC2oJ*
4. *Balkan, Ö. L. (1975). The price revolution of the sixteenth century: A turning point in the economic history of the Near East. International Journal of Middle East Studies, 6(01), 3–28. https://doi.org/10.1017/S0020743800020227*
5. *Inalcik, H. (1960). Harir. In Encyclopedia of Islam (2nd ed.). Leiden: Brill.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

6. *Inalcik, H. (1960). Bursa XV. Asir Sanayi Ve Ticaret Tarihine Dair Vesikalar (Documents on the industrial and commercial history of Bursa during the fifteenth century). Belleten, 24, 45–102.*
7. *Inalcik, H. (1969). Capital formation in the Ottoman Empire. The Journal of Economic History, 29(03), 97–140. https://doi.org/10.1017/S0022050700097192*
8. *Dalsar, F. (1960). Turk Sanayi ve Ticaret Tarihinde Bursa'da Ipekcilik (The place of the Bursa silk industry in the industrial and commercial history of Turkey). Istanbul: Türk Tarih Kurumu.*
9. *Braude, B. (1979). International competition and domestic cloth in the Ottoman Empire, 1500–1650: A study in undevelopment. Review (Journal of the Fernand Braudel Center, SUNY), (Winter), 437–461.*
10. *Sahillioglu, H. (1974). Yeniceri Cuhasi ve II. Beyazid'in Son Yillarinda Yeniceri Cuha Mu-hasebesi (Accounts of the woolen cloth for Janissaries during the last year of Beyazid II). Güney DoĞu Avrupa Arastirmalari Dergisi, 2–3, 415–467.*
11. *Barkan, Ö. L. (1970). Research on the Ottoman fiscal surveys. In M. A. Cook (Ed.), Studies in the economic history of the Middle East (pp. 163–171). London: Oxford University Press.*
12. *Jennings, R. C. (1976). Urban population in Anatolia in the sixteenth century: A study of Kayseri, Karaman, Amasya, Trabzon and Erzurum. International Journal of Middle East Studies, 7, 21–57. https://doi.org/10.1017/S0020743800020343*
13. *Akdag, M. (1975). Turk Halkinin Dirlik ve Duzenlik Kavgasi, Celali Isyanlari (The struggle of Turkish people for order and the Celali uprisings). Istanbul: Kervan Kitapçılık.*
14. *Barkan, Ö. L. (1966). Edirne Askerî Kassamina Ait Tereke Defterleri, 1545–1659 (Inheritance registers of the Edirne Askeri class, 1545–1659). Türk Tarih Beguiler Dergisi, 3, 1–479.*
15. *Çizakça, M. (1978). Inflation and the Bursa silk industry. Studies in Development (Special Issue), 1–38.*
16. *Sahillioglu, H. (1958). Kurulufundan XVII. Asrin Sonlarina Kadar Osmanh Para Tarihi Hakkinda Bir Deneme (Study of Ottoman monetary history from the beginning to the seventeenth century) (Ph.D. diss., Istanbul University).*
17. *Sahillioglu, H. (1965). Bir Asirlik Osmanh Para Tarihi, 1640–1740 (Ottoman monetary history, 1640–1740). Istanbul: Edebiyat Fakültesi Basimevi.*
18. *Sahillioglu, H. (1964). XVII. Asrin Ilk Yarisinda Istanbul'da Tedavüldeki Sikkelerin Rayici (The rate of coins in circulation during the first half of the seventeenth century in Istanbul). Belgeler Dergisi, 1, 227–235.*
19. *Islamoglu, H., & Faroqhi, S. (1979). Crop patterns and agricultural production trends in sixteenth-century Anatolia. Review, 2(3), 413. https://doi.org/10.2307/40240764*
20. *Masson, P. (1911). Histoire du commerce français dans le Levant au XVIIIe siècle (pp. 445–467). Paris: Librarie Armand Colin.*
21. *Davis, R. (1967). Aleppo and Devonshire Square. London: Macmillan.*
22. *Ulker, N. (1974). The rise of Izmir, 1686–1740 (Ph.D. diss., University of Michigan).*
23. *Mantoux, P. (1965). The industrial revolution in the eighteenth century (Rev. ed.). New York: Harper & Row.*
24. *Heeringa, K. (1910–1917). Bronnen tot de Geschiedenis van den Levantschen Handel (2 parts). The Hague: Nijhoff.*
25. *Groot, A. H. de. (1978). The Ottoman Empire and the Dutch Republic. Leiden/Istanbul: Brill.*
26. *Van der Wee, H. (1978). Konjunktur und Welthandel in den Südlichen Niederlanden (1538–1544). In H. Kellenbenz & J. Schneider (Eds.), Wirtschaftskrafte und Wirtschaftswege, Beitrâge zur Wirtschaftsgeschichte (pp. 144). Bamberg: Kulmbach.*
27. *Brulez, W. (1970). The balance of trade of the Netherlands in the middle of the sixteenth century. Acta Historiae Neerlandica, 4, 36.*
28. *Bowden, P. J. (1977). Movements in wool prices, 1490–1610. Yorkshire Bulletin of Economic and Social Research, 4, 116. https://doi.org/10.1080/03023327709436537*
29. *Beveridge, W. H. (1966). Prices and wages in England from the 12th to the 19th century. London: Longmans, Green and Co.*
30. *Hamilton, E. J. (1965). American treasure and the price revolution in Spain, 1501–1650 (Rev. ed.). New York: Octagon Books.*
31. *Thijs, A. K. L. (1969). De Zijdennijverheid te Antwerpen in de Zeventiende Eeuw. Liège: Université de Liège.*
32. *Cole, C. W. (1964). Colbert and a century of French mercantilism (Rev. ed.). Hamden: Archon Books.*
33. *Cole, C. W. (1961). England and the Mediterranean, 1570–1670. In F. J. Fisher (Ed.), Essays in the economic and social history of Tudor and Stuart England (pp. 120–121). Cambridge: Cambridge University Press.*
34. *Çizakça, M. (1979). Inflation and the Bursa silk industry. Review, 2(3), 262. https://doi.org/10.2307/40240767*
35. *Islamoglu-Faroqhi, H. (1979). Crop patterns and agricultural trends. Review, 2(3), 413–414. https://doi.org/10.2307/40240764*
36. *Brulez, W. (1959). L'Exportation des Pays-Bas vers l'Italie par voie de terre au milieu du XVIe siècle. Annales, E.S.C., 14(3), 461–491. https://doi.org/10.1017/S0395264900024627*
37. *Bowden, P. J. (1977). Movements in wool prices, 1490–1610. Yorkshire Bulletin of Economic and Social Research, 4, 116. https://doi.org/10.1080/03023327709436537*
38. *Beveridge, W. H. (1966). Prices and wages in England from the 12th to the 19th century. London: Longmans, Green*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

INFLUENCE OF PROJECT MANAGEMENT PRACTICES ON PERFORMANCE OF TELECOMMUNICATION PROJECTS A CASE STUDY OF GOLIS TELECOMMUNICATION SOMALIA

Abdihakin Hassan Kalif [1], Samuel Nyambega Nyang'au[2]
[1]*Mount Kenya University, Kenya*
[2]*Samuel Garissa University. Kenya*

ABSTRACT
Despite the government's best attempts to make money more readily available for development purposes, a growing number of telecommunications projects in Somalia have failed. The performance of the majority of projects in Somalia fails to fulfill the intended objectives based on the indicators of time, quality, and cost. The specific objectives of this research was evaluate the influence of stakeholder participation, project risk management, project planning and monitoring and evaluation practices on the performance of telecommunications projects. A case study of Golis Telecommunication Somalia. The study adopted descriptive design. The target population in the research consisted of 214 staff members from Golia limited. The use of Slovene's formula was used to arrive at 139. The method of sampling that was used for the research is stratified random sampling, and participants were selected at random from each stratum. Using a method called simple random sampling, the researcher was chosen Golia restricted participants at random from among each set of employees. The study used semi structured questionnaires. Statistical analysis, inferential statistics was used to find out the relationship between the variables. Stakeholder involvement methods, had a substantial effect on the outcome of projects on the other hand, the results indicated that techniques for managing projects' risks significantly impacted their outcomes. Project planning techniques had a substantial effect on the performance of projects. Lastly, the results showed that Golis Telecommunication Somalia's project success was significantly influenced by the quality of the M&E procedures. It was found out that project planning has positive relationship with performance of telecommunications projects. The study recommends that project management practices should encourage collective pride in completed work. Indirect and direct users alike should reap the benefits of the project's completion. Users should be able to do this at any point in the project's execution. The projects should be seen as investments that will provide for current and future generations, thus all parties involved should make every effort to work together.

KEYWORD: *project management practices, Performance of projects, Telecommunications.*

1.0 INTRODUCTION

Government and commercial sector clients alike are invested in seeing this project through to a happy ending. Although there is much discussion on how best to manage projects, nobody can agree on how their performance should be evaluated (Bai, & Yang, 2011). Successful project completion requires both the creation of a detailed timetable and an understanding of the most influential factors. It makes it easier for the project management and the stakeholders to make the appropriate choices and move in the direction of the project's success (Adan,2016). Despite the absence of government control of phone or Internet connection, several telecommunications providers in Somalia are vying for customers, contributing to the rapid development of technology and people's access to it. Somalia's phone service industry is highly competitive, which has helped the country's economy recover slowly and shows that even in one of Africa's least developed markets, certain complex businesses can survive and thrive (Dahie, et. al 2016). Golis Limited is a key player in the rollout of critical infrastructure for global telecommunications networks. Currently, these endeavors are being worked on by Golis Limited. Abdiaziiz(2018) identifies integration, project scope management, time and cost management, procurement, risk management, communications management, human resources management, and quality management as the two most important processes for completing telecommunications network equipment projects on time and under budget. In order to ensure a smooth rollout of communications network equipment projects, the following process areas have been prioritized. Because of the difficulty and expense involved in maintaining multiple technologies, as well as the necessity of freeing up valuable assets that are currently occupied by technology that is both older and less effective, operators have started making preparations for the decommissioning of their older networks.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

1.2 Statement of the Problem

Numerous initiatives all around the globe continue to be unsuccessful, which costs businesses and organizations tens of millions of dollars. Despite the government's best attempts to make money more readily available for development purposes, a growing number of telecommunications projects in Somalia have failed (Gharouni, 2021). According to Kaufmann and Kock, (2022),the performance of the majority of projects in Somalia fails to fulfill the intended objectives based on the indicators of time, quality, and cost. More than 70% of the initiatives that are really carried out will almost certainly lengthen the overall duration of the project by fifty percent. Additionally, more than fifty % of the projects that are carried out will most likely result in an increase of more than twenty % in the total cost of the project. Most telecommunication projects in Somalia which are aimed at ensuring the better the community have been mentioned to have short lifespan, others have stalled and others have not impacted significantly to the community intended (United Nations Development Programmed (Khalid, 2015). According to Dai and Wells (2004), project teams and supervisors lack soft skills. Soft skills in project performance have not been examined in the Somali telecommunications business. It is not entirely obvious if the successful completion of projects in the telecommunications industry in Somalia is influenced in any measurable way by the use of certain "soft skills" possessed by project managers. It was noted that top management should try to incorporate the organization's plans in their activities. However, there exists a notable gap in the research landscape, as none of these studies have been extended to encompass performance of projects of telecommunications. A case study of Golis Telecommunication Somalia.

1.3 Objectives of the study

This research aimed to determine;

i. To investigate the influence of stakeholder engagement on performance of projects of telecommunications. A case study of Golis Telecommunication Somalia.
ii. To assess the effect that project risk management practices have on performance of projects of telecommunications. A case study of Golis Telecommunication Somalia.
iii. To determine the extent to which project planning practices on performance of projects of telecommunications. A case study of Golis Telecommunication Somalia.
iv. To investigate the influence of monitoring and evaluation on performance of projects of telecommunications. A case study of Golis Telecommunication Somalia.

2.0 LITERATURE REVIEW

Stakeholders Participation Practices and Performance of Projects

Adan(2019) studied the Isiolo North Constituency to see how voters affect the success of development funds. This study used a descriptive approach. This study demonstrates the importance of project managers and government officials in a project's final outcome. The key concerns of the research were the roles played by different parties and suggestions for bolstering electoral progress. Research is now being performed with the goal of better understanding how stakeholders in Somalia's telecommunications projects are involved in the implementation process.In their research, Mandala, (2018) investigated how the engagement of stakeholders affected the efficiency of road construction projects carried out by the Kenya National Highways Authority(KeNHA). In order to obtain quantitative as well as qualitative information, the research included interview schedules and questionnaires. A stratified random sample approach was used to choose 251 participants from the prequalified contractor population, KeNHA top management(Job group 7-10), and prequalified consultant populations for this research. All of the participants worked for legitimate companies. The research found that seminars and conferences, as well as open lines of communication between all parties involved, were essential to the success of road construction projects. Wamugu and Ogollah(2017) looked on how involved different groups were in carrying out the CDF project in Kenya's Mathira East constituency. Since stakeholders may have the largest effect on the results of CDF initiatives, the findings suggest that their involvement in the project's preliminary stages, including identification, screening, and selection, is crucial. Only CDF projects were included in the study, whereas the current examination is narrowing down on the effectiveness of telecoms initiatives in Somalia.

Project Risk Management Practices and Performance of Projects

According to Ahmadabadi and Heravi, (2019) study's findings, construction projects' risk management strategies can be defined as any action taken to reduce the likelihood of undesirable outcomes that could compromise the project's timeline, budget, or overall success. The studies did not address the project risk on a telecommunications project, which is a gap in the variable of project risk on performance projects that is meant to be addressed by this research. Maiyo and Kamaara. (2019) was found out that development projects will fulfill their intended goals if sufficient accountability and transparency are exercised in the process of resource mobilization, and that involvement of project stakeholders leads to projects that are demand driven, which in turn leads to projects that reach their intended results. Stakeholder analysis and stakeholder interaction were also highlighted as areas where project teams may benefit from training.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

By examining how project risk affects the successful conclusion of telecommunications projects, this research hopes to fill a need in the existing literature.

Motaleb and Kishk, (2013) found out that faults in linkages to the project occurred during unprepared implementation. The second kind of risk is involved with the Execution phase of the project and happens when team members are unable to complete project-related tasks effectively. Finally, there's the potential for horizontal and vertical integration throughout the whole of the project's work. Their advice is to put more effort into carrying out the tasks after they have been planned. One of the problems that has been identified all through the process of adding new features is integration risks, where one part of the project is not compatible with the other, leading to malfunction and a lack of component interoperability. To rephrase, even if everyone in the team completes their work on time and on budget, the project may still fail if its many components are not well-suited to one another. Maghanga(2019) looked on how cement manufacturing companies in Nairobi County, Kenya, handled project risk and how it affected final results. Aspects of project risk management that have been found to effect project results include risk avoidance, risk retention, risk transfer, and risk control. Additionally, there is a considerable link between the factors, both independent and dependent on one another. The research will concentrate on initiatives related to telecommunications in Somalia.

Project Planning Practices and Performance of Projects

Muute and James, (2019) examined how project planning practices and performance of construction projects in Nairobi City County, Kenya. The study's scope was narrow since it solely examined housing developments and attempted to identify factors that affect actual implementation. This research will examine the effectiveness of telecommunications project management. Nzioka(2018) investigated the positive outcomes of careful project management planning in Kenya's capital city, Nairobi. All aspects of the research were anchored in the context of the Kenya Power Infrastructure Development Projects. In order to collect information for this research, a Census Survey was sent to all project managers. The study mapped out the various planning tasks and identified the various planning approaches. This study aims to answer the question of whether or not effective project planning improves the speed with which telecommunications projects are finished.

To ascertain the significance of planning for projects, Gitau, (2015) found out that the quality of a project's early planning significantly affects the project's outcome. Researchers deduced from this that success rates for projects were higher when more time was spent on preparation. This study's findings suggest that project managers need to put in sufficient effort during the planning phase of their endeavors. This successfully places the emphasis on the role that risk management plays throughout the planning phase of the project. Similar conclusions were reached by Magagan and Ngugi, (2021) showed that the project's success or failure was heavily dependent on the human capital planning tactics used. It should come as no surprise that the quality of the instruction offered to the persons who participated in the effort and the amount of participation demonstrated by the individuals who were a part of the initiative were directly related to the project's success. The research shed light on the several aspects of planning that, when combined, have the potential to greatly impact the accomplishment of building endeavors.

Monitoring and Evaluation Practices and Performance of Projects

Project management approaches were very helpful for local businesses in the Lake Basin Region's road building projects, as stated by Ochenge(2018). Findings suggest that the success of road infrastructure programs is significantly affected by the degree to which their progress is monitored and assessed. The Lake Basin Region served as the study's location, and it used both descriptive and explanatory research approaches into its overall methodology. This research is going to be carried out in Somalia. Wambua(2019) investigated how M&E affects county-funded education initiatives. Makueni was studied descriptively. The county M&E unit and sub-county M&E teams, all of whom got M&E training and engaged in public participation-oriented baseline surveys, structured the M&E process, the data showed. This research examines how M&E affects Somalia's several telecommunications initiatives. In the setting of Makueni County, Muindi(2018) conducted research on the impact of M&E on county-funded programs for social betterment. The study's results informed recommendations for how Kibwezi Sub County should better coordinate its assets to ensure that the administrative personnel and financial means needed to oversee county-funded initiatives were readily available. The M&E was the primary focus of the research, however performance initiatives were not discussed.

Kala, (2020) revealed that many projects failed to meet their objectives. The research says this happened because there wasn't enough checking in and assessing going on. Research shows that these things are necessary for activities to take place: participant involvement, capacity building, and appropriate funding. However, there are also some beneficial outcomes, such as greater quality projects thanks to public backing and larger profits for private investors because to public subsidies. Due to the fact that there was no previous study that looked at the influence of M&E on project outcomes during telecommunications projects, this new research will fill the void left by

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

the absence of such research. Njiru(2018) investigated manufacturing company project management methods and execution in Nairobi, Kenya. It was found out that project monitoring should be a constant and ongoing project review and surveillance to verify that the deliveries, schedules of work, goal outputs and other necessary actions are implemented in accordance with the plan. Research on M&E in telecommunication firms in Somalia neglected to include the context of project success, which is a void that this research intends to fill.

3.0 METHODOLOGY

Research Design

This study was used a descriptive study design. This descriptive format allows one to express information about the nature and state of an event more clearly(Creswell, 2012). This descriptive study design was relevant for this analysis as it helped to characterize the state of activities as they appear without the study's aim of manipulating variables.

Population of the Study

The population of this study covered 214 employees at Golis Telecommunication. Employees were classified as either upper-level managers, middle-level managers, or entry-level workers. The layers were put into action.

Table 1: Distribution of the Target Population

Category	Population	Percentage
Senior Level Management	29	**14%**
Middle level Management	83	**39%**
Bottom Level Management	102	**48%**
Total	**214**	**100**

Source: Golis Telecommunication HR records(2022)

Sample Size and Sampling Techniques

Sample is the proportion of the total population to be studied sampling technique was the method used for selecting a sample. The number of elements in a sample is known as sample size. Since the population of this study was finite, the application of statistical formula becomes essential in order to determine the sample size. The sample size for this study was arrived at using the Taro Yamane formula. This is as expressed below

$$\mathrm{n} = \frac{N}{1 + N(e)^2}$$

Where:
n =Sample size
N =Population of the study
e =Tolerable level of error (5%)

$$\frac{214}{1 + 214(0.05)^2}$$

$$\mathrm{n} = \frac{214}{1 + 214\ (0.0025)}$$

$$\mathrm{n} = 139$$

Table2: Sample Size

Category	Population	Proportionate sample Size (x/214*139)
Senior Level Management	29	19
Middle level Management	83	54
Bottom Level Management	102	66
Total	**214**	**139**

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Method of Data Analysis

Descriptive statistics in SPSS 24 were used to assess the study's quantitative data. Mean, frequency, standard deviation, and percentages are all examples of descriptive statistics that may be used to characterize a sample and highlight key trends in the data. Using a correlation statistic called the product-moment correlation coefficient that Pearson devised, the researcher assessed the significance of the associations between the variables. Multiple linear regression analysis was used to look for correlations and establish causation. This research investigated how different approaches to project management might impact the efficiency of an organization. The information obtained over the course of this research will be analyzed using SPSS version 22, which will be provided by IBM. The regression model will consist of the following:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + Ɛ$$

Where;
Y = Performance of Projects
α - Is the regression constant or intercept,
β1, β2, β3 and β4– Are regression coefficients or change induced in Y by each X_1, X_2, X_3 and X_4 that are predictor variables,
X1 = Stakeholder Participation Practices
X2 = Project Risk Management Practices
X3 =Project Planning Practices
X4 = Monitoring and Evaluation
Ɛ (Extraneous) - That part of the error term that takes into consideration the predictor variables' linear effects but fails to explain the observed variation in Y.

4.0 DATA ANALYSIS AND FINDINGS

In this study, multivariate regression analysis was employed to ascertain the correlation between the dependent variable, namely the performance of telecommunications projects, and a set of independent variables, including stakeholder participation practices, project risk management practices, project planning practices and M&E practices.
The multiple regression models were as follows:

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$$

Whereby; Y was performance of projects of telecommunications, B0 was a Constant, β1- β4 were Coefficients of determination,
X1 was stakeholder participation practices
X2 was project risk management practices
X3 was project planning practices
X4 was monitoring and evaluation practices
ε was Error term.

Table 3: Model summary for combined Performance of projects

Model	R	R Square	Adjusted R square	Std. Error of the estimate
1	.861a	.742	.730	.35548

Constant predictors include stakeholder engagement, risk management, planning, and M&E procedures. Table 3 displays the findings, revealing a R Square statistic of 0.742. According to these results, about 74.2 % of the observed variation in project outcomes can be explained. Therefore, it can be deduced that factors not included or analyzed in the current study may account for 25.8% of the observed variations in project success. As can be seen in Table 4.10, the outcomes of an ANOVA were calculated and presented in a clear and plain format.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 4: ANOVA for combined determinants and performance of projects

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	31.187	4	7.797	61.702	.000b
	Residual	10.867	133	.126		
	Total	42.055	137			

Dependent variable: Performance of projects
Predictors:(constant), Stakeholder participation practices, project risk management practices, project planning practices and M&E

As shown in Table 4, the value of F=61.702 with p=0.000<0.05, this means that project management practices significantly predicts performance of projects. The results of the regression beta coefficients with the p-values are as indicated in table 5

Table5: Model coefficients for combined determinants and performance of project

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.609	.265		-2.300	.024
	Stakeholder Participation Practices	.235	.064	.261	3.666	.000
	Project risk management	.240	.068	.245	3.559	.001
	Project Planning Practices	.174	.077	.173	2.259	.026
	Monitoring and Evaluation	.493	.089	.400	5.556	.000

From the findings in Table 4.11, the following model is predicted between project management practices and performance of projects:

$$Y=0.609+.235X1 +.240X2 +.174X3 +.493X4$$

Where

Y is Performance of projects.

X1 is Stakeholder Participation Practices

X2 is Project Risk Management

X3 is Project Planning Practices

X4 is Monitoring and Evaluation

As a result, strategies for project management account for -.609 of the variation in project outcomes. For each unit increase in stakeholder involvement practices, project success rises by 0.235 units, assuming all other factors remain unchanged. The same holds true for project risk management; every unit of improvement there is associated with a 0.24% rise in project success. Project performance also varies

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

by 0.174 units for every unit variation in planning approaches. In conclusion, there is a positive correlation between a one-unit increase in M&E and a 0.49-unit improvement in project performance.

5.0 CONCLUSION AND RECOMMENDATIONS

The study concludes that stakeholder engagement techniques were the fourth most influential factor in determining project success. The execution of the projects took care of the needs of the users as the system grew. Customers were given the opportunity to take some level of responsibility throughout the design and implementation phases of the project. When it comes to tackling legal, financial, and technological risks, Goliath company has a number of obstacles. These risks induce cost and schedule overruns, which in turn affect poor performance of the projects they are attached to. The researchers concluded that project planning strategies had a large effect on project outcomes. The results also suggest that the project team effectively coordinated their efforts to achieve the project's goal, which was directly related to the organization's overall objective. Lastly, the studies conclude the importance of M&E in determining performance since these processes assist maintain track of actions and provide solutions when things aren't going as planned. Since M&E provides information that helps support decision-making, it plays a role in supporting good management choices, which is one of its many benefits.

The findings suggest that project management practices should encourage collective pride in completed work. Indirect and direct users alike should reap the benefits of the project's completion. Users should be able to do this at any point in the project's execution. The report recommends that Goliath develop and follow best practices in time management related to projects since time is a crucial resource that leads to a 65% failure rate for initiatives. The projects should be seen as investments that will provide for current and future generations, thus all parties involved should make every effort to work together. Since M&E of the projects is the best approach to improve the projects' outcomes, they should be encouraged. More people need to be involved in monitoring activities for there to be a meaningful flow of information and lessons learned.

REFERENCES

1. *Abdiaziiz Jama, M.(2018). Telecommunication industry and employment creation in Garowe District Somalia(Doctoral dissertation, Kampala International University).*
2. *Adan, H(2012) influence of Stakeholders role on Performance of Constituencies" Development Fund Projects. Industrial Engineering and Engineering Journal, 1915-1918.*
3. *Ahmadabadi, A. A., & Heravi, G. (2019). The effect of critical success factors on project success in Public-Private Partnership projects: A case study of highway projects in Iran. Transport policy, 73, 152-161.*
4. *Bai, J., & Yang, X.(2011). Research on construction project process performance measurement. Industrial Engineering and Engineering Journal, 1915-1918.*
5. *Creswell, J., (2012). Best practices in mixed methods for quality of life research. Quality of life Research, 21, 377-380.*
6. *Dahie, A. M., Takow, M. A., Nur, A. H., & Osman, M. M.(2016). Organizational culture and employee performance at telecommunication firms in Mogadishu-Somalia. International Journal in Commerce, IT & Social Sciences, 3(1), 30-41.*
7. *Dai, C. X., & Wells, W. G. (2004). An exploration of project management office features and their relationship to project performance. International journal of project management, 22(7), 523-532.*
8. *Ernawati.(2013), Motivation by project and functional managers in matrix organizations. Engineering Management Journal, 13(2) 3 – 9.*
9. *Gitau, L. M. (2015). The effects of risk management at project planning phase on performance of construction projects in Rwanda. Jomo Kenyatta University of Agriculture and Technology, 1-76.*
10. *Gwadoya, R. A.(2012). Factors influencing effective implementation of monitoring and evaluation practices in donor funded projects in Kenya: a case of Turkana District(Masters Dissertation). Kenyatta University, Nairobi, Kenya.*
11. *Kala, Y. (2020). Influence of Monitoring and Evaluation Practices on the Performance of County Government Projects: a Case of Mandera Central Sub-county, Mandera County: Kenya (Doctoral dissertation, University of Nairobi).*
12. *Kaufmann, C., & Kock, A. (2022). Does project management matter? The relationship between project management effort, complexity, and profitability. International Journal of Project Management, 40(6), 624-633.*
13. *Khalid, A. J. (2015). Telecommunication companies and socio-economic development in Puntland state of Somalia: case study-Golis Telecommunication Company.*
14. *Magagan, K. C., & Ngugi, L. (2021). Influence of project management practices on performance of projects in Unilever Kenya Ltd. International Academic Journal of Information Sciences and Project Management, 3(6), 392-418.*
15. *Maghanga, M. E. (2019). Effect Of Project Risk Management Practices On Project Performance In Cement Manufacturing Firms In Kenya. Clear International Journal of Research in Commerce & Management, 10(3).*
16. *Maiyo, L. K., & Kamaara, M. (2019). Influence Of Stakeholders Participation On Completion Of Fiber Optic Projects In Kenya. Journal of International Business, Innovation and Strategic Management, 3(3), 110-127.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

17. *Mandala, E. (2018). Influence of stakeholder's involvement in project management on the performance of road construction projects in Kenya: a case of Bondo sub county, Siaya County (Doctoral dissertation, University of Nairobi).*
18. *Motaleb, O., & Kishk, M. (2013). An investigation into the risk of construction projects delays in the UAE. International Journal of Information Technology Project Management (IJITPM), 4(3), 50-65.*
19. *Muindi, J. M. (2018). Influence of monitoring and evaluation on performance of county funded social development projects in Makueni County, Kenya (Doctoral dissertation, School of Open and Distance Learning, University of Nairobi).*
20. *Muute, N. C., & James, R. (2019). Project planning practices and performance of construction projects in Nairobi City County, Kenya. Unpublished Masters dissertation), Kenyatta University, Kenya.*
21. *Njiru, S. G. (2018). Project management practices and implementation of projects in manufacturing companies in Nairobi City*
22. *Noor, A., & Ampornstira, F. (2019). Challenges of Business Investment in Somalia: The Case of Mobile Telecommunication, Banks and Remittance Companies. European Journal of Business and Management, 11(18), 137-145.*
23. *Nzioka, W. M., (2023). Influence of public-private partnership on healthcare service delivery in Nairobi County, Kenya. International Academic Journal of Health, Medicine and Nursing, 2(1), 341-362.*
24. *Ochenge, M. D. (2018). Project Management Practices and Performance of Road Infrastructure Projects Done By Local Firms in the Lake Basin Region, Kenya (Doctoral dissertation, Doctoral dissertation, Kenyatta University).*
25. *Wamugu, J. W., & Ogollah, K. (2017). Role of stakeholders participation on the performance of constituency development fund projects in Mathira East constituency in Kenya. International Academic Journal of Information Sciences and Project Management, 2(1), 104-125.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

INTERNATIONAL STANDARDS FOR PROTECTION OF RELIGIOUS FREEDOM, HUMAN RIGHTS AND LAW

Ms. Nandini Mehra[1], Prof. (Dr.) Monika Rastogi[2]
[1]LL.M. Student, School of Law, Lingaya's Vidyapeeth, Faridabad
[2]Head, School of Law, Lingaya's Vidyapeeth (Deemed to be University), Faridabad

ABSTRACT

Religious freedom stands as a cornerstone of human rights, embodying the fundamental principle that individuals should have the liberty to practice their faith or belief system without fear of discrimination or persecution. This research paper investigates the intricate interplay between international standards for protecting religious freedom, human rights principles, and legal frameworks. In our increasingly interconnected world, characterized by religious diversity and socio-political complexities, understanding the mechanisms and frameworks that uphold and safeguard religious freedom is paramount. The paper begins by delineating the concept of religious freedom, elucidating its definition, scope, and historical significance. Religious freedom is not merely a legal concept but a fundamental aspect of human dignity, with implications for societal harmony, individual autonomy, and global peace. Central to the discourse are the international standards and agreements established to protect religious freedom. The Universal Declaration of Human Rights (UDHR) and the International Covenant on Civil and Political Rights (ICCPR) serve as foundational documents, affirming the right to freedom of religion or belief for all individuals. Additionally, declarations such as the Declaration on the Elimination of All Forms of Intolerance and of Discrimination Based on Religion or Belief further underscore the commitment of the international community to combat religious discrimination. Examining legal frameworks and protections, the paper explores constitutional provisions, legislative measures, and judicial precedents aimed at safeguarding religious freedom. From constitutional guarantees enshrining the right to religious freedom to legislative acts prohibiting discrimination based on religion, legal mechanisms play a vital role in ensuring the protection and promotion of religious diversity. Despite these safeguards, challenges persist. Discrimination, state interference, social barriers, and extremism pose significant threats to religious freedom worldwide. Through case studies and examples, the paper elucidates the multifaceted nature of these challenges, highlighting the urgent need for robust implementation and enforcement mechanisms. In addressing these challenges, the paper outlines various recommendations for strengthening religious freedom. These include policy reforms, legal amendments, education initiatives, and international cooperation efforts aimed at fostering greater respect for religious diversity and pluralism. The research underscores the intrinsic value of religious freedom as a fundamental human right and calls for concerted efforts to uphold and protect this right for all individuals, regardless of their faith or belief system. By embracing the principles of tolerance, respect, and inclusivity, societies can foster a more harmonious and equitable world for generations to come.

KEYWORDS: *religious freedom, human rights, international standards, legal frameworks, discrimination, persecution, constitutional protections, implementation mechanisms, challenges, case studies, recommendations, tolerance, diversity, pluralism, global peace*

INTRODUCTION

Religious freedom stands as a cornerstone of human rights, embodying the fundamental principle that individuals should have the liberty to practice their faith or belief system without fear of discrimination or persecution. Rooted in the inherent dignity and autonomy of every person, religious freedom encompasses the right to hold, manifest, and change one's religion or belief, as well as the freedom from coercion or compulsion in matters of religion.Throughout history, religious freedom has been both a source of inspiration and a source of conflict. From ancient civilizations to modern nation-states, the question of how to reconcile diverse religious beliefs and practices within pluralistic societies has challenged lawmakers, philosophers, and religious leaders alike. While some societies have embraced religious pluralism and tolerance as essential values, others have sought to impose religious orthodoxy through coercion, discrimination, and violence. In the contemporary world, the protection of religious freedom has emerged as a pressing human rights issue, reflecting the increasing interconnectedness of diverse cultures, religions, and ideologies. Globalization, migration, and technological advancements have facilitated greater interaction and exchange among religious communities, but have also exposed underlying tensions and conflicts rooted in religious differences. Against this backdrop, international standards, legal frameworks, and advocacy initiatives have sought to promote and safeguard religious freedom as a universal human right. Documents such as the Universal Declaration of

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Human Rights and the International Covenant on Civil and Political Rights affirm the right to freedom of religion or belief for all individuals, regardless of their faith or belief system. However, despite these efforts, challenges to religious freedom persist. Discrimination, persecution, state interference, and social barriers continue to threaten the rights and dignity of religious minorities and dissenting voices around the world. Moreover, the intersectionality of religious freedom with other human rights, such as freedom of expression, assembly, and association, complicates efforts to balance competing interests and values in diverse societies. In light of these challenges, it is essential to critically examine the mechanisms and frameworks that uphold and protect religious freedom, identify emerging trends and threats, and explore innovative strategies for promoting greater respect, tolerance, and pluralism in religious matters. By engaging in dialogue, advocacy, and cooperation at the local, national, and international levels, stakeholders can work towards creating a more just, inclusive, and peaceful world where religious freedom is cherished as a fundamental human right for all.

PROBLEM DEFINITION AND OBJECTIVES

The protection of religious freedom faces numerous challenges globally, including discrimination, persecution, state interference, and societal barriers. Despite the existence of international standards and legal frameworks, violations of religious freedom persist, undermining individual autonomy, social cohesion, and global peace. Therefore, there is a pressing need to examine the efficacy of existing mechanisms and identify strategies for strengthening the protection of religious freedom. These are some objectives:

1. To analyze the current state of religious freedom worldwide, including the prevalence of discrimination, persecution, and other violations.
2. To assess the effectiveness of international standards, agreements, and legal frameworks in safeguarding religious freedom.
3. To identify key challenges and obstacles hindering the protection of religious freedom, such as state interference, social attitudes, and extremist ideologies.
4. To examine case studies and examples of religious freedom violations, illustrating the diverse range of challenges faced by individuals and communities.
5. To propose recommendations for enhancing the protection of religious freedom, including policy reforms, legal amendments, and education initiatives.
6. To explore the role of international cooperation and diplomacy in promoting religious tolerance, respect, and inclusivity.
7. To contribute to the scholarly discourse on religious freedom and human rights, raising awareness and fostering dialogue on this critical issue.

RESEARCH GAP

Despite significant efforts to protect religious freedom through international standards, legal frameworks, and advocacy initiatives, there exists a notable research gap in understanding the effectiveness of these mechanisms in addressing contemporary challenges. One key research gap lies in the limited empirical evidence regarding the implementation and enforcement of religious freedom protections at the national level. While international agreements and declarations establish broad principles, the extent to which they are translated into concrete action varies across countries. Additionally, there is a lack of comprehensive studies examining the intersectionality of religious freedom with other human rights, such as freedom of expression, assembly, and association. Understanding how these rights intersect and potentially conflict in diverse socio-political contexts is essential for developing nuanced policy responses. Furthermore, existing research often focuses on high-profile cases of religious persecution or discrimination, neglecting the experiences of marginalized or minority religious groups. This gap highlights the need for more inclusive and intersectional approaches that consider the diverse range of religious identities and experiences within societies. Moreover, while there is ample literature on legal frameworks and protections for religious freedom, there is a dearth of research on the role of informal social norms and cultural attitudes in shaping individuals' experiences of religious freedom. Exploring these dynamics can provide valuable insights into the underlying drivers of religious intolerance and discrimination. In conclusion, addressing these research gaps requires interdisciplinary approaches that combine legal analysis, sociological inquiry, and human rights perspectives. By filling these gaps in knowledge, researchers can contribute to more effective policies and interventions aimed at promoting and protecting religious freedom for all individuals and communities.

RESEARCH METHODOLOGY

The research methodology for this study will adhere to a doctrinal approach, focusing on analyzing existing legal frameworks, international standards, and relevant literature pertaining to the protection of religious freedom. The doctrinal method involves a systematic examination and interpretation of legal sources, statutes, case law, and scholarly writings to address the research objectives. Primary sources such as international treaties, declarations, and constitutional provisions will be analyzed to understand the legal foundations of religious freedom protections. This will involve a thorough review of documents such as the Universal Declaration of

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Human Rights (UDHR), the International Covenant on Civil and Political Rights (ICCPR), and regional human rights instruments. Secondary sources including academic articles, books, and reports will be consulted to provide critical insights into the implementation, challenges, and effectiveness of existing legal frameworks in protecting religious freedom. Additionally, case studies and examples from diverse socio-political contexts will be examined to illustrate real-world applications and implications of religious freedom protections. The research methodology will employ a systematic approach to data collection, analysis, and interpretation, ensuring rigor and reliability in the study's findings and conclusions.

UNDERSTANDING RELIGIOUS FREEDOM

1. Understanding Religious Freedom: Religious freedom, also known as freedom of religion or belief (FoRB), encompasses the right of individuals and communities to practice, manifest, and change their religion or belief system without coercion, discrimination, or persecution. It is a fundamental human right enshrined in various international instruments, including the Universal Declaration of Human Rights (UDHR) and the International Covenant on Civil and Political Rights (ICCPR).

2. Definition and Scope: Religious freedom entails the freedom to worship, observe religious rituals, engage in religious practices, and express one's beliefs openly. It extends beyond mere tolerance to encompass the full range of religious expressions, including the right to hold and manifest beliefs individually or in community with others. This freedom applies not only to religious adherents but also to atheists, agnostics, and individuals with non-religious philosophical beliefs.

3. Importance: Religious freedom is essential for upholding human dignity, autonomy, and pluralism within societies. It fosters social harmony, respect for diversity, and peaceful coexistence among individuals of different faiths and beliefs. Moreover, it serves as a cornerstone of democratic societies, safeguarding individual liberties and preventing the imposition of religious orthodoxy by the state or majority group.

4. Implications: The protection of religious freedom has far-reaching implications for various aspects of life, including education, employment, healthcare, and family life. It influences public policy decisions, legal frameworks, and societal attitudes towards religious diversity. Violations of religious freedom can lead to social unrest, inter-religious tensions, and human rights abuses, undermining the stability and prosperity of societies.

5. Historical Context: The struggle for religious freedom has deep historical roots, spanning centuries of religious persecution, conflict, and reform. From the Edict of Milan in 313 CE, which granted tolerance to Christians in the Roman Empire, to the religious wars of the Reformation era and the subsequent development of secularism and religious pluralism, the concept of religious freedom has evolved in response to changing social, political, and cultural dynamics. Today, historical legacies continue to shape contemporary debates and challenges surrounding religious freedom, underscoring the ongoing importance of upholding this fundamental human right.

INTERNATIONAL STANDARDS AND AGREEMENTS

1. Universal Declaration of Human Rights (UDHR): Adopted by the United Nations General Assembly in 1948, the UDHR is a foundational document that proclaims the inalienable rights to which all human beings are entitled, including the right to freedom of thought, conscience, and religion. Article 18 of the UDHR specifically recognizes the right to freedom of religion or belief, stating that everyone has the right to freedom of thought, conscience, and religion; this right includes freedom to change his religion or belief, and freedom, either alone or in community with others and in public or private, to manifest his religion or belief in teaching, practice, worship, and observance.

2. International Covenant on Civil and Political Rights (ICCPR): Adopted by the United Nations General Assembly in 1966, the ICCPR is a legally binding international treaty that further elaborates on the rights enshrined in the UDHR. Article 18 of the ICCPR reaffirms the right to freedom of thought, conscience, and religion, emphasizing that this right may only be subject to such limitations as are prescribed by law and are necessary to protect public safety, order, health, or morals or the fundamental rights and freedoms of others.

3. Declaration on the Elimination of All Forms of Intolerance and of Discrimination Based on Religion or Belief: Adopted by the United Nations General Assembly in 1981, this declaration reaffirms the principles of the UDHR and the ICCPR regarding religious freedom and prohibits discrimination based on religion or belief. It calls upon states to take effective measures to prevent and eliminate discrimination on grounds of religion or belief in the recognition, exercise, and enjoyment of human rights and fundamental freedoms in all fields of civil, economic, political, social, and cultural life.

4. European Convention on Human Rights (ECHR): Adopted by the Council of Europe in 1950, the ECHR is an international treaty that protects fundamental rights and freedoms within the jurisdiction of the member states of the Council of Europe. Article 9 of the ECHR guarantees the right to freedom of thought, conscience, and religion, including the freedom to manifest one's religion or beliefs in worship, teaching, practice, and observance, subject only to such limitations as are prescribed by law and are necessary in a democratic society.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5. Other Regional Agreements and Declarations: Various regional organizations and bodies have adopted agreements and declarations affirming the right to religious freedom, tailored to the specific contexts and challenges within their respective regions. These include the American Convention on Human Rights in the Americas, the African Charter on Human and Peoples' Rights in Africa, and the ASEAN Human Rights Declaration in Southeast Asia. Each of these instruments contributes to the global framework for protecting religious freedom and promoting respect for diversity and pluralism.

LEGAL FRAMEWORKS, CONSTITUTIONAL PROTECTIONS AND CASE STUDIES

1. ***Constitutional Protections:*** Many countries include provisions related to religious freedom in their constitutions, guaranteeing individuals the right to practice their religion or belief freely. These constitutional protections often serve as the highest legal authority within a country and provide a basis for challenging laws or actions that infringe upon religious freedom. Examples include the First Amendment of the United States Constitution, which prohibits the establishment of a state religion and protects the free exercise of religion, and Article 18 of the Indian Constitution, which guarantees freedom of conscience and the right to freely profess, practice, and propagate religion.
2. ***Legislative Measures:*** Legislative bodies enact laws and statutes to further protect and promote religious freedom. These laws may address issues such as religious discrimination, hate speech, religious accommodation in the workplace, and the recognition of religious holidays. Legislative measures can vary significantly across jurisdictions, reflecting the unique social, cultural, and political contexts of each country. For example, the Religious Freedom Restoration Act (RFRA) in the United States aims to prevent laws that substantially burden a person's exercise of religion, unless the government can demonstrate a compelling interest.
3. ***Judicial Precedents and Case Studies:*** Courts play a crucial role in interpreting and applying laws related to religious freedom through judicial decisions and precedents. Landmark cases often shape the legal landscape and establish important principles regarding the scope and limitations of religious freedom. For instance, the US Supreme Court case of Employment Division v. Smith (1990) clarified the standard for evaluating laws that burden religious practices, establishing that neutral and generally applicable laws are generally constitutional, even if they incidentally burden religious practices. Similarly, the European Court of Human Rights has issued numerous judgments concerning religious freedom, addressing issues such as religious symbols in public spaces and conscientious objection to military service.
4. ***Case Studies:*** Examining specific cases of religious freedom violations provides insights into the challenges faced by individuals and communities in different contexts. These case studies may involve instances of discrimination, persecution, restrictions on religious practices, or conflicts between religious freedom and other rights. Analyzing the outcomes of these cases helps identify areas where legal protections may be inadequate or where additional measures are needed to safeguard religious freedom effectively. For example, the case of Burwell v. Hobby Lobby Stores, Inc. (2014) in the United States raised questions about the scope of religious exemptions from certain healthcare mandates, sparking debates about the balance between religious freedom and women's reproductive rights.

DECIDED CASE LAWS

1. ***Employment Division v. Smith (1990)-*** In this case, the US Supreme Court held that neutral and generally applicable laws that incidentally burden religious practices are generally constitutional. The case involved two Native Americans who were fired from their jobs for using peyote, a hallucinogenic drug, as part of their religious rituals. The Court ruled that Oregon's prohibition on the use of peyote did not violate the Free Exercise Clause of the First Amendment because it was a neutral law of general applicability.
2. ***Burwell v. Hobby Lobby Stores, Inc. (2014)-*** This case concerned the religious freedom rights of closely-held corporations under the Religious Freedom Restoration Act (RFRA). Hobby Lobby, a chain of craft stores, challenged the Affordable Care Act's requirement that employer-provided health insurance plans include coverage for contraceptives, which conflicted with the religious beliefs of the company's owners. The Supreme Court ruled that closely-held corporations could be exempted from certain healthcare mandates if they conflicted with the owners' sincerely held religious beliefs.
3. ***Lautsi v. Italy (2011) European Court of Human Rights (ECHR):*** In this case, an Italian mother challenged the presence of crucifixes in public school classrooms, arguing that it violated her children's right to freedom of religion under the European Convention on Human Rights (ECHR). The ECHR ruled that the display of crucifixes in public schools did not violate the European Convention on Human Rights as long as it did not amount to indoctrination.
4. ***O Centro Espirita Beneficente Uniao do Vegetal v. Ashcroft (2006) United States:*** This case involved a Brazilian-based religious group, the União do Vegetal (UDV), which used hoasca tea, containing a controlled substance, in its religious ceremonies. The US Supreme Court ruled that the federal government could not prohibit the religious use of hoasca tea under the Controlled Substances Act, as doing so would substantially burden the UDV members' exercise of religion without a compelling government interest.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FINDINGS AND RECOMMENDATIONS

1. ***Varied Implementation of Legal Protections:*** Despite robust legal frameworks protecting religious freedom at the international and national levels, there are disparities in their implementation across different countries. Some nations effectively uphold religious freedom through constitutional provisions, legislative measures, and judicial precedents, while others struggle to enforce these protections, leading to widespread discrimination and persecution based on religion or belief.
2. ***Challenges to Religious Freedom:*** Various challenges pose threats to religious freedom, including state interference, societal discrimination, extremist ideologies, and cultural barriers. These challenges manifest differently in different regions and contexts, highlighting the need for tailored approaches to address specific issues and vulnerabilities faced by religious communities.
3. ***Intersectionality of Rights:*** Religious freedom often intersects with other human rights, such as freedom of expression, assembly, and association. Conflicts between religious freedom and competing rights, as seen in cases involving conscientious objection, healthcare mandates, and public displays of religious symbols, underscore the complexities of balancing individual liberties with broader societal interests.
4. ***Enhanced Legal Protections:*** Governments should ensure the effective implementation and enforcement of existing legal protections for religious freedom. This may involve strengthening constitutional safeguards, enacting comprehensive anti-discrimination legislation, and establishing mechanisms for monitoring and addressing violations of religious freedom.
5. ***Promotion of Interfaith Dialogue and Tolerance:*** Initiatives aimed at fostering interfaith dialogue, understanding, and cooperation can promote mutual respect and tolerance among religious communities. Educational programs, community outreach efforts, and interfaith partnerships can help counteract prejudice, stereotypes, and misconceptions that fuel discrimination and intolerance.
6. ***Capacity Building and Training:*** Governments, civil society organizations, and religious institutions should invest in capacity building and training programs to equip stakeholders with the knowledge, skills, and resources needed to promote and protect religious freedom effectively. This may include training for law enforcement officials, educators, religious leaders, and community advocates on human rights principles, religious diversity, and conflict resolution strategies.
7. ***International Cooperation and Diplomacy:*** Enhanced international cooperation and diplomatic efforts are essential for addressing cross-border challenges to religious freedom and promoting global respect for diversity and pluralism. Governments should engage in multilateral initiatives, dialogue forums, and diplomatic exchanges to exchange best practices, share experiences, and develop collaborative strategies for advancing religious freedom worldwide.
8. ***Empowerment of Religious Minorities:*** Efforts should be made to empower and support religious minorities, ensuring their full participation in social, political, and economic life. This may involve measures to combat discrimination, protect minority rights, and provide access to justice, education, and economic opportunities for marginalized religious communities.

By implementing these recommendations, stakeholders can work towards creating a more inclusive, equitable, and respectful society where religious freedom is safeguarded as a fundamental human right for all individuals and communities.

CONCLUSION

In conclusion, the protection of religious freedom stands as a critical pillar of human rights, reflecting the inherent dignity and autonomy of individuals to practice their faith or belief system without fear of discrimination or persecution. Throughout this research, we have explored the multifaceted landscape of international standards, legal frameworks, challenges, and recommendations pertaining to religious freedom. Despite the existence of robust international instruments such as the Universal Declaration of Human Rights and the International Covenant on Civil and Political Rights, the implementation of religious freedom protections varies widely across different countries and regions. While some nations have established comprehensive legal safeguards and mechanisms for enforcing religious freedom, others grapple with systemic discrimination, state interference, and social barriers that undermine this fundamental right. Challenges to religious freedom persist, ranging from discrimination and persecution to conflicts between religious freedom and other rights or interests. Addressing these challenges requires a multifaceted approach, encompassing legal reforms, interfaith dialogue, capacity building, and international cooperation. Nevertheless, there is cause for optimism. By embracing the principles of tolerance, respect, and inclusivity, societies can foster greater understanding and appreciation of religious diversity, thereby promoting social cohesion, peace, and stability. Through concerted efforts at the local, national, and international levels, stakeholders can work towards creating a more just and equitable world where religious freedom is upheld as a cornerstone of human rights for all individuals and communities. In closing, the protection of religious freedom is not only a legal obligation but also a moral imperative, reflecting our shared commitment to dignity, diversity, and mutual respect. By standing together in defense of religious freedom, we affirm our collective humanity and advance the cause of justice and peace for generations to come.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FUTURE RESEARCH

Future research in the field of religious freedom could explore several avenues to deepen our understanding, address emerging challenges, and inform policy and practice:

1. ***Impact of Technology:*** Investigate the impact of digital technologies, social media, and online platforms on religious freedom, including their role in facilitating religious expression, mobilizing religious communities, and exacerbating religiously motivated hate speech and violence.
2. ***Intersectionality and Religious Freedom:*** Explore the intersectionality of religious freedom with other dimensions of identity, such as gender, ethnicity, sexual orientation, and socioeconomic status, to better understand how multiple forms of discrimination intersect and compound to affect individuals' experiences of religious freedom.
3. ***Religious Freedom in Conflict and Post-Conflict Settings:*** Examine the dynamics of religious freedom in conflict-affected and post-conflict contexts, including the role of religion in conflict resolution, peacebuilding, and reconciliation efforts, as well as the challenges faced by religious minorities in rebuilding their communities and identities.
4. ***Religious Freedom and Migration:*** Investigate the intersection of religious freedom with migration, displacement, and refugee protection, including the challenges faced by religious minorities in host countries, the role of religion in migrants' integration and identity formation, and the impact of immigration policies on religious freedom.
5. ***Religious Freedom and Sustainable Development:*** Examine the relationship between religious freedom and sustainable development goals, including access to education, healthcare, and economic opportunities for religious minorities, as well as the role of religious actors in promoting social cohesion, conflict prevention, and community resilience.
6. ***Comparative Studies and Cross-Regional Analysis:*** Conduct comparative studies and cross-regional analysis to identify patterns, trends, and best practices in protecting and promoting religious freedom across diverse cultural, political, and religious contexts.
7. ***Longitudinal Studies and Trends Analysis:*** Undertake longitudinal studies and trends analysis to track changes in religious freedom over time, including shifts in legal frameworks, societal attitudes, and patterns of discrimination and persecution.

REFERENCES

1. *Bielefeldt, Heiner. Freedom of Religion or Belief: An International Law Commentary. Oxford University Press, 2016.*
2. *Grim, Brian J., and Roger Finke. The Price of Freedom Denied: Religious Persecution and Conflict in the Twenty-First Century. Cambridge University Press, 2011.*
3. *Witte Jr., John, and Johan D. van der Vyver. Religious Human Rights in Global Perspective: Legal Perspectives. Martinus Nijhoff Publishers, 1996.*
4. *Feldman, Noah. The Fall and Rise of the Islamic State. Princeton University Press, 2008.*
5. *United Nations Human Rights Office of the High Commissioner (OHCHR) - [Religion and Belief](https://www.ohchr.org/EN/Issues/FreedomReligion/Pages/FreedomReligionIndex.aspx)*
6. *Pew Research Center - [Religious Freedom](https://www.pewresearch.org/topics/religious-freedom/)*
7. *Freedom House - [Freedom of Religion](https://freedomhouse.org/issues/freedom-religion)*
8. *United States Commission on International Religious Freedom (USCIRF) - [Annual Reports](https://www.uscirf.gov/annual-reports)*
9. *Amnesty International - [Annual Report on Religious Freedom](https://www.amnesty.org/en/what-we-do/religious-freedom/)*
10. *Human Rights Watch - [Reports on Religious Freedom](https://www.hrw.org/topic/religious-freedom)*
11. *Tomka, Miklós. "Freedom of Religion or Belief: Legal, Philosophical and Historical Perspectives." Religion and Human Rights, vol. 1, no. 2, 2006, pp. 97-115.*
12. *Scharffs, Brett G. "Religious Freedom and the Common Good." Harvard Human Rights Journal, vol. 27, 2014, pp. 219-247.*
13. *Ghanea, Nazila. "Freedom of Religion or Belief in the Twenty-First Century." Religion and Human Rights, vol. 1, no. 2, 2006, pp. 145-166.*
14. *Marshall, Paul. "The Complex Role of Religion in Advancing Human Rights." Journal of Religious Ethics, vol. 45, no. 2, 2017, pp. 210-231.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FORMULATION AND EVALUATION OF HERBAL PAIN RELIEF BALM

[1]Ms.Poonam P.Papule, [2]Mr.Prajwal Papule
[1]Assistant professor at RMP'S Bhalchandra college of Pharmacy

ABSTRACT
Modern life is stressful, and tension headaches are one result of that stress. Cosmetics have great demand since ancient time, now a days, a focus has been shifted more towards derived cosmetic products. Not only cosmetic products, but also to the skin products due to their ease of application among all dermal drug delivery products, pain balm formulation are preferably used so as to get the faster local effect. There has been an increasing focus on development of new routes of drug administration to provide tailored treatments for patients, without decreasing efficacy of analgesia, in proportion to the progression of the knowledge of pain mechanisms. While acute pain acts as an alarm, chronic pain is a syndrome requiring meticulous selection of analgesic drugs of high bioavailability for long-term use. Such criteria are challenges that topical medications aim to overcome, allowing progressive delivery of active component, maintaining stable plasma levels, with a good safety profile. Dashamoola inhibits prostaglandin synthesis to relive joint pain and inflammation, it also improves glucosamine level to lubricates and rejuvenate joint tissues Shallaki contains boswellic acid, which can help reduce inflammation and pain by targeting enzymes that release pro-inflammatory chemicals in the joints. Shallaki also has antiinflammatory properties that can help reduce swelling and pain in arthritis patients. The present research study is about to formulate the topical herbal balm for analgesic and antiinflammatory activity

KEYWORDS: *Anti inflammatory activity Dashmoola oil, shallaki oil, camphor, rosemerry oil,Petrolium jelly,Sodium Benzoate, Herbal balm*

Pain has much in common with other sensory modalities. First, there are specific pain receptors. These are nerve endings, present in most body tissues, that only respond to damaging or potentially damaging stimuli. Second, the messages initiated by these noxious stimuli are transmitted by specific, identified nerves to the spinal cord. The sensitive nerve ending in the tissue and the nerve attached to it together form a unit called the primary afferent nociceptor. The primary afferent nociceptor contacts second-order pain-transmission neurons in the spinal cord. The second-order cells relay the message through well-defined pathways to higher centers, including the brain stem reticular formation, thalamus, somatosensory cortex, and limbic system. It is thought that the processes underlying pain perception involve primarily the thalamus and cortex. The pain balm works on the counter irritancy principal the where the instead of relieving the pain, the pain sensation is suppressed by causing the irritation to the point where formulation has been applied. the balm in common sense is defined as semisolid formulation and which is to be applied externally. Pain balm is such formulation that is intended to be used for the relief of mild to moderate rate pain. According to NCBI, the prevalence of knee pain has increased by 66% since 1974, even after adjusting for age and BMI. There are Some possible reasons why knee pain may be increasingBeing overweight, Overusing your knee, Aging, Arthritis, and Other medical conditions. Many types of minor knee pain respond well to self-care measures, such as physical therapy, knee braces, and exercise. Low-impact exercises like swimming, cycling, and walking can help strengthen knees and reduce knee pain symptoms. Non-steroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen, to help with pain, inflammation, and swelling. NSAIDs can cause serious side effects, some of which may be life-threatening. NSAIDs may interact with other medicines and cause unwanted effects. Topical NSAIDs have a lower risk of stomach upset and heart problems than oral NSAIDs. A review found that topical diclofenac and topical ketoprofen can provide good levels of pain relief in osteoarthritis, but only for about 10% more people than get this result with topical placebo. Balms can relieve pain by absorbing methyl salicylate and camphor through the skin. Methyl salicylate acts as an analgesic. Camphor acts as a rubefacient, which produces a cool sensation and also acts as a mild local anesthetise.

Drug Profile : 1. Dashamoola Oil
Dashamoola, as the name signifies is the potent magical concoction of ten dried roots of ten different plants, which have been widely used in Ayurveda since ages due to its amazing health benefits. It possesses those qualities that work in tandem for effectively offering ultimate remedies for numerous health conditions, especially the ones related to nerves, muscles, bones, joints and lungs. The word Dashamoola is Sanskrit terminology, where 'Dasha' means ten and 'moola' means root. ll it Dashamula, Dashmulam or Dashamul, this incredible herbal remedy is not only used for pain disorders and inflammatory diseases including osteoarthritis, rheumatoid arthritis and gouty arthritis but also frequently used as an enema as it helps to alleviate constipation, anorexia, abdominal lump, bloating, flatulence, lower back conditions and inflammation in the pelvic and sacral areas.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table no.01-Composition of *Dashmoola Taila*

Name of Ingredients			Part used	Quantity
Sanskrit	**English**	**Botanical**		
Bilwa	Stone apple	*Aegle marmelos* L.	Root	50 gm
Agnimantha	Dusky Fire Brand Bark	*Premna mucronata* Roxb.	Root	50 gm
Shayonak	Indian trumpet tree	*Oroxylum indicum* Vent.	Root	50 gm
Patala	Trumpet	*Stereospermum suaveolens* Roxb.	Root	50 gm
Gambhari	Coomb teak	*Gmelina arborea* Roxb.	Root	50 gm
Shalparni	Sal leaved Desmodium	Desmodium gangeticum (L.) DC.	Root	50 gm
Prashnaparni	Slight-of-hand	*Uraria Picta* Jacq.	Root	50 gm
Brahati	African egg plant	*Solanum indicum* Linn	Root	50 gm
Kantakari	Yellow - Berried Nightshade	*Solanum surattense* Burm. f.	Root	50 gm
Gokshur	Puncture Vine	*Tribulus terrestris* L.	Root	50 gm
Nirgundi	Five-leaved chaste tree	*Vitex negundo Linn.*	Leaves	500 gm
Sarshap	Field mustard	*Brassica comprestis* L.	Root	2 Liter

2. Shallaki Oil

Botanical Name: ***Boswellia serrate*,Family:** Burseraceae. Shallaki is one of the ancient herbs in Ayurveda. It is a moderate-large sized branching tree. Shallaki is a holy plant which is widely used in traditional medicine and is considered to be an important part of Ayurvedic medicine. Synonym is Boswellia Serrata, Kundur, Salai, Dhup, Gugali, Chitta, Guguladhuph, Parangi, Saambraani. Arthritic patients can take 1-2 Shallaki tablets along with water to get relief from swelling in the joint. It reduces swelling as well as stiffness in the inflamed joints due to its anti-inflammatory property. Consuming Shallaki juice (before taking food) on a regular basis also helps improves brain function as it prevents cell damage caused by free radicals due to its antioxidant activity. Chemical Composition of ShallakiThe extract of Shallaki contains sugars, essential oil, volatile oil, terpenoids, and several pentacyclic triterpene acids like -boswellic acid.

3. Camphor

Scientific name: Cinnamomum camphora,Synonym: Alcanfor.,Family: Lauraceae.

Chemical constituents: D-camphor (51.3%), 1,8- cineole (4.3%), and alpha-terpineol. Uses: Provide relief from cold cough, chest congestion, bronchitis and asthma. Improves blood circulation and help to curb muscular and joint aches. Powerful analgesic oil that produces a cooling sensation to numb pain and a warming sensation to increase circulation.

4. Rosemary Oil

Scientific name: Rosmarinus officinalis. **Synonym**:Rosmarinus angustifolius Mill. **Family**: Lamiaceae. **Chemical constituents:** 1,8-cineol (38.5%), Camphor (17.1%), limonene (6.23%), camphene(6.00%) and linalool.

Uses : Reduce pain and Inflammation ,Relieve Stress, and Anxiety, Treat respiratory problems, Heal your skin, Combat Gastrointestinal.

5. Methyl Salicylate

Methyl Salicylate is a colorless yellowish or reddish liquid with odor of wintergreen. colourless or yellow-to-red oily liquid with characteristics .

Boiling Point:- 432° F at 760 mm Hg, **Melting Point:-** 16.5° F

Solubility:- less than 1 mg/mL at 66° F Water Solubility- Slightly soluble chloroform, ether; miscible with alcohol, glacial acetic acid

Method of preparation

Oil is water-steam distilled from leaves charged into the still and allowed to macerate for several hr to hydrolyze gaultheria glycoside (methyl salicylate + glucose). Distillation from 5-6 hr yields approximately 0.7% essential oil. Often adulterated by co-distilling sweet birch bark. mostly prepared by esterification of salicylic acid with methanol. Product of commerce is about 99% pure.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Material and method

1. **Petroleum Jelly**

Petroleum jelly hit the market almost 150 years ago. It's still a favorite of dermatologists. That's because it seals water into your skin. That's good for your wounds because they need amoist place to heal. It may take up to twice as long for dry injured skin to get better. This oily moisturizer may also ease the redness of a new scar and lower your chances of infection. It also won't burn when you put it on.

2. **Bees wax**

Scientific name: Ceraalba,**Synonym**: Yellow wax,**Family:** *Apidea.*
Chemical constituents: Myricylpalmitate (80%), free cerotic acid (15%), melissic acid cerolein.
Uses: Used as Antibacterial. Antifungal. It has anti-inflammatory and anti-allergic properties.

3.Sodium Benzoate

Sodium Benzoate powder is accepted as a preservative by some of the worlds toughest natural product certification. Using sodium benzoate in shampoo and conditioner as a preservative is a safe and effective technique to protect against bacteria and mold forming the bottles.

Uses: Preservative, Sodium Benzoate is also an effective product stabilizer commonly used in pain.

Method: Weighing all the required herbal ingredients for herbal pain relieving balm preparation were accurately weighed by using digital balance**.**

4. **Turmeric**

Botanical Name: Curcuma Longa, **Family**: Zingiberaceae, **Synonym:** Curcumae longa.
Chemical constituents: Turmeric mainly contains polyphenol compounds in the form of curcuminoids. **Uses:** treat skin disorders.

Formulation of Herbal Pain Relief Balm

1. Take one container in that weigh and add 5gm of petroleum jelly, place the container in a hot plate and boil it until all the amount of petroleum jelly completely dissolved. Weigh 5ml of methyl salicylate and boil the solution in hot plate.
2. In the dissolved petroleum jelly solution weigh and add 5gm of bees wax, stir it and boil until the bees wax added completely dissolve in the petroleum jelly. .
3. Weigh 0.6m of camphor and dissolve
4. Weigh 10ml of Dashmoola oil stir the solution and boil the solution.
5. Weigh10ml of Shallaka oil, stir the solution and boil the solution.
6. Weigh 5ml of Rosmarry oil, stir the solution and boil the solution.
7. Weigh 5gm of sodium benzoate and add it to the solution, stir it well and boil the solution, for complete dissolution of the solution.
8. When all the added ingredients were completely dissolved and turns in to the liquid form then take the solution out of the hot plate and keep the herbal balm solution for cooling. Finally the prepared solution cools down and turns into a semi solid herbal balm.

Table no.02-Formulation Table

SR.NO	INGREDIENTS	QUANTITY	MEDICINAL USES
1	Dashmoola oil	10ml	Pain reliever
2	Sallaka oil	10ml	Relieves arthritic pain
3	Bees wax	5gm	Antifungal, Antibacterial
4	Petroleum jelly	5gm	Relieves dry skin, healing
5	Camphor	5gm	Relives cough
6	Methyl salicylate	5gm	Analgesic, skin absorbent
7	Sodium benzoate	5gm	Preservative

Evaluation of prepared herbal formulation:

1. **Physical parameters:**

Clarity and colour was checked by naked eyes against white background, the odour was smelled.

2. ***PH***

The PH of the prepared formulation was determined by using digital PH meter by dipping the glass electrode completely in to the gel system to cover the electrode. The measurement was carried out in triplicate and the average of the three readings was recorded.

3. Phase separation

The prepared balm was transferred in a suitable wide mouth container. Set aside for storage, the oil phase and aqueous phase separation were visualizing after 24h.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4. Viscosity

Viscosity of balm was determined using brook filled viscometer (S-62,model LVDV-E)at 25°C with a spindle speed of the viscometer rotated at 12rpm.

5. Spredability

Two sets of glass slides of standard dimensions were taken. The herbal balm formulation was placed over one of the slides. The other slides was placed on the top of the gel, such that the gel was sandwiched between the two slides in an area occupied by a distance of 7.5cm along the slides. Hundred g weight of gel was placed on the upper slides so that the gel was between the two slides was pressed uniformly to form a thin layer. The weight was removed and the excess of gel adhering to the slides was scrapped off. The two slides in position were fixed to a stand with out slightest disturbance and in such a way that only upper slides to slip off freely by the force of weight tied on it. A20 g weight was tied to the upper slide carefully. The time taken for the upper slide to travel the distance of 7.5 cm and separated away from the lower slide under the influence of the weighed was noted. The experiment was repeated for three times and the mean time was taken for calculation.

6. Patch test

Apply the product to a small patch of skin where a person is unlikely to accidentally wash or rub it away. Good areas may included the inside of the arm or bend of the elbow. Apply the product to a quarter-sized patch of skin. A person should apply the product as thickly as they would when using it regularly. Leave the product on the patch of skin for as long as it would normally be on the skin. If a person is testing a product that they would usually wash off, such as a cleanser, they should keep the patch on for 5min or long as the instructions advice. Repeat the patch test twice a day for between 7-10 days. A reaction may not happen immediately, so it is important to continue applying the product for this length of time. If a persons skin react to the product, they should wash it off as soon as possible and stop using it. a person can use a cool compress or petroleum jelly to relieve the skin if needed.

Collection of Raw Material

All the material are collected from market and the natural material used in present study i.e. Dashmoola oil, shallaki oil, Camphor oil, Methyl Salicylate, beeswax, and Rosemary oil Beeswax, rosemary oil, Camphor and were purchased from the market.

Methods of data collection Observation method of the data collection will be employed for the collection of data for the present dissertation work. Data on the Formulation and Evaluation of herbal pain reliving Balm will be collected from various standard journals and other sources like research literature databases such as Springer, Research Gate, Google scholar, Yahoo Gov and various ayurveda and herbal formulation book etc.

Results and discussion:

The ysicochemical parameters of the prepared balm were determined parameters such as colour, odour, appearance and PH were tested. The formulations exhibited good in appearance characteristic as well as PH was found in the range 7.0 which is the desired PH ofthe skin.

Table no.03-Result of organoleptic test for herbal balm

Sr.no	Organoleptic characters	Herbal balm	Marketed balm
1	Formulation	Pain balm	Pain balm
2	Colour	Yellowish	white
3	Odour	Fragrant	Fragrant
4	Appearance	Good	Smooth
5	State	Semi solid	Semi solid

Table no.04 Evaluation result of herbal pain balm

SRNO.	PARAMETERS	RESULTS
1	PH	6.5
2	Spreadability	7.4
3	Phase separation	No phase separation
4	Viscosity	39010cps
5	Patch test	Non allergenic

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table no.05 Stability studies

SRNO.	FORMULATION	PERIOD	COLOUR	PH	ANY OTHER
1	**Pain balm**	Room Temperature	Yellowish	7.0	Nil
2		25°C± 2°C/ 60% ±5% RH	Yellowish	6.8	Nil
3		30°C±2°C/ 65% ±5% RH	Yellowish	6.7	Nil
4		30° C±2°C65% ±5%RH	Yellowish	6.5	Nil

SUMMARY CONCLUSION

Herbal balm was prepared by using hot processing technique and were found to be without particles transparent components which are used in formulation are having good compatibility without any significant changes.Dashmoola oil and shallaki oil have relieving pain property.The prepared formulation showing good physical characteristics.Further evaluated by various evaluation parameters such as ph, extrudability, spreadability, viscosity, patch test and gives good result. Based on the study research it can be concluded that herbal components can be effectively formulate as in the form of balm by using hot Processing technique which having excellent pain-relieving property.

REFERENCES

1. *Abhishek Kumar, Prem Kumar, Pratyush Mishra, Guide-Shibanjan Paul Roy, 'Herbal based pain balm formulation for pain relief', International Journal of AYUSH; 2023: 12 (1); 01-06.*
2. *Jagruti S Bidgar, Shivam S Bamankar, Kajal K Katkar, Samadhan K kodalkar, 'Formulation and evaluation of herbal pain reliving balm 'International Journal of Advanced Research and Development Volume 8, Issue 3, 2023, Page No. 26-30.*
3. *Pratiksha Salunke, Shital Markad, Komal Magar, 'Formulation And Evaluation Of Herbal Pain Relief Balm', International Journal of Creative Research Thoughts Volume 12, Issue 5 May 2024 . Page No. b703-b806.*
4. *Alloui A, Chassaing C, Schmidt J, Ardid Dubray C, Clorac A, Eschlier A. Paracetamol exerts a spinal, tropiserton–revesible, antinociceptive effect in an inflammatory pain model in rats, European Journal of Phamacology,2002:443:71-77.*
5. *Ghazikhanlou Sani K, Jafari MR, Shams S. A comparison of the efficacy, adverse effects, & patient compliance of the senagraph ® syrup & castor oil regiments for bowel preparation. Iran J Pharm Res,2010:9(2):193–8.*
6. *Prashanth K, Jagadish PC, Krishnamurthy MB.Development & Validation of Stability indicating HPLC method for Clotrimazole Lozenges formulation. International Journal Of Pharmacy & Pharamaceutical Sciences, 2014, 6.*
7. *Pawar , A , Gaud , RS. Modern Dispensing Pharmacy 3rd Edition , Textbook of publication , Page No. : 276.*
8. *Shubhangi ; E. Sawant , Monali D . Tajani "Formulation and Evalution of herbal ointment containing Neem & Turmeric extract" Journal of Scientific and Innovative Reserch , 2016 ; 5 (4) : 149 –151.*
9. *Kumaran, A.; Karunakaran, R.J. Antioxidant activities of the methanol extract of Cardiospermum halicacabum. Pharm. Biol, 2006; 44, 2: 146-151.*
10. *Ms. Telange- Patil P.V., Ms.Bendgude P.D., Ms. Chavan M.R.Miss.Jadhav S.T.,"Formulation and Evaluation of herbal pain reliving Balm" International Journal of Current Science Volume 12, Issue 4 December 2022, Page No. : 177-189*
11. *Bogdanov S. Beeswax : uses &trade . Bee Product Science . 2009 : 1-18.*
12. *Singh M . K . , Khare G . , Iyer S . , Sharma G . , Tripathi D.K . , clerodendrum Serratum : A clinical approach . JAPS . 2012 : 2 (2) : 11-15.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

DEVELOPMENT OF NOVEL HERBAL-BASED MOUTHWASH EFFECTIVE FOR THROAT PAIN

Ankit Kantilal Sanap[1], Sakshi Omprakash Jaju[2*], Gokul Nagorao Rathod[3]
[1]*Student of Bachelor in Pharmacy, Dr. Babsaheb Ambedkar Technological University, Raigad, Lonere.*
[2]*Department of Pharmaceutics, Faculty of Pharmaceutics, Dr. Babsaheb Ambedkar Technological University, Raigad, Lonere*
[3]*Student of Bachelor in Pharmacy, Dr. Babasaheb Ambedkar Technological University, Raigad, Lonere*

Corresponding Author: Sakshi Jaju,

ABSTRACT
This abstract explores the advantages and effectiveness of herbal mouthwash as a natural alternative for maintaining oral hygiene. Herbal mouthwashes, containing plant-based ingredients such as Clove oil, Peppermint oil, ginger, turmeric powder, Tulsi, and Guava leaves, offer various benefits including antimicrobial, anti-inflammatory, and antioxidant properties. Natural Plants such as Clove oil, Peppermint oil, ginger, turmeric powder, Tulsi, and Guava leaves are used in preparation of polyherbal mouthwash. Natural mouthwashes present promising advantages over chemical alternatives. Developing easily prepared and safely usable formulations of such mouthwashes using natural products could potentially enhance the overall dental health of the population.
KEYWORDS: *Herbal medicine, Guava leaves, Tulsi, Natural Plants.*

1. INTRODUCTION

Mouthwashes, renowned for their anti-inflammatory, antimicrobial, and analgesic properties, are commonly utilized for their refreshing, deodorant, and antiseptic effects. A potent mouthwash formulation should incorporate ingredients like clove oil, peppermint oil, guava leaves extract, turmeric powder, and ginger.

While mouthwashes boasting a 99.9% bacteria-killing ability may seem beneficial, indiscriminate bacteria elimination can disrupt the mouth's microbiome, compromising its ability to combat cavities, gingivitis, and halitosis. Incorporating mouthwash into both morning and bedtime routines can optimize its benefits, serving as an effective addition to daily oral care practices. (1)

Herbal mouthwashes, enriched with phytochemicals, offer desired antimicrobial and anti-inflammatory effects without alcohol, artificial preservatives, flavours, or colours. These natural formulations harness the cleansing and healing properties of herbs like clove and peppermint, known for their antiseptic and cooling effects, respectively. Scientifically validated herbs such as Triphala, Tulsi, Neem, and Pudina, whether used singly or in combination, have demonstrated safety and efficacy in addressing oral health issues such as bleeding gums, mouth ulcers, and tooth decay, without adverse effects. (2)

In recent years, herbal medicines and natural compounds have witnessed a surge in popularity, surpassing synthetic counterparts for managing various chronic inflammatory conditions. Notably, approximately half of the drugs approved by the Food and Drug Administration are either directly derived from or inspired by natural products, underscoring the therapeutic potential of nature-derived remedies in modern healthcare. (3)

1.1 History

- The importance of mouth and teeth cleanliness has been recognized from the earliest days of civilization to the 21st century.
- As far as we have come in creating dental solutions that are effectively treat and prevent various types of oral diseases, the mouthwash rinses our ancestor used to maintain a healthy smile were just as widely used as some of the around today.
- The first known references to mouth rinsing are in Ayurveda and Chinese medicine around 2700 BC. Mouthwash is a chemotherapeutic agent used as effective home care system by the patient to oral hygiene.

1.2 Explain

Mouthwash: Mouthwash is an aqueous solution which is most often used for control of plaque and is a medicated liquid which is held in mouth and swished by the action of perioral musculature to eliminate the oral pathogens.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Herbal Mouthwash: Herbal mouthwashes serve as a valuable addition to oral hygiene routines, complementing activities like tooth brushing and flossing. Demonstrating effective anti-inflammatory and anti-plaque properties, they play a supportive role in periodontal therapy. Unlike chemical counterparts, herbal mouthwashes are free from alcohol, artificial preservatives, Flavors, and colors, making them a compelling alternative for sustaining oral hygiene, especially given the additional benefits conferred by herbal formulations. [4]

1.3 Types of Mouthwash

1) **Fluoride Mouthwash**
   Fluoride mouthwashes contain salt that aids in safeguarding teeth against cavities and decay. However, since fluoride is also present in toothpaste and water, caution is advised to avoid excessive fluoride intake, which can be detrimental to overall health.
2) **Antiseptic Mouthwash**
   Among the most common types, antiseptic mouthwashes typically contain alcohol and are favoured by individuals combating mouth infections to inhibit bacterial proliferation.
   They are also beneficial for addressing halitosis when used in conjunction with proper tooth brushing and flossing, helping to eliminate bacteria responsible for oral infections and bad breath.
3) **Cosmetic Mouthwash**
   Cosmetic mouthwashes primarily serve to freshen breath or mask unpleasant odors without providing substantial oral care benefits.
4) **Natural Mouthwash**
   Natural mouthwashes function similarly to other types but boast natural ingredients, making them a preferred option, particularly for those seeking alcohol-free alternatives. With safer ingredients compared to traditional mouthwashes, natural formulations offer a gentler yet effective approach to oral hygiene maintenance. [5]

1.4 Advantages of Herbal Mouthwash

- Fresh breath.
- Reduction of tooth decay with sodium fluoride.
- Decreased gum inflammation by eliminating bacteria.
- Teeth whitening through bleaching agents.
- All herbal mouthwashes do not contain alcohol and/or sugar.
- Herbal mouthwashes is gentle for even the most sensitive mouth.
- Herbal mouthwashes has naturally antibacterial property.
- It contain no harsh additives.
- It is highly in demand.

1.5 Benefits of Herbal Mouthwash

- Utilizes time-tested natural ingredients.
- Gentle for sensitive mouths.
- Provides a pleasant sensation.
- Naturally antibacterial.
- Free from harsh additives.
- Effective in maintaining oral hygiene without causing dryness. [6]
- It contains no harsh additives.
- It is highly in demand.
- It keeps your mouth healthy and plaque frees. [8]

1.6 Use of Herbal mouthwash

- Use of herbal mouthwash is to improve oral hygiene.
- It help to control dental plaque.
- It can be use in gum diseases.
- Used for killing germs in oral cavity.
- It freshen breath and covers bad breath.
- Using a mouthwash for gum disease prevention is very important.
- It relieve pain and inflammation.
- In treatment of Mucositis and Halitosis.
- Used in Periodontal diseases. [9]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2. OBJECTIVE

The primary objective of herbal mouthwash is to promote oral health using natural ingredients. Specifically, herbal mouthwashes aim to:

1) **Reduce Bacterial Load:**
   They help decrease the number of harmful bacteria in the mouth, which can lead to plaque, gingivitis, and bad breath.
2) **Freshen Breath:**
   Many herbal mouthwashes contain natural oils and extracts like peppermint, eucalyptus, or clove, which help to freshen breath.
3) **Maintain Oral Hygiene:**
   They can be used as part of a daily oral care routine to complement brushing and flossing.
4) **Soothe Inflammation:**
   Ingredients like aloe vera and chamomile are known for their anti-inflammatory properties, which can help soothe gum inflammation.
5) **Prevent Cavities:**
   Some herbal mouthwashes contain substances that may help strengthen tooth enamel and prevent cavities.
6) **Provide Antioxidants:**
   Certain herbs have antioxidant properties that can help protect oral tissues from oxidative stress.

3. NEED OF WORK

Herbal mouthwashes offer a natural solution for oral hygiene, promoting improved oral health without harsh chemicals. Formulations containing Salvadora Persica, Piper Betle, and Belleric myrobalan have demonstrated effectiveness in reducing plaque and gingivitis. These mouthwashes aim to provide antibacterial, antifungal, and antioxidant properties, benefiting oral health without the adverse effects associated with traditional mouthwashes. Research supports their potential in maintaining oral hygiene and preventing oral diseases, highlighting their significance in oral care routines.

4. DRUG AND EXCIPIENT PROFILE

4.1 Clove Oil



Figure 1 Clove oil

Synonyms: Clove buds, Clove flowers
Botanical name: Syzygium aromaticum L
Family: Myrtaceae

Chemical constituents

- Clove oil primarily consists of eugenol, which is responsible for its characteristic aroma and many of its medicinal properties.

Use

- Natural antibiotic with broad antibacterial, antifungal, and antiviral properties. Acts as a carminative to increase stomach acid and boost peristalsis.
- Relieves toothache when applied to a decayed tooth. [10]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4.2 Peppermint Oil



Figure 2 Peppermint oil

Synonyms: Mentha oil, mint oil
Botanical name: Mentha piperita
Family: Mentha piperita L.
Chemical constituents:

- Peppermint oil primarily contains menthol, which gives it its characteristic cooling sensation and aroma. Other major constituents include menthone, menthyl acetate, and 1,8-cineole.

Use:

- Treats stomach disorders, acts as a cough drop, eliminates 99% of germs causing bad breath and cavities.
- Contains menthone and menthyl esters, especially menthyl acetate. [(11)]

4.3 Turmeric powder



Figure 3 Turmeric powder

Synonyms: curcumin, Indian saffron
Botanical name: Curcuma longa.
Family: Zingiberaceae
Chemical constituents

- Turmeric powder contains several chemical constituents, but its main active compound is curcumin.

Use:

- Kills bacteria in the mouth, reduces inflammation, and promotes oral health.
- Acts as a natural antibiotic, detoxifying herb, antioxidant, and benefits cardiovascular, skeletal, and digestive systems. [(12)]

4.4 Ginger



Figure 4 Ginger

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Synonyms: Zingiber, Root ginger
Botanical name: zingiber officinale
Family: Zingiberaceae
Chemical constituents:

- Ginger contains a variety of chemical constituents, including gingerol, shogaol, paradol, and zingerone, which contribute to its distinctive flavor and aroma.

Use:

- This should be fresh and about one inch grated. Ginger is naturally antibacterial.
- Its natural flavor can also leave a refreshing sensation in the mouth.

4.5 Tulsi



Figure 5 Tulsi

Synonyms: Ocimum sanctum
Botanical name: Ocimum tenuiflorium
Family: Lamiaceae
Chemical constituents:

- Tulsi, also known as Holy Basil, contains a range of chemical constituents. Some of the main ones include eugenol, which gives it its characteristic aroma, as well as other essential oils like caryophyllene and methyl eugenol.

Use :

- Kills bacteria in the mouth, freshens breath, and promotes oral health.
- Leaves can be chewed or powdered for oral hygiene. [13]

4.6 Guava leaves



Figure 6 Guava leaves

Synonyms: Psidium leaves
Botanical name: Psidium guajava
Family: Myrtaceae
Chemical constituents

- Guava leaves contain a variety of chemical constituents, including flavonoids (such as quercetin, kaempferol, and myricetin), tannins, triterpenoids, essential oils, and phenolic compounds.

Use:

- Reduces inflammation of swollen gums and minimizes plaque.
- Chewing fresh guava leaves stops bleeding gums and bad breath.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Commonly used in mouthwashes for its antimicrobial properties to combat mouth infections. [14]

4.7 Menthol crystal



Figure 7 Menthol crystal

Synonyms: Peppermint camphor, Mentholatum
Botanical name: Mentha arvensis
Family: Lamiaceae
Chemical constituents:

- Menthol crystals are primarily composed of menthol, which is a naturally occurring organic compound.

Use:

- They can help freshen breath, provide a tingling sensation, and offer a pleasant taste.
- Additionally, menthol has mild antibacterial properties, making it a popular choice in oral care products to help combat bad breath and promote oral hygiene.

5. MATERIAL AND METHODS

5.1 Materials:

Clove oil, peppermint oil, turmeric powder, ginger, tulsi, guava leaves

5.2 Equipment:

1) **Mixing bowls**: For mixing the ingredients to prepare the herbal mouthwash formulation.
2) **Measuring instruments**: Weighing balance for accurate measurement of ingredients.
3) **Heating apparatus**: heating metal for boil water.
4) **Stirring rods or spatulas**: For thorough mixing and homogenization of the formulation.
5) **pH meter:** To monitor and adjust the pH of the herbal mouthwash formulation.
6) **Sterile containers:** To store the prepared antibacterial herbal mouthwash formulation, maintaining hygiene and preventing contamination.
7) **Packaging materials:** Such as transfer the herbal mouthwash solution in glass container for storage and distribution.

5.3 Experimental Work:

- **Formulation of herbal mouthwash**

Table no.1: Formulation table

Sr. no	Ingredients	Quantity Taken	Category
1	Clove oil	1ml	Anti-inflammatory
2	Peppermint oil	1ml	Reduce throat pain
3	Turmeric powder	2gm	Help reduce oral inflammation, Anti-inflammatory
4	Ginger	2gm	Immune booster, Weight loss
5	Tulsi	2gm	Stress relief
6	Guava leaves extract	5ml	Antioxidant
7	Menthol crystal	2gm	Antimicrobial, Anticancer

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5.4. Procedure

1. Collect and weigh all ingredients.
2. Prepare guava leaves extract.
3. Boil distilled water and add clove oil and peppermint oil.
4. Add turmeric powder, ginger, tulsi, and guava leaves extract.
5. Mix thoroughly with continuous stirring.
6. Filter the formulation.
7. Transfer the solution into suitable containers.
8. Pack and label in airtight containers.



Figure 8 Heating mantle



Figure 9 Formulation of herbal mouthwash

6. EVALUATION TEST

Colour and odour: Physical parameters like colour and odour can be examined by the visual examination.
pH: The pH value of the herbal mouthwash can be measured by using the pH paper.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Figure 10 Determination of pH

Microbial growth test: The prepared mouthwash can be taken at a agar plate and the plate have to be placed in the incubator at 37ºC for 24 hour. After the incubation period the plate have to be checked for microbial growth and compare with control group.

Stability testing of mouthwash: The stability testing of pharmaceutical products is done for the assurance of product stability at environment conditions. This is done in order to determine the physical and chemical stability of the prepared product and also determine the safety of the product. [15]

7. RESULT AND DISCUSSION

Table no.2: Observation Table

Sr.no	Parameters	Result
1	Colour	Brown
2	Odour	Pleasant
3	pH	6.9
4	Microbial growth	No microbial activity
5	Stability	Stable

8. CONCLUSION

An attempt has been made to outline some of the commonly available herbs and plants, and certain fruits, which are readily available, and can be used as effective mouthwashes by all. If people can use and promote such cost-effective measures of maintaining the oral health which are also devoid of any untoward side effects, it may help in overcoming some common dental problems.

9. FUTURE PROSPECTIVE

1. **Growing Demand for Natural Products**
   With increasing consumer awareness about the benefits of natural ingredients and sustainability, there is a rising demand for herbal oral care products like mouthwash.
2. **Health Consciousness**
   People are becoming more conscious about their overall health, including oral health. Herbal mouthwashes, with their potential to provide effective oral care using natural ingredients, align well with this trend.
3. **Research and Development**
   Ongoing research and development efforts are likely to lead to the formulation of more effective herbal mouthwashes that address specific oral health needs, such as fighting bacteria, reducing inflammation, and promoting gum health.
4. **Innovation in Formulation**
   Advancements in herbal extraction techniques and formulation technology may lead to the development of mouthwashes with improved taste, aroma, and efficacy.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

10. REFERENCE

1. *Kumar P, Ansari S.H,Ali .J . Herbal remedies for the treatment of pridental disease: A patient review. Recent pat drug deliver formula 2009;3:221-8.*
2. *Sandhya R. Herbal product as mouthwash-a review. Int J Sci Res. 2017; 6(7):1334-7.*
3. *Newman DJ, Cragg GM. Natural products as sources of new drugs over the 30 years from 1981 to 2010. J Nat Prod 2012;75(3):311e35.*
4. *Shivani Suresh Uttarwar, Formulation and Evaluation of Herbal Mouthwash, IJCRT, 2022, 10(2), 55-64.*
5. *Hinal S. Gandhi etal, A Systematic Review: Herbal mouthwash for effective oral care IJRPR 7(4) Page No. 126 -127.*
6. *Dr. Harshita Reddy etal , Herbal Mouthwash European journal of molecular & clinical Medicine 7(2) 2022, Page No. 6656*
7. *Nomura Y, Tamaki Y, Tanaka T, Arakawa H, Tsurumoto A, Kirimura K et al. Screening of periodontitis with salivary enzyme tests. J Oral Sci, 2006; 48(4): 177-83.*
8. *Parashar A. Mouthwashes and their use in different oral conditions. Sch J Dent Sci. 2015; 2(2B):186-91.*
9. *Mouthwashes, Camile.S. Farah, Lidija McIntosh, Michael.J.McCullough*
10. *http://valuefood.info/Herbs-and-Spices/Nutrition-Health-Benefits-Spices/health-benefits-of-ajowan or-ajwain-seeds.html Access on 21.02.2020.*
11. *R. Eccles. Menthol and Related Cooling Compounds. J. Pharm. Pharmacol 1994; 46(8):618–630p. PMID 7529306.*
12. *Turmeric an amazing healer, Anne McIntyre.*
13. *Biswas NP, Biswas AK. Evaluation of some leaf dusts as grain protectant against rice weevil Sitophilus oryzae (Linn). Environ Ecol 2005; 23(3): 485–488.*
14. *Development of alcohol-free herbal mouthwash having anticancer property, journal of herbal science*
15. *Bloom T, slot DE, Quiren M, Vander Weijden GA .The effect of mouth rinses on malodour ;a systemic review .Int J Dent Hygiene 2012;10(3):209-22.*
16. *Shafi Ahmad etal, Formulation & evaluation of antibacterial Herbal mouthwash against oral Disorders "Indo Global Journal of Pharmaceutical science 8(2) 2018, Page No. 40*
17. *Pathan MM, Bhat KG, Joshi VM. Comparative evaluation of the efficacy of a herbal mouthwash and chlorhexidine mouthwash on select periodontal pathogens: An in vitro and ex vivo study. J Indian Soc Periodontol. 2017 Jul-Aug;21(4):270-275.*
18. *Dahal S, Shrestha A, Bhagat T. Effectiveness of Herbal Mouthwash among Visually Impaired Residential School Students. JNMA J Nepal Med Assoc. 2018 Jul-Aug;56(212):728-734.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

APPLICATION OF CORPUS TO THE TEACHING PROCESS

Parpieva Shakhnoza Muratovna
Teacher, Uzbekistan State University of World Languages, Uzbekistan

ABSTRACT

This article explores the application of corpus linguistics to the teaching process. Corpus linguistics is the study of language based on large collections of real-world text, known as corpora. The article discusses how corpus data and analysis can be leveraged to inform curriculum development, material design, and teaching methods in order to better meet the needs of language learners. Key areas covered include corpus-informed vocabulary instruction, grammar teaching, and the use of authentic language samples. The article also addresses challenges and limitations in applying corpus approaches in the classroom. Overall, the paper demonstrates the valuable insights that corpus linguistics can provide to enhance the effectiveness of language teaching.

KEYWORDS: *corpus linguistics, language teaching, vocabulary, grammar, authentic language.*

Corpus linguistics is a rapidly growing field that has significant implications for language teaching and learning. Corpus linguistics involves the systematic analysis of large collections of authentic language data, known as corpora. [1] Through the use of corpus analysis tools and techniques, researchers and teachers can gain deeper insights into patterns of real-world language use, lexical frequencies, collocations, and other linguistic phenomena.

Corpus-Informed Vocabulary Instruction

One of the primary applications of corpus linguistics in teaching is in the area of vocabulary instruction. Corpus data can provide teachers with empirical information about the most common and essential words that language learners need to acquire. Frequency lists derived from corpora can guide curricular decisions about which vocabulary to prioritize and teach. [2] Furthermore, corpus analysis can reveal important information about lexical patterns, such as common collocations and idiomatic expressions, which are crucial for learners to master.

Corpus-Informed Grammar Instruction

In addition to vocabulary, corpus linguistics also has important applications for grammar teaching. Corpora can be used to identify the most frequent grammatical structures used in natural language, allowing teachers to align their instruction with real-world usage patterns. Corpus-based reference grammars have been developed, providing detailed, data-driven descriptions of grammatical phenomena. [3] Teachers can leverage these resources to design grammar lessons and activities that are firmly grounded in authentic language use.

Use Of Authentic Language Samples

A key benefit of corpus linguistics is the ability to access large repositories of authentic language samples. Rather than relying solely on simplified or contrived examples, teachers can incorporate genuine texts, dialogues, and other language excerpts into their instructional materials. This exposure to real-world language can help learners develop a more nuanced understanding of how the target language is actually used in natural contexts. [4]

Challenges and Limitations

While the applications of corpus linguistics in language teaching are significant, there are also some challenges and limitations to consider. Corpus data may not always be representative of the specific language variety or dialect that learners need to acquire. Additionally, the technical skills required to effectively navigate and analyze corpus resources can present barriers for some teachers. Careful curation and adaptation of corpus materials is often necessary to ensure their relevance and accessibility in the classroom.

Corpus-Informed Curriculum Development

Corpus data can inform decisions about the content and structure of language curricula. Frequency information from corpora can help identify the most important vocabulary, grammatical structures, and language functions that should be prioritized in a curriculum. Corpus-based syllabi and coursebooks have been developed, ensuring the teaching materials are aligned with real-world language use. [5]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Authentic Material Design
Beyond just informing curriculum, corpus data can also be directly incorporated into instructional materials. Teachers can use corpus tools to identify genuine language samples, such as transcripts of conversations, newspaper articles, or academic texts, that exemplify target linguistic features. These authentic materials can then be adapted and integrated into lessons, providing learners with exposure to natural, contextualized language.

Data-Driven Learning
An innovative approach is to engage learners directly with corpus data through data-driven learning (DDL) activities. [6] In DDL, students are given hands-on experience exploring corpus resources, querying the data, and inductively discovering linguistic patterns. This process encourages learners to become active researchers of the language, developing valuable analytical skills.

Limitations and Considerations
While the benefits of applying corpus linguistics to teaching are substantial, there are also some important limitations to consider. Corpora may not always represent the specific regional dialects, registers, or genres that are most relevant to learners' needs. Additionally, technical barriers, such as the skills required to access and interpret corpus data, can hinder some teachers from fully leveraging these resources. Careful selection, adaptation, and scaffolding of corpus-based materials is often necessary.

Corpus-Informed Materials Evaluation
Corpus analysis can also be used to critically evaluate the linguistic content of existing instructional materials, such as textbooks and coursebooks. By comparing the lexical and grammatical features in these materials against corpus-derived frequency data, teachers can assess how well the materials align with real-world language use. [7] This evaluation can inform decisions about supplementing or adapting the materials to better meet learners' needs.

Corpus-Based Needs Analysis
Corpora can be leveraged to conduct more rigorous needs analyses for language learners. By examining the linguistic characteristics of the target registers, genres, or domains that learners need to engage with, corpus data can provide valuable insights to guide the design of learning objectives and syllabus content. [8] This data-driven approach to needs analysis leads to more tailored and effective instructional planning.

Corpus-Informed Assessment
Corpus linguistics also has implications for language assessment. Corpus data can inform the development of test items and tasks that reflect authentic language use, rather than relying on artificial or decontextualized language samples. Additionally, corpus-based scoring rubrics and benchmarking can be used to evaluate learners' productive language abilities in a more nuanced and criterion-referenced manner. [9]

Professional Development for Teachers
Integrating corpus-based approaches into language teaching requires specific knowledge and skills on the part of instructors. Providing teachers with professional development opportunities to learn about corpus linguistics, access corpus resources, and develop corpus-informed lesson plans is an important consideration. [10] Building teachers' capacity in this area enhances their ability to leverage corpus data effectively in their classrooms.

These are just a few of the additional ways in which corpus linguistics can be applied to enhance various aspects of the language teaching process. As the field continues to evolve, the potential applications will likely expand even further, positioning corpus linguistics as an increasingly valuable tool for language educators.

Corpus-Informed Feedback and Error Correction
Corpus data can inform the provision of feedback and error correction for language learners. By analyzing common errors or nonstandard usages in learner corpora, teachers can identify patterns and develop more targeted strategies for addressing these issues. [11] Corpus-based feedback can also be automated through intelligent computer-assisted language learning (ICALL) systems.

Corpus-Driven Vocabulary Instruction
Corpora offer a wealth of information about vocabulary, including word frequencies, collocations, and semantic associations. This data can guide the selection of high-frequency and pragmatically salient words to include in vocabulary instruction. [12] Corpus-informed techniques, such as concordancing and collocation analysis, can also be used to help learners develop a more nuanced understanding of lexical items.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Corpus-Based Genre Analysis

Examining the linguistic features of different genres and registers through corpus analysis can provide valuable insights for genre-based language teaching. [13] By understanding the conventions and patterns of target genres, such as academic writing or business correspondence, teachers can design instruction that better prepares learners to engage with those genres effectively.

Corpus-Informed Syllabus Design

Beyond just informing individual lessons and materials, corpus data can play a role in the overall design of language curricula and syllabi. Frequency information, as well as insights into language variation and change, can guide decisions about the sequence and focus of linguistic content to be covered. [14] This corpus-informed approach helps ensure that syllabi reflect the realities of contemporary language use.

These are just a few additional examples of how corpus linguistics can be leveraged to enhance various aspects of language pedagogy. As the field continues to evolve and corpus resources become more sophisticated and accessible, the potential applications in the language teaching domain will only continue to grow.

Overall, the field of corpus linguistics offers a wealth of possibilities for enhancing language teaching and learning. As the availability and sophistication of corpus resources continue to grow, the integration of corpus-informed approaches into classroom practice will be an increasingly important area of development in the language teaching profession.

In conclusion, the field of corpus linguistics has much to offer the language teaching profession. By leveraging corpus data and analysis techniques, teachers can make more informed decisions about curriculum, design more effective instructional materials, and provide learners with richer exposure to authentic language use. As corpus linguistics continues to evolve, the integration of these approaches into language teaching will become increasingly important for enhancing the effectiveness of language instruction.

REFERENCES

1. *McEnery, T., & Hardie, A. (2011). Corpus linguistics: Method, theory and practice. Cambridge University Press.*
2. *Nation, I. S. P. (2001). Learning vocabulary in another language. Cambridge University Press.*
3. *Biber, D., Johansson, S., Leech, G., Conrad, S., & Finegan, E. (1999). Longman grammar of spoken and written English. Pearson Education Limited.*
4. *Gilquin, G., & Granger, S. (2010). How can data-driven learning be used in language teaching? In A. O'Keeffe & M. McCarthy (Eds.), The Routledge handbook of corpus linguistics (pp. 359-370). Routledge.*
5. *Flowerdew, L. (2012). Corpora and language education. Palgrave Macmillan.*
6. *Boulton, A., & Cobb, T. (2017). Corpus use in language learning: A meta-analysis. Language Learning, 67(2), 348-393.*
7. *Harwood, N. (2005). What do we want EAP teaching materials for? Journal of English for Academic Purposes, 4(2), 149-161.*
8. *Flowerdew, J. (2013). Needs analysis and curriculum development in ESP. In B. Paltridge & S. Starfield (Eds.), The handbook of English for specific purposes (pp. 325-346). Wiley-Blackwell.*
9. *Barker, F. (2010). How can corpora be used in language testing? In A. O'Keeffe & M. McCarthy (Eds.), The Routledge handbook of corpus linguistics (pp. 633-645). Routledge.*
10. *Boulton, A., & Vyatkina, N. (2021). Teaching foreign languages with corpora: Historical development, research, and ongoing challenges. Language Teaching, 54(2), 154-169.*
11. *Gilquin, G., & Granger, S. (2010). How can data-driven learning be used in language teaching? In A. O'Keeffe & M. McCarthy (Eds.), The Routledge handbook of corpus linguistics (pp. 359-370). Routledge.*
12. *Nation, I. S. P. (2013). Learning vocabulary in another language (2nd ed.). Cambridge University Press.*
13. *Biber, D., & Conrad, S. (2019). Register, genre, and style (2nd ed.). Cambridge University Press.*
14. *Römer, U. (2009). Corpus research and practice: What help do teachers need? In K. Aijmer (Ed.), Corpora and language teaching (pp. 83-98). John Benjamins.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

KEY ACHIEVEMENTS IN CORPUS LINGUISTICS

Parpieva Shakhnoza Muratovna
Uzbekistan State University of World Languages, Teacher

ABSTRACT

Corpus linguistics has made significant advancements over the past few decades, revolutionizing the way we study and understand language. This article examines some of the key achievements in this dynamic field, highlighting how corpus-based approaches have transformed linguistic research, language teaching, and practical applications. From the development of large-scale electronic corpora to the advancement of computational tools for corpus analysis, the article explores the ways in which corpus linguistics has expanded the boundaries of linguistic inquiry and provided new perspectives on the nature of language. Additionally, the article discusses how corpus-informed methodologies have enhanced our understanding of language variation, change, and usage, as well as their profound impact on language pedagogy and the creation of more effective teaching materials. By showcasing these notable achievements, the article underscores the pivotal role of corpus linguistics in advancing our knowledge of language and its practical applications in various domains.

KEYWORDS: *Corpus linguistics, language research, lexicography, language teaching, natural language processing, corpus analysis.*

Corpus linguistics has played a pivotal role in the study of language, transforming the way researchers and practitioners approach the analysis and understanding of linguistic phenomena. Since the pioneering work of scholars such as John Sinclair and Geoffrey Leech in the 1960s and 1970s, the field has undergone remarkable advancements, both in terms of theoretical and methodological developments. [1] This article aims to provide a comprehensive overview of the key achievements in corpus linguistics, highlighting its significant contributions to various domains of language research and application.

1. The development of large-scale corpora

At the core of corpus linguistics lies the creation and analysis of large-scale, electronically stored collections of natural language data, commonly known as corpora. The evolution of corpus linguistics has been closely tied to the technological advancements that have enabled the collection, storage, and analysis of increasingly vast and diverse language samples. [2] From the early days of manually compiled text collections to the current era of digital archives and web-based corpora, the field has witnessed a remarkable expansion in the availability and accessibility of linguistic data.

One of the seminal achievements in corpus linguistics is the creation of the Brown Corpus, the first million-word electronic collection of written American English, which was developed in the 1960s. [3] This groundbreaking effort paved the way for the development of other influential corpora, such as the LOB Corpus, the British National Corpus, and the International Corpus of English, each offering unique insights into the structure and use of language in various geographical, social, and cultural contexts. [4]

The advent of the internet and the World Wide Web has further revolutionized the field, leading to the creation of increasingly large and diverse corpora, such as the Corpus of Contemporary American English (COCA), the Google Books Ngram Corpus, and the GLUE Corpus, which have collectively transformed the landscape of language research. [5] These expansive data sources have enabled scholars to uncover patterns and trends in language use at an unprecedented scale, opening up new avenues for empirical investigations and theory-building.

2. Advancements in corpus analysis techniques

Alongside the development of large-scale corpora, corpus linguistics has witnessed significant advancements in analytical techniques and tools, which have greatly enhanced the field's capacity to extract meaningful insights from linguistic data. [6] The introduction of computational methods, such as concordancing, collocation analysis, and topic modeling, has enabled researchers to systematically examine language patterns, identify lexical and grammatical features, and explore the semantic and pragmatic dimensions of language use. [7]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The increasing availability of user-friendly corpus analysis software, such as AntConc, WordSmith Tools, and the Sketch Engine, has further democratized the field, making corpus-based investigations accessible to a broader range of scholars, students, and language professionals. [8] These tools have empowered researchers to engage in data-driven explorations, uncover unexpected linguistic phenomena, and challenge prevailing assumptions about language structure and use.

3. Contributions to lexicography and language teaching

One of the most significant achievements of corpus linguistics has been its profound impact on the field of lexicography. Corpus-based approaches have revolutionized the way dictionaries and other reference resources are compiled, moving away from the reliance on introspection and towards the systematic analysis of authentic language data. [9] Corpus linguistics has enabled lexicographers to gain a more comprehensive understanding of word meanings, collocations, and usage patterns, leading to the production of more accurate and up-to-date dictionaries that better reflect the realities of language in use.

In the realm of language teaching, corpus linguistics has also made substantial contributions, informing the development of syllabi, teaching materials, and classroom activities that are more closely aligned with the linguistic needs and preferences of learners. [10] By providing empirical insights into the most frequent and salient language features, corpus-based approaches have enabled educators to design more effective curricula, select appropriate teaching resources, and create engaging language learning experiences that better prepare students for real-world communication.

4. Advancements in natural language processing

The field of corpus linguistics has also played a crucial role in the advancement of natural language processing (NLP), a subfield of artificial intelligence concerned with the processing and analysis of human language data. [11] Corpus-based techniques, such as part-of-speech tagging, named entity recognition, and sentiment analysis, have been instrumental in the development of various NLP applications, including machine translation, text summarization, and language generation. The availability of large, annotated corpora has been essential for training and evaluating NLP models, enabling these systems to better understand and process natural language.

5. Advances in corpus annotation and computational tools

Alongside the growth of language corpora, corpus linguistics has witnessed significant advancements in the field of corpus annotation and the development of computational tools for corpus analysis. The ability to annotate corpora with linguistic information, such as part-of-speech tags, syntactic structures, and semantic labels, has enhanced the depth and precision of corpus-based research. [12] Furthermore, the continuous development of sophisticated software and algorithms for corpus querying, visualization, and statistical analysis has empowered researchers to explore language data in increasingly sophisticated ways. [13] These advancements have enabled linguists to uncover complex linguistic phenomena, identify patterns and trends, and draw more nuanced conclusions about language use.

6. Insights into language variation and change

Corpus-based research has been instrumental in enhancing our understanding of language variation and change. By analyzing large collections of language data, corpus linguists have been able to document and analyze the ways in which language varies across different geographical regions, social groups, and time periods. [14] This has led to a more comprehensive understanding of the factors that shape language use and the dynamic nature of language evolution. Corpus-based studies have shed light on the emergence of new linguistic features, the diffusion of language change, and the sociolinguistic factors that influence language variation, providing valuable insights for both theoretical and applied linguistics.

7. Corpus linguistics and language teaching

The application of corpus linguistics to language teaching and learning has been another significant achievement. Corpus-based research has informed the development of more effective teaching materials, syllabi, and assessment tools, ensuring that the linguistic content and focus of language instruction align more closely with the realities of authentic language use. [15] Furthermore, the integration of corpus-informed approaches, such as data-driven learning and corpus-based needs analysis, has empowered language learners to engage more actively with language and develop analytical skills that enhance their overall language proficiency. [16]

8. Practical applications of corpus linguistics

Corpus linguistics has also made important contributions to various practical applications of language, beyond the realm of academic research. For instance, corpus-based analyses have been instrumental in the development of natural language processing (NLP) systems, including machine translation, information retrieval, and language generation. [17] Additionally, corpus data has been utilized in fields

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

such as lexicography, where it has informed the creation of more accurate and comprehensive dictionaries and glossaries. [18] The widespread adoption of corpus-based methodologies in these practical domains has demonstrated the broader impact and versatility of corpus linguistics as a field of study.

The achievements in corpus linguistics over the past decades have been truly remarkable, transforming the way we approach the study of language. From the development of large-scale corpora to the advancement of computational tools and the application of corpus-based insights in various domains, the field has made significant strides in expanding our understanding of language and its complexities. As corpus linguistics continues to evolve, its impact on linguistic research, language teaching, and practical applications will undoubtedly continue to grow, paving the way for even more groundbreaking discoveries and innovations in the years to come.

REFERENCES

1. *Sinclair, J. (1991). Corpus, concordance, collocation. Oxford University Press.*
2. *McEnery, T., & Hardie, A. (2012). Corpus linguistics: Method, theory and practice. Cambridge University Press.*
3. *Francis, W. N., & Kučera, H. (1964). Manual of information to accompany a standard corpus of present-day edited American English, for use with digital computers. Department of Linguistics, Brown University.*
4. *Leech, G. (1992). 100 million words of English: The British National Corpus (BNC). Language Research, 28(1), 1-13.*
5. *Davies, M. (2008). The Corpus of Contemporary American English: 450 million words, 1990-present. BYE, Brigham Young University.*
6. *Hunston, S. (2002). Corpora in applied linguistics. Cambridge University Press.*
7. *Biber, D., Conrad, S., & Reppen, R. (1998). Corpus linguistics: Investigating language structure and use. Cambridge University Press.*
8. *Anthony, L. (2014). AntConc (Version 3.4. 4) [Computer Software]. Tokyo, Japan: Waseda University.*
9. *Atkins, B. T. S., & Rundell, M. (2008). The Oxford guide to practical lexicography. Oxford University Press.*
10. *Timmis, I. (2015). Corpus linguistics for ELT: Research and practice. Routledge.*
11. *Manning, C. D., & Schütze, H. (1999). Foundations of Statistical Natural Language Processing. The MIT Press.*
12. *Lüdeling, A., & Kytö, M. (Eds.). (2008). Corpus linguistics: An international handbook (Vol. 1). Walter de Gruyter.*
13. *McEnery, T., & Hardie, A. (2012). Corpus linguistics: Method, theory and practice. Cambridge University Press.*
14. *Biber, D., & Reppen, R. (2015). The Cambridge handbook of English corpus linguistics. Cambridge University Press.*
15. *Flowerdew, L. (2012). Corpora and language education. Palgrave Macmillan.*
16. *Boulton, A., & Cobb, T. (2017). Corpus use in language learning: A meta-analysis. Language Learning, 67(2), 348-393.*
17. *Gries, S. T., & Stefanowitsch, A. (Eds.). (2006). Corpora in cognitive linguistics: Corpus-based approaches to syntax and lexis. Walter de Gruyter.*
18. *Hanks, P. (2012). The corpus revolution in lexicography. International Journal of Lexicography, 25(4), 398-436.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

EASTERN MORAL VALUES AS A WAY FOR THE DEVELOPMENT OF THE SPIRITUAL CULTURE OF THE YOUTH

Abdullayev Bakhodir Ismoilovich
Deputy Dean, The University of Urgench RANCH Technology

Article DOI: https://doi.org/10.36713/epra17528
DOI No: 10.36713/epra17528

ABSTRACT

This article explores the pervasive influence of moral values on diverse aspects of human existence, extending beyond social interactions to encompass professional, ecological, technological, and political realms. It emphasizes the comprehensiveness of values, encompassing not only material wealth but also spiritual heritage and natural resources.

KEY WORDS: *moral values; human behavior; social relations; ecology; technology; politics; material values; spiritual values; natural values; socio-political values.*

Moral values, which form the basis of human interaction and social activity, include certain principles that are useful in distinguishing right from wrong, good from bad, and justice from injustice. As a result of the rapid development of the period, the penetration of moral values into various spheres and directions of life has increased, now this concept remains one of the factors with a strong influence not only in social relations, but also in the professional, ecological, technological and political spheres. It should not be forgotten that "a set of natural and social benefits and events that serve the interests and goals of the nation, people and social groups, which are important for people and humanity, and are valued and appreciated by them" is considered a value [1]. The essence of moral value is seen in people's behavior, manners, attitude towards social norms, laws, mutual respect and universal, spiritual and cultural principles.

The comprehensiveness of values, that is, their coverage of various sides of life and society, is an aspect that deserves special attention. Values have a wide scope as they include not only the material wealth of the nation, but also its spiritual heritage and "natural, material, socio-political, moral values are distinguished [2]". In addition to these, there are many works aimed at explaining the types of values, D.Shokirova and B.Nazarova spoke about the types of values, They cited "values formed as a result of globalization, national-regional values [3], public and sectarian values, values of individual freedom and independence, values of economic freedom, free activity in the market system and spiritual growth, flexibility, tolerance, ethics, customs, traditional values, the values of the harmony of personality formation, values of professionalism and specialization". If we focus on the main categories of these values, the basis of material values is the nation's material wealth, property, historical and modern infrastructures, as well as financial and economic resources. Whereas spiritual values include non-material, cultural and religious traditions and beliefs, ceremonies, customs that reflect the uniqueness of the nation and society, as well as samples of art and literature, oral works of the people passed down from generation to generation, etc.

Natural values are also referred to as ecological values in some sources [4], it includes the preservation and conservation of natural environments and ecological systems, biodiversity, natural landscapes, and sustainable use of natural resources. Socio-political values regulate the social and political life of individuals, indicate principles such as justice and equality in the management of society, rule of law. While moral values mean moral principles that evaluate personal behavior, play an important role in managing social relations, and call for honesty, correctness and truthfulness. These types of values are closely connected and constantly influence each other. For example, socio-political values can influence material values by shaping economic policies that promote equality and stability, or spiritual values can influence moral values by creating a basis for ethical behavior.

According to M.Farmonova, "Among the moral values characteristic of our nation, concern, patience, restraint, politeness, hospitality, kindness, enthusiasm, respect for the elderly, modesty in social life are ingrained in our blood [5]." These values are important in maintaining social harmony, strengthening mutual respect, and ensuring solidarity. Because, From time immemorial, moral values such as caring for the well-being of others, paying attention to their needs and problems, encouraging a sense of mutual help, and supporting each other without interest are characteristic of the Uzbek nation. These values are an integral part of the social

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

consciousness of the Uzbek people and they serve as a support that is passed down from generation to generation, reflected in everyday life, and serves to ensure a strong, cohesive and stable society.
The analysis of the world and national moral values system shows that despite the fact that the essence of these values is characteristic of all peoples and nations, this does not imply that the predominant moral value within the mindset of one people or nation is likewise the predominant moral value within the mindset of another people or nation. It cannot be denied that moral values are universal and do not choose time or period. However, it is necessary to take into account that they are influenced by culture, religion, social and political norms. In some cases, the history of a particular nation can influence the formation of its moral values, for example, colonial policy, struggles between socio-political forces play a special role in the development of moral rules. That is, depending on the diversity of people, nations and cultures, the origin, historical development, customs and traditions of each ethnic group, the role and importance of moral values will be different. For example, according to the results of the research conducted by J.Graham and others on the foundations of moral values, the moral values of countries such as Spain, Poland, Australia, USA, Great Britain, Hungary, and Latvia are based on the principle of individuality, according to which the preservation, protection, and support of a person is central. According to the author, in Iran, Serbia, Mongolia, Turkey, China and Japan, the principle of dependence prevails, and according to it, moral values such as social group, family, unity with the nation, solidarity, and loyalty are important [6]. In America, leaving a tip for a waiter shows that a person is aware of ethical manners, but in South Korea, leaving extra money for a waiter is considered rude. In Korea, it is normal to consider the appearance of employees when hiring them, but in most countries this is considered discrimination and is considered as a violation of professional ethics. In Japan, the system of moral education is interpreted as "education aimed at forming the character of the individual, activities aimed at educating moral qualities acceptable for the state, and educating the basics of civic ethics [7]." Summarizing the thoughts, while we are talking about the issue of moral values, it is necessary to pay attention to the introduction of the universal moral values of the Uzbek people and culture into the education system.

From time immemorial, the Uzbek people have paid attention to the role of moral values and the formation of spiritual culture in education. Looking at the spiritual heritage of our ancestors, we can understand that the role of moral values in education is reflected in many masterpieces such as "Al-Adab al-Mufrad" by Imam al-Bukhari (810-870), "Fozil odamlar shahri" by Abu Nasr al-Farabi (873-950), "Danishnama" by Ibn Sina (980-1037), "Mukaddamat ul-adab" by Mahmud Zamakhshari (1075-1144), "Bustan" and "Gulistan" by Saadi Shirazi (1210-1291), "Akhloki Muhsini" by Husain Vaiz Koshifi (1442-1505), "Akhloki Jalali" by Davani (1427-1502), "Turkiy guliston yoxud axloq" by A.Avloni (1878-1934).

The deep rooting of moral and spiritual education issues in Central Asia was caused by historical, cultural, religious and social influences, which was based on two factors.

Firstly, it is the priority of social values in society. In the history of the peoples of Central Asia, there was a strong demand for strong moral and ethical rules in order to live a life based on collective harmony and maintain social order. In order to build such a society, great attention was paid to the development of enlightenment, education, including moral teaching. To this day, values such as mutual respect, support, and cooperation, reflected in the cultural and social norms of the peoples of Central Asia, continue to be passed down from generation to generation.

Secondly, the penetration of religious influences into human life. In Islam, which is the main religion in Central Asia, great attention is paid to high spirituality, good behavior, moral education and social justice. In the teachings of Islam, the inclusion of these issues in everyday life is promoted and the ideas of living correctly and living a good life are shown. Internal moral and spiritual development is emphasized as a way to reach enlightenment in the directions of Islamic Sufism.

As a result of these processes, issues of morality, spirituality and enlightenment in Central Asia developed on the basis of the religious factor, especially during the renaissance, science in our country reached a higher level. It is known from history that the Renaissance was observed twice in the history of Uzbekistan. The first Renaissance appeared in the IX-XII centuries, and during this period, the economic, social-political, spiritual-cultural development of cities and countries was reflected in the works of the bright representatives of Islamic civilization.

Imam al-Bukhari, a great thinker and hadith scholar, was one of the most prominent representatives of the First Renaissance, who made a great contribution to the interpretation of spiritual and moral issues through his work "Al-Adab al-Mufrad". This collection of hadiths focuses on aspects such as moral behavior, interpersonal relationships, and public behavior, virtues such as kindness, generosity, patience, and respect for others are emphasized, also the spiritual importance of moral behavior in human life is highlighted. According to S.Afifi and N.Setiavan [8], the work describes the rules of ethics, in particular, the issue of communication etiquette, speech ethics, as well as certain prohibitions related to the communication process. Imam al-Bukhari showed moral issues on the example of relationships between people in society, between parents and children, between neighbors and between a teacher

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

and a student. He also emphasized the five principles of morality, which are in the leading position in all forms, kindness, compassion, generosity, avoidance of discrimination and refraining from insult.
The concept of decency at the center of "Al-Adab al-Mufrad" includes decency towards parents, children, others, Allah and our Prophet Muhammad. This book contains the rules of Islamic-religious etiquette that every Muslim should have. Ideas such as performing good deeds, being open-handed, generosity, helping the weak, being forgiving, being patient, visiting relatives and the sick, being embarrassed respect to all take place.

The thinker Abu Nasr al-Farabi, who lived and created during this period, describes the philosophical ideas about the ideal state and good society in the work "Fozil odamlar shahri". He promotes a society led by a philosopher-king who embodies both the wisdom and moral excellence of Islamic thought. The thinker connects spirituality with intelligence and moral behavior and emphasizes that true happiness and moral excellence is achieved through intellectual and spiritual development. In the work, topics such as people and their spiritual nature, the structure of human society are described in six sections and nineteen chapters, firstly, the qualities of the ruler, secondly, the difference between the city of virtuous people and the city of ignorant people, and thirdly , his thoughts on how to achieve happiness have a special place. Within these three topics, the content of spiritual and moral ideas such as honesty, temperance, being satisfied, pleasing oneself and others, calling people to justice, showing mercy to the oppressed, being noble and fair, being brave and able to think freely was revealed. Abu Nasr al-Farabi was one of the first to write about the problem of moral education in his works and interpreted it as a direction of practical philosophy. He emphasized that it is necessary to start educating a person from a young age, and that not only mental, but also physical education is important.

In "Danishnama" by Ibn Sina, while investigating the nature of the metaphysics of soul and morality, issues such as the relationship between the body and the soul, the pursuit of knowledge, and the sense of moral responsibility of individuals are described. The work analyzes the importance of the development of the spiritual soul through the acquisition of knowledge and the education of human qualities, and the importance of achieving intellectual and spiritual maturity.

It can be seen that spirituality, enlightenment, morals, ethics and these kinds of issues are directly connected with Islam in the works of thinkers who created during the early renaissance. Also, the ideas that morality is interpersonal relations, building a mature society, and the achievement of intellectual and moral perfection of true happiness were put forward.

REFERENCES

1. *Values and social development.-T.: Uzbekistan, 1997. p.198.*
2. *Tolajanov J. Philosophy of values.-T.: Uzbekistan, 1998. p.333.*
3. *Shokirova, D., & Nazarova, B. (2014). Some aspects of the formation of a value-oriented education system in a higher educational institution. Economics and innovative technologies, (2), p. 108–113. retrieved from https://inlibrary.uz/index.php/economics_and_innovative/article/view/8130*
4. *Wiseman M., Bogner F. X. A higher-order model of ecological values and its relationship to personality //Personality and Individual differences. - 2003. - T. 34. – no. 5. p. 783-794.*
5. *Farmonova M. The essence of spiritual and moral values in child education. Public education.-T.: Ministry of public education of the Republic of Uzbekistan, 2017. p. 113-118.*
6. *Jesse Graham, Jonathan Haidt, Sena Koleva, Matt Motyl, Ravi Iyer, Sean P. Wojcik, Peter H. Ditto, Moral Foundations Theory: The Pragmatic Validity of Moral Pluralism, Editor(s): Patricia Devine, Ashby Plant, Advances in Experimental Social Psychology, Academic Press, Volume 47, 2013, P. 55-130, ISSN 0065-2601, ISBN 9780124072367, https://doi.org/10.1016/B978-0-12-407236-7.00002-4.*
7. *T.Sultanov, Sh.I.Mustafakulov Foreign experiences on the development of the field of education. Scientific electronic magazine "Economy and innovative technologies". No. 4, May, 2012. p. 4*
8. *Afifi, S., & Setiawan, N. A. . (2021). Communication ethics in the book of Adabul Mufrad by Imam Al-Bukhari. Communications in Humanities and Social Sciences, 1(2), p. 82–90. https://doi.org/10.21924/chss.1.2.2021.20*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

COMPUTATIONAL STUDY ON VIBRATIONAL SPECTRAL AND THERMAL CHARACTERIZATION USING ORGANIC DERIVATIVE OF 3-FORMLNITROBENZEN

Dr.B.Rameshe[a] , Dr.P.Geetha[b], C.Jeevarathinam[c] , Dr. G.V.Pandian[d]
[a]*Department of Physics,Rajiv Gandhi College of Engineering and Technology,Puducherry,India.*
[b]*Department of Chemistry,Rajiv Gandhi College of Engineering and Technology,Puducherry,India.*
[c]*Department of Chemistry,Raak Arts and Science College,Puducherry,India.*
[d]*Department of Chemistry, T.B.M.L College, Porayar,India.*

Article DOI: https://doi.org/10.36713/epra16830
DOI No: 10.36713/epra16830

ABSTRACT
In this work, the vibrational spectral analysis was carried out by using FT-IR and FT-Raman spectroscopy in the range 400-4000 cm-1 and 100-1900 cm-1 respectively, for Thiosemicarbazone of m-nitrobenzaldehyde molecule. The potential energy curve shows that molecule molecule has one stable structure. The molecular structure, fundamental vibrational frequencies and loudness of the vibrations bands were interpreted with the aid of structure optimizations and normal coordinate force field calculations-based density functional theory (DFT) and ab initio HF methods and different basis set combination. The outcomes of the computation were put on to simulated spectra of the title compound, which show excellent agreement with observed spectra. The scaled B3LYP/6-311++G (d -p) results show the best agreement with the experimental values over the other method. The energy and oscillator strength calculated by Time-Dependent Density Functional Theory (TD-DFT) complements with the experimental findings. In addition, molecular electrostatic potential and thermodynamic properties of the title compound were performed. Mulligan and natural charges of the title molecule were also calculated and interpreted.
KEYWORDS: *FT-IR; FT-RAMAN; Chlorobenzene; DFT; HF and B3LYP.*

1. INTRODUCTION

Thiosemicarbazone of m-nitrobenzaldehyde is an organic crystal plays an important function in application in optical computing and optical communication devices. In recent year, an intense research study has been taken out to identify a limited form of thermally stable optical material. Organic compounds are frequently shaped by very weak Vander walls and hydrogen bonds and possess a high degree of delocalization. Hence, they are optically more nonlinear than inorganic crystals. Recent researches have brought up that organic crystals are bulk in size, hardness, stable, and large nonlinear optical susceptibilities compared to the inorganic crystals. The slow evaporation solution growth Technique (SESGT) is an important technique because large size, stability, optical crystals are being produced by this technique [1-6]. Hence, these crystals are employed in the field of optical communication and optical computing and information process. The harvested crystals were characterized by FT-IR spectral analysis, UV, ^{1}H and ^{13}C Nuclear magnetic resonance spectra, TGA-DSC studies, X-ray diffraction (XRD), Microhardness analysis, and SHG efficiency studied [7-12].

2. EXPERIMENTAL DETAILS

The compound under investigation, namely thiosemicarbazone m-nitrobenzaldehyde is purchased from M/S Aldrich chemicals, U.S.A with spectroscopic grade and it is used as such without any further refinement. The FT-IR spectrum of the compound has been entered in a Perkin-Elmer 180 Spectrometer in the range of 4000–400 cm^{-1}. The spectra are recorded with scanning speed of 30 cm^{-1} min^{-1} of spectral width 2 cm^{-1}. The frequencies of all sharp bands are accurate to ± 1 cm^{-1}. The frequencies of all sharp bands are accurate within ±1 cm^{-1}.The Bruker NMR spectrometer was used to record NMR spectra of the title compound at 500 MHz for 1H and 125.76 MHz for ^{13}C at the Research Center, College of Pharmacy, King Saud University, Saudi Arabia.

3. QUANTUM CHEMICAL CALCULATIONS

The quantum chemical computations have been performed at HF and DFT (B3LYP) methods with 6-311++G (d-p) basis sets using

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

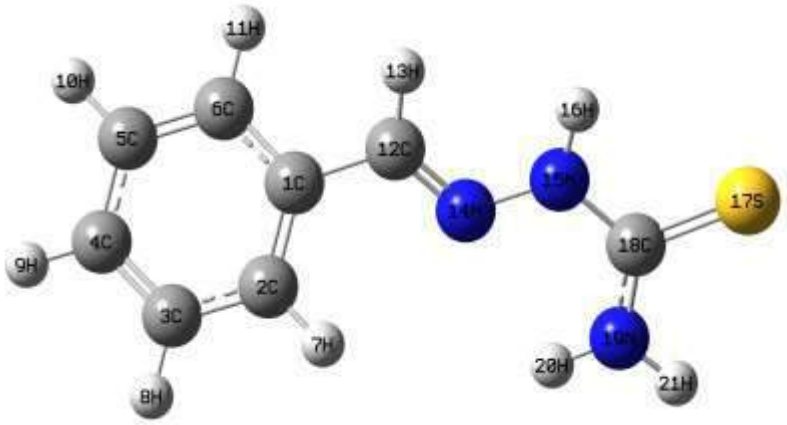
the Gaussian 09 W program [8]. The optimized structural parameters have been measured for the calculations of vibrational frequencies at different level of theories and a variety of basis sets by assuming C_1 point group symmetry. At the optimized geometry for the thiosemicarbazone of m-nitrobenzaldehyde imaginary wavenumbers modes were obtained, Hence there is a true minimum on the potential energy surface was found. As an event, the unscaled calculated frequencies, reduced masses, force constants, infrared intensities, Raman activities, Raman intensities, and depolarization ratios are held. In society to better the calculated values in arrangement with the experimental values, it is necessary to scale down the calculated harmonic wavenumbers. Hence, the vibrational wavenumbers calculated at the HF level are scaled by 0.9067 and the range of wave numbers above 1700 cm^{-1} are scaled by 0.958 and below 1700 cm^{-1} scaled by 0.983 for B3LYP [9, 10]. After scaling with the scaling elements, the difference from the experiments is less than 10 cm^{-1} with a few exceptions. The PEDs are computed from quantum chemically calculated vibrational frequencies using VEDA program [11]. Gaussview program [12] has been counted to make a visual animation and also for the substitution of the normal mode assignment. The electronic absorption spectra for optimized molecule calculated with the time dependent density functional theory (TD-DFT) at B3LYP/6-311++G(d,p) level.

4. RESULTS AND DISCUSSION

4.1. Molecular Geometry

The molecule with CH, S and N is the substitute in a planar six-member ring in the lower limit of the potential energy surface, the substituents being co-planar with the ring the disubstituted derivative. The optimized geometry by B3LYP/6-311++G(d,p) of the thiosemicarbazone of m-nitrobenzaldehyde with atom numbering is shown in Fig.1. By reserving the rest of all parameters, the calculations converge to optimized geometries, which equate to true energy minima, as exposed by the lack of imaginary frequencies in the vibration mode calculation [13, 14]. The optimized geometry thiosemicarbazone of m-nitrobenzaldehyde value is presented in the Fig 1. The global minimum energy is obtained for structure optimization of thiosemicarbazone of m-nitrobenzaldehyde is -872.86170 a.u. For B3LYP/6-311++G (d - p) and -869.16900 a.u HF/6-311++G (d- p). All the above observations are made without any symmetric constrains.

The optimized bond lengths and bond angles of thiosemicarbazone of m-nitrobenzaldehyde are calculated by various methods listed in Table 1. It is well known that HF methods underestimate and DFT method overestimate bond lengths, particularly the CH bond lengths. The aromatic C-C bond distances of thiosemicarbazone of m-nitrobenzaldehyde are found to have higher measures in case of B3LYP calculation with respect to HF computation. Merely knowing that electronegative substituent on aromatic rings course to shorten the C-C bonds adjacent to the substituent, we took for granted that the bond lengths C1-C2, C1-C6 and C3-C4 are higher values than C2-C3, C4-C5 and C5-C6. The highest value of C-C is obtained in the C1-C2 (1.405 Å) near to the substitution. The C-H aromatic bond distances are also in same trend, with relatively large distances in B3LYP/6-311++G (d-p). The C12-H13 bond length is higher in all B3LYP/6-311++G (d-p) basis sets. There are three N-H bond lengths with various values in B3LYP and HF. In this, N15-H16 is having the 1.016 and 0.997 a.u highest value. Similarly, C-N also is having the same values like this in N-H and N15-C18 is having the highest value. The bond angles are calculated using various methods show the same trends as significant variation in bond lengths. The remaining CCC angles are close to 120°. The remaining CCC angles are close to 120°. The B3LYP/6-311++G(d,p) calculations also gives shortening of the angle C1-C2-C6, C3-C4-C5 and C4-C5-C6 and increase of the angle C1-C2-C3, C2-C3-C4 and C1-C5-C6 and this asymmetry of exocyclic angles reveals the repulsion between the substitutions and the phenyl ring. The largest angle is obtained in S17-C18-N19 as 124.7° and 123.4°.



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 1. Optimized parameters of the thiosemicarbazone of m-nitrobenzaldehyde

Bond length	B3LYP	HF	Bond angle	B3LYP	HF
C1-C2	1.405	1.392	C1-C2-C6	118.8	119.2
C1-C6	1.402	1.380	C2-C1-C12	122.4	122.2
C1-C12	1.461	1.398	C6-C1-C12	118.7	118.6
C2-C3	1.388	1.379	C1-C2-C3	120.3	120.1
C2-H7	1.082	1.073	C1-C2-H7	119.2	119.5
C3-C4	1.397	1.390	C3-C2-H7	120.4	120.2
C3-H8	1.084	1.075	C2-C3-C4	120.4	120.3
C4-C5	1.392	1.382	C2-C3-H8	119.7	119.7
C4-H9	1.084	1.075	C4-C3-H8	119.8	119.9
C5-C6	1.392	1.387	C3-C4-C5	119.7	119.8
C5-H10	1.084	1.075	C3-C4-H9	120.1	120.1
C6-H11	1.085	1.076	C5-C4-H9	120.2	120.1
C12-H13	1.095	1.084	C4-C5-C6	119.9	119.8
C12-N14	1.283	1.254	C4-C5-H10	120.2	120.3
N14-N15	1.355	1.355	C5-C6-H10	119.8	119.8
N15-H16	1.016	0.997	C1-C6-C5	120.7	120.6
N15-C18	1.372	1.345	C1-C6-H11	119.5	119.8
S17-C18	1.674	1.681	C5-C6-H11	119.7	119.5
C18-N19	1.346	1.328	C1-C12-H13	116.5	116.2
N19-H20	1.009	0.992	C1-C12-N14	122.9	122.9
N19-H21	1.005	0.991	H13-C12-N14	120.5	120.9
			C12-N14-N15	117.6	117.5
			N14-N15-H16	121.7	121.2
			N14-N15-C18	122.1	121.9
			H16-N15-C18	116.1	116.8
			N15-C18-S17	120.1	120.1
			N15-C18-N19	115.1559	116.4
			S17-C18-N19	124.7411	123.4
			C18-N19-H20	120.397	121.1
			C18-N19-H21	118.2909	118.1
			H20-N19-H21	121.3109	120.9

4.2. Thermodynamic properties

On the basis of vibration analysis at B3LYP/6-311++G(d,p) level, the standard statistical thermodynamic functions: heat capacity ($C^0_{p,m}$), entropy (S^0_m), and enthalpy changes (ΔH^0_m) for the title compound were obtained from the theoretical harmonic frequencies and listed in Table 2 and are shown in the Fig 2. From Table 2, it can be noted that these thermodynamic functions are increasing with temperature ranging from 100 to 500 K due to the fact that the molecular vibrational intensities increase with temperature [15, 16]. The correlation equations between heat capacities, entropies, enthalpy changes and temperatures were fitted by quadratic, linear and quadratic formulas and the corresponding fitting factors (R^2) for these thermodynamic properties are 0.99975,

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

0.99970 and 0.9964, respectively. The corresponding fitting equations are as follows and the correlation graphics from those shows in Figs. 2.

$$C_{p,m}^{0} = 1.199956 + 0.15474T - 5.88904.x10^{-5}\,T^{2} \qquad (R^{2} = 0.99975)$$

$$S_{m}^{0} = 50.90793 + 0.22124\,T - 1.21877 \times 10^{-4}\,T^{2} \qquad (R^{2} = 0.99970)$$

$$\Delta H_{m}^{0} = -1.33596 + 0.02399\,T + 3.194\,x10^{-5}\,T^{2} \qquad (R^{2} = 0.9964)$$

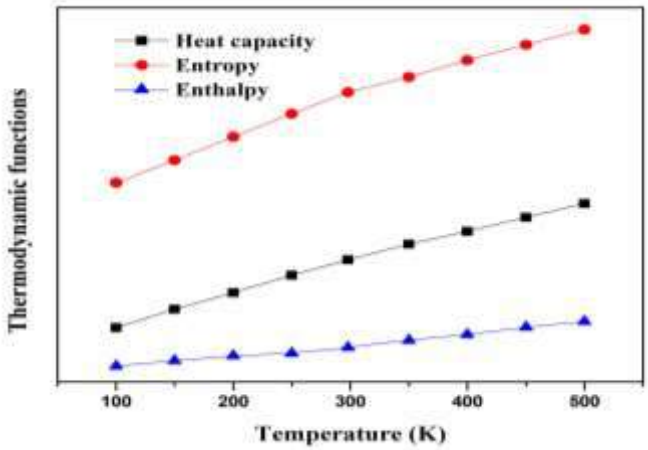


Table 2. Thermo dynamical distribution of thiosemicarbazone of m-Nitrobenzaldehyde

Temperature	$C_{p,m}^{0}$	S_{m}^{0}	ΔH_{m}^{0}
100	16.035	72.151	1.1769
150	23.191	80.832	3.260
200	29.566	89.900	5.145
250	36.300	98.789	6.133
298.13	42.327	107.164	8.404
350	48.331	112.975	11.160
400	53.269	119.529	13.405
450	58.746	125.544	16.188
500	64.066	131.352	18.456

All the thermodynamic data supply helpful information for the further written report on the thiosemicarbazone of m-nitrobenzaldehyde. They tin be applied to calculatite the other thermodynamic energies according to the relationships of thermodynamic functions and estimate directions of chemical reactions according to the second law of thermodynamics in Thermochemical field [17]. Notice: all thermodynamic calculations were executed in gas phase and they could not be applied in solution. Dipole moment reflects the molecular charge distribution and is passed as a vector in three dimensions. Thus, it can be applied as a form to describe to depict the charge movement across the molecule.The focal point of the dipole moment vector in a particle depends on the centers of positive and minus accusations. Dipole moments are strictly set for neutral atom. For charged systems, its value depends on the choice of origin and molecular orientation.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4.3. Mulliken Atomic Charge

Mulliken atomic charge computation has an important in the application of quantum chemical calculation to molecular system because of atomic charges effect dipole moment, molecular polarizability, electronic structure and more a lot of properties of molecular systems. The calculated Mulliken charge values are listed in Table 3 and in Fig 3. The direction of carbon atoms C1, C2 and C18 are positive and remaining carbon care are negative. This suggests, the carbon atoms near to the situational group are positive due to the electron are withdrawing group like N atoms and NH2. The hydrogen atoms are nearer to the subtntituional group also possesses low positive charge and the same in NH2 group hydrogen atoms are having high positive charge. Among the charges, N14 is having positive of 0.213824 and 0.292005 e in B3LYP and HF basis sets The root mean square deviation is very small in B3LYP/6-311++G (d, p) method.

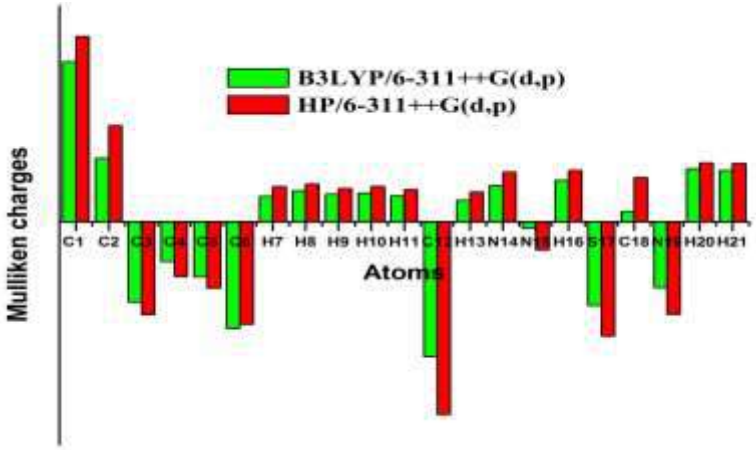


Table 3. Mulliken charge distribution of thiosemicarbazone of m-nitrobenzaldehyde

ATOM	B3LYP	HF
C1	0.944372	1.094805
C2	0.373656	0.566330
C3	-0.474751	-0.550264
C4	-0.235913	-0.325735
C5	-0.325897	-0.391344
C6	-0.631320	-0.606815
H7	0.149691	0.206972
H8	0.182606	0.221457
H9	0.161155	0.196034
H10	0.168122	0.208676
H11	0.152672	0.187999
C12	-0.798078	-1.140048
H13	0.125594	0.175085
N14	0.213824	0.292005
N15	-0.038749	-0.166259
H16	0.243890	0.302426
S17	-0.494547	-0.675350
C18	0.059889	0.259917
N19	-0.388393	-0.546423
H20	0.311711	0.346318
H21	0.300466	0.344213

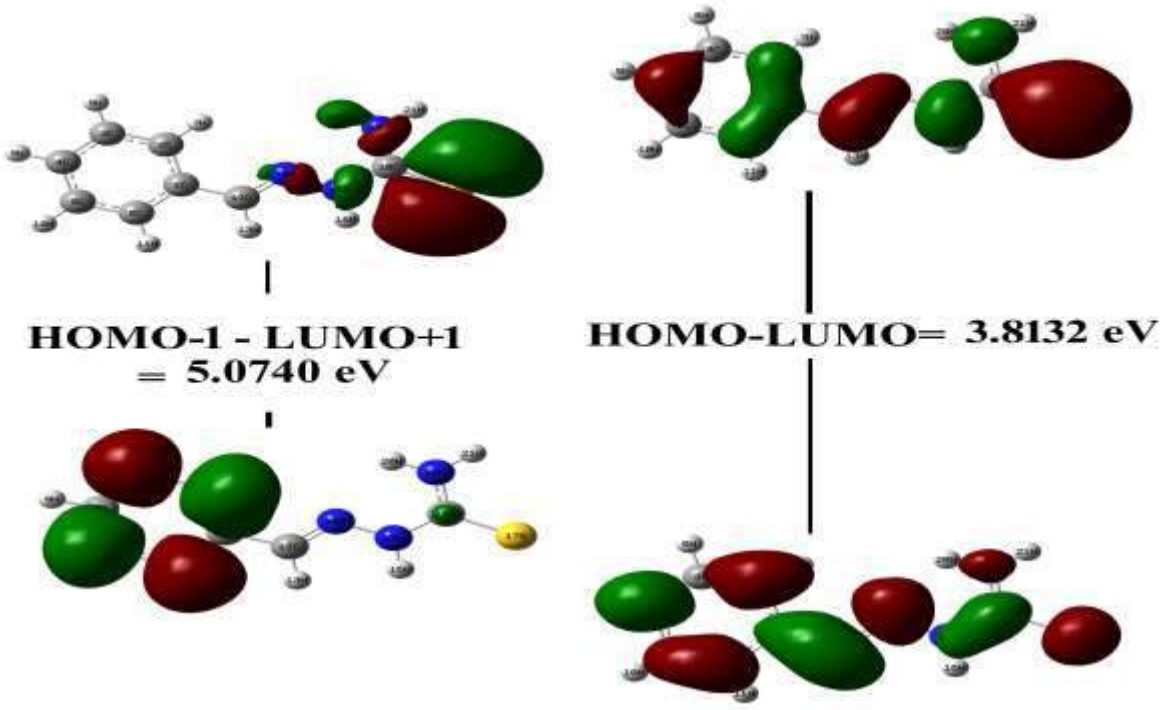
SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4.4. Frontier Molecular Orbitals (FMOs)

The highest occupied molecular orbital (HOMOs) and the lowest-lying unoccupied molecular orbital (LUMOs) are named as frontier molecular orbital (FMOs). The FMOs play a significant part in the optical and electrical attributes, as considerably as in quantum chemistry and UV–Vis spectra [18]. The energy gap between HOMO and LUMO determines the kinetic stability, chemical reactivity and, optical polarizability and chemical hardness–softness of a molecule [19, 20].

The energies of four important molecular orbital of thiosemicarbazone: the second highest and highest occupied MO's (HOMO, HOMO−1 and HOMO-2), the lowest and the second lowest unoccupied MO's (LUMO, LUMO+ 1 and LUMO+2) were calculated using B3LYP/6-311++G (d, p) and are presented in Table 4. 3D plots of the HOMO-2, HOMO-1, HOMO, LUMO, LUMO+1 and LUMO+2 orbits computed at the B3LYP/6-311G++ (d, p) level for thiosemicarbazone are illustrated in Fig. 4. But, while the HOMO-1 is localized on the benzene ring, LUMO+1 is localized on almost the whole molecule. Both the HOMOs and the LUMOs are, mostly π-anti-bonding type orbits.

The calculated energy values of HOMO are -6.2215, -6.2245, -6.2161 and -6.2204 a.u. In acetonitrile, DMSO, Ethanol and Methanol, respectively. LUMO are -1.9473, -1.9473, -1.9470 and -1.9473 a.u. In acetonitrile, DMSO, Ethanol and Methanol, respectively. The value of energy separation between the HOMO and LUMO is 4.2742, -4.2772, -4.2690 and -4.2731 a.u. In acetonitrile, DMSO, Ethanol and Methanol, respectively. The energy gap of HOMO–LUMO explains the eventual charge transfer interaction within the atom, which influences the biological activity of the speck. Furthermore, in proceeding from the gas phase to the solvent phase, the increasing value of the energy gap and the atom becomes more static. The HOMO is located over the group, the HOMO→LUMO transition implies an electron density transfer to ring from chlorine and partially from the pack. Consequently, the lowering of the HOMO–LUMO band gap is essentially a result of the large stabilization of the LUMO due to the strong electron-acceptor ability of the electron-acceptor group.



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

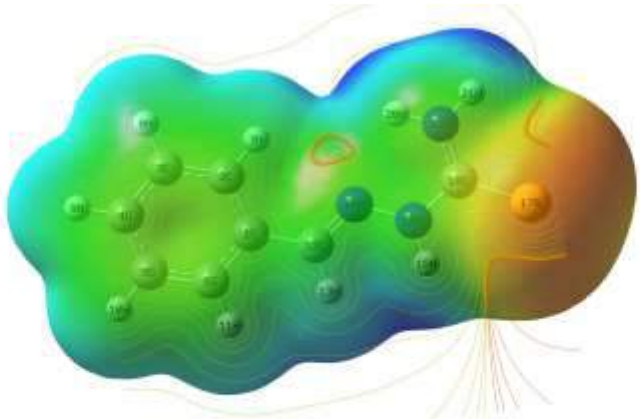
Table 4. Calculated energy values, chemical hardness, electronegativity and dipole moment of in Acetontrilie, DMSO, Ethanol and Methanol

TD–DFT/B3LYP/ 6–311++G(d,p)	Acetontrilie	DMSO	Ethanol	Methanol
E_{total} (Hartree)	-872.8670	-872.8672	-872.8667	-872.8669
E_{HOMO} (eV)	-6.2215	-6.2245	-6.2161	-6.2204
E_{LUMO} (eV)	-1.9473	-1.9473	-1.9470	-1.9473
$\Delta E_{HOMO–LUMO\ gap}$ (eV)	4.2742	4.2772	4.2690	4.2731
$E_{HOMO–1}$ (eV)	-6.4219	-6.4278	-6.4110	-6.4194
E_{LUMO+1} (eV)	-0.7575	-0.7567	-0.7589	-0.7578
$\Delta E_{HOMO–1–LUMO+1\ gap}$ (eV)	5.6643	5.6711	5.6521	5.6616
$E_{HOMO–2}$ (eV)	-7.0067	-7.0086	-7.0032	-7.0059
E_{LUMO+2} (eV)	-0.5536	-0.5552	-0.5504	-0.5528
$\Delta E_{HOMO–2–LUMO+2\ gap}$ (eV)	6.4531	6.45337	6.4528	6.4531
Electronegativity χ (eV)	-4.0844	-4.0859	-4.0815	-4.0838
Chemical hardness η (eV)	2.1371	2.1386	2.1345	2.1365
Softness ζ (eV)$^{-1}$	0.2339	0.2337	0.2342	0.2340
Dipole moment (Debye)	6.9963	7.0173	6.9581	6.9880

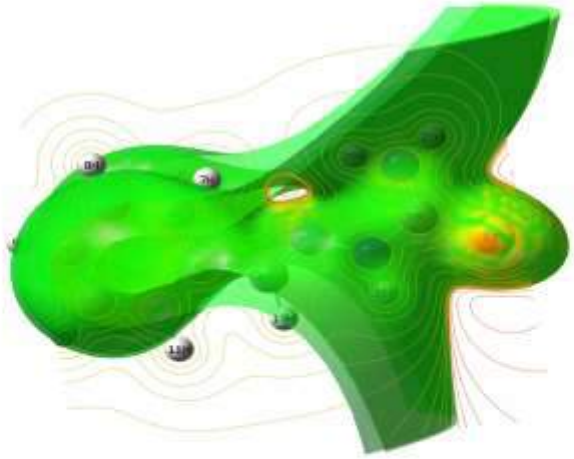
4.5. Electrostatic potential, total electron density and Molecular electrostatic potential

In the present study, the electrostatic potential (ESP) and molecular electrostatic potential (MESP) of thiosemicarbazone of m-nitrobenzaldehyde are illustrated in Fig. 5. Nevertheless, it can be viewed from the ESP figures, that while the negative ESP is localized to a greater extent over the particles and is chewed over as a greenish gloss. The MESP is a useful place to study the reactivity given that a nearing electrophile will be attracted to negative regions (where the electron distribution effect is dominant). The importance of MESP lies in the fact that it simultaneously displays molecular size, shape as well as positive, negative and neutral electrostatic potential regions in terms of color grading (Fig. 5) And is very useful in research of molecular structure with its physiochemical property relationship [21-25]. The resulting surface simultaneously displays molecular size and shape and electrostatic potential value.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



MSEP=+0.04884 to -0.04884



ESP=+0.006649 to -0.006649

The different values of the electrostatic potential at the show up are represented by different colors. Electric potential gains in the order red < orange < yellow < green < blue. The color code of these maps is in the range between -0.04884 a.u. (Deepest red) to 0.04884 (deep blue) in the compound, where blue indicates the strongest attraction and red indicates the strongest repulsion. The ESP color is in the range between -0.006649 to 0.006649 a.u. Regions of negative V (r) are usually associated with the lone pair of electronegative atoms.

4.7 NMR Analysis

The experiment and calculated ^{1}H and ^{13}C NMR chemical shift values of the thiosemicarbazone of m-nitrobenzaldehyde molecule is shown in Table 5 and in Fig.6 and have been compared with the experimental data. ^{1}H and ^{13}C NMR chemical shifts are reported in ppm relative to TMS. Firstly, full geometry optimization of the thiosemicarbazone molecule was carried out at the gradient corrected density functional level of theory using the hybrid B3LYP method based on Becke's three parameters functional of DFT. Thereafter, gauge-including atomic orbital (GIAO) ^{1}H and ^{13}C chemical shift calculations of the title compound was performed by the same method using 6-311++G (d,p) basis set. Aromatic carbons gave calculated signals in the overlapped regions of the ^{13}C spectrum of the title molecule with chemical shift values experimentally in the orbit of 131.5 to 142.3 ppm. Their corresponding theoretical chemical shift values occurred in the range of 135.5-143.5 ppm. Moreover, the highest ^{13}C chemical shift values were observed for C12 and C18 is 167.1 and 178.4 ppm. The hydrogen atoms are calculated values from 8.2 to 7.6 ppm.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

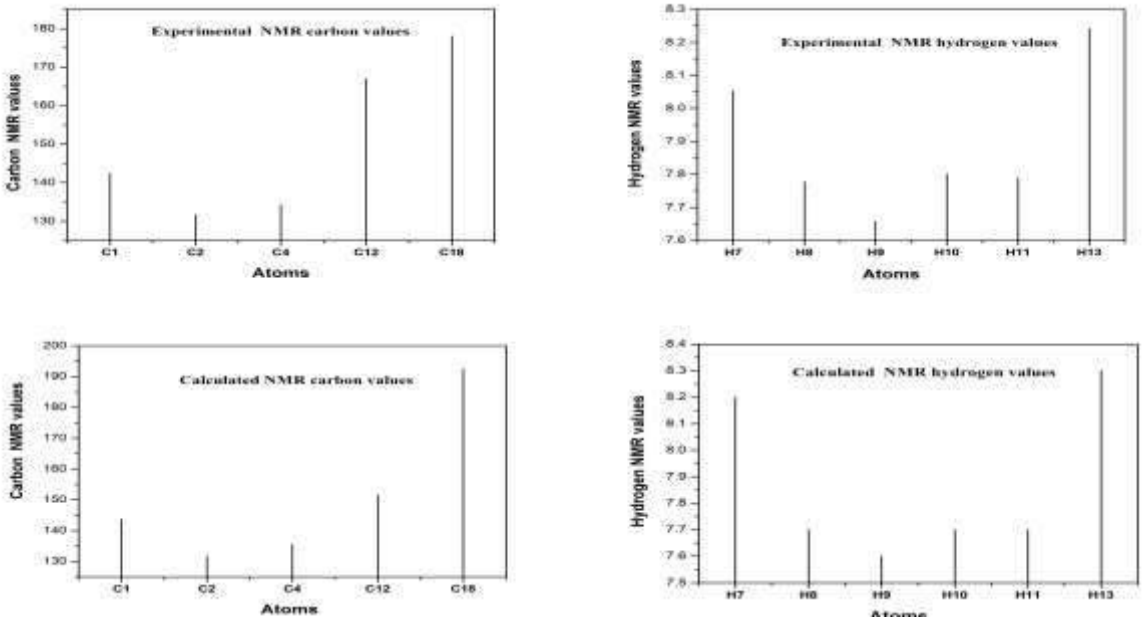


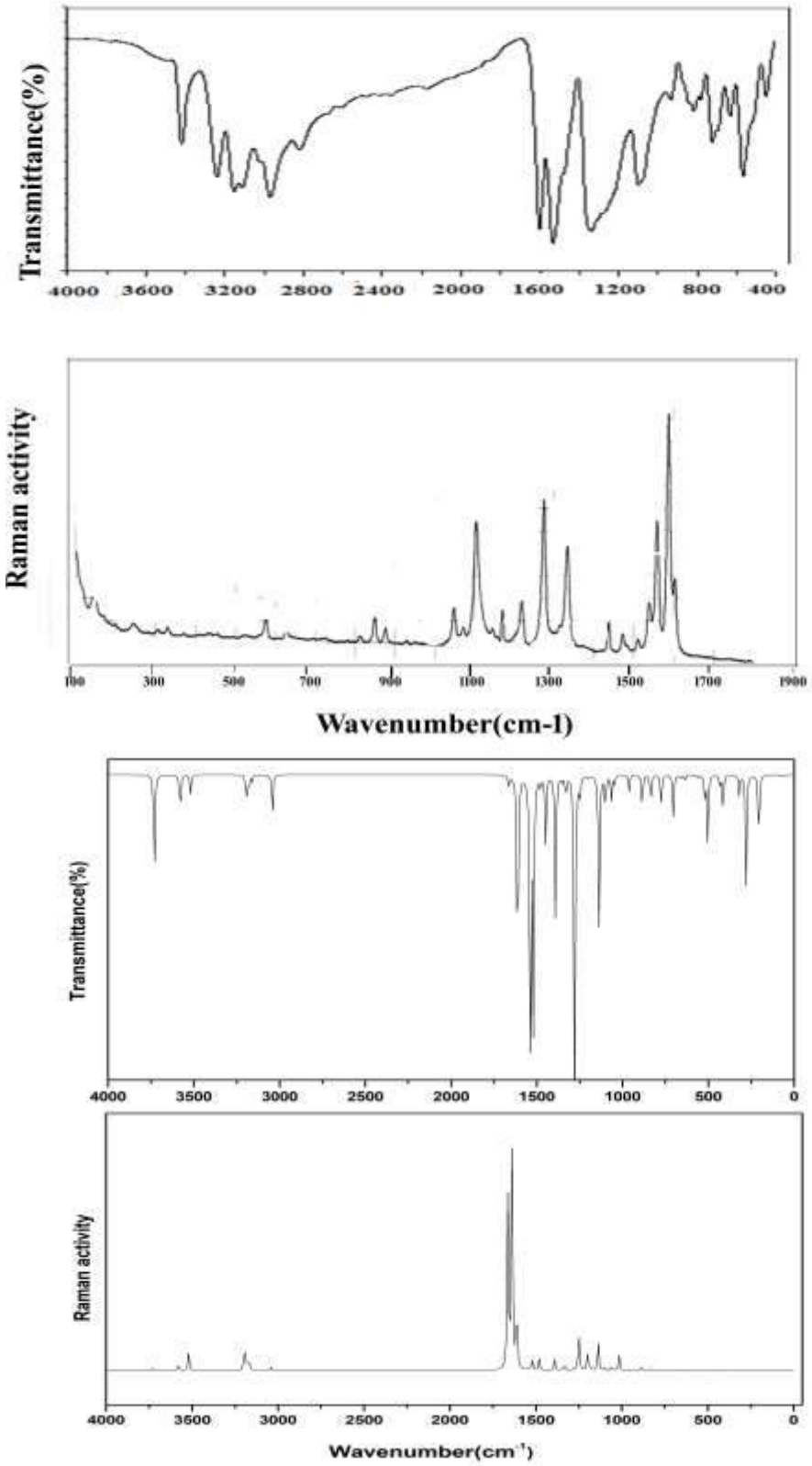
Table .5: Experimental and theoretical probable ^{13}C and ^{1}H NMR isotropic chemical shifts of compound (atom positions are numbered as in Fig. 1)

Atom	Experimental	Theoretical	Atom	Experimental	Theoretical
C18	178.04	192.4	H16		9.4
C12	167.01	151.5	H13	8.242	8.3
C1	142.38	143.5	H7	8.053	8.2
C4	134.22	135.5	H10	7.801	7.7
C6		135.4	H11	7.789	7.7
C3		135.4	H8	7.777	7.7
C5		135.2	H9	7.657	7.6
C2	131.56	131.6	H20		6.3
			H21		6.3

4.8. Vibration analysis

The upper limit form of potentially active observable fundamentals of a non-linear molecule which contains N atoms is equal to (3N-6), apart from three translational and three rotational degrees of exemption. Hence, thiosemicarbazone of m-nitrobenzaldehyde molecule, that was planar, has 21 atoms with 57 normal modes of oscillation. The fundamental modes are distributed species as: $\Gamma_{vib}=\Sigma$ (39A′+18A″). All vibrations are active both in infrared absorption. The detailed vibrational assignment of the experimental wavenumbers is based on normal mode analyses and a comparison with theoretical scaled wavenumbers by B3LYP method. Since the scaled wavenumbers following B3LYP/6-311++G (d-p) method are found closest to experimental data. The observed and simulated FT-IR of thiosemicarbazone is shown in Fig. 7 and 8.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 6. Detailed assignments of theoretical wavenumbers of Thiosemicarbazone of m-nitrobenzaldehyde

Number	Species	FTIR	FTRaman	B3LYP Unscaled	B3LYP scaled	I_{IR}	SRaman	Mode description
1.	A′	3419		3730	3574	106.26	48.43	γNH
2.	A′			3579	3429	42.83	131.63	γNH
3.	A′	3350		3519	3371	19.67	312.58	γNH
4.	A′			3200	3065	6.23	129.22	γCH
5.	A′			3191	3057	19.95	262.04	γCH
6.	A′	3040		3179	3045	14.88	119.13	γCH
7.	A′			3168	3035	0.00	92.68	γCH
8.	A′	3025		3159	3027	6.56	32.66	γCH
9.	A′	2920		3042	2914	39.19	55.20	γCH
10.	A′	1630		1663	1635	9.92	1910.25	βNH
11.	A′		1610	1638	1610	1.07	2518.1	βNH
12.	A′		1590	1613	1586	98.86	73.96	βNH
13.	A′		1580	1611	1584	134.98	693.61	γCC
14.	A′		1515	1539	1513	360.50	20.26	γCC
15.	A′		1488	1521	1495	238.39	99.13	γCC
16.	A′			1479	1454	8.74	129.99	γCC
17.	A′		1420	1449	1424	65.80	2.12	γCC
18.	A′	1365		1391	1367	146.89	119.93	γCC
19.	A′		1335	1354	1331	6.11	18.51	γCC
20.	A′		1310	1331	1309	22.42	74.39	γNN
21.	A′		1260	1279	1257	352.22	15.72	γCN
22.	A′		1230	1250	1229	22.31	407.22	γCN

4.8.1 C-H Vibrations

Aromatic compounds commonly exhibit multiple weak bands in the region 3100–3000 cm^{-1} [26, 27] due to aromatic C-H stretching vibrations. They are not appreciably affected by the nature of the substituent [28-30]. In the present study, the thiosemicarbazone is one substituted aromatic system; it has five C-H adjacent moieties. Hither, the C–H vibrations of the title compound are observed at 3040 and 3025 cm^{-1} in FT-IR spectrum and one substituted C-H vibration in the range 2920 cm^{-1}. The bands due to C-H in-plane bending vibrations are observed in the region 1000–1300 cm^{-1} [52, 53]. In this compound, the above vibrations are observed at 1025 and 950 cm^{-1} in FT-IR. One band is slightly beyond the range. The theoretically scaled vibrations by B3LYP/6-311++G (d-p) level method also show good agreement with experiment recorded data. The C-H out-of-plane bending vibrations are appearing within the region 900-675 cm^{-1} [52]. The vibrations obtained at 640 and 570 cm^{-1} in FT-IR and 820 cm^{-1} in FT-Raman is assigned to C-H out-of-plane bending for thiosemicarbazone of m-nitrobenzaldehyde. The C-H out-of-plane bending vibrations are also lie within the characteristic region.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4.8.2 Ring Vibrations

The ring stretching vibrations is expected within the region 1620-1390 cm^{-1} [31]. Generally, the C-C stretching vibrations in aromatic compounds from the strong bonds. In the present study, the bands are of different intensity and are observed at 1580, 1515, 1488, 1420 and 1335 cm^{-1} in FT- Raman and 1365 in FTIR have been assigned to C-C stretching vibrations. The experimental values are well coincide with calculated by B3LYP/6-311++G (d-p) method. The in-plane bending and out-of-plane bending modes are also good agreeing with experimental data. Only one infrared band at 430 cm^{-1} is assigned to C–C-C in-plane bending vibrations of thiosemicarbazone of m-nitrobenzaldehyde. The bands are assigned to C-C-C out-of-plane bending vibrations 310 cm^{-1} in FT-Raman spectrum of thiosemicarbazone.

4.4.6. C-N Vibrations

Because of the mixing of several bands, the identification of C–N vibrations is a very difficult task. Silverstein [32] assigned C–N stretching absorption in the region 1382–1266 cm^{-1}. In the present work, the band observed in 1260, 1230 and 1170 cm^{-1} in FT-Raman spectrum have been assigned to C-N stretching vibration. The mode calculated at 1257, 1229 and 1178 cm^{-1} to 6-311++G (d-p) basis set is in agreement with experimental values. The experimental in-plane and out-of-plane bending vibrations well coincided with calculated values.

4.8.3. N-H and N-N vibrations

Normally, the N–H stretching vibrations occur in the region 3500–3300 cm^{-1}. The asymmetric $–NH_2$ stretching, vibration appears from 3500 to 3420 cm^{-1} and the symmetric $–NH_2$ stretching is observed in the range 3420–3340 cm^{-1}. In this work, the two NH_2 asymmetric stretches at 3419 and 3350 cm^{-1} in FT-IR cm^{-1} FT-Raman is in agreement with B3LYP/6-311++G (d-p) calculated values. The NH_2 in-plane deformation vibrations occur in the short range 1650–1580 cm^{-1} region of the spectrum. Thus, a very strong band is observed at 1630 in FTIR cm^{-1} and 1610 cm^{-1} in FT-Raman is assigned in-plane deformation mode of the amino group. The amino out-of-plane bending normally appears in the range 1150–900 cm^{-1}. The out-of-plane bending modes are experimentally found at 1110, 1180 and 1150 cm^{-1} and they are well assigned to the calculated values. These amino vibrations are also in good agreement with literature values of aniline [33-36]. The experimental values of N-N values are assigned well with calculated vibrations.

5. CONCLUSION

A complete vibration analysis of thiosemicarbazone of m-nitrobenzaldehyde is performed by HF and DFT-B3LYP methods in 6-311++G (d-p) basis sets. The influences of carbon-nitrogen bonds and phenyl ring to the vibrational frequencies of the title compound were discussed. The observed and simulated spectra are agreed for the good frequency fit in DFT/B3LYP/6-311++G (d-p) method. The conflict between theoretical and experimental wave numbers within 10 cm^{-1} is supported by the qualitative agreement between the computed and observed frequencies. The same style is also contemplated in the optimized parameters. Various quantum chemical calculations help us to distinguish the structure and symmetry properties of the title molecule. The excellent agreement of the computed and observed vibrational spectra reveals the advantages of higher basis set for quantum chemical calculations. Furthermore, the thermodynamic and electronic absorption properties of the compound have been counted. The correlations between the statistical thermodynamics and temperature are also held. It was realized that the heat capacities, entropies and enthalpies increase with the increasing temperature owing to the intensities of the molecular vibrations increase with increasing temperature. The Milliken charge distribution is calculated and well in coincides with electronic distribution.

Figure Captions

Figure 1: The theoretical optimized possible geometric structure with atoms numbering of thiosemicarbazone of m-nitrobenzaldehyde
Figure 2: Thermodynamic functions and temperature for the thiosemicarbazone of m-nitrobenzaldehyde.
Figure 3: The Mulliken charge distribution for the thiosemicarbazone of m-nitrobenzaldehyde.
Figure 4: The molecular orbitals and energies for the HOMO-1, HOMO, LUMO and LUMO+1 of the thiosemicarbazone of m-nitrobenzaldehyde.
Figure 5: Electrostatic potential (ESP) and the molecular electrostatic potential map (MEP) for the thiosemicarbazone of m-nitrobenzaldehyde.
Figure 6: NMR experimental and calculated values of the thiosemicarbazone of m-nitrobenzaldehyde.
Figure 7: Experimental FT-IR and FT-Raman and spectra of thiosemicarbazone of m-nitrobenzaldehyde.
Figure 8: Calculated FT-IR and FT-Raman and spectra of thiosemicarbazone of m-nitrobenzaldehyde

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Acknowledgement
One of the authors (GVP) thank the University Grant Commission, New Delhi for the award of UGC: minor project [File No. 4-1/2008 (BSR)].The authors thank the management and principal of T.B.M.L.College for their support. As the author thank C.Anusha, Department of Biochemistry, Bharathidasan University, and Trichirappalli.The Authors are grateful to the Dr. Brindha Department of Center for Advanced Research in Indian System of Medicine (CARISM).

REFERENCES

1. *Manivannan S, Danuskodi S. Growth and characterizationof a new organic nonlinear crystals: Semicarbazone of N-dimethylaminebenzaldehyde J.Crystal growth 257 (2003) 305-308.*
2. *Vasudevan G, Anbusrinivasan P, Madhurambal G, Mojumdar SC .Thermal analysis effectof dopantsSpectral characterization and growth aspect of KAP crystals .J Therm Anal Calorim 2009(96) 99-102. Anbusrinivasan P, Pandian G.V, Determination of Nucleation Temperature, metestablezone with spectral analysis of sulphanilic acid grown from Ethanol-Water as growth medium;Ultra chemistry vol 8(1),83-90(2012).*
3. *RamachandraRaja C, Ramamoorthi K,Manimekalai.R, Growth and spectroscopic characterization of ethylene diamine tetra acetic acid (EDTA) doped Zinc sulphatehepta hydrate-A semi organic NLO material, Spectrochimica Acta Part a 99(2012)23-26.*
4. *Madhurambal G ,Ramasamy P, Anbusrinivasan P, Vasudevan G, Kavitha S, Majumdar SC, Growth and characterization studies of 2-bromo-4"-Chloro-acetophenone (BCAP) crystals.J Therm Anal calorim 2008; 94:59-62.*
5. *Anbusrinivasan P, Pandian G.V, Determination of Nucleation Temperature, metestablezone with spectral analysis of sulphanilic acid grown from Ethanol-Water as growth medium;Ultra chemistry vol 8(1),83-90(2012).*
6. *Ramalingam S, Anbusrinivasan P, Periandy S:FT-IR and FT-Raman Spectral Investigation,Computed IR-Intensity and Raman activity analysis and frequency estimation analysis on 4-chloro-2-bromoacetophenone was – HF and DFT calculations; Spectrochimica Acta part A 2011(78) 826-834.*
7. *Yun-zhang, Yonggangwang, Yunxiache, Jiminezheng Growth and properties of two new organic nonlinear optical crystals; Hydroxyethylammonium-l-tartrate monohydrate and Hydroxyethylammonium-o-tartratemonohydrate. J crystal growth 299 (2007) 120-124*
8. *M.J. Frisch et al, Gaussion 03 Program, Gaussian, Inc., Wallingford, CT, 2004.*
9. *A. Hakan, A. Öztekin, Int. J. Mol. Sci. 8 (2007) 760-776.*
10. *N. Sundaraganesan, S. Illakiamani, H. Saleem, P.M. Wojciechowski, D. Michalska, Spectrochim. Acta 61A (2005) 2995.*
11. *M.H. Jamróz, Vibrational Energy Distribution Analysis, VEDA 4, Warsaw,2004.*
12. *R.I. Dennington, T. Keith, J. Millam, K. Eppinnett, W. Hovell, Gauss View Version 3.09, 2003.*
13. *E.G. Lewars, Computational Chemistry, Springer Science, Bussiness Media, B.V (2011) 1-7.*
14. *N. Sampath, R.Mathews, M.N.Ponnuswamy, J.Chem.Crystallogr.40 (2010) 1099–1104.*
15. *J. Bevan Ott, J. Boerio-Goates, Calculations from Statistical Thermodynamics, Academic Press, 2000.*
16. *D. Sajan, L. Josepha, N. Vijayan, M. Karabacak, Spectrochim. Acta A 81 (2011) 85– 98*
17. *R. Zhang, B. Dub, G. Sun, Y. Sun, Spectrochim. Acta A 75 (2010) 1115–1124.*
18. *I. Fleming, Frontier Orbitals and Organic Chemical Reactions, Wiley, London, 1976.*
19. *A.M. Asiri, M. Karabacak, M. Kurt, K.A. Alamry, Spectrochim. Acta A 82 (2011) 444–455*
20. *B. Kosar, C. Albayrak, Spectrochim. Acta A 78 (2011) 160–167.*
21. *J.S. Murray, K. Sen, Molecular Electrostatic Potentials, Concepts and 399 Applications, Elsevier, Amsterdam, 1996. 400.*
22. *I. Alkorta, J.J. Perez, Int. J. Quant. Chem. 57 (1996) 123. 401.*
23. *E. Scrocco, J. Tomasi, in: P. Lowdin (Ed.), Advances in Quantum Chemistry, 402 Academic Press, NewYork, 1978. 403.*
24. *F.J. Luque, M. Orozco, P.K. Bhadane, S.R. Gadre, J. Phys. Chem. 97 (1993) 9380. 404.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

DATA WAREHOUSING IMPLEMENTATION IN HEDGE FUND ADMINISTRATION INDUSTRY

Dr. Neelam Mehta[1]
[1]Assistant Professor, Khyati School of Computer Application, Ahmedabad.

Article DOI: https://doi.org/10.36713/epra17507
DOI No: 10.36713/epra17507

ABSTRACT
This research work tried to provide an outline specification for scope of implementation of data warehousing. This model is targeting industry as a whole and covering general system and data sets which are minimally required by each and every hedge fund administrator, however based on geographical location and changes in regulatory conditions, macroeconomic environment across the globe and software, networking and hardware technical advancements and security led to open doors for further study and research according changes in trends and scope as we discussed. Few areas identified can be classified as: Technical Scope, Financial and budgetary changes, Changes in regulatory process, Change in macroeconomic environments, Changes in accounting terms, Information Security.

KEYWORDS: *Data Warehousing, Hedge Funds, Extraction, Administration, Trading*

INTRODUCTION

As investment across various asset classes are growing day by day hedge funds as a private investment funds playing a major role in growth of money markets. A hedge fund is a group fund open to few or limited number of investors that perform a wider range of investment and trading activities. Incestor pays a performance/management fee to its fund manager. Hedge funds invest in multiple investment strategy that determines the type of investments and the methodologies of investment. Hedge funds invest in a vital range of investments including stock markets, debt, commodities, CDS, currencies and real estate etc.

REVIEW OF LITERATURE

Hedge funds are proficient to advertise securities diminutive and to acquire securities on influence. At the same time as this movement is not exclusive to hedge funds, hedge funds frequently use influence forcefully. Hedge funds administration is the fastest growing industry with rapid growth of money markets and alternative investment funds. Every day new hedge funds and private equity funds are emerging in markets. Every fund itself cannot afford IT infrastructure and a team of dedicated professionals specialized in financial accounting, risk analysis auditing, and investor's database maintenance. Management at hedge fund has to concentrate on his business while shifting all accounting, investor reporting, portfolio management, and risk and performance analysis etc. tasks to hedge funds administrator. They can have fun a function in financial modernization and the reallowance of financial threat. Some hedge funds have the probable to interrupt the implementation of fiscal markets.

Hedge funds can offer profits to financial markets by ornamental liquidity and efficiency. Additionally, they can play a role in financial innovation and the reallocation of financial risk. However, some hedge funds, like other large highly leveraged financial institutions, also have the potential to disrupt the functioning of financial markets. Its responsibility of hedge fund administrator to provide accurate and quality repots and data to hedge funds so that analysts and investor can take right decisions about their investments and can make their business profitable. A well-managed data warehouse at IT department of hedge fund administrator is capable to meet out all such requirements. Proper implementation methodologies and well defined processes and structure help not only existing staff of organization but also helps new comers to quickly adopt and understand the system. Further since everything is well defined and modification to the system will also become easy to implement.

The Hedge funds are a single example of a gathering of institutions that aggressively trade securities and unoriginal instruments. An appraisal of the community strategy concerns created by hedge funds strength consequently advantage from a deliberation of hedge funds in the broader circumstance of trading movement. In today's financial system, the marketplaces for operated securities are performing arts, a gradually more significant function in the intermediation of recognition. The varied compilation of

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

organizations, together with hedge funds that connect in dealing movement can be distinguished by similarities in their make use of mark-to-market regulation, influence, and energetic trading.

About hedge funds administration industry: A hedge find administrator can also be defined as a service provider who provides accounting and financial services along with various type of analytical reports and data management service for both investors of hedge funds and fund managers.

Administrators play a major role by providing the operational infrastructure of a fund that meets the needs of hedge funds. Fund administrators see this as the opportunity to create a service offering that is integral to a hedge fund's investment process.

The processes that a hedge fund administrator performs are: Investment data processing, Reconciliations of data both collected from brokerage houses and fund managers and compiling it in information format, Portfolio pricing and management, Fee computations live management fees redemption fees etc., Investor related activities like investor account statements, NAV reporting, documents maintenance and Reporting.

RESEARCH METHODOLOGY

Research work was conducted at NAV Back office IT Solutions (P.) Ltd. Jaipur (India) which is a back office of NAV Consulting INC., Chicago, USA. Starting point of the work was identification of various asset classes which are being used by hedge funds for investing, identification of various accounting formula commonly used in reporting like rate of returns, risk analysis, performance analysis, exposure, position etc. reports.

Commonly used database structure was designed which is to be consumed across various applications which are being used by hedge fund administrator organization.

Prepared various use cases to be implemented over data and various commonly needed reporting formats were designed and collected. A critical study was done for identification for vendor specific warehousing tools and its implementation.
Finally, a common proposed model was established in this research with perspective of data warehouse.
This research work may bring following business advantages for a hedge fund administrator:

- Well defined data collection mechanism
- Centralized Data Repository for all operations
- Efficient and quick retrieval of information
- Business Intelligence
- Boost in Query and System Performance
- Improved Data Quality and Consistency
- Historical Intelligence and Data mining
- High Return on Investment

Research work also explored Data warehousing methodologies and formulas for aggregation etc. with few business case studies and various vender specific data warehousing solution available in market. As a part of research work main data sets in from of tables were identified, this was essential to manage data of hedge funds. Research presented a commonly used database and structure for hedge fund administrator.

Finally, a model was presented by integrating information collected and system identified during research. This model is suitable to fit in any small to large-scale administration service provider and along with data warehousing it also explores utility software and web sites required for successful operation. Thus bringing this research work for commercial benefits and converting in real time system will be very beneficial to hedge fund business. This research work can work as a base line draft for an administrator.

DATA WAREHOUSING

A data warehouse is a repository of an organization's electronically stored data. Data warehouses are designed to facilitate reporting and analysis. This definition of the data warehouse focuses on data storage. However, the means to retrieve and analyze data, to extract, transform and load data, and to manage the data dictionary are also considered essential components of a data warehousing system. Many references to data warehousing use this broader context. Thus, an expanded definition for data warehousing includes business intelligence tools, tools to extract, transform, and load data into the repository, and tools to manage and retrieve metadata. A Data Warehouse is a record used for exposure and investigation. The Data Warehouse centers on data storage. From the prepared systems the data stored in the warehouse is uploaded. The data is used in the Data Warehousing for reporting. The Data Warehouse uses dramatization, amalgamation and right of entry layers to accommodation its solution purposes. The dramatization layer stores raw data, the amalgamation layer integrates the data and shifts it into hierarchal groups, and the right of entry layer helps users to

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

retrieve data. Data Warehousing includes business intelligence tools, tools to remove, convert and fill data into the depository, and tools to manage and salvage metadata.
The across the world admitted meaning of a data warehouse urbanized by Bill Inman in the 1980s is "a subject-oriented, integrated, time variant and nonvolatile collection of data used in strategic decision making". The data warehouse proceeds as the essential position of data incorporation that is the initial stair in the direction of revolving facts into information.
Significance of Data Warehousing for a hedge fund administrator**:** An administrator manages so many funds at the same time so he has to have data warehousing infrastructure in its organization. Huge data storage capabilities, fast and accurate data retrieval and reconciliation, being able to record each and every trade being done by fund managers, maintain individual investor's record, multidimensional and analytical reporting needs makes data warehousing best implementation candidate for a hedge fund administrator.

There are two most important advances to storing data in a Data Warehouse are:
The Dimensional Approach: In this approach the data warehouse should be modeled using a Star Schema or Dimensional Model. The transaction data are paneled into either facts i.e. numeric transaction data or dimensions which gives framework to the facts. The main advantages of this approach are:

- The Data Warehouse is easy to understand and to use.
- The Retrieval of data from the Data Warehouse tends to operate very quickly.
- As the organization is separated into dimensions or specifics and circumstance or dimensions.
- The disadvantages of the dimensional advance are as follows:
- For maintaining the reliability of facts and magnitudes loading the Data Warehouse with data from different operational systems is convoluted.
- If the association adopting the dimensional advance alters the mode in which it does dealing, modification of the Data Warehouse structure is difficult.

The Normalized Approach: This approach is also called as the Third Normalization Form model and in this approach the data warehouse should be molded using an E-R model or normalized model. In this approach the data in the Data Warehouse are accumulated the following rules of database normalization. The normalized arrangement separates the data into entities which are used for creating various tables in a relational database. The main advantage of this approach is to add sequence of data into the database straightforward and the drawback of this approach is that it can be difficult for users, because there are number of tables involved, both to:

- Join data from different sources into meaningful information and then
- Admittance the information without a clear accepting of the resource of data and of the data constitution of the data warehouse.

Data warehousing has been mentioned as the highest priority project of IT administrative. To maintain the increasing market a huge number of data warehousing technologies and tools are obtainable. For concentrating on the operational data online transaction processing systems are useful but online transaction processing is not suitable for supporting queries or questions of managers in the business. These queries and questions engross methodical including aggregation, drilldown and dicing of data which are sustained by online analytical processing systems.

Data warehouses in this processing system maintain these applications by amassing and maintaining data in multidimensional layout. Data is hauled out and loaded from multiple online transaction processing data resources using extract, transfer and load tools. The metadata accumulates characterizations of the starting place records; data sculpts for objective databases and conversion imperatives of time inconsistency and non-volatility are important for a data store. The trade information representation signifies to facilitate facts and is the organization for all methods' forms, together with the data warehouse representation.

Data marts store subsets of data from a warehouse i.e. the Data Warehouse can be subdivided into data marts. The data in all data mart is as a rule adapted for a exacting potential or purpose, for instance invention productivity examination, KPI analysis, consumer demographic analysis, and rapidly. All particular data mart is not automatically compelling for extra exercises. All selections of data marts have worldwide and exceptional distinctiveness.

The most popular methods of data modeling for data warehousing are:
E-R Modeling: It follows the standard online transaction processing database design process starting with a conceptual E-R design explaining the E-R schema into a relational schema and then normalizing the relational schema.

Dimensional Modeling: This Dimensional Model is cool, calm and collected of an information table and numerous tables. An information table is a dedicated relation with a multi element key and encloses elements whose principles are usually preservative

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

and numeric. A dimension table has a solitary element primary key which keeps up a correspondence to one of the elements of the multi element solution of the information table. Star join schema has a star like structure of the substantial demonstration of a dimensional model. This model can be absolute to a snowflake schema by eradicating the stump principally elements in the measurements and insertions of them in part tables which are connected back into the dimension table with reproduction types.

Decision support queries may possibly have need of considerable aggregation and joining in the case of Online Analytical Processing. Denormalization is habitually encouraged in the situation of the data warehouse to improve the performance. A design which consent to announcement, arrangement, continuation, knowledge and reuse is structural design. It comprises dissimilar areas such as: Data Design, Technical Design, Hardware Design, Software Infrastructure Design.

There are several policies for schema design as: Top down, Bottom Up, Inside Out and Mixed. The data warehousing information representation is residential by concerning some tread renovation progression to the trade information representation. These steps are:

- Pick the facts of concentration.
- Insert instance to the explanation.
- Insert consequent facts.
- Establish granularity stage.
- Review facts.
- Amalgamate units.
- Generate arrangements.
- Isolate facts.

There are different types of data warehousing methodologies which are shown in the tables below. The foundations of these methodologies can be off the record into 3 wide-ranging classes: Core Technology Vendors, Infrastructure Vendors, Information Modeling Companies

On the basis of the errands of the data warehousing, we present a position of powers that confine the important facial appearance of any data warehousing methodology.

The primary element we believe is the core capability of the companies, whose methods could have dissimilar prominence depending upon the portion they are within. The sellers of the core methods are those companies which put up for sale engines of the database. The methods/ methodologies we appraise consist of:

- NCR’s Teradata-based methodology
- Oracle’s methodology
- IBM’s DB2-based methodology
- Sybase’s methodology
- Microsoft’s SQL Server-based methodology

The second element i.e. infrastructure vendors comprises those companies which are in the data warehouse communications industry. A communication apparatus in the data warehouse empire could be a method to administer metadata using depositories, to help remove; transfer and load data into the data warehouse or to assist produce customer clarifications.

ANALYSIS

A compressive set of reports is required by fund managers to make their investment decision. Investment strategies depend on multiple factors like sectorial performance of an asset class, business environment, current asset values, position and portfolio risk. Financial market is rapidly changing and dynamic kind of environment where data and decision is everything.
d managers require up to date to information about their past, present and future investments, including performance, portfolio, sectorial and regional exposure, risk, regulatory filings, etc. A data warehouse provides facility to consolidate any portfolio-related data in a single location. The proper storage of this data is the first step toward building reporting tools with an integrated view of all of the firm's information.

The transformational data thus produced from processing stage can be configured to be a centralized for operations, accounting, compliance, finance, risk and exposure management, legal, market data/SIS, and investor relations. The platform comes with connectivity to all major prime brokers, fund administrators, custodians, and counterparties.

Attribution and performance analysis includes the impact of the investment strategy with regard to overall policy, asset allocation, security and activity. Returns on investment are compared to a benchmark in order to determine whether an investment done is proper and profit making or not.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

CONCLUSION

Hedge funds administration is the fastest growing industry with rapid growth of money markets and alternative investment funds. Every day new hedge funds and private equity funds are emerging in markets. Every fund itself cannot afford IT infrastructure and a team of dedicated professionals specialized in financial accounting, risk analysis auditing, and investor's database maintenance. Management at hedge fund has to concentrate on his business while shifting all accounting, investor reporting, portfolio management, and risk and performance analysis etc. tasks to hedge funds administrator.

The responsibility of hedge fund administrator is to provide accurate and quality reports and data to hedge funds so that analysts and investor can take right decisions about their investments and can make their business profitable. A well-managed data warehouse at IT department of hedge fund administrator is capable to meet out all such requirements. Proper implementation methodologies and well defined processes and structure help not only existing staff of organization but also helps new comers to quickly adopt and understand the system. Further since everything is well defined and modification to the system will also become easy to implement. This research will certainly help fund administration service provider to establish data warehousing in its organization. Research will enlist all challenges arises during implementation and their solutions which will help them to go in right direction with a well-planned and defined manner with step by step methodological approach. It will also help an organization to compare or analyze available vendor specific data warehousing tools and their cost effectiveness and suitability for their organization.

This research will also help them to find commonly used database structure targeted to hedge funds industry structure and predefined commonly used MIS and Investor specific reports. Data warehousing is the forefront and most trustworthy technology used today by financial institutions for data management, planning, reporting, and data mining. After the evolution of the concept of data warehousing during the early 90's this technology is growing at a very rapid pace and best suitable for financial institutions like a hedge fund administrator.

REFERENCES

i. *A methodological framework for data warehouse design. (1998). DOLAP '98: Proceedings of the 1st ACM international workshop on Data warehousing and OLAP, (pp. 3–9). doi:https://doi.org/10.1145/294260.294261*
ii. *Antoniewicz, R. (2009). Fund Administration Fact Book 2009. Retrieved from http://www.intercontilimited.com*
iii. *Berman, M. (27 January 2010). Hedge Funds and Prime Brokers. (2. edition, Ed.) Risk Books.*
iv. *Bouzeghoub, M., Fabret, F., & Broqué, M. M. (1999). Modeling the Data Warehouse Refreshment Process as a Workflow Application. Proceedings of the Intl. Workshop on Design and Management of Data Warehouses. Heidelberg, Germany.*
v. *Bouzeghoub, M., & Kedad's, Z. (2000). A quality-based framework for physical data warehouse design. Proceedings of the Second Intl. Workshop on Design and Management of Data Warehouses. Sweden.*
vi. *Gardner, S. R. (1998). Building the data warehouse, Communications of the ACM. 52-60. doi:10.1145/285070.285080*
vii. *Golfarelli, M., Rizzi, S. B., & Cella , I. (2004). Beyond data warehousing: what's next in business intelligence? DOLAP '04: Proceedings of the 7th ACM international workshop on Data warehousing and OLAP, (pp. 1–6). doi:https://doi.org/10.1145/1031763.1031765*
viii. *J. Cavero, M. a. (2001). MIDEA: A multidimensional data warehouse methodology., (pp. 138-144).*
ix. *Ji Zhang, Tok Wang Ling, Robert M. Bruckner, & A Min Tjoa. (003). Building XML Data Warehouse Based on Frequent Patterns in User Queries. (pp. 99-108). Data Warehousing and Knowledge Discovery, 5th International Conference. doi:10.1007/978-3-540-45228-7_11*
x. *Loader, D. (23 February 2011). Fundamentals of Fund Administration: A Guide (Elsevier Finance) (1st Edition ed.). (K. Edition, Ed.) Butterworth-Heinemann.*
xi. *M. GOLFARELLI, S. RIZZI, & E. SALTARELLI. (2002). Index selection techniques in data warehouse systems. (pp. 33-42). Proceedings of the 6th ACM international workshop on Data warehousing and OLAP.*
xii. *Ponniah, P. (2001). Data Warehousing Fundamentals: A Comprehensive Guide for IT Professionals. New York: Wiley–Blackwell. Retrieved September 14, 2001*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FORMULATION AND EVALUATION OF ANTIACNEY FACEWASH

Arti Rajendra Kise[1*], Avinash Gajanan Wagh[2], Somnath Mahadev Kale[3]
[1]Student of Bachelor in Pharmacy, Dr. Babsaheb Ambedkar Technological University, Raigad, Lonere.
[2]Department of Pharmaceutics, Faculty of Pharmaceutics, Dr. Babsaheb Ambedkar Technological University, Raigad, Lonere
[3]Student of Bachelor in Pharmacy, Savitribai Phule Pune University
[*]Corresponding Author: Arti Kise

ABSTRACT
Natural remedies are often favored due to their perceived safety and minimal side effects compared to synthetic alternatives. There is a growing global demand for herbal formulations. This study focuses on the development and evaluation of an herbal anti-acne face wash, incorporating aqueous extracts of betel leaves (Piper betel), turmeric (Curcuma longa), and walnut (Juglans regia). Despite the availability of many herbal acne treatments on the market, our objective is to create a completely herbal product devoid of synthetic ingredients. The selected plants are renowned for their antimicrobial, antioxidant, and anti-inflammatory properties. We prepared several formulation batches (F1 to F3) using varying concentrations of honey and evaluated them based on parameters such as color, appearance, consistency, washability, pH, and spreadability. The optimized formulation was then compared to a commercial product. Among all the formulations, batch F2 was found to be optimal across all parameters. This study is a significant step toward developing an effective herbal anti-acne face wash using betel leaf, walnut, turmeric, and other natural ingredients.

KEYWORDS: *Anti-acne, herbal, betel leaf, walnut, honey, face wash*

INTRODUCTION

Acne vulgaris is a highly prevalent skin disorder affecting nearly all individuals at least once in their lifetime. While the incidence of acne peaks during adolescence, a significant number of men and women aged 20-30 also experience this condition.(1) The pathogenesis of acne involves several physiological factors, including follicular hyper-proliferation, increased sebum production due to elevated androgen levels, and the colonization of Propionibacterium acnes and Staphylococcus epidermidis. Emerging concepts in acne pathogenesis highlight variations in target cell sensitivity, biological markers, neuro-endocrine factors, genetics, and environmental influences. Both herbal and synthetic ingredients have shown remarkable benefits in treating acne vulgaris. (3.4)

Herbal cosmetics: Herbal healing involves the use of herbs, herbal extracts, or natural products to improve health conditions. In recent years, medical practitioners in Western countries have increasingly prescribed medicines containing plant extracts. This appreciation of traditional and ancient forms of medicine has led to a growing global demand for Indian herbal drugs. The surge in popularity of herbal remedies, including skin care products and cosmetics, is evident. Herbal products are often perceived as safer, possessing numerous therapeutic properties with minimal side effects compared to modern chemical treatments. The skin, being the body's most exposed organ, requires protection from pathogens. Formulations with antibacterial, antioxidant, and anti-inflammatory properties are essential for preventing skin diseases. Hormonal imbalances during puberty can cause various skin issues, highlighting the need for effective skincare solutions. (5)

Skin care preparation for face

1. Face packs and masks
2. Cleansing creams and lotions
3. Rouges
4. Face washes
5. Compact powders

Facewash

Effective acne prevention requires a balanced approach, combining moisturizing and oil control, exfoliation, and cell renewal. Washing your face twice daily, in the morning and at night, helps remove debris, germs, and sebum that clog pores, making the skin prone to

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

pimples. Face washes can aid in pimple reduction and some are formulated to prevent acne while also addressing issues like lines and wrinkles, while others are intended simply to cleanse the skin**.**

A. Properties of face wash

- It should be stable and aesthetically pleasing.
- It should soften upon application and spread easily without dragging.
- It should not feel oily or greasy during application.

B. Function of Face wash [(6)]

- Removing dead skin cells
- Rejuvenating skin cells and alleviating tension

C. Face wash benefits include:

- Removes dead skin cells, allowing new cells to replace the old ones
- Keeps skin fresh and healthy
- Makes the skin look radiant by unclogging pores, preventing acne, whiteheads, blackheads, and reducing the overall tired appearance

D. Advantages of face wash:

- Helps remove dead skin cells, promoting new cell growth
- Keeps skin fresh and healthy
- Enhances skin radiance

Objective:

- Formulate an herbal face wash suitable for all ages, targeting skin tanning.
- Develop a product particularly effective in soothing irritated or inflamed skin conditions, such as acne or redness.
- Avoid the use of harmful chemicals on facial skin.

Need of this product

An effective anti-acne face wash should contain ingredients like walnut, turmeric, and betel leaf oil. These ingredients help unclog pores, reduce inflammation, and eliminate acne-causing bacteria. It is crucial to choose a gentle cleanser that preserves the skin's natural oils, as overly drying products can worsen acne.

Application: -[(7)]

- Helps keep skin fresh and healthy
- Enhances skin radiance

Drug profile & Excipients profile

Betel Leaves



Fig.1 Betel Leaves

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- **Common Name:** Piper betel
- **Scientific Name:** Piper siriboa L.
- **Family:** Piperaceae

Taxonomical Information:
- Kingdom: Plant
- Order: Piperales
- Family: Piperaceae
- Genus: Piper
- Species: betle

Pharmacology
The analgesic and anti-inflammatory activities of Piper betle can be attributed to the presence of phytochemical compounds such as flavonoids, tannins, phenols, and glycosides. [8]

Uses:
Betel leaves help cleanse and purify the skin by removing dirt and grime from pores, resulting in smooth, supple, and glowing skin. [9]

2.Walnut



Fig.2 Walnut

- **Common Name:** Akhroot
- **Scientific Name:** Juglans regia
- **Family:** Juglandaceae

Taxonomical Information: [10]
- Kingdom: Plant
- Family: Juglandaceae
- Genus: Juglans
- Species: Juglans regia

Pharmacology
The antioxidant activity of walnut compounds is 15 times greater than that of vitamin E. Walnuts reduce inflammation caused by free radicals, thanks to the presence of γ-tocopherol. Antioxidants such as selenium and melatonin provide protection against various chronic diseases, including atherosclerosis and oxidative stress. Polyphenols like gallic acid and ellagic acid prevent the oxidation of LDL in the blood. [11]

Uses
Walnuts impart a bright and youthful glow to the skin. Their texture, vitamins, and antioxidant content make them excellent exfoliants for the skin.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3. Turmeric



Fig.3 Turmeric

- **Common Name:** Curcumin
- **Scientific Name:** Curcuma longa
- **Family:** Zingiberaceae

Taxonomical Information
- Kingdom: Plantae
- Order: Zingiberales
- Family: Zingiberaceae
- Genus: Curcuma
- Species: longa

Pharmacology
Curcuma longa Linn. is known for its various medicinal properties. The rhizome of Haridra (turmeric) possesses therapeutic activities and is used by medical practitioners for its anti-diabetic, hypolipidemic, and anti-inflammatory effects. [12]

Uses
Curcumin protects the skin by neutralizing free radicals and reducing inflammation through the inhibition of nuclear factor-KB. It also shortens wound-healing time, improves collagen deposition, and increases fibroblast and vascular density in wounds.

4. Aloe vera



Fig.4 Aloe vera

- **Common Name:** Aloe barbadensis Mill
- **Scientific Name:** Aloe perfoliata L.
- **Family:** Asphodelaceae

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Taxonomical Information
- Kingdom: Plant
- Order: Asparagales
- Family: Asphodelaceae
- Genus: Aloe
- Species: barbadensis-miller

Pharmacology
Aloe vera softens the skin through its cohesive action on superficial flaking epidermal cells and the action of amino acids. (13)

Uses
Aloe vera prevents ulcers and enhances the healing process of dermal injuries.

5. Honey



Fig 5 .Honey

- Common Name: Honey purified, mel, madhu
- Scientific Name: Honey
- Family: Apidae

Taxonomical Information
- Kingdom: Animalia (Insecta)
- Order: Hymenoptera
- Family: Apidae
- Genus: Apis
- Species: Apis mellifera

Pharmacology
Raw honey helps balance the bacteria on your skin, making it an excellent product for acne treatment. Studies have shown honey to be significantly more effective than other popular acne products. As a natural exfoliator, raw honey removes dry, dull skin, revealing new skin cells underneath. (14)

Uses
- Naturally antibacterial
- Anti-inflammatory
- Suitable for sensitive skin

6. Rose Water
Rose water is ideal for cleansing the skin and removing impurities that can cause blemishes. It also acts as a fragrant component in herbal cosmetic products.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

7. Coco Glucoside
Coco glucoside is used to build viscosity and increase the foaming capacity of liquid soaps in hair and skincare products. It primarily functions as a foaming agent.

Materials and Equipment
Mixing bowls: For blending and mixing the ingredients to prepare the face wash formulation.
Measuring instruments: Weighing balance for accurate measurement of ingredients.
Blender or grinder: To grind or blend ingredients such as walnut or betel leaves (Piper betel) into powder form.
Heating apparatus: Heating mantle for betel leaf oil extraction.
Stirring rods or spatulas: For thorough mixing and homogenization of the formulation.
Soxhlet apparatus: For oil extraction process.
Sieve shaker: For separation of tiny particles into smaller particles.

Formula

Sr.no	Drug	Quantity	Use
1	Betel leaf oil	5 ml	Reduce dark spots, help to reduce premature ageing and skin damage
2	Honey	5 ml	Moisturizing agent
3	Aloe Vera gel	5 ml	Smoothing and tightening agent
4	Turmeric powder	2 gm	Antiacne
5	Rose Water	3 ml	Hydrating
6	Walnut	3 gm	Exfoliating agent, provide hydration, brightness and Refresh the skin
7	coco-glucoside	2 gm	Foaming agent

Table no.1

Steps / Methodology
Collection
Betel leaves were collected from the market in Badnapur, Jalna district.
Walnuts were collected from Sant Eknath Ayurvedic Hospital, Chanakwadi, Taluka Paithan.
Honey, Aloe vera, Turmeric, coco-glucoside, and rose water were collected from the laboratory of the Institute of Pharmacy, Badnapur.

Extraction
1. Collect and wash betel leaves with water to remove dirt.
2. Dry the leaves naturally for 4-5 days.
3. Extract oil using the Soxhlet apparatus.
4. Collect walnuts and grind them into powder form using a grinder.
5. Pass the powder through a sieve.
6. Add other ingredients like Aloe Vera gel, honey, turmeric, coco-glucoside, and the foaming agent. [15]

Preparation
1. Measure all the ingredients accurately.
2. Mix the ingredients thoroughly in a mixing bowl using stirring rods or spatulas until a homogeneous formulation is achieved.
3. Store the face wash in appropriate containers.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Fig 6. Soxhlet apparatus

Development of Formulation

Various formulation batches were prepared according to Table 1. The desired concentrations of herbs were weighed accurately and dispersed in betel leaf oil with moderate stirring. The required amount of aloe vera gel was mixed with the appropriate amount of honey by gentle stirring. The concentrated herbal extracts were then added to the remaining amount of betel leaf oil and combined with the honey mixture through gentle stirring. This mixture was finally incorporated into the previously prepared formulation. The completed formulations were filled into suitable containers and labeled accordingly. [16]



Fig 7. Formulation

Sr.no	Ingredients	Quantity taken for 25ml		
		F1	F2	F3
1	Betel leaf oil	5ml	2.5ml	2ml
2	Honey	5ml	2.5ml	5ml
3	Aloevera gel	5ml	2.5ml	5ml
4	Turmeric powder	2gm	1gm	1gm
5	Rose water	3ml	1.5ml	1ml
6	walnut	3gm	1.5gm	3gm
7	Coco-glucoside	2gm	2gm	2gm

Table no.2

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Evaluation Test

Physical evaluation

Physical parameters such as color, appearance, and consistency were checked visually.

1. Washability

Formulations were applied to the skin, and the ease and extent of washing with water were checked manually.

2. pH

The pH of the face wash formulation was measured using pH paper, and the result was found to be pH 6.5. [17]



Fig 6. pH

3. Spreadability

Spreadability denotes the extent of area to which the gel readily spread on application to skin or the affected part. The bioavailability efficiency of a gel formulation also depends on its spreading value. The spreadability is expressed in terms of time in seconds taken by two slides to slip off from the gel, placed in between the slides, under certain load. Lesser the time taken for separation of two slides, better the spreadability. Two sets of glass slides of standard dimensions were taken. The herbal gel formulation was placed over one of the slides. The other slide was placed on the top of the gel, such that the gel was sandwich between the two slides in an area occupied by a distance of 6 cm along the slide. 100gm weight was placed upon the upper slide so that the gel between the two slides was pressed uniformly to from a thin layer. The weight was removed & the excess of the gel adhering to the slides was scrapped off. The two slides in position were fixed to stand without slightest disturbance & in such a way that only the upper slide to slip off freely by the force of weight tied to it. A 20gm weight was tied to the upper slide carefully. The time taken for the upper slide to travel the distance of 6 cm7 separated away from the lower slide under the influence of the weight was noted. The experiment was repeated three times both formulated gels & marketed gel & the meantime taken for calculation.

Spreadability was calculated by using the following formula,

$S=M\times L/T$ $10\times3.25/3 = 10.83$

Were, S- Spreadability

M- Weight tied to the upper slide (20gm).

L- Length of the glasss (6.5cm).

T- Time in sec.

4. Stability test

Stability tests were carried out at room temperature (25°C) and 45°C for two weeks. The samples were observed for sweating, solution deformation, and phase separation. The system was considered stable if no deformation or oil droplets were observed on the surface of the face wash. The color of the formulations was also monitored for any changes. [18]

Result

1)	Colour	Orange	Orange	Orange
2)	Consistency	Semi solid gel	Semi solid gel	Semi solid gel
3)	Washability	Good	Good	Good
4)	PH	6.2	6.4	6.7
5)	Spreadability	10.15	11.14	11.76
6)	Skin irritation	No irritation	No irritation	No irritation

Table no.3

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Extraction of Chemical Constituents from Betel Leaf and Their Formulation for Face Wash

The formulation and evaluation of a face wash using chemical constituents extracted from betel leaf were undertaken in this project. The test methods described serve as examples of a suitable face wash formulation. The aim was to collect recommended herbal medicines for assessing anti-acne activity and content of herbal materials, aiding national laboratories in pharmaceutical evaluation tests. This publication includes detailed descriptions of the preparation and formulation of a face wash using herbal ingredients, primarily betel leaf oil, walnut, and honey. Additionally, the evaluation tests of the face wash, including its physical characteristics, visual inspection, and pH measurement, were discussed.

CONCLUSION

Natural remedies are increasingly preferred due to their perceived safety and fewer side effects compared to synthetic alternatives. Herbal formulations are in growing demand globally. This study successfully established an herbal face wash containing betel leaf oil, turmeric powder, and walnut. The results indicated that the developed herbal formulation of batch F2 was superior to other formulations. Herbal face washes offer multiple benefits, including refreshing the skin, maintaining elasticity, removing grime, and enhancing blood flow. They are non-toxic and nourish the skin effectively, helping to remove scars, marks, and pimples. Additionally, herbal face washes exfoliate the skin and provide a cooling, soothing effect, working efficiently in a short amount of time.

REFERENCE

1. *(Sowmya K.V., Darsika C.X., Grace F., Shanmuganathan S., "Formulation & Evaluation of Poly-herbal Face wash gel", World Journal of Pharmacy & Pharmaceutical sciences, 2015; 4(6): 585-588.*
2. *Kapoor V.P., Joshi H., Chaubey M., "Applications of seed gums in pharmaceutical formulations", J Med Arom Plant Sci., 2000, 22/4A & 23/1A, 42-44.*
3. *Kanlayavattanakul M., Lourith N., "Therapeutic agents & herbs in topical applications for acne treatment", International Journal of cosmetic Science, 2011; 33: 289-297.*
4. *(Kubo I., Muroi H., Kubo A., "Naturally occurring anti-acne agents", J Nat Prod, 1994; 57(1): 9-17*
5. *Aditya Singh., Mr. Chirag Singh., Dr. Tarkeshwar Prasad Shukla., "FORMULATION AND DEVELOPMENT OF ANTI-ACNE HERBAL FACE WASH GEL". ,International Research Journal of Modernization in Engineering Technology and Science,2023; 2582-5208.*
6. *Rutuja S Rokade 1, *, Sakshi R Vidhate 1, Disha S Kale 2 and Shravan. J. Somani Formulation and development of herbal facewash using Beal leaves: Aegle marmelos in World Journal of Biology Pharmacy and Health Sciences, 2024, 17(01), 061–074.*
7. *of India G. Ayurvedic Pharmacopoeia of IndiaPart I & Part II. Govt.Of India; Ghaziabad; 2007. p. 589.Koli DS, Mane AN, Kumbhar VB, Shaha KS. Formulation & evaluation of herbal anti-acne face wash. World J. Pharm. Pharm. Sci. 2016 Apr 15;5(6):2001-200.*
8. *Çağlarırmak, N. (2003). Biochemical and physical properties of some walnut genotypes (Juglansregia, L.). Food/Nahrung, 47(1), 28–32.*
9. *Lavedrine, F, Zmirou, D., Ravel, A., Balducci, F., & Alary, J. (1999). Blood cholesterol and walnut consumption: A cross-sectional survey in France. Preventive Medicine, 28(4), 333-339. Logan, A. C. (2004), Lipids in health and disease, 3, 25.*
10. *Chunekar KC (2010) Editor Bhavpraakash Nighantu of BhavaMisra. Chaukhambha Bharti Academy, Varanasi: 110.*
11. *Pandey GS (2002) Dravyaguna Vijnana (2ndedn), Krishnadas Academy, Varanasi, India 1: 737-746*
12. *Chunekar KC (2010) Editor Bhavpraakash Nighantu of BhavaMisra. Chaukhambha Bharti Academy, Varanasi: 110.*
13. *Molan, P.C. and R.A. Cooper, 2000. Honey and sugar as a dressing for wounds and ulcers. Tropical Doctors, 30: 249-250.*
14. *Kubo I., Muroi H., Kubo A., "Naturally occurring anti-acne agents", J Nat Prod, 1994; 57(1): 9-17.*
15. *Sampath Kumar, K.P., Debjit Bhowmik, Chiranjib, Biswajit and M.R. Chandira, 2010. Medicinal uses and health benefits of Honey: An Overview. Journal of Chemistry and Pharmacy Research, 2(1): 385-395.*
16. *Singh H.P., Samnhotra N., Gullaiya S., Kaur I., "Anti-acne synergistic Herbal face wash gel Formulation, Evaluation, & Stability study", World Journal of Pharmaceutical Research, 2015; 4(9): 1261-1273.*
17. *Subhashis Debnath,M. Niranjan Babu and G. Kusuma with review article on Formulation and Evaluation of Herbal Antimicrobial Deodorant Stick in Research Journal of Topical and Cosmetic Sciences. Published In - Volume -2, Issue-1, Year- 2011.*
18. *Hassali, M.A.; AL-Tamimi, S.K.; Dawood, O.T.; Verma, A.K.; Saleem, F. Malaysian cosmetic market: Current and future prospects. Pharm. Regul. Aff. 2015, 4, 155-157.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FORMULATION AND EVALUATION OF GUAVA LEAVES EXTRACT FACE SERUM

Nitin Prabhakar Tikande[1], Yogiraj Prakash Muley[2], Pradip Ramprasad Bhutekar[3], Avinash Kailash Pawar[4]

[1]Department of Bachelor in Pharmacy, Faculty of Pharmacy, Dr. Babasaheb Ambedkar Technological University, Raigad, Maharashtra
[2]Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Dr. Babasaheb Ambedkar Technological University, Raigad, Maharashtra
[3]Department of Bachelor in Pharmacy, Faculty of Pharmacy, Dr. Babasaheb Ambedkar Technological University, Raigad, Maharashtra
[4]Department of Bachelor in Pharmacy, Faculty of Pharmacy, Dr. Babasaheb Ambedkar Technological University, Raigad, Maharashtra

ABSTRACT

The main motive of this work was to make serum using different herbal extract. The maim active ingredient in this formulation is guava leaves (P. guajava L., Myrtaceae) and other ingredient is aloe vera gel, glycerin, and coconut oil , rose water. Traditionally this plant is often in India, south America, Africa and other countries. It is used as food and traditional medicine in ancient time. The face serum are highly concentrated cosmetic products.[3]

Serum has a quick absorption and ability to penetrate deep layers of the skin, as well as a non-oily Finish and a deep formula with a very high amount of active ingredients. Due to deep penetration it's give maximum pharmacological action.[(4)] Guava leaf was used as an outcome of the anti-wrinkle and whitening ability It also has Anti-oxidant properties that can prevent premature aging. Aloe vera gel is commonly used to treat various skin ailments, sunburn, Minor cuts, insect bites, and is also used as a wound healing, anti-inflammatory, anti-bacterial, and anti- Fungal effect. Olive oil has anti-inflammatory properties and is used as a skin moisturizing agent. The present study focused on the formulation of polyherbal face serum and evaluates the antioxidant property of serum. Antioxidants help protect skin cells from damage and aging and improve skin texture and appearance. Serum was formulated using various excipients like olive oil, sandalwood oil, glycerin, coconut oil, tween 20, dematerialized water.[(5)]

According to the Food Drug Administration (FDA), cosmetics are substances or preparations intended for contact with external Cosmetics have a function, namely to clean the skin, beautify, increase attractiveness and change theappearance or maintain it in good condition of skin. The facial Serum was evaluated by its PH, physical appearance, spreadability, viscosity, microbial testing, cyclic temperature test Etc. The results of the stability study show that there was no change in visual acuity or homogeneity.[(5)]

KEY WORDS: *Antioxidant, Cosmetic, Face serum, acne remover, moisturizer, Evaluation, Penetrate, Active substance, polyherbal.*

INTRODUCTION

The word cosmetics was derived from the Greek word "kosmtikos" meaning having the power, arrange, skill in Decorating.[(6)] 'Cosmeceuticals' can be referred to as topical cosmetic pharmaceutical formulation to enhance beauty through Ingredients that provide additional health related functions or benefits on human skin. Serum are thin viscose topical formulation that contain concentrated amount of active ingredients(6). Serum is a concentrated product which widely used in Cosmetology. The name comes from itself in professional cosmetology. The cosmetic serum is as concentrated as compared with other cream. Serum contains ten times more organic matter than cream. Therefore, deal with the cosmetic problem quickly and effectively [(5)]

The skin is the largest organ of the body and most protective organ of the body for 24 hours, but sometimes the skin can become dry for many reasons such as UV rays, dirt, cosmetics left overnight can cause irritation or allergies. Skin serum is a skin care product thatyou can apply to your skin in after cleansing but before moisturizing with the intention of bringing the ingredients directly to the skin.(5) There for value of cosmetics has increased as more and more people want to stay young and attractive. Serum is a skin care product that contains a gel, light weight lotion or moisturizer and has the ability to penetrate deep to bring the active ingredients to the skin.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

A good skin serum may give your skin firmness, a smooth texture, make the pores appear smaller and increase moisture levels. Whether it is a moisturizing, anti-aging or anti-wrinkle product or serum for skin, all of these products should contain antioxidants, cell- based ingredients and skin-like ingredients. All skin types need these ingredients to stay as healthy Serums act locally upon different body parts as a face, neck, decollate, eyelids. They can be used irrespective of age . The purpose of this study was to formulate a polyhedral serum by mixing the extracts of guava leaves ,aloe vera gel, glycerin, and coconut oil , rose water. Which was intended to produce rapid fairness action.

STATEMENT OF PROBLEM & HYPOTHESIS

- **Statement of problem**

If people are having problems like acne, pimple, fine line, redness of skin and dark spots then This guava leaves face serum can be helpful. The make your skin more radiant, inflamated Skin and irritated skin then use guava leaves face serum

- **Hypothesis**

The given experimental study provides information about antioxidants property, antiacne, dark Spots, wrinkle remover. Guava has a high antimicrobial activity. Guava leaves have high Antibacterial activity in extracts that can inhibit the growth of (*S. Aureus)*. Plant leaf metabolic Extracts of P. Guava leaves have high anti-microbial activity. These extract can inhibit the Bacillus and Salmonella bacteria. This make it potential work has to improve glove of skin, as well as moisturize the skin.

LITERATURE SURVEY

Desri ayu lestari & Oktavia Rajebi

The herbal serum for the management of acne with botanicals was successfully formulated and evaluated for different parameters. The result of this formulation indicates that the presence of gallic acid in both the herbs will show anti-bacterial activity, which will help in the management of acne with the retinaldehyde(1).

Miss. Purva S Rajdev

The aim of the study was to formulate different herbals into a serum form moisturizing and glowing activity on skin. Cosmeceuticals are skin-care products that cater both cosmetics and drug. In the serum aloe vera and sandalwood oil are mainly used. The aloe vera gel from the inner central part of the leafoften has a very good action in acne, pimples and other skin problems, burns due to heat, sun exposureand in treatment of radiation dermatitis. Aloe vera is rich in vitamins and minerals that have a good moisturizing capacity and anti-aging effects to maintain healthy- and fresh-looking skin. [(5)]

Type of Facial Serums [(6)]

1. Antioxidant serum
2. Hydrating serum
3. Brightening serum
4. Anti-ageing serum
5. Serums for Hyperpigmentation
6. Serums that reduce acne and fades acne scarring
7. Serum for sensitive skin
8. Serum for combination skin

AIM AND OBJECTIVE

Aim: The formulation and evaluation of guava leaves extract Face Serum.

Objective of study

- The main Objective of these study is to formulate and evaluate an herbal face serum various herb formultipurpose use.
- To improve skin texture.
- To minimize the skin pores.
- Reduce the fine lines wrinkles.
- Hydrates and nourishes the skin.
- Improve skin elasticity.
- Reduced dark circle.
- Protect from the reed radical.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

General Description of Guava leaves:



Fig no 1: guava leaves

Plants are a predominant natural source of numerous bioactive compounds. The projected growth of the plant preparation market is around USD 86.74 billion by 2022, with the largest market share belonging to the pharmaceutical sector, followed by the nutraceutical industry. Interestingly, the utilization of plant preparations for cosmetics, beverages, food, and medicine is mainly dependent onplant leaves. Among all plant organs, leaves are the largest accumulators of bioactive compounds, such as secondary metabolites. Several recent studies reported phytochemical profiles and biologicalactivities of leaf extracts of various cultivated plants Hence, although plant leaves are considered as agricultural waste, they are a rich source of high-value Nutra-pharmaceutical compounds.

- Family: Mytraceae
- Drug name: Guava leaves
- Biological source: Guava leaves extract is made from the crushed leaves of Guava plant.
- Biological name: Psidium Guajava

Proximate Composition
Chemical composition [7]

- Guava leaves (GLs) are a rich source of various health-promoting micro- and macronutrients as wellas bioactive compounds. They contain 82.47% moisture, 3.64% ash, 0.62% fat, 18.53% protein, 12.74% carbohydrates, 103 mg ascorbic acid, and 1717 mg galli
- Species: Psidium Guajava
- Kingdom: Planeta

Phenolic Compounds

The various secondary metabolites present in GLs include phenolic acids, flavonoids, triterpenoids,sesquiterpenes, glycosides, alkaloids, and saponins. Phenolic compounds (PCs) serve as key bioactive compounds which provide antioxidant and hypoglycemic properties to GLs. Generally, five quercetin glycosides are present in GLs. The presence of two new benzophenone galloyl glycosides (guaianolides A and B) and one quercetin galloyl glycoside (guaianolide C) was also reported.

Minerals and Vitamins

Guava leaves are the rich source of minerals, such as calcium, potassium, sulfur, sodium, iron, boron, magnesium, manganese, and vitamins C and B. The higher concentrations of Mg, Na, S, Mn,and B in GLs makes them a highly suitable choice for human nutrition and also as an animal feed toprevent micronutrient deficiency The higher vitamin C content in GLs may help in improving the immunesystem and maintain the health of blood vessels, whereas vitamin B plays an important role in improving blood circulation, nerve relaxation, and cognitive function stimulation.

Protein

Guava leaves contains 9.73% protein on a dry weight basis. Proteins are large biomolecules composed of amino acids and act as building blocks of cells. Proteins play a majorrole in growth and maintenance, enzyme regulation, and cell signaling, and also as biocatalysts.

Essential Oil

GLsare a rich source of essential oils. The major constituent of GL essential oil includes 1,8-cineole and trans-caryophyllene. GL essential oil from the Philippines was found to contain a different profile, with limonene, α-pinene, β-caryophyllene, and long cyclone as major compounds. Ecuadorian GL essential oil contained a higher content of monoterpenes (limonene andα-pinene)

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Fig 2:- Dried Guava leaves Powder

Different benefits of using guava leaves on skin

Helps To Treat Wrinkles on Face

Guava leaves have anti-aging properties which help to prevent the appearance of wrinkles on the face. It helps in destroying the free radicals which are damaging your skin

Helps To Lighten Dark Spots

Guava leaves also help to lighten the dark spots on your face and alsoclears as the blemishes left behind on the skin. Guava leaves make an excellent skin lightening ingredient, thereby, providing you with a clear looking complexion and a spot free skin.

Treats Acne and Blemishes

Guava leaves are an excellent antibacterial agent which help to treat acne, pimples, and blemishes on the face. When applied on skin, guava leaves help in reducing the appearance of pimples and acne on the face.

Helps To Remove Blackheads

Guava leaves can help to remove blackheads and shrink the large sized pore.

Relieves Itching on Face

Itching can be one of the major problems for many and if you suffer from itching on the skin inflammation, guava leaves can help to treat this problem. Due to allergy blockingcompounds present in the guava leaves, it helps to instantly cure itchiness on skin

Health Benefits of Guava Leaves

- It is helps in stopping diarrhea.
- The guava leaves content property to losing weight.
- Helps to manage the blood sugar level.
- Its have ability to fight cancer cell.
- Used for healing acne.
- Relives cough and cold.
- Reduce inflammation.
- Boosts immunity.

Selection of Herbs

Extraction is the crucial first step in the analysis of medicinal plants, because it is necessary to extractthe desired chemical components from the plant materials for further separation and Characterization.Extraction, as the term is used pharmaceutically, involves the separation of medicinal active portions of plant or animal tissues from the inactive or inert components by using selective solvents in standard extraction procedure. Commonly used methods in the extraction of medicinal plants.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

MATERIAL AND METHOD

Requirement

Table 1. Formula for face serum

Sr, no.	Ingredients	WorkingFormula(50 ml)
1	Guava LeavesExtract	25 ml
2	Aloe Vera	5 gm
3	Methyl Paraben	0.1 gm
4	Glycerin	12.5 ml
5	Sandal wood oil	1 ml
6	Coconut oil	1 ml
7	Rose Water	Qt as pre req.

Details information about Guava leaves

- Family: Mytraceae
- Biological source: Guava leaves extract is made from the crushed leaves of Guava plant.
- Biological name :- Psidium Guajava
- Species:- Psidium Guajava
- Kingdom :- Planeta
- Geographical source: America, India
- Morphological characteristics: Color, Odor, Taste,



Fig No 3: Guava Leaves

1) color: Green
2) odor: characteristic
3) taste: sweet fruit, Better leaves
4) Shape: oval in shape

Chemical constituents: It content flavonoids, tannins, phenol, triterpenes, saponin, carotenoid, lectins, vitamins, fiber, and fatty acids, resin, glycoside,

Details information about Aloe vera

Aloe vera is a great moisturizer intended for a skin. Aloe vera rejuvenates skin, hydrates this and keeps skin layer looking fresh all the time. Aloe vera has anti-microbial property rendering it ideal to deal with acne and pimples. Aloe vera powder contains several nutrients like glycerin, sodium palmate, sodium carbonate, sodium palm kemelate, sorbitol, etc. Aloe vera is a phenomenal skin lotion. Aloe vera saturates, revives & keeps up with skin's energetic appearance. Because of its enemy of microbial properties, aloe vera is phenomenal for treating skin inflammation & pimples. Various supplements, including glycerin, Na-palmate, NaCO3, sodium palm kemelate, sorbitol & others, can be found in aloe vera powder.[8]



- Kingdom: Plantae
- Order: Asparagales
- Family: Asphodelaceae
- Subfamily: Asphodeloideae
- Genus: Aloe
- Species: A. vera
- Binomial name: Aloe vera (L.) Burm. f.
- Synonyms: Aloe barbadensis Mill.
- Geographical source: Indian, America, south Africa
- Morphological characteristics: Color, Odor, Taste
  1) Color: Yellowish brown
  1) Odor: Characteristic, sour
  2) Taste: Bitter & unpleasant



Fig No 4: Aloe vera

Chemical constituents: Anthracene glycoside (11 to 40%) barbaloin, aloin, C glycoside, isobarbaloin, Aloesone, Aloinoside A& B Resin

Sandalwood

Sandalwood has an anti-tanning and anti-aging property. It also helps skin in many ways like toning effect, emollient, antibacterial properties, cooling astringent property, soothing and healing property. The Sandalwood is common in india and it has an anti-

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

tanning and anti-aging property. It is used in the treatment of skin disease, it has toning effect, emollient, antibacterial properties, cooling astringent property, soothing and healing property.



Fig no 5: Sandalwood Oil

Details Information about Coconut oil

Coconut oil is made up of about 90% saturated fats and 9% unsaturated fats. However, the saturated fats in it differ from saturated fats in animal fats. Over 50% of the fats in coconut oil are medium chain fatty acids, such as lauric acid (12:0). Coconut oil is the highest natural source of lauric acid.



Fig. 1 Coconut

Kingdom	: Plantae
Family	: Arecaceae
Subfamily	: Cocoideae
Genus	: *Cocos*
Common name	: Coconut
Botanical name	: *Cocos nucifera* Linn.

Fig no 6 : Coconut Fruit Oil

Collection of Plant Materials

The leaves of P sidium guava leaves were collected from botanical gardens of college campus of Institute of pharmacy, Badnapur. The Collected materials were cleaned and flesh was removed for Further processes of separation of seeds and extraction

Preparation of the Extraction [9]

1. Guava leaves were washed with tap water properly dried and placed into a blender to be grounded into powdered form and kept in an airtight container for further use.
2. The solvent extraction method was used for the extraction of vitamin C from guava leaves powder.
3. Take a 25 gram of guava leaves of powder through the container in china dish.
4. The guava leaves powder put in to iodine flask which content 100 ml of ethyl acetate.
5. The mixture of guava leaves and ethyl acetate pour in iodine flask.
6. stare the mixture for 24 hours.
7. filtrate the mixture through watman filter paper of (type 1) and store in air tight container for further use.
8. Concentrate the extract with help of rotary evaporator.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Fig 7 . Assembly of Extraction Method



Fig.no 8 : Extraction of Guava Leaves



Fig.no 9 : Filtration of Guava Leaves Extract

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Method of preparation of Face Serum [5]

1) Take all oily component consist of sandalwood oil ,tween 20 , coconut oil ,

2) mixing of all component for 10 min to obtan auniform solution .

3) At the same time the water phase was prepared by mixing aloe vera, glycerin, guava leaves extract & small amount of rose water.

4) The oil phase added to liquid phase by drop wise under mechanical vibration at 2500 rpm.

5) finaly oftain oil in water base (o/w) biphasic serum.

Chemical Test

Test for Alkaloids

Dandruffs test: Take 2 ml of each extract, few drops of Dandruff's reagent (potassium Dandruffs bismuth iodide solution) was added. A turbid organ/ orange-red precipitate was observed in presenceof alkaloids.

Test of Tannins

Ferric chloride reagent test: - 2-3 drops of 5% ferric chloride solution were taken and they are pouredon both extracts. Then the formulation of green (greenish-black color indicates the presence of tannins.Test for phenolic Compounds.
An equal amount of 1% Ferric chloride solution and 1 % potassium ferrocyanide was mixed, 3 dropsof this prepared mixture were added to the 2 ml of extracts. The positive result shows the formulationof a bluish color.

Test for Flavonoids

Alkaline reagent test:
1ml of 10% solution hydroxide solution was taken and added to the extract to form yellow color, which confirms the presence of flavonoids in the sample

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

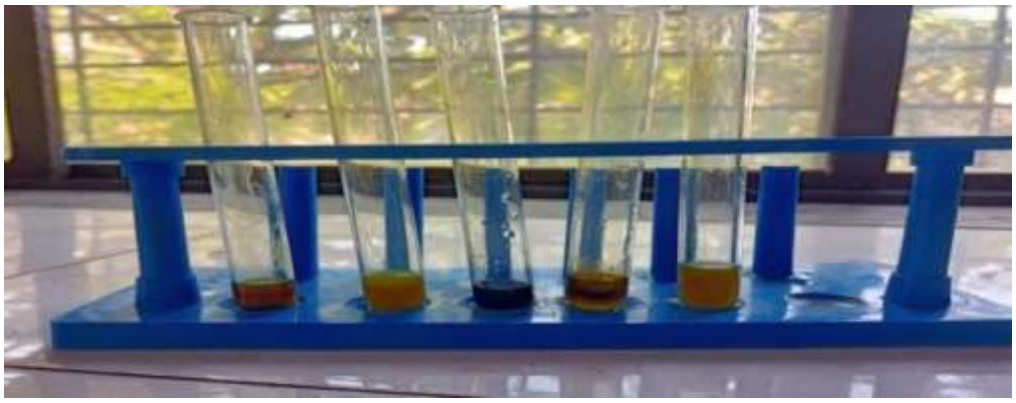


Fig no 10: Phytochemical Test

Evaluation Parameter:[4]

Physical appearance / visual inspection:

The prepared serum was tested for physical appearance and homogeneity by visual inspection

PH Meter



Fig No 11: PH Meter Reading

Viscosity studies: - serum formulation was tested for their rheological parameters at 25° C using Brookfield Viscometer. The measurements were made over a whole range of speed setting from 10rpm with the 30 s between two successive speeds and then in descending order.

Determination of Spread ability

1gm of serum sample was placed on a surface. A slide was attached to a pan to which 20 gm weightwas added. The time (seconds) required to separate the upper slide from surface was taken as a measure of Spread ability.

Stability Studies

Formulation and development of a pharmaceutical product is not complete without proper stability analysis carried out on it to determine physical and chemical stability and thus safety of the product.The stability studies are carried out as per ICH guidelines. Short term accelerated stability study wascarried out for the period of few months for the prepared formulation. The samples were stored at different storage conditions of temperatures such as 3-5oC, 250C RH=60% and 40oC±2% RH=75%.

FORMULA

$$S = M \times L / T$$

Where,

S= Spreadability

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

M= Weight tide to the upper slide

L= Length of glass slide

T=Time taken to separate the slides.

RESULT & DISCUSSION

Table 2 . Physical Evaluation

Sr.No	Test Parameter	Formulation1	Formulation2
1	Colour	Light Brown	Light Brown
2	Odour	Characterstics odour	CharacteristicsOdour
3	Consistency	Semi-soild	Semi-solid
4	ɔmogenecity AndTexture	Good	Good
5	pH	5.4	5.04
6	Washability	Washable	Washable
7	Phase Separation	Yes	Nil
8	Irritancy	Nil	Nil

Table 3 . Cyclical temperature Test

Sr. No	Parameter	Stability
1	Freezer temperature	Unstable
2	Room temperature	Stable

CONCLUSION

The herbal serum for the management of acne with botanicals was successfully formulated and evaluated for different parameters. The presence of vitamin C in guava leaves will shows high anti - oxidant which will help in the management of acne and dark spots. It shows that it will give a better effect on the skin when used to topically. This Formulation of face serum was done by Maceration process using magnetic stirrer of extraction method, homogenizer method and further evaluated by various evaluation parameters suchas physical evaluation, pH value, viscosity gives better and good result. The two batches were formulated and it was found that batch F2 was the optimized and satisfactory batch

REFERENCE

1. *A narrative literature review of the potency of guava leaf extract (psidium guajava) as a cosmetic formulation of guava leaves by Desri Ayu Lestari, Oktavia Rajebi*
2. *A article of development of guava liposome serum and evaluation of free radical-scavening capacity by Sayan Chuanoi , siriwan weerataweeporn, Chittima Managit, and Narisa Kamkane*
3. *A research article of formulation andevaluation of fairness serum using polyherbal extract by Shan Sasidharan, pyrry joseph.*
4. *Journal of formulation and evaluation of anti-aging serum by Kanchan Chande, Sunidhi Dessai, Santosh Bhutekar*
5. *A research paper of formulation and evaluation of face serum by miss. Purva S Rajdev, prof. Gaikwad S. D, miss. Shubhangi S Gunjal of IJARSCT in volume 2, 2022.*
6. *A reaserch article of formulatiomn and evaluation of polyherbal face serum by Abhirami V, Asma Kombathethil Ali Dharsa V of IJCRT.ORG ,volume 11,in 2023*
7. *A review article of guava leaves :Nutritional composition, phytochemical profile, and Heaith-Promoting bioactivities by Monoj kumar, Maharishi tomar , M. Snehe Nair, in 2021*
8. *A book of aloe veva properties and value added product by M. M. Azam, D. V. Singh, S. Kumar, M. M. Roy in 2011*
9. *A research article of extraction of bioactive compounds form psidium guajava and their application in dentistry by Shaik Shaheena, Anjani Devi Chintagunta, Vijaya Ramu Dirisala and N. S. Sampath kumar in Springer publication in 2019*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

PROXIMATE COMPOSITION AND ACCEPTABILITY OF CASSAVA-BASED PANCAKE FOR COLLEGE STUDENTS

Alyssa Tabor Fajardo[1*], Martina Delos Reyes- Peñalber, Ed.D.[2]
[1]Central Graduate School, Isabela State University- Echague Campus, Philippines
[2]College of Education, Isabela State University- Echague Campus, Philippines

[*]Corresponding Author

Article DOI: https://doi.org/10.36713/epra17515
DOI No: 10.36713/epra17515

ABSTRACT

This study is an experimental research about the proximate composition and acceptability of Cassava-Based Pancake. The study was conducted on the S.Y. 2023-2024 at Isabela State University-Main Campus, Food Processing Center, College of Education. The products were subjected to sensory evaluation using the 9-point Hedonic Scale acceptability test in terms of color/appearance, odor/aroma, taste/flavor, texture, and general acceptability. A sensory evaluation was conducted to untrained panel composed of fifty (50) individuals, who were randomly selected from among the students, teachers, and staff of Isabela State University-Main Campus, whose age ranges from 18-60 years old. Result showed that in terms of color/appearance, and odor/aroma T1 obtained the highest degree of acceptability. Of the five treatments, T4 had the highest mean score in terms of taste/flavor and general acceptability, and T3 obtained the highest acceptability in texture. The result on the Acceptability Consumer Index (ACI) revealed that setting aside the T1 (control), T4 (25% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) got the highest rank among the treatment. The treatments were subjected to nutrient analysis which includes the amount of crude protein, crude fiber, crude fat, moisture, and ash. The reports of analysis show that T2 had the highest percentage in Crude Protein, Crude Fat, and Ash. T5 had the highest Crude fiber content while T4 had the highest Moisture content. The Return-on-Investment per production of the product shows that T1 achieved the highest percentage followed by T4, T3, T2, and T5.

KEYWORDS: *Acceptability, Decent Work and Economic Growth, Pancake, Sagip, Zero Hunger*

INTRODUCTION

One of the biggest problems in the world is poverty. Families who are in the lower class do not have enough money to provide their basic needs especially food. Due to poverty there are a lot of children who are suffering from hunger and that may lead them to malnutrition.

In the news provided by Compassion International (2023), in 2023, the world is hungrier than ever, and poor children are among the most vulnerable. According to the World Food Program, up to 828 million people will go to bed hungry each night, indicating a lot of number of people affected by the food crisis. Moreover, hunger causes malnutrition because one of the primary sources of energy is proper nutrition, which people obtain from the foods they consume. According to The World Bank (2021), among the countries from East Asia and Pacific region, the Philippines ranked fifth in the highest prevalence of stunting and is included on the 10 countries in the world with the most stunted children. One in every three children (29%) under the age of five is stunted (2019) or undersized for their age. Some regions have stunting rates that reach 40% of the population. In Bangsamoro Autonomous Region in Muslim Mindanao with 45%, in Southwestern Tagalog Region (MIMAROPA) with 41%, Bicol Region, Western Visayas, and South-Central Mindanao Region (SOCCKSARGEN) with 40%. Based on these findings, the researcher doesn't want its community to have this kind of number of stunted children.

On the other hand, nutrition is the process of giving or receiving the food required for health and growth. It is an essential component of health and development. Malnutrition, in any form, poses a severe threat to human health. Brazier (2023) stated that malnutrition occurs when a person's diet does not provide enough nutrients or the right balance for optimal health or an imbalance in dietary intake. There are various types of malnutrition, including scurvy due to lack of vitamin C. People who are older adults, young children, heavy drinkers, and people with certain mental health issues are at risk of scurvy. Marasmus is a deficiency of protein and overall energy intake. Another cause of malnutrition is inadequate vitamins or minerals, many children develop vision problems due to lack of Vitamin A, and under nutrition (wasting or stunting). Vinmec International Hospital identified dietary inadequacies

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

as the primary causes of stunting in children under the age of five, particularly those under the age of three. The primary causes include a shortage of energy, protein, lipids, and micronutrients such as iron, zinc, vitamins A, D, and Calcium.

On the other hand, breakfast is the first meal of the day and gives children with the energy they need to get the day started. Breakfast kick-starts the metabolism, allowing to burn calories throughout the day. It also provides the energy required to complete tasks and helps people focus at work or school. According to Edwards (2022), students who do not have breakfast may experience problems concentrating. They are more easily distracted by their friends and struggle to recall information compared to students who have breakfast.

With the hectic schedule, especially of those people who are working and students who are away from their parents and alone in an apartment students can't cook their breakfast due to lack of time. Rushing to get out the door, they just prepare some instant foods like cup noodles, easy open can or buy some street foods without considering the nutrients that consumers can get from those foods.

On the other hand, cassava is gluten-free, grain-free and nut-free and has fiber, anti-oxidants content and a high-carb food. Therefore people, who follow a balanced diet, should also eat foods that have Protein, Fats, Vitamins and Minerals. As an outcome, Isabela State University- Main Campus, College of Education developed a product; Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay and Turmeric Powder which is composed of the key ingredient Cassava with other ingredients of Mung Bean, Sesame, Malunggay, Turmeric and Cacao Pod Husk Powder (CPHP) that is already complete and balanced. Additionally, this research-based product is in partnership of the Barangay Integrated Development Approach for Nutrition Improvement (BIDANI), a developed project of Isabela State University- Main Campus dedicated to the 15 adopted Barangays of Echague, Isabela. Collaborating with this project will ensure the success in combating malnutrition. According to Medrano (2018), in revival of BIDANI in ISU, "reviving BIDANI will greatly help in solving the problem of malnutrition." Dr. Pedrita Medrano also quoted, "BIDANI is one of the proven development [strategies], tool *na nakakatulong sa pagre-reduce ng ating malnutrition rate…* we embrace the idea that we need, really, to revive and strengthen BIDANI as a program."

As a result with the above mentioned problems, the researcher utilized the research-based product of the Isabela State University-Main Campus, College of Education; Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder, that is scientifically proven to as a great source of nutrients as abovementioned to innovate an existing popular breakfast food; Pancake due to its characteristic that it is thin, flat shape, which makes it cook quickly and easy to prepare. Since pancake is made out of pure all-purpose flour as Kresser (2019) stated that it can increase the risk of many health conditions including weight gain or obesity, metabolic syndrome, diabetes, hypertension, heart disease, cognitive decline, food addiction, depression, cancer and acne. Therefore, the researcher made it more nutritious yet affordable food as it will help the consumers to have balance diet and have a complete source of nutrients that the body needs to start the day, function optimally and mitigate those aforementioned forms of malnourishment.

Additionally, this study is a great help in attaining the 17 Sustainable Development Goals (SDGs). Particularly in addressing the SDG numbers 1, 2, 3, and 8: 1, "No Poverty"; this product can be sold and help the farmers to promote their local crop product as abovementioned that Cagayan Valley Region is one of the top producers of cassava, thus, it can be a source of income. 2. "Zero Hunger"; the ingredients of this product are available in the locality and easy to prepare, hence it will be sold in an affordable price and so many can afford to prepare and buy it. Given the fact that it will be made using healthy and nutritious ingredients it aids the SDG no. 3, "Good Health and well-being", and by conducting an extension program, providing trainings about utilizing the local crop and indigenous products of the locality, aligned with the BIDANI program, the people of the community will have the knowledge in utilizing their local crop products such as cassava turning it into a nutritious food by innovating food products like pancake and sell it instead of being left rotten. Simply turning waste into wealth can lead them to SDG no. 8 "Decent Work and Economic Growth".

STATEMENT OF THE PROBLEM

This study was conducted to determine the Proximate Composition and Acceptability of Cassava-Based Pancake for College Students.

Specifically, this study aimed to answer the following questions:

1. Which among the five treatments is more acceptable in terms of color/appearance, odor/aroma, taste/flavor, texture, and general acceptability?
2. What is the Acceptability Consumer Index (ACI) of the different treatments?
3. What is the nutritive value of each treatment of cassava-based pancake?
4. What is the Return-on-Investment (ROI) computed for the different treatments?

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

METHODOLOGY

Ingredients

Table 9 shows the ingredients and its proportion in the preparation of Cassava-Based Pancake used in the study.

Table 9. Proportion of Ingredients used in Making Cassava-Based Pancake.

Ingredients	T1	T2	T3	T4	T5
Cassava-Based Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder	0g	750g	500g	250g	1000g
All-Purpose Flour	1000g	250g	500g	750g	0g
Baking Powder	90g	90g	90g	90g	90g
Baking Soda	27g	27g	27g	27g	27g
Egg	900g	900g	900g	900g	900g
Milk	2696.4g	2696.4g	2696.4g	2696.4g	2696.4g
Salt	27g	27g	27g	27g	27g
Sugar	225g	225g	225g	225g	225g
Vanilla	39.60g	39.60g	39.60g	39.60g	39.60g
Vegetable Oil	244.8g	244.8g	244.8g	244.8g	244.8g

Collection and Preparation of the Material

Cassava Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder was bought in Isabela State University- Main Campus in collaboration with the BIDANI program and all other ingredients was bought from Santiago City market, before measuring the different proportions for the treatments. The flowchart for making hotcake is shown in Figure 5.

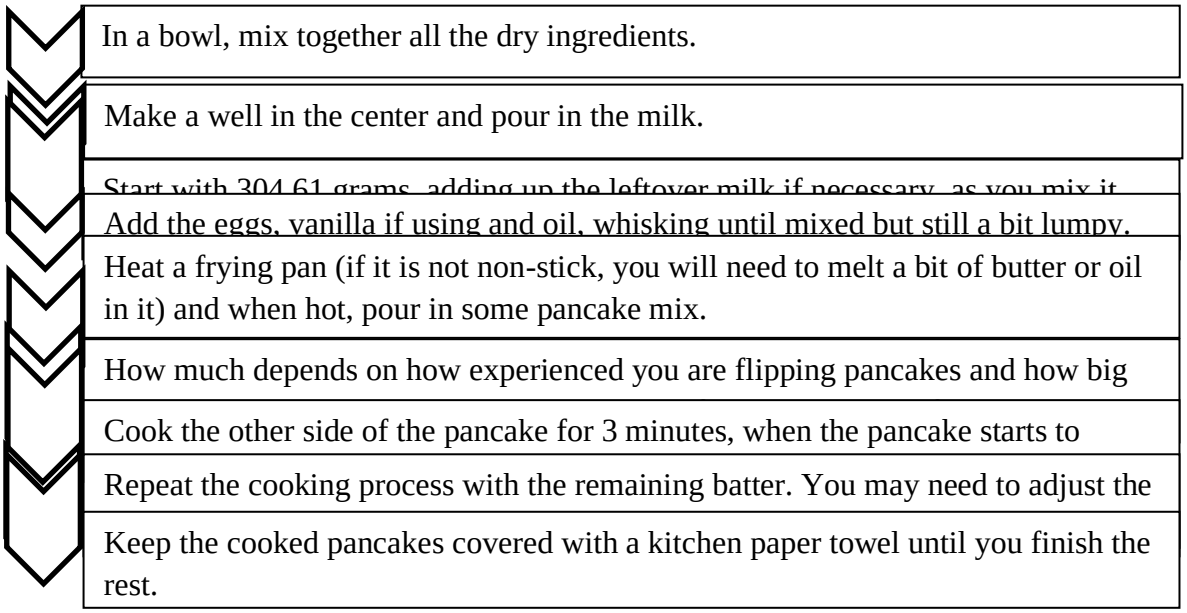


Figure 5. Flow Chart in Making Cassava-Based Pancake.

Treatment of the Study

The proportions of ingredients of Cassava-Based Pancake in this study were the same except for the main ingredient which is the all-purpose flour. Different ratio of Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder were used as the main ingredients in making Pancake.

The treatments of this study are as follows:

T1 = Commercial Hotcake

T2 = 75% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder (750 grams), 25 % All-Purpose Flour (250 grams)

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

T3 = 50% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder (500 grams), 50% All-Purpose Flour (500 grams)
T4 = 25% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder (250 grams), 75% All-Purpose Flour (750 grams)
T5 = 100% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder (1000 grams), 0% All-Purpose Flour (0 grams)

Nutrient Analysis
The treatment products of Hotcake samples were subjected to nutrient analysis conducted at the Regional Food Technology Development and Incubation Center, Integrated Laboratory Division of the Department of Agriculture Regional Government Center, Carig Sur, Tuguegarao, City, Cagayan.

Sensory Evaluation
Sensory Evaluation was conducted at the Food Processing Laboratory Room, CEd Cafeteria, Isabela State University, Echague Campus, Echague, Isabela to determine the acceptability of the experimental product in terms of color/appearance, odor/aroma, taste/flavor, texture, and general acceptability of Cassava-Based Pancake. The instrument for data gathering will make use of score sheet using the 9-Point Hedonic Scale.
The range of scale is interpreted as follows:

Scale	Range	Descriptive Rating
9	8.50 – 9.00	Like Extremely
8	7.50 – 8.49	Like Very Much
7	6.5 – 7.00	Like Moderately
6	5.5 – 6.49	Like Slightly
5	4.5 – 5.49	Neither Like or Dislike
4	3.5 - 4. 49	Dislike Slightly
3	2.5 - 3.49	Dislike Moderately
2	1.5 - 2.49	Dislike Very Much
1	1.0 - 1.49	Dislike Extremely

A sensory panel were composed of fifty (50) individuals who were randomly selected from among the students, teachers and staff. The qualification of the panelists in terms of age should be 18 to 60 years old. They were screened to be non-smokers, not liquor drinkers, and in good health during the sensory evaluation.

The treatment samples of 1 piece of Pancake were subjected to sensory evaluation by the panellists. The panellists were requested to evaluate keenly and rate the treatment samples as to its color/appearance, odor/aroma, taste/flavor, texture, and general acceptability following the Hedonic scale ratings. All the respondents were requested to rinse their mouth before tasting each sample. This was strictly observed as a standard procedure to ensure the credibility and validity of the result of the study.

Cost and Return Analysis
Cost analysis was performed to determine the economic feasibility of the product if it will be sold in the market. This will be done by listing down all the cost incurred in producing the different proportion of Cassava-Based Pancake and computing the unit cost and the return on investment (ROI) per treatment.

Statistical Data Analysis
Results of the sensory evaluation were statistically analyzed using descriptive statistics specifically mean to get the general evaluation of the respondents on each treatment.

RESULT AND DISCUSSION
This study was conducted to determine the proximate composition and consumers' acceptability of Cassava-Based Pancake.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 10. Profile Distribution of Respondents by Age

Age Bracket	Frequency	Percentage
18-22	43	86.00
33-37	2	4.00
38-42	1	2.00
43-47	2	4.00
53-57	1	2.00
58-62	1	2.00
Mean	23.50	

It can be gleaned from table that ages from 18-22 are dominant with 43 or 86.00%. This was followed by age brackets of 33-37 and 43-47 with a frequency count of 2 or 4.00%. The least of them were from the age range of 38-42, 53-57, and 58-62 with a frequency count of 1 or 2.00%.

Table 11 shows the profile of respondents by sex.

Table 11. Profile Distribution of Respondents by Sex

Sex	Frequency	Percentage
Male	22	44.00
Female	28	56.00
Total	50	100.00

As shown from the table, there were more female respondents, 22 or 44%, compared to male respondents with a frequency count of 28 or 56%, a total 50 respondents or 100%.

Degree of Acceptability

Color/Appearance. Table 12 shows the degree of acceptability of Cassava-Based Pancake in terms of color/appearance.

Table 12. Degree of Acceptability in terms of Color or Appearance

TREATMENT	MEAN	QD
T_1 – Pure All-Purpose Flour	8.36	Like extremely
T_2 – 75% Cassava-Based Sagip Nutri-Pack Powder	7.60	Like very much
T_3 – 50% Cassava-Based Sagip Nutri-Pack Powder	6.78	Like moderately
T_4 – 25% Cassava-Based Sagip Nutri-Pack Powder	6.46	Like moderately
T_5 – 100% Cassava-Based Sagip Nutri-Pack Powder	5.58	Like slightly
SD	1.07	
CV (%)	15.4	

(t = 14.57, P 0.00)

The degree of acceptability of cassava-based powder as alternate to commercial flour in the production of pancake significantly improved the color or appearance of the product with approximately by 1.07. There is strong evidence (t =14.57, P 0.00) that cassava affected the color of the product thus influenced its acceptability.

This revealed that among treatments wherein Treatment 1and Treatment 2 exhibited more appealing color/appearance with comparable mean values of 8.36 and 7.60, respectively. This was followed by Treatment 3 with a mean value of 6.78, Treatment 4 with a mean value of 6.46 and Treatment 5 with a mean value of 5.58. Treatment 1 had the highest score perceived by the panelist with a qualitative description of "Like Extremely". Treatment 5 had the lowest score with a mean of 5.58 and a qualitative description of "Like Slightly". This means that the higher ratio of Cassava- Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder the darker the color and treatment with Pure All-Purpose Flour had the vibrant color/appearance.

Odor/Aroma. Table 13 shows the data on odor/aroma of cassava-based pancake.

Table 13. Degree of Acceptability in terms of Odor or Aroma

TREATMENT	MEAN	QD
T_1 – Pure All-Purpose Flour	7.74	Like very much
T_2 – 75% Cassava-Based Sagip Nutri-Pack Powder	7.16	Like moderately
T_3 – 50% Cassava-Based Sagip Nutri-Pack Powder	6.88	Like moderately

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

T_4 – 25% Cassava-Based Sagip Nutri-Pack Powder	6.88	Like moderately
T_5 – 100% Cassava-Based Sagip Nutri-Pack Powder	6.60	Like moderately
SD	1.07	
CV (%)	15.13	

(t = 36.45, P 0.00)

The degree of acceptability of cassava-based powder as alternate to commercial flour in the production of pancake significantly improved the odor or aroma of the product with approximately by 1.07. There is strong evidence (t =36.45, P 0.00) that cassava affected the odor of the product thus influenced its acceptability.

The statistical procedure revealed that Commercial Flour (T1) and 75% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder (T2) had more aromatic smell with means of 7.74 and 7.16, followed by Treatment 3 and treatment 4 with means of 6.88 and treatment 5 with a mean of 6.60. Treatment 1 with a mean of 7.74 and qualitative description of "Like Very Much" had the highest score perceived by the panelists. Treatment 5 had the lowest score with a mean of 6.60 and a qualitative description of "Like Moderately". Indicating that adding a Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder reduced the acceptability of odor/aroma due to the strong smell of the ingredients of Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder.

Taste/Flavor**.** Table 14 presents the taste/flavor of cassava-based pancake.

Table 14. Degree of Acceptability in terms of Taste or Flavor

TREATMENT	MEAN	QD
T_1 – Pure All-Purpose Flour	7.24	Like very much
T_2 – 75% Cassava-Based Sagip Nutri-Pack Powder	6.70	Like moderately
T_3 – 50% Cassava-Based Sagip Nutri-Pack Powder	7.04	Like moderately
T_4 – 25% Cassava-Based Sagip Nutri-Pack Powder	7.72	Like very much
T_5 – 100% Cassava-Based Sagip Nutri-Pack Powder	6.60	Like moderately
SD	0.45	
CV (%)	6.37	

(t = 35.09, P 0.00)

The degree of acceptability of cassava-based powder as alternate to commercial flour in the production of pancake significantly improved the taste or flavor of the product with approximately by 0.45. There is strong evidence (t =35.09, P 0.00) that cassava affected the taste of the product thus influenced its acceptability.

Among treatments it was revealed that Treatment 4 (25% Cassava-Based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) and Treatment 1 (Commercial Flour) obtaining number of respondents with respect to its flavor/taste with mean values of 7.72 and 7.24, respectively. This was followed by Treatment 3 (50% Cassava-Based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 7.04, Treatment 2 (75% Cassava-Based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 6.70 and Treatment 5 (100% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder). Treatment 4 had the highest score perceived by the panelist with the qualitative description of "Like Very Much". Treatment 5 had the lowest score with a mean of 6.60 and a qualitative description of "Like Moderately". Indicating that higher ratio of Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder content were less preferred due to the bitterness in after taste of the Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder.

Texture. The texture of cassava-based pancake is presented in Table 15.

Table 15. Degree of Acceptability in terms of Texture

TREATMENT	MEAN	QD
T_1 – Pure All-Purpose Flour	7.68	Like very much
T_2 – 75% Cassava-Based Sagip Nutri-Pack Powder	7.24	Like very much
T_3 – 50% Cassava-Based Sagip Nutri-Pack Powder	7.72	Like very much
T_4 – 25% Cassava-Based Sagip Nutri-Pack Powder	6.98	Like moderately
T_5 – 100% Cassava-Based Sagip Nutri-Pack Powder	7.00	Like moderately

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

SD	0.36
CV (%)	4.89

(t = 45.68, P 0.00)
The degree of acceptability of cassava-based powder as alternate to commercial flour in the production of pancake significantly improved the texture of the product with approximately by 0.36. There is strong evidence (t =45.68, P 0.00) that cassava affected the texture of the product thus influenced its acceptability.

It recorded that the 50% Cassava-Based Sagip Nutri Pack Fortified with Malunggay, and Turmeric Powder (T3) had the highest score with a mean of 7.72 and a qualitative description of "Like Very Much", followed by T1 (Commercial Flour) with a mean of 7.68 and a qualitative description of "Like Very Much", T2 (75% Cassava-Based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 7.24 or "Like Very Much", T5 (100% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 7.00 or "Like Moderately" and T4 (25% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) had the lowest score with a mean of 6.98 and a qualitative description of "Like Moderately" due to its light and airy texture compared to T3 which has soft or fluffy texture. Therefore, using the same amount of all-purpose and Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder improves texture satisfaction.

General Acceptability. Table 16 presents the general acceptability of cassava-based pancake.

Table 16. Degree of Acceptability in terms of General Acceptability

TREATMENT	MEAN	QD
T_1 – Pure All-Purpose Flour	7.70	Like very much
T_2 – 75% Cassava-Based Sagip Nutri-Pack Powder	7.12	Like moderately
T_3 – 50% Cassava-Based Sagip Nutri-Pack Powder	7.20	Like moderately
T_4 – 25% Cassava-Based Sagip Nutri-Pack Powder	7.88	Like very much
T_5 – 100% Cassava-Based Sagip Nutri-Pack Powder	6.46	Like moderately
SD	0.56	
CV (%)	7.66	

(t = 29.19, P 0.00)
The degree of acceptability of cassava-based powder as alternate to commercial flour in the production of pancake significantly improved the general acceptability of the product with approximately by 0.56. There is strong evidence (t =29.19, P 0.00) that cassava affected the general acceptability of the product thus influenced its acceptability.

Significant variations among treatments are evident with Treatment 4 (25% Cassava-Based Sagip Nutri Pack Powder Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) and Treatment 1 (Commercial Flour) as the most accepted treatments with mean values of 7.88 and 7.70, respectively. However, statistical analysis showed that the latter treatment (T1) is comparable with Treatment 3 (50% Cassava-Based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 7.20, Treatment 2 (75% Cassava-Based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 7.12 and Treatment 5 (100% Cassava-Based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 6.46 with the same qualitative descriptions of "Like Moderately". Treatment 4 had the highest score perceived by the panelists with qualitative description of "Like Very Much". This means that panelists prefer pancake with a higher ratio of all-purpose of flour. The 75% of All-Purpose Flour and 25% of Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder was the most acceptable.

Acceptability Consumer Index (ACI). Table 17 shows the Acceptability Consumer Index (ACI) of the sensory evaluation result of different proportions of treatments.

Table 17. Acceptability Consumer Index (ACI)

	Appearance		Aroma		Texture		Taste		ACI	RANK
T1	8.36	1.84	7.74	1.47	7.68	1.50	7.24	2.86	7.67	1
T2	7.60	1.67	7.16	1.36	7.24	1.41	6.70	2.65	7.09	3
T3	6.78	1.49	6.88	1.31	7.72	1.51	7.04	2.78	7.09	3
T4	6.46	1.42	6.88	1.31	6.98	1.36	7.72	3.05	7.14	2
T5	5.58	1.23	6.60	1.25	7.00	1.37	6.60	2.61	6.45	4

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

As indicated in the table, Treatment 1 ranked first with ACI of 7.67, followed by Treatment 4 (25% of Cassava-based Sagip Nutri-Pack Fortified with Malunggay and Turmeric Powder) with ACI of 7.14, while Treatment 2 (72% of Cassava-Based Sagip Nutri-Pack Fortified Cacao Pod Husk (CPH), with Malunggay, and Turmeric Powder) and Treatment 3 (50% of Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) obtained the third ranked with an ACI of 7.09 and Treatment 5 received the lowest ranked indicating the least desirable option with an ACI of 6.45. The table implies that setting aside the Treatment 1 (control), Treatment 4 got the highest rank among the treatment utilizing the Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder.

Same result on the study of Adonu et. al. (2022), on Proximate Composition and Consumer Acceptability of Pancakes made with Wheat and Soybean Flour Blends that pancake made with 100% wheat flour served as the control and received the highest ratings, though did not differ from the fortified pancake samples AA1 and AA2. It is observed that substituting wheat flour partially with soybean flour with up to 10% and 20% could be used to produce acceptable pancake or pastry products without affecting the sensory quality.

Nutrient Analysis on the Different Treatments of Cassava-Based Pancake. Table 18 shows the nutrient analysis of each Treatment.

Table 18. Nutrient Analysis on the Different Treatments of Cassava-Based Pancake

TREATMENT	Crude Protein (%)	Crude Fiber (%)	Crude Fat (%)	Moisture (%)	Ash (%)
T_1 – Commercial Pancake	5.93	0.57	15.11	50.11	1.72
T_2 – 75% Cassava-Based Sagip Nutri-Pack Powder	7.00	1.15	19.42	45.76	2.10
T_3 – 50% Cassava-Based Sagip Nutri-Pack Powder	5.93	1.08	16.15	48.46	1.93
T_4 – 25% Cassava-Based Sagip Nutri-Pack Powder	5.75	0.93	15.14	50.69	1.72
T_5 – 100% Cassava-Based Sagip Nutri-Pack Powder	5.83	1.46	18.65	48.88	1.97

Treatment 2 (75% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) had the highest percentage in crude protein with 7.00 compared to the Commercial Pancake (T1) with 5.93 the same with T3 (50% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) while T5 (100% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with 5.83 and T4 (25% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) had the lowest crude protein percentage with 5.75. Result indicates that the higher the ratio of Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder had the highest Crude Protein Content.

On the other hand, T5 had the highest percentage in terms of crude fiber with 1.46, followed by T2 with 1.15, T3 with 1.08, T4 with 0.93 compared to the Commercial Pancake (T1) with lowest crude fiber percentage of 0.57. This implies that increasing the Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder in pancake resulted in a corresponding increase in the crude fiber content.

In terms of crude fat percentage Commercial Pancake (T1) had the lowest percentage with 15.11 compared to the other treatments with 15.14 (T4), 16.15 (T3), 18.65 (T5), and 19.42 (T2). This means that T2 (75% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) had the highest percentage of crude fat with 19.42% compared to the Commercial Pancake (T1) with the lowest percentage of 15.11%.

This showed that higher ratio of fat content increased as Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder increased.

In moisture content, T4 had the highest percentage with 50.69% followed by the Commercial Pancake (T1) with 50.11%, T5 with 48.88%, T3 with 48.46%, and T2 had the lowest percentage with 45.76%.

Result showed that when the ratio of Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder was increased, the moisture content decreased in all fortified pancakes.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

In terms of Ash content, Commercial Pancake (T1) and T4 (25% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) had the lowest ash content with 1.72% compared to T3 (50% Cassava-based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with 1.93%, T5 (100% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) and T2 (75% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with the highest ash content of 2.10%. This means that T2 had the highest ash content with 2.10% than the commercial pancake (T1) with 1.72%.

This implies that increasing the Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder in pancake resulted in a corresponding increase in the ash content.

Summary of Cost and Return Analysis of Cassava-Based Pancake. As shown in Table 19, the cost of Cassava-Based Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder used in fortifying the four treatments differed.

Table 19. Summary of Cost and Return Analysis of Cassava-Based Pancake

Particulars	T1 (Commercial pancake)	T2 (75% Cassava-Based Sagip)	T3 (50% Cassava-Based Sagip)	T4 (25% Cassava-Based Sagip)	T5 (100% Cassava-Based Sagip)
Ingredients					
Cassava-Based Nutri-Pack Powder	0.00	18.75	12.5	6.25	25.00
All-Purpose Flour	4.00	1.00	2.00	3.00	0.00
Baking Powder	2.00	2.00	2.00	2.00	2.00
Baking Soda	0.20	0.20	0.20	0.20	0.20
Egg	7.00	7.00	7.00	7.00	7.00
Milk	15.00	15.00	15.00	15.00	15.00
Salt	0.20	0.20	0.20	0.20	0.20
Sugar	4.50	4.50	4.50	4.50	4.50
Vanilla	1.00	1.00	1.00	1.00	1.00
Vegetable Oil	2.00	2.00	2.00	2.00	2.00
Subtotal	35.90	51.65	46.40	41.15	56.90
ADDITIONAL EXPENSES					
Packaging	5.00	5.00	5.00	5.00	5.00
Label	3.00	3.00	3.00	3.00	3.00
Subtotal	8.00	8.00	8.00	8.00	8.00
Other Operating Expenses					
Gas	20.00	20.00	20.00	20.00	20.00
Fare	8.00	8.00	8.00	8.00	8.00
Subtotal	28.00	28.00	28.00	28.00	28.00
Total Cost (Php)	71.90	87.65	82.40	77.15	92.90

As for Treatment 1 (100% All-Purpose Flour), the amount of All-Purpose flour is Php 4.00, for Treatment 2 (Pancake with 75% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder), the amount of Cassava-Based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder is Php18.75; Treatment 3 (50%

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder), the amount of Cassava-based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder is Php 12.25; Treatment 4 (25% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) the amount of Cassava-based Sagip Nutri Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder is Php 6.25; and for Treatment 5(100% Cassava-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) the amount of Cassava-Based Sagip Nutri Pack Fortified with Malunggay, and Turmeric Powder is Php 60.00.

For the All-Purpose Flour used in Three treatments differed: For Treatment 2 (25% All-Purpose Flour) the amount of All-Purpose Flour is Php 1.00; Treatment 3 (50% All-Purpose Flour) the amount of All-Purpose Flour is Php 2.00; and for Treatment 4 (75% All-Purpose Flour) the amount of All-Purpose Flour is 3.00.

The same amount or the other ingredients was alloyed for the five treatments; Baking Powder, Php 2.00; Baking Soda, Php 0.20; Egg, Php 7.00; Milk, Php 15.00; Salt, Php 0.20; Sugar, Php 4.50; Vanilla, Php 1.00; and Vegetable Oil, Php 2.00.

Considering all the above expenses for the ingredients, the subtotal for Treatment 1; Treatment 2, Treatment 3, Treatment 4, and Treatment 5 were Php 35.90; Php 51.65, Php 46.40, 41.15, and Php 56.90, respectively.

Additional expenses for all treatments amounted to Php 5.00 which includes Packaging Material and Label at Php 3.00. In addition, other operating expenses such as Gas at Php 20.00, and Fare at Php 8.00 totaled to Php 28.00.

Summing up all of the above expenses, the cost incurred in producing the products amounted to Php 71.90, Php 87.65, Php 82.40, Php 77.15 and Php 92.90, for T1; T2, T3, T4 and T5, respectively.

Table 20. Summary Computation of Return and Investment

PARTICULARS	Treatments				
	T1	T2	T3	T4	T5
Total Production Cost (Php)	71.90	87.65	82.40	77.15	92.90
No. of tub	4	4	4	4	4
Selling Price	30.00	30.00	30.00	30.00	30.00
Total Sale	120.00	120.00	120.00	120.00	120.00
Income	48.10	32.35	37.60	42.85	27.10
ROI	66.90%	36.91%	45.63%	55.54%	29.17%

The table presents the Summary Computation of Return and Investment of five different treatments or products. Each treatment is evaluated in terms of its total production cost, number of tub produced, selling price per unit, total sales, income generated, and return on investment (ROI) percentage. The total production costs for treatments T1 to T5 are Php 71.90, Php 87.65, Php 82.40, Php 77.15, and Php 92.90, respectively, with all treatments producing 4 tubs each. The selling price per tub is consistent across all treatments at Php 30.00, resulting in total sales of Php 120.00 for each treatment. The income generated, calculated by subtracting the total production cost from the total sales, varies among the treatments: T1 yields Php 48.10, T2 yields Php 32.35, T3 yields Php 37.60, T4 yields Php 42.85, and T5 yields Php 27.10. The ROI percentages further illustrate the profitability of each treatment relative to its production cost, with T1 achieving the highest at 66.90%, followed by T4 at 55.54%, T3 at 45.63%, T2 at 36.91%, and T5 at 29.17%.

In conclusion, Treatment 1offers the highest profitability and ROI making it the best option for maximizing returns. Treatment 4 also presents a strong case with a significant ROI. Treatments 2 and 3, while profitable, provide moderate return, and Treatment 5, despite being profitable, is the least favorable due to its low ROI. This analysis helps in identifying the most efficient and profitable treatments for pancake production.

Developed Information, Education, and Communication (IEC) material

The Information, Education, and Communication (IEC) Material contains the name, ingredients, and procedure of the product. It also gives information about the health benefits and other facts of the product. The contact persons are also included in the material.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

This is done to easily give information and promote the product to the school, community and to the public. It is one way of educating the consumers as well as to easily disseminate and advertise the dish which can help in attaining good health and wellness.



Figure 7. Developed Information, Education, and Communication (IEC) material

CONCLUSION

Based on the result of the study the following conclusions are derived:

1. In terms of color/appearance, and odor/aroma treatment 1 is the most acceptable. In terms of texture, treatment 2 is more acceptable and among of the five treatments, treatment 4 is more acceptable in terms of taste/flavor and general acceptability;
2. In terms of Acceptability Consumer Index treatment 1 ranked first, treatment 4 being the second, treatment 2 and treatment 3 ranked third and treatment 5 ranked fourth.
3. Among the five treatments, Treatment 2 had the highest Crude Protein, Crude Fat, and Ash Content. Treatment 4 had the highest Moisture content and Treatment 5 had the highest Crude Fiber content; and
4. As to net profit, the production of the different treatments of pancake, treatment 1 achieved the highest, followed by treatment 4, treatment 3, treatment 2 and treatment

RECOMMENDATIONS

Based on the results of the study, the following recommendations are given:

1. Treatment 4 is recommended to be introduced as a new fortification of pancake to the consumers since it was rated the most liked in terms of taste and general acceptability among the other treatments. However, since it was rated "Like Moderately" as to its color/appearance, garnishing the product is recommended to mask its color/appearance and odor/aroma, enhancing the odor/aroma of the product by adding lemon grass or other food aroma is recommended in all treatments to mask the odor/aroma.
2. Microbial analysis is encouraged to be conducted to determine the microbial content of the finished product;
3. Shelf-life analysis is advised to be conducted to determine the stability of the products; and
4. Conduct further analysis and market testing to validate these findings and explore any potential improvements in production processes or ingredient sourcing that could enhance profitability and ROI across all treatments.

REFERENCES

1. *Adonu, R. E., Amponsah, A. S., Aikins, C. (2022, November) Journal Critical Reviews Proximate Composition and Consumer Acceptability of Pancakes Made with Wheat and Soybean Flour Blends. ResearchGate.*
2. *Agbemafle, R. (2019, January) Proximate, Starch, Sugar Compositions and Functional Properties of Cassava Flour. ResearchGate.*
3. *Ahmed, A. (2018, June 25) Health Benefits Of Pancakes. TGDAILY. Alvarez, J A. P., Gonzalez, R. L., Hernandez, J. M., Lopez, C. C., Lopez, J. F., Martuscelli, M., Ospina, J. D., & Tovar, C. G. (2021, May 30) Cacao Pod Husk Flour as an Ingredient for Reformulating Frankfurters: Effects on Quality Properties. MDPI.*
4. *Aprilia, S., Aryani, R., Purwanti, L., & Priani, S, E. (2019, October) Antioxidant and tyrosinase inhibitory activity of face serum containing cocoa pod husk phytosome (Theobroma cacao L.). Journal of Applied Pharmaceutical Science Vol. 9(10), pp 110-115*
5. *Attia, A. (2022, August 19) Cassava Plant- How to Grow and Harvest Cassava. diys.com.*
6. *Benlafquih, C. (2019, November 12) Basic Msemen Recipe-Square Moroccan Pancakes. Taste of Moroc.*
7. *Braganza (2023) Moringa:14 Health Benefits of Malunggay and Side Effects. Agraryo*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

8. *Braganza (2023) Philippines Cassava Farming and Production. Agraryo*
9. *Brazier, Y., & Bernstein, A. (2023, October 12) Malnutrition: What you need to know. MEDICALNEWSTODAY.*
10. *BusinessMirror. (2023) Malunggay and its various uses and health benefits. BusinessMirror.*
11. *Byju, G., Elisabeth, D A. A., Ginting, E., & Utomo, J. S. (2022, August) Cassava Flour by Small Scale Processors, its Quality and Economic Feasibility.*
12. *Compassion International (2023, May 26) On World Hungrier Day in 2023, the World is Hungrier Than Ever. PR Newswire*
13. *Chintapali, S., & Allarakha, S. (2022, July 8) Micronutrient Types, Functions, Benefits, and More. MedicineNet.*
14. *Doudjo, S., Kouadio, E., Kouassi, E. A., & Ouattara, Y. L., (2021, December) Cocoa pod husk: A review. ResearchGate.*
15. *Dresden, D., Merango, K., (2023, October 27) What to Know about Cassava: Nutrition and Toxicity. MedicalNewsToday.*
16. *Entsie, B. (2020, October 16) 5 amazing benefits of Cassava to the body. Puls.com.gh.*
17. *Faluyi, O. (2022, March 27) Medicine in unlikely plant parts: Cacao pod Husk. Punch Nigeria Limited.*
18. *FOODSTUFF. (2019, January) Sesame: History and Uses. Hubpages*
19. *Frey, M., Syn, M. (2023, June 06) Pancake Nutrition Facts and Health Benefits. Verywell fit.*
20. *Guo, L., Lu, H., Xie, C., & Zhang, L. (2019, December) Study on quality characteristics of flour and cassava flour short biscuits. ResearchGate.*
21. *Harvard Health Publishing. (2019) Legume of the month: Mungbeans. Harvard Health PublishingHARVARDMEDICAL SCHOOL.*
22. *Ki. (2020, January 17) Malunggay In English: Tagalog-English Translation of "Malunggay". Philippine News.*
23. *Killebrew, K. (2017, February 17) Authentic Injera (Ethiopian Flatbread). The Daring Gourmet.*
24. *Krans, B., & Johnson, M L. (2023, November) Balanced Diet. healthline.*
25. *Lang, A., Kubala, J. (2022, April 6) What is Cassava Flour? Benefits, Recipes, and More. healthline.*
26. *Lincoln, H. (2017, June 28) 10 things you might not know about Cassava. Casade Campo Living.*
27. *MasterClass. (2021) Cacao Guide: Inside the Origin, Taste, and Uses of Cacao. MasterClass.*
28. *Melian, G. (2022, August 9) Cachapas. Bon appètit.*
29. *Muinos, L., & Jarosh, W. (2021, November) Mung Beans: Nutrition Facts and Health Benefits. Verywell fit.*
30. *National Center for Complementary and Integrative Health. (2020, May) Turmeric. National Center for Complementary and Integrative Health.*
31. *NATIONAL NUTRITION COUNCIL. (2022) Amazing Health Benefits of Malunggay leaves. NATIONAL NUTRITION COUNCIL*
32. *Ouattara, L. Y., Kouassi, E. K. A., Soro, D., Soro, Y., Yao, K. B., Adouby, K., Drogui, A. P., Tyagi, D. R., and Aina, P. M. (2021).* ***Cocoa pod husks as potential sources of renewable high-value-added products: A review of current valorizations and future prospects.*** *BioResources.*
33. *Philippine Statistics Authority. (2023, September) Major Vegetable and Root Crops Quarterly Bulletin, April-June 2023. Philippine Statistics Authority.*
34. *Reilly, F. (2019, March 22) Why Jianbing is China's Most Popular Street Breakfast. Serious Eats.*
35. *Robbins. (2023) What Is Sesame? Explore the Benefits & Uses of Sesame Seeds and Tahini.FOOD REVOLUTION NETWORK.*
36. *Sarkar, P., V. (2021, August 9) Savory Dosas Recipe (South Indian Pancakes). The Spruce Eats.*
37. *Statista (2023) Production volume of cassava in the Philippines from 2012 to 2022 (in million metric tons). Statista.*
38. *Sissons. (2021) Everything to know about sesame seeds. MEDICALNEWSTODAY.*
39. *Swasthi (2022, November 3) Besan Chilla Recipe (Cheela). Swasthi's Recipes.*
40. *THE WORLD BANK. (2021): Undernutrition in the Philippines: Scale, Scope, and Opportunities for Nutrition Policy and Programming. The World Bank.*
41. *Ware, M. (2023, June 16) Everything you need to know about turmeric. Medical News Today.*
42. *WebMD Editorial Contributor. (2023) Cacao Powder Health Benefits. WebMD.*
43. *WebMD Editorial Contributor. (2022) Health Benefits of Sesame Seeds. WebMD.*
44. *WebMD Editorial Contributors. (2023) What to Know About Foods for Brain Health. WebMD.*
45. *Villafañe, F. (2022, May 27) Mung Beans: Properties, Uses, and Benefits. Step to Health.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

SENSORY EVALUATION AND ACCEPTABILITY OF CORN-BASED NUTRI-SNACK FOR JUNIOR HIGH SCHOOL

Czarina Mae S. Danzalan[1*], Martina Delos Reyes-Peñalber, Ed.D.[2]
[1]Central Graduate School, Isabela State University, Echague Campus, Philippines
[2]College of Education, Isabela State University, Echague Campus, Philippines

[*]Corresponding Author

Article DOI: https://doi.org/10.36713/epra17536
DOI No: 10.36713/epra17536

ABSTRACT

The purpose of the study delves on innovating Corn-Based Sagip Nutri-Snack. It generally aims to innovate supplementary snack for school-based feeding program and contribute to attainment of Sustainable Development Goals. The study has been conducted for sensory evaluation, acceptability, nutritive value, return on investment and market analysis. This study was conducted within January- May 2024 at Jones Rural School. The research design was experimental study. The five treatments are sensory evaluated according to color/appearance, taste/flavor, odor/aroma, and general acceptability by fifty individuals thirty-three female and twenty-two male who were randomly selected junior high school students. Results of sensory evaluation were statistically analyzed using one-way classification of the Analysis of Variance. F test, mean, and descriptive statistics were used to determine if there is significant difference among the treatments. In terms of degree of acceptability, the study reveals that respondents prefer treatment 2. The acceptability consumer index for Treatment 1 achieved the highest followed closely by Treatment 2 with only 0.04 difference. As regards to nutritive value, Treatment 1 has the lowest energy while other treatments have higher energy. This suggests that treatments with Nutri-Pack is more viable option. The Market Analysis of product showed that Treatment 2 is more favorable than Treatment 1. In terms of ROI treatment 2 have comparable ROI to treatment 1. The positive result of the innovation must be disseminated to schools and other agencies to maximize the viability of the product.

KEYWORDS – *Acceptability Consumer Index, Economic Growth, Nutri-Snack, Sagip, Sensory Evaluation, Zero hunger*

INTRODUCTION

Malnutrition is one of the pressing problems in the world especially in the Philippines. Physical health issues bring with them a slew of other problems for a child–isolation, cognitive and behavioral problems, and poor educational outcomes. Improved nutrition is one of the keys to improve a learner's behavior, academic performance, and overall health.

According to the UNICEF-WHO-The World Bank 2023 Report on the joint Child Malnutrition Estimates (JME) — Levels and Trends, child malnutrition estimates for the indicators stunting, wasting, overweight and underweight describe the magnitude and patterns of malnutrition aligned with the Sustainable Development Goal (SDG) Target 2.2.

Malnutrition, with its 2 constituents of protein–energy malnutrition and micronutrient deficiencies, continues to be a major health burden in developing countries. It is globally the most important risk factor for illness and death, with hundreds of millions of pregnant women and young children particularly affected. Apart from marasmus and kwashiorkor (the 2 forms of protein– energy malnutrition), deficiencies in iron, iodine, vitamin A, and zinc are the main manifestations of malnutrition in developing countries. (Müller & Krawinkel 2005)

Eating a balanced diet that contains the recommended number of fruits, vegetables, grains, and protein-rich foods is the best way to prevent malnutrition. Receiving a supplement and the addition of micronutrients or fortified foods into diets can also help prevent malnutrition. (Ahmed et al.,2022)

In recent years, several legislations have been enacted by the Philippine Congress to support healthier diets and nutrition of Filipinos. The Department of Education has also issued policies on sale of healthy foods and beverages in schools, as well as the conduct of school feeding program. According to Lawson (2012), school feeding program as a social safety net has been popular in developing countries as an instrument for achieving the Millennium Development Goals.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

DepEd Order No.23, s.2020 known as School-Based Feeding Program (SBFP) aims to address hunger and encourage learners to enroll, contribute to the improvement of their nutritional status, provide nourishment for their growth and development, help boost their immune system, and enhance and improve their health and nutrition values.

In the implementation of SBFP, the preparation of food supply map of food commodities available in the region as reference in developing a localized cycle menu. The cycle menu can be by school clusters/ schools' district/municipality/schools' division-wide. It shall be composed of but not limited to a combination of hot meals, enhanced Nutri-bun/Milky Bun from PCC / Fortified/ Enriched breads, local fruits and fortified blended food and Nutri-Packs.

Anent to this, several efforts have been made by the DepEd schools to localized the menu for SBFP. Innovations in food preparation are encouraged to the school implementers depending on the available resources within their locality. The Municipality of Jones, where the Jones Rural School is located, is primarily an agricultural municipality best suited for the intensive production of rice and corn as evidence by its topographic map which shows that 73% of the agricultural area of 16,848 hectares. (Department of Agriculture-Jones, 2023)

Due to massive availability of corn and malunggay, this can be utilized as an alternative in making fortified Nutri-Packs. Maize flour can be fortified with malunggay powder as this contains vitamins and minerals to combat the malnutrition of the SBFP recipients (Pachon, 2018). Malunggay, also known as Moringa, is a highly nutritious plant that is rich in vitamins, minerals, and antioxidants (Braganza, 2023).

A research paper titled "Development of Malunggay-Based Products for Health and Nutrition Program" by Valera and Ancheta (2021) showed that snacks with moringa leaves as the primary ingredient to supplement the nutritional needs of Filipino children were found to be generally acceptable by home economics teachers and grade school children.

An action research program funded by the UN Food and Agriculture Organization (FAO) and the National Science and Technology Authority (NSTA) of the University of the Philippines Los Banos (UPLB) which is the Barangay Integrated Development Approach for Nutrition Improvement (BIDANI) a comprehensive nutrition-in-development strategy emphasizing the need to mainstream improving the nutrition of Filipinos towards achieving sustainable development.

BIDANI as a network program composed of various state colleges and universities (SUCs) across the Philippines was established and the ISABELA State University Echague Campus was one of it. In addressing this, Isabela State University Echague Campus particularly the College of Education developed a "SAGIP NUTRI-PACK" a food supplement which contains corn, mung bean, sesame fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder.
Combining these mixtures available local products can be an alternative ingredient in the productions of Buchi. Buchi is a popular, delicious and satisfying snack that is perfect for any time of day. It is a great source of carbohydrates and protein, which can help provide energy especially for school children.

With this, the proposed research delved on innovating food product locally known as "Buchi". The proposed study is entitled "Sensory Evaluation and acceptability of Corn (*Zea mays*)-Based Nutri-Snack for Junior High School" to determine its acceptability, nutritive value, return on investment and market analysis. This undertaking generally aimed to innovate a supplementary snack for school-based feeding program and contribute on the attainment of the Sustainable Development Goals specifically on SDG 1 No Poverty, SDG 2 Zero Hunger, SDG 3 Good Health and Well-being, SDG 4 Quality Education, SDG 8 Decent Work and Economic Growth and SDG 12 Responsible Consumption and Production.

OBJECTIVE/ STATEMENT OF THE PROBLEM

Generally, the study aimed to determine the acceptability and nutritive value of Sensory Evaluation and Acceptability of Corn-Based Nutri-Snack for Junior High School.

Specifically, it aimed to answer the following:

1. Which among the five treatments is more acceptable in terms of color/appearance, odor/aroma, taste/flavor, texture, and general acceptability?
2. What is the Acceptability Consumer Index (ACI) of the different treatments?
3. What is the nutritive value of the Corn-Based Nutri-Snack?
4. What is the Return-on-Investment (ROI) computed for the different treatments?
5. Which among the five treatments is more marketable for Junior High School students?

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

METHODOLOGY

Collection and Preparation of Materials

The Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder was obtained at ISU CED Cafeteria, Echague, Isabela. The buchi is prepared using the proportion of Corn-Based Nutri-Snack with the ratio 250g, 500g, 750g and 1000g for the treatment samples. The flowchart for making buchi is shown in Figure 2.

In a mixing bowl, sift and combine the flour and other dry ingredients. Put the water then mix well. Separate the dough into individual pieces and roll each individual piece of dough until a spherical (round) shape is formed. Press the center of the spherical dough until the shape becomes concave put the cube size cheese then seal the dough and roll it once more until the shape is spherical. Place the sesame seeds in a bowl then roll the sphere-shaped dough over it.

Heat the pan and pour-in the cooking oil. When the cooking oil is very hot, deep fry the dough until the sesame seed's color turns golden brown. Remove the cooked buchi from the pan and drain excess oil.
Allow the Buchi balls to cool completely before packaging. Place them in small, clear plastic box. Seal the packaging securely to keep the Buchi fresh.

The same procedure was done to the experimental products in using separate cooking utensils as to eliminate contaminations which will affect the organoleptic characteristics of the product.

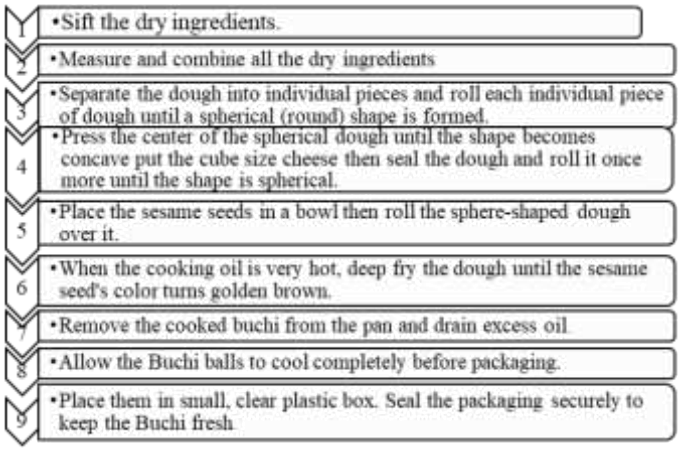


Fig. 2 Flow Chart in Cooking Buchi Corn-Based Nutri-Snack

Treatment of the Study

The proportions of ingredients of Buchi Corn-Based Nutri-Snack for in this study were the same except for the main ingredient which is the glutinous flour. Different ratio of Buchi Corn-Based Nutri-Snack was used as the main ingredients in making buchi. The treatment of this study are as follows:

T1 = Commercial Glutinous Flour
T2 = 25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder (250g), 75%Glutinous Flour (750g)
T3= 50%Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder (500g), 50%Glutinous Flour (500g)
T4 = 75% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder (750g), 25%Glutinous Flour (250g)
T5 = 100% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder (1000g), Glutinous Flour (0g)

Nutrient Analysis

Treatments was subjected to nutrient analysis conducted at the Regional Food Technology Development and Incubation Center, Integrated Laboratory Division of the Department of Agriculture Regional Government Center, Carig Sur, Tuguegarao City, Cagayan. The nutrients that were analyzed were Crude Protein, Crude Fiber, Crude fat, Moisture and Ash.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Sensory Evaluation

Sensory Evaluation was conducted at the Food Processing Laboratory Room, Jones Rural School, Jones, Isabela to determine the acceptability of the experimental product in terms of color/appearance, odor/aroma, taste/flavor, texture, and general acceptability of Buchi Corn-Based Nutri-Snack. The instrument for data gathering made use of score sheet using the 9-Point Hedonic Scale.
The range of scale is interpreted as follows:

9	8.50 – 9.00	Like Extremely
8	7.50 – 8.49	Like Very Much
7	6.50 – 7.00	Like Moderately
6	5.50 – 6.49	Like Slightly
5	4.50 – 5.49	Neither Like nor Dislike
4	3.50 – 4.49	Dislike Slightly
3	2.50 – 3.49	Dislike Moderately
2	1.50 – 2.49	Dislike Very Much
1	1.00 – 1.49	Dislike Extremely

A sensory panel were composed of fifty (50) individuals. The qualification of the panelists in terms of age should be 12-16 years old. They will be also screened to be non-smokers, not liquor drinkers, and in good health during the sensory evaluation.

The treatment samples of serving of Buchi Corn-Based Nutri-Snack, were subjected to sensory evaluation by the panelists. The panelists were requested to sensory evaluate keenly and rate the treatment samples as t its color/appearance, odor/aroma, taste/flavor, texture and general acceptability following the Hedonic scale ratings. The respondents were required to rinse their mouth before tasting each sample. This was strictly observed as a standard procedure to ensure the credibility and validity of the result of the study.

Cost and Return Analysis

Cost analysis was performed to determine the economic feasibility of the product if it will be sold in the school canteen/market. This will be done by listing down all the cost incurred in producing the different proportion of Buchi Corn-Based Nutri-Snack and computing the unit cost and the return on investment (ROI) per treatment.

Market Analysis

Market Analysis was conducted at the Jones Rural School Canteen, Junior High School, Jones, Isabela to determine the marketability of the Buchi Corn-Based Nutri-Snack among Junior High School students. The instrument for data gathering made use of score sheet using the 5-Point Hedonic Scale.
The range of scale is interpreted as follows:

5	4.50 – 5.00	Extremely Desirable
4	3.50 – 4.49	Very Desirable
3	2.50 – 3.49	Moderately Desirable
2	1.50 – 2.49	Slightly Desirable
1	1.00 – 1.49	Not Desirable

A market analysis was composed of two hundred (200) individuals consisting of 40 panelists per treatment thru quota sampling. The qualification of the panelists in terms of age should be 12-16 years old.

The panelists were requested to evaluate the market analysis tool following the Hedonic scale ratings stated above.

Statistical Data Analysis

The data gathered were tallied, tabulated, organized and analyzed with the following statistical treatments:

1. Frequency and Tally Percent. These statistical measures were used to tabulate the acceptability and marketability of the product.
2. Arithmetic and Weighted Mean. This measure was used to get the average of the acceptability and marketability of the product

RESULTS

I. Degree of Acceptability

Color/Appearance. Table 4 shows the degree of acceptability of Corn-Based Nutri-Snack in terms of color or appearance by the respondents.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 4. Degree of Acceptability in terms of Color or Appearance of Corn-Based Nutri- Snack

TREATMENT	MEAN	QD
T_1 – Commercial Glutinous Flour	7.68	Like very much
T_2 – 25% Corn-Based Sagip Nutri-pack, 75% Glutinous flour	7.58	Like very much
T_3 – 50% Corn-Based Sagip Nutri-pack, 50% Glutinous flour	6.96	Like moderately
T_4 – 75% Corn-Based Sagip Nutri-pack, 25% Glutinous flour	6.96	Like moderately
T_5 – 100% Corn-Based Sagip Nutri-pack	6.48	Like moderately
SD	0.49	
CV (%)	6.96	

(t = 32.13, P 0.00)

The degree of acceptability in terms of color or appearance of Corn-Based Nutri-Snack as alternate to commercial flour in the production of Buchi Corn-Based Nutri-Snack significantly improved the color or appearance of the product with approximately by 0.49 units. There is strong evidence (t = 32.13, P 0.00) that Corn-Based Sagip Nutri-Pack affected the color of the product thus influenced its acceptability.

In terms of color or appearance, Treatment 1 (Commercial Buchi) obtained the highest degree of acceptability with a mean of 7.68 followed by Treatment 2(25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 7.58 which were described as" Like Very Much".

Based on the result, it can be gleaned that Treatment 1 (Commercial) and Treatment 2 (25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) lies on the same qualitative description of "like very much" which indicates that they are comparable in terms of color/appearance.

Moreover, Treatment 3 (50% Corn-based Sagip Nutri-pack) with a mean of 6.96, Treatment 4 (75% Corn-based Sagip Nutri-pack) gained a mean 6.96, and lastly, Treatment 5 (100% Corn-based Sagip Nutri-pack) acquired a mean of 6.48. These three treatments were labelled as "Like moderately".

Taste/Flavor. Table 5 presents the degree of acceptability in terms of taste or flavor of Corn-Based Nutri-Snack by the respondents.

Table 5. Degree of Acceptability in terms of Taste or Flavor of Corn-Based Nutri-Snack.

TREATMENT	MEAN	QD
T_1 – Commercial Glutinous Flour	8.00	Like very much
T_2 – 25% Corn-Based Sagip Nutri-Pack, 75% Glutinous flour	8.02	Like very much
T_3 – 50% Corn-Based Sagip Nutri-Pack, 50% Glutinous flour	7.60	Like very much
T_4 – 75% Corn-Based Sagip Nutri-Pack, 25% Glutinous flour	6.70	Like moderately
T_5 – 100% Corn-Based Sagip Nutri-Pack	5.72	Like slightly
SD	0.44	
CV (%)	13.72	

(t = 16.29, P 0.00)

The degree of acceptability in terms of taste or flavor of Corn-Based Nutri-Snack as alternate to commercial flour in the production of Buchi Corn-Based Nutri-Snack significantly improved the color or appearance of the product with approximately by 0.44.

It can be seen that Treatment 1 (Commercial Glutinous Flour), Treatment 2 (25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder), and Treatment 3 (50% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) have the same description, "Like very much" with means 8.00, 8.02 and 7.60, respectively.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Moreover, Treatment 4 (75% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) obtained a mean of 6.70 which described as "Like moderately, and lastly Treatment 5 (100% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) obtained a mean of 5.72.was described as "Like Slightly".

In terms of Flavor/Taste, Treatment 2 obtained the highest mean which indicate that respondents prefer this treatment over the other treatments. The components of the Nutri-Snack might be a factor influencing their preference as it contains mixtures of corn, turmeric, malunggay, mung beans, sesame seeds and Cacao pod husk powder.

Odor/Aroma. Table 6 shows the degree of acceptability in terms of odor or aroma of Corn-Based Nutri-Snack.

Table 6. Degree of Acceptability in terms of Odor or Aroma of Corn-Based Nutri-Snack.

TREATMENT	MEAN	QD
T_1 – Commercial Glutinous Flour	8.10	Like very much
T_2 – 25% Corn-Based Sagip Nutri-Pack, 75% Glutinous flour	8.06	Like very much
T_3 – 50% Corn-Based Sagip Nutri-Pack, 50% Glutinous flour	7.12	Like moderately
T_4 – 75% Corn-Based Sagip Nutri-Pack, 25% Glutinous flour	6.70	Like moderately
T_5 – 100% Corn-Based Sagip Nutri-Pack	6.12	Like slightly
SD	0.39	
CV (%)	11.94	

(t = 18.73, P 0.00)

The degree of acceptability in terms of odor or aroma of Corn-Based Nutri-Snack as alternate to commercial flour in the production of Buchi Corn-Based Nutri-Snack significantly improved the color or appearance of the product with approximately by 0.39 units. There is strong evidence (t = 18.73, P 0.00) that Corn-Based Sagip Nutri-Pack affected the odor or aroma of the product thus influenced its acceptability.

As shown in the table, Treatment 1 obtained the mean of 8.10 and followed by Treatment 2 (25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 8.06. Both treatments are categorized under the "Like Very Much" qualitative description which signifies comparable odor or aroma.

Moreover, Treatments 3 and 4 described as "Like moderately" with their means 7.12 and 6.70. Lastly Treatment 5 obtained a mean 6.12which described as "Like slightly".

Texture. Table 7 shows the degree of acceptability in terms of texture of Corn-Based Nutri-Snack.

Table 7. Degree of acceptability in terms of Texture of Corn-Based Nutri-Snack.

TREATMENT	MEAN	QD
T_1 – Commercial Glutinous Flour	8.04	Like very much
T_2 – 25% Corn-Based Sagip Nutri-Pack, 75% Glutinous flour	7.94	Like very much
T_3 – 50% Corn-Based Sagip Nutri-Pack, 50% Glutinous flour	7.18	Like moderately
T_4 – 75% Corn-Based Sagip Nutri-Pack, 75% Glutinous flour	6.66	Like moderately
T_5 – 100% Corn-Based Sagip Nutri-Pack	6.00	Like slightly
SD	0.39	
CV (%)	12.05	

(t = 18.56, P 0.00)

The degree of acceptability in terms of texture of Corn-Based Nutri-Snack as alternate to commercial flour in the production of Buchi Corn-Based Nutri-Snack significantly improved the color or appearance of the product with approximately by 0.39 units.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

There is strong evidence (t = 18.56, P 0.00) that Corn-Based Sagip Nutri-Pack affected the texture of the product thus influenced its acceptability.

As shown in the table, Treatment 1 obtained the highest mean of 8.04 and followed by Treatment 2 (25% Corn-based Sagip Nutri-Pack) with a mean of 7.94. Both treatments were described as "Like Very Much", making the two treatments comparable to each other.

Furthermore, Treatment 3 (50% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean 7.18, Treatment 4 (75% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) which obtained 6.66. These treatments were described as "Like moderately".

Lastly, Treatment 5 (100% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) described as "Like slightly". This result is due to the fact that the contents of Corn-Based Sagip Nutri-Pack were gluten free causing the product not to form on its desired shape. With this, it is not recommended to utilize 100% Corn-Based Sagip Nutri-Pack for the production of Buchi.

General Acceptability. Table 8 shows the degree of General Acceptability of Corn-Based Nutri-Snack by the respondents.

Table 8. Degree of General Acceptability of Corn-Based Nutri-Snack.

TREATMENT	MEAN	QD
T_1 – Commercial Glutinous Flour	8.12	Like very much
T_2 – 25% Corn-Based Sagip Nutri-Pack, 75% Glutinous flour	8.24	Like extremely
T_3 – 50% Corn-Based Sagip Nutri-Pack, 50% Glutinous flour	7.60	Like very much
T_4 – 75% Corn-Based Sagip Nutri-Pack, 25% Glutinous flour	7.00	Like moderately
T_5 – 100% Corn-Based Sagip Nutri-Pack	6.12	Like slightly
SD	0.39	
CV (%)	11.80	

(t = 18.95, P 0.00)

The degree of general acceptability of Corn-Based Nutri-Snack as alternate to commercial flour in the production of Buchi Corn-Based Nutri-Snack significantly improved the color or appearance of the product with approximately by 0.39 units. There is strong evidence (t = 18.95, P 0.00) that Corn-Based Sagip Nutri-Pack affected the general acceptability of the product thus, influenced its acceptability.

It can be seen in the table that Treatment 2 obtained the highest mean of 8.12 which described as "Like extremely". This finding shows that respondents prefer this treatment that contains 25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder. The uniqueness of the color/appearance, odor/aroma, flavor/taste and texture contribute to the degree of general acceptability of the product. The result is a good indication that the Nutri-Snack has a potential market value.

Treatment 1 with a mean 8.12 and Treatment 3 (50% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) gained a mean 7.60 were described as "Like very much", respectively. Moreover, Treatment 4 with a mean 7.00 was described as "Like moderately" and Treatment 5 obtained mean 6.12 which described as "Like slightly".

II. ACCEPTABILITY CONSUMER INDEX

Acceptability Consumer Index (ACI). Table 9 shows the acceptability consumer index (ACI) of Corn-Based Nutri-Snack.

Table 9. Acceptability Consumer Index (ACI) of Corn-Based Nutri-Snack.

	Appearance		Aroma		Texture		Taste		ACI	RANK
T1	7.68	1.69	8.10	1.54	8.04	1.57	8.00	3.16	7.96	1
T2	7.58	1.67	8.06	1.53	7.94	1.55	8.02	3.17	7.92	2
T3	6.96	1.53	7.12	1.35	7.18	1.40	7.60	3.00	7.29	3
T4	6.96	1.53	6.70	1.27	6.66	1.30	6.70	2.65	6.75	4
T5	6.48	1.43	6.12	1.16	6.00	1.17	5.72	2.26	6.02	5

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The ranking of treatments indicates the acceptability consumer index of Corn-Based Nutri-Snack. Treatment 1 achieved the highest ACI of 7.96 followed closely by Treatment 2 with 7.92. This finding shows that the only difference of Treatment 1 (Commercial Glutinous Flour) and Treatment 2 (25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) are only 0.04.

Furthermore, Treatment 3 obtained the third highest rank with an ACI of 7.29. Treatment 4 and 5, had lower rankings but still with ACI 6.75 and 6.01 respectively.

III. NUTRITIVE VALUE

The nutrient facts of Corn-Based Nutri-snack provided by the Regional Food Technology Development and Incubation Center can be gleaned that Treatment 1(Commercial Glutinous Flour) has lowest energy (kcal) of 78 among all other treatments. With the same serving size, Treatment 2 gained higher energy (kcal) of 89 versus Treatment 1. This result is attributed to the components of the Nutri-Snack. With the objective of improving the nutrition of the learners through the school-based feeding program, treatment 2 is a viable option among other snacks. This finding also coincides on the general acceptability of Treatment 2 gaining highest mean through sensory evaluation of the SBFP recipients.

As cited in the study of Ahmed et al.,2022 “Eating a balanced diet that contains the recommended number of fruits, vegetables, grains and protein-rich foods is the best way to prevent malnutrition. Receiving a supplement and the addition of micronutrients or fortified foods into diets can also help prevent malnutrition.”

Moreover, Treatment 3 gained the highest energy (kcal) of 93% and Treatment 4 gained a 92% energy(kcal). These treatments also gained a high energy because it contains more percentage of the Nutri-Pack.

Furthermore, in terms of total fat, total carbohydrates and total protein, all treatments contain mostly the same amounts.

Table 10. Nutrient Content of Corn-Based Nutri-Snack based on the Regional Feed Chemical Analysis Laboratory

Sample Description	Crude Protein	Crude Fiber	Crude Fat	Moisture	Ash
Commercial Buchi, T1	3.92	1.92	2.42	40.80	1.02
Buchi Corn-Based Nutri-Snack (25%), T2	4.12	1.65	5.38	36.07	1.31
Buchi Corn-Based Nutri-Snack (50%), T3	5.34	2.15	6.07	33.35	1.28
Buchi Corn-Based Nutri-Snack (75%), T4	5.18	1.88	6.91	35.14	1.60

As shown in the table, Treatment 1 (Commercial Buchi) has 3.92% of Crude Protein, 1.92% of Crude Fiber, 2.42% of Crude Fat, 40.80 % of Moisture, 1.02% of Ash ; Treatment 2 (25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) it has 4.12% of Crude Protein, 1.65% of Crude Fiber, 5.38% of Crude Fat, 36.07 % of Moisture, 1.31% of Ash ;Treatment 3 (50% of Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) it has 5.34% of Crude Protein, 2.15% of Crude Fiber, 6.07% of Crude Fat, 33.35 % of Moisture, 1.28% of Ash ; Treatment 4 (75% of Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) it has 5.18% of Crude Protein, 1.88% of Crude Fiber, 6.91% of Crude Fat, 33.14 % of Moisture, 1.60% of Ash.

Furthermore, Treatment 5 (100% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) was not tested by Regional Food Technology Development and Incubation Center because the product did not form its desired shape, and they additionally advised there is no need to test the nutritional value since the product is not commercially viable.

The result indicates that the higher ratio of Corn-Based Nutri-Snack, the higher its nutrient value.

III. COST AND RETURN ANALYSIS

Cost of Production. Table 11 shows the cost production of the five treatments of Corn-Based Nutri-Snack in terms of ingredients and operating expenses

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 11. Cost of production of Corn-Based Nutri-Snack

MARKET LIST	Treatments				
	T1	T2	T3	T4	T5
A. Ingredients					
CORN-BASED NUTRI-SNACK	0.00	8.07	16.15	24.23	32.3
Glutinous Flour	6.92	5.19	3.46	1.73	0.00
Sweet Potato	2.31	2.31	2.31	2.31	2.31
Salt	0.01	0.01	0.01	0.01	0.01
White Sugar	2.7	2.7	2.7	2.7	2.7
Water	0.72	0.72	0.72	0.72	0.72
Cheese	9.26	9.26	9.26	9.26	9.26
Sesame	3.46	3.46	3.46	3.46	3.46
Subtotal	25.38	31.72	38.07	44.42	50.76
B. Operating Expenses					
Cooking Oil	5.00	5.00	5.00	5.00	5.00
Packaging Material	5.00	5.00	5.00	5.00	5.00
Label	2.00	2.00	2.00	2.00	2.00
Gas	5.00	5.00	5.00	5.00	5.00
Fare	8.00	8.00	8.00	8.00	8.00
Subtotal	25.00	25.00	25.00	25.00	25.00
Total Cost (Php)	50.38	56.72	63.07	69.42	75.76

For treatment 1, the amount spent was Php 50.38, for treatment 2 Php 56.72, treatment 3 Php 63.07, treatment 4, Php 69.42 and treatment 5, Php 75.76. The amount spent in producing 8 pieces of Buchi Corn-Based Nutri-Snack varies based on the amount of proportion of ingredients used in each treatment.

Return on Investment. Table 12 shows the return on investment among all the five treatments of Corn-Based Nutri-Snack.

Table 12. Summary Computation of Return and Investment

PARTICULARS	Treatments				
	T1	T2	T3	T4	T5
Total Production Cost (Php)	50.38	56.72	63.07	69.42	75.76
Number of Box (12 pieces Buchi Corn-Based Nutri-Snack)	3	3	3	3	3
Selling Price	28.00	28.00	28.00	28.00	28.00
Total Sales	84.00	84.00	84.00	84.00	84.00
Total Income	33.62	27.28	20.93	14.58	8.24
ROI (*Total Income//Total Production Cost*) *100	66.73%	48.10%	33.19%	21.00%	10.88%

The summary computation of return on investment shown in Table 12 indicates that treatments 2 garnered 48.10%, Treatment 3 obtained 33.19%, Treatment 4 obtained 21%, and Treatment 5 received 10.88% return on investment. This indicates that these treatments, which contain Corn-Based Sagip Nutri-Pack fortified with cacao pod husk, malunggay, and turmeric powder have a comparable return on investment to treatment 1 with 100% Commercial Glutinous flour, that gained a 66.73% ROI. This suggests that utilizing a more nutritious snack is a better option considering the percentage of the return on investment.

IV. MARKET ANALYSIS

Market Analysis. Table 13 shows the market analysis of the five treatments by consumer preferences.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 13. Market Analysis of Corn-Based Nutri-Snack

TREATMENTS	N	Mean	Description
T_1 – Commercial Flour	61	4.87	Extremely desirable
T_2 – 25% corn flour, 75% Glutinous flour	95	4.53	Extremely desirable
T_3 – 50% corn flour, 50% Glutinous flour	36	3.86	Very Desirable
T_4 – 75% corn flour, 725% Glutinous flour	8	3.25	Moderately Desirable
T_5 – 100% corn flour	0	-	No taker
TOTAL	200		

As shown in the table, Treatment 1 obtained the highest mean of 4.87 with 67 consumers followed by Treatment 2 (25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 4.53 with 95 consumers. Both treatments were described as "Extremely Desirable". The result indicates an extreme desirability of consumers in choosing Treatment 2 as it contains nutritious ingredients.

Furthermore, Treatment 3 (50% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) garnered a mean of 3.86 with 36 consumers described as "Very Desirable", Treatment 4 (75% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) which obtained 3.25 with 8 consumers described as "Moderately Desirable". Lastly, Treatment 5 (100% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) no consumers because the finished product did not form as exactly it should be in a commercial Buchi.

SUMMARY

This study was conducted to determine the sensory evaluation and acceptability of Corn-Based Nutri-Snack for Junior High School as well its marketability of the product, conducted within the months of January - May 2024.

Sensory Evaluation was conducted at the Food Processing Laboratory Room, Jones Rural School, Jones Isabela to determine the acceptability of the experimental product, in terms of color/appearance, taste or flavor, odor/aroma, texture and general acceptability. The instrument for data gathering made use of score sheet using the 9-Point Hedonic Scale. A Sensory panel composed of 50 individuals 33 female and 17 male who were randomly selected among the students. In terms of age, the respondents belong to the youth category as indicated by the grand mean of 15 years old, and majority are females comprising 66% while males were only 34%.

Results of the sensory evaluation were statistically analyzed using the one-way classification of the Analysis of Variance (ANOVA). F test, mean, and descriptive statistics were used to determine if there is a significant difference among the treatments in terms of color/appearance, taste/flavor, odor/aroma, texture and general acceptability.

Results showed that in terms of color/appearance, Treatment 1 (Commercial Buchi) and Treatment 2 (25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) are both liked very much by the 50 respondents.

In terms of taste/flavor, Treatment 2 (25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) obtained the highest degree of acceptability with a mean 8.02 with a descriptive rating of Like very much.

The most like treatments in terms of odor/aroma with a descriptive rating of Like very much are both treatment 1 and 2.

In terms of texture, Treatment 1 obtained the highest mean of 8.04 and followed by Treatment 2 (25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean of 7.94. Both treatments were described as Like Very Much while Treatment 5 (100% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) with a mean 6.00 which described as "Like slightly". This result is due to the fact that the contents of Corn-Based Sagip Nutri-Pack like the Corn and Mung bean are gluten free causing the product not to form on its desired shape.

In General Acceptability of Corn-Based Nutri-Snack Treatment 2 (Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) obtained the highest mean of 8.24 described as "Like Very Much".
In the Acceptability Consumer Index of Corn-Based Nutri-Snack. Treatment 1 achieved the highest ACI of 7.96 followed closely by Treatment 2 with 7.92. The only difference of Treatment 1 (Commercial Glutinous Flour) and Treatment 2 (25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) are only 0.04.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

As regards to the nutrient content of the product, Treatment 1(Commercial Glutinous Flour) has lowest energy (kcal) of 78 among all other treatments. Furthermore, in terms of total fat, total carbohydrates and total protein, all treatments contain mostly the same amounts except for Treatment 5 (5 (100% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) which was not tested by Regional Food Technology Development and Incubation Center because the product did not form its desired shape, and they additionally advised there is no need to test the nutritional value since the product is not commercially viable.

The Market Analysis of the product was conducted at the Jones Rual School Junior High School Canteen and Food Laboratory SOTA Building. Result showed that Treatment 2 (25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) obtained a mean of 4.53 described as Extremely desirable with 95 out of 200 consumers.

The return on investments for treatment 2 garnered 48.10%, Treatment 3 obtained 33.19%, Treatment 4 obtained 21%, and Treatment 5 received 10.88% which contain Corn-Based Sagip Nutri-Pack fortified with cacao pod husk, malunggay, and turmeric powder have a comparable return on investment to treatment 1 with 100% Commercial Glutinous flour, that gained a 66.73% ROI.

CONCLUSION

Based on the results of the study, the following conclusions were formulated:

1. In terms of degree of acceptability, the study reveals that the respondents prefer treatment 2 that contains 25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder. The uniqueness of the color/appearance, odor/aroma, flavor/taste and texture contribute to the degree of general acceptability of the product. Moreover, Treatment 5 (100% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) described as “Like slightly”. This result is due to the fact that the contents of Corn-Based Sagip Nutri-Pack were gluten free causing the product not to form on its desired shape.
2. The acceptability consumer index of Corn-Based Nutri-Snack, Treatment 1 achieved the highest ACI of 7.96 followed closely by Treatment 2 with 7.92. The only difference of Treatment 1 (Commercial Glutinous Flour) and Treatment 2 (25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) is only 0.04.
3. As regards to the nutritive value, Treatment 1 has the lowest energy while other treatments have higher energy. This result is attributed to the components of the Nutri-Snack. Furthermore, in terms of total fat, total carbohydrates, and total protein, all treatments contain mostly the same amounts.
4. The return on investments for treatment 2 which contain Corn-Based Sagip Nutri-Pack fortified with cacao pod husk, malunggay, and turmeric powder have a comparable return on investment to treatment 1 with 100% Commercial Glutinous flour.
5. In the Market Analysis of the product showed that Treatment 2 is more favorable than Treatment 1 in terms of consumer preferences.

RECOMMENDATION

Based on the results of the study, the following recommendations are given:

1. Treatment 2 (25% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) is recommended to be introduced to the market since it was rated as one of the most liked among the five treatments and that treatments with Nutri-Pack are a more viable option among other snacks.
2. Treatment 5 (100% Corn-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder) is not recommended to utilize for the production of Buchi Corn-Based Nutri-Snack due to the fact that the gluten-free contents of Corn-Based Sagip Nutri-Pack.
3. The product may be introduced in the nearby locality for additional source of income of residents and local food processors.
4. The product may be utilized as a School Based Feeding to the students due to its nutrient contents.
5. The developed Information, Education and Communication material for the consumers must be utilized and distributed as a guide in the production of Corn-Based Nutri-Snack.
6. The product may subject to the application of IPOPHL for intellectual property protection.
7. Further study is recommended to arrive for a more conclusive and reliable result.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FORMULATION AND DEVELOPMENT OF CHEMICAL FREE ECO FRIENDLY HANDWASH POWDER

Yogesh Gaibi Kayande [1], Gitesh Vyas [2*]

[1]Student of Bachelor in Pharmacy, Dr. Babsaheb Ambedkar Technological University, Raigad, Lonere.
[2]Department of Pharmcognosy, Faculty of Pharmcognosy, Dr. Babsaheb Ambedkar Technological University, Raigad, Lonere

[1] Corresponding Author: Yogesh Kayande

ABSTRACT

A herbal handwash was prepared using extracts of leaves of curry leaves, hibiscus powder, turmeric powder, reethe, orange pill, potato pill, tabrind pulp. The antibacterial of the prepared herbal handwash against skin pathogens was checked using Disc diffusion method and results were compared with the commercially available antiseptic soap. The results showed that the herbal handwash gave larger inhibition zone than the commercial antiseptic soap against Staphylococcus aureus and Pseudomonas aeruginosa. The efficacy of the herbal handwash was evaluated using Glove Juice method which revealed that the herbal handwash is efficient in reducing higher number of organisms from the hands than the commercial antiseptic soap. Hence, due to the higher antimicrobial activity these plant materials can be used in the preparation of herbal handwash on a commercial scale.

KEYWORDS: *curry leaves, hibiscus powder, turmeric powder, reethe, orange pill, potato pill, tamarind pulp, beet roots juice, salt .*

INTRODUCTION

Hygiene

Hygiene is a branch of science concerned with the practices and knowledge aimed at promoting health. Adhering to hygiene practices is crucial for preventing the spread of bacterial and viral infections[1].Activities such as hand washing and bathing remove dirt, soil, and infectious microbes, thereby maintaining hygiene.[2] Maintaining cleanliness is vital for health, as keeping bodily hygiene and using cleansers are essential for healthy living. These concepts underscore the importance of hygiene in disease prevention.[3]

Hand Hygiene

Hand hygiene involves cleaning hands with water, soap, or other liquids. [4]It is essential because it removes harmful chemicals and pathogens, including bacteria and viruses. Hand hygiene is particularly important for individuals in the medical field, those working in restaurants, and anyone involved in food preparation and service. Effective hand hygiene practices can significantly reduce the transmission of cold viruses and other germs. Promoting and implementing hand washing programs in schools has led to a 42% reduction in school absenteeism and decreased the incidence of gastrointestinal and respiratory illnesses among children.

Hand Washing

Hand washing involves cleaning hands with plain or antimicrobial soap and water.[11] practice can range from a brief rinse to extensive scrubbing.[5] In healthcare settings, the primary purpose of hand washing is to remove pathogenic microorganisms and prevent their transmission.[6] However, the adherence to hand washing protocols remains inadequate in many medical environments, with numerous healthcare professionals neglecting to wash their hands before patient contact.t.[7]A study demonstrated that proper hand washing and other basic procedures could reduce the rate of catheter-related bloodstream infections by 66%.[8,9]

The skin, being one of the most exposed parts of the body, requires protection from pathogens. [10]Hand washing is a crucial precaution to protect the skin from harmful microorganisms and prevent the spread of contagious disease.[11] Using a fingernail brush correctly to clean hands and fingertips is an effective way to remove transient microorganisms. Hand washing not only removes visible dirt but also reduces the number of harmful microorganism.[1

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

SIX STEPS TO EFFECTIVE HAND WASHING [16]

Step 1



Fig. 1 Wet hands and apply soap. Rub palms together until soap is bubbly.

Step 2



Fig. 2 Rub each palm over the back of the other hand

Step 3



Fig. 3 Rub between your fingers on each hand.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Step 4



Fig. 4 Rub your hands with the fingers together

Step 5



Fig. 5 Rub around each of your thumbs.

Step 6



Fig. 6 Rub in circles on your palms. Then rinse and dry your hand

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Hand Washing and Its Importance

Hands are essential for numerous activities, including farming, cooking, and personal hygiene. They come into contact with various substances, including soil and contaminated food. Clean hands are crucial for stopping the spread of germs, making hand washing a key measure in infection control programs to prevent cross-transmission of microorganisms between patients.

Plant Extracts in Hand Wash Formulation

Plant extracts have been used for centuries in traditional medicine, functional foods, natural dyes, cosmetics, detergents, and disease treatments. This study focuses on formulating herbal hand washes using various plant extracts known for their antibacterial properties, thereby establishing them as potent antimicrobial agents.

AYURVEDIC APPROACH IN HAND HYGIENE

Ayurveda, the traditional medicinal system of India, dates back over 6,000 years. It provides guidelines for maintaining health and treating diseases. The term "Ayurveda" means "knowledge of life," and it encompasses both curative medical science and comprehensive healthy living practices. Guidelines for maintaining health are known as "Swastha vritta."

Despite hand hygiene being the simplest and least expensive method of preventing healthcare-associated infections and antimicrobial resistance, poor hand hygiene practices persist due to a lack of scientific knowledge, awareness of risks, and availability of facilities.

Ayurvedic Herbs for Hand Hygiene

An Ayurvedic approach was used to screen classical literature for herbs with cleansing properties.[13,14,15] The "Pancha Valkala" combination, which includes the barks of five plants, has properties such as:

- Vranaprakshlana (wound cleansing)
- Vranaropana (wound healing)
- Shothahara (anti-inflammatory)
- Upadanshahara (curing ulcers)
- Visarpahara (curing skin diseases)

The Pancha Valkala comprises the barks of:

- Vata (Ficus bengalensis Linn.)
- Udumbara (Ficus glomerata Roxb.)
- Ashwattha (Ficus religiosa Linn.)
- Parisha (Thespesia populnea Soland ex. Correa)
- Plaksha (Ficus lecor Buch. Hum)

HISTORY OF HERBAL HAND WASH

The importance of hand hygiene was first highlighted by the Austrian-Hungarian physician Ignaz Semmelweis in 1847. Working at the Vienna General Hospital's Maternity Department, Semmelweis discovered that puerperal fever, a severe infection occurring after childbirth, was significantly reduced when medical staff washed their hands with a chlorinated lime solution after performing autopsies. This simple practice brought down the incidence of fatal puerperal fever from 10% (with a range of 5–30%) to about 1–2%.

During Semmelweis's time, the prevailing belief was that diseases were caused by various unrelated factors, and each case was considered unique. Semmelweis proposed a revolutionary hypothesis that cleanliness was the key to preventing infections. Despite the compelling evidence, his ideas were largely dismissed, ridiculed, and ignored by his contemporaries. Facing professional backlash, Semmelweis was dismissed from his position and had to relocate to Pest. His frustration with the medical community's indifference led him to write increasingly angry letters to prominent obstetricians, accusing them of negligence.[16]

Unfortunately, Semmelweis's advocacy for hand hygiene was not recognized during his lifetime. In 1865, he was committed to an asylum, where he died of septicemia, possibly due to a severe beating by guards. It wasn't until years later, when Louis Pasteur's germ theory of disease provided a scientific basis for his findings, that Semmelweis's contributions were fully appreciated. Today, he is acknowledged as a pioneer of antiseptic process.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

In recent times, Semmelweis University in Budapest has continued his legacy by adopting advanced digital tools to teach proper hand disinfection techniques. The university's Department of Surgical Research and Techniques introduced a UV dye-based, computer-imaging device to enhance hand hygiene education, earning recognition with the 1st ICPIC Innovation Academy Award.[17]

BENEFITS OF USING HERBAL HAND WASH

Ease of Availability: Herbal ingredients are readily accessible in both rural and urban areas, making them convenient for widespread use.

Cost-Effective: Herbal plants are generally cheaper than the chemical ingredients found in synthetic hand washes, offering an economical alternative.

Increased Efficiency: Herbal hand washes can be more effective in promoting hand hygiene due to the natural antibacterial properties of certain herbs.

Fewer Side Effects: Compared to synthetic hand washes, herbal options typically have fewer side effects, reducing the risk of skin irritation and other adverse reactions.

MATERIAL AND METHODS

Collection of Plant Materials

Leaves of curry leaves, hibiscus flowers, orange peels, potatoes, reetha (soapnut), tamarind, lemon, and turmeric were collected from the market in Badnapur. Hibiscus and curry leaves were additionally obtained from the College of Agriculture in Badnapur.

Curry Leaves (Murraya koenigii)

Curry leaves come from a small deciduous aromatic shrub, Murraya koenigii, part of the Rutaceae family. Native to South Asia, it grows in Sri Lanka, Bangladesh, China, and India, including regions like the Himalayas, Maharashtra, Tamil Nadu, Kerala, and Assam. Known for its vibrant leaves, curry leaves are used as a flavoring agent in Indian cuisine and have various names such as Kadipatta (Hindi),

Karuvepillei (Tamil), and Kariveppilee (Malayalam).



Scientific Classification

- Kingdom: Plantae
- Clade: Tracheophytes
- Order: Sapindales
- Family: Rutaceae
- Genus: Bergera
- Species: B. koenigii
- Binomial Name: Bergera koenigii (L.)

- **Chemical Constituents**: Contains compounds like cinnamaldehyde, carbazole alkaloids (mahanimbine, girinimbine, mahanine), and nutrients such as carotenoids, beta-carotene, calcium, and iron.
- **Categories**: Antibacterial, antiviral, antifungal, laxative, and anti-inflammatory properties.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Tamrind

Tamarind is a large evergreen tree cultivated throughout India, except in the Himalayas and western dry regions. The fruit pulp is a common spice in South Asian cuisine.



Scientific Classification

- Kingdom: Plantae
- Clade: Tracheophytes
- Order: Fabales
- Family: Fabarecea
- Binomial Name: Tamarindus indica

Hibiscus Flower (Hibiscus rosa-sinensis)

Hibiscus flowers are known for their large, colorful, trumpet-shaped blooms and are rich in natural acids, iron, phosphorus, calcium, and vitamin B complex.

Scientific Classification

- Kingdom: Plantae
- Clade: Tracheophytes
- Order: Malvales
- Family: Malvaceae
- Subfamily: Malvoideae
- Tribe: Hibisceae
- Genus: Hibiscus

- Categories: Anti-inflammatory, antimicrobial, antioxidant properties.

Turmeric:-

Turmeric is used widely as a spice and medicinal herb, recognized for its distinctive yellow color and flavor.



Turmeric rhizome and powder

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- **Scientific Classification:**
  - Kingdom: Plantae
  - Clade: Tracheophytes
  - Order: Zingiberales
  - Family: Zingiberaceae

  - **Binomial Name:** Curcuma longa
- **Synonyms**: Curcuma domestica Valeton
- **Categories:** Anti-inflammatory, potential treatment for degenerative eye conditions, metabolic syndrome, and arthritis.

Potato pills

Potato peels are rich in bioactive compounds with antimicrobial and antioxidant properties, making them a potential ingredient in hand wash formulations.



Scientific Classification

- Kingdom: Plantae
- Clade: Tracheophytes
- Order: Solanales
- Family: Solanaceae

Binomial Name: Solanum tuberosum L.

Salt

Salt acts as a preservative in herbal hand wash powder by enhancing its shelf life, inhibiting microbial growth, and promoting stability. It increases viscosity, regulates bubbles, and improves cleaning ability. Additionally, salt can act as a hardener, adjust pH, stabilize the soap mixture, and enhance lathering. The use of salt in hand wash formulations is crucial for maintaining quality and efficacy over time.



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Beetroot

Beetroot powder can add a natural pink or red hue to cosmetics and can be used in formulations like soaps, lotions, and lip balms.
The search results do not contain any information about the use of "bear root" as a coloring agent. The focus is solely on beetroot powder **.**
Beetroot (Beta vulgaris) is an excellent natural coloring agent that can be used in various herbal formulations:



REETHA

Reetha, also known as soapnut, contains saponins which have natural cleansing properties and is commonly used in Ayurvedic shampoos and cleansers.



Fig. 11 Reetha (Sapindus mukorossi)

Scientific Classification:

- Kingdom: Plantae
- Clade: Tracheophytes
- Order: Sapindales
- Family: Sapindaceae
- Genus: Sapindus
- Species: S. mukorossi

ORANGE PEEL:-

Orange peel powder is rich in Vitamin C and limonene, providing skin lightening and anti-inflammatory benefits. It helps brighten dark areas and reduces wrinkles.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Lemon peel

Lemon peel powder is beneficial for skin whitening, cleansing, and reducing pimples, thanks to its Vitamin C and citric acid content.



- **Scientific Classification**
  - Kingdom: Plantae
  - Clade: Tracheophytes
  - Order: Sapindales
  - Family: Rutaceae
  - Genus: Citrus
  - Species: C. limon

PREPARATION OF HERBAL HAND WASHES

Steps of Herbal Hand Wash Formulation:

1. Drying: All plant materials are dried and ground into a powder.
2. Weighing: The required quantities of each ingredient are weighed individually.
3. Size Reduction: The dried ingredients are reduced in size using a hand-driven mixer.
4. Mixing: The fine powders are thoroughly mixed to form a homogeneous mixture.
5. Sieving: The mixture is passed through a sieve (no. 120) to ensure a fine, uniform powder.

Formulations

Formulation Table

Sr. No	Ingredients	Quntity	Action
1	Curry leaves	3 gm	Antimicrobial
2	Hibiscus flower	2.5 gm	Antibacterial
3	Turmeric	3 gm	Anti inflammetry
4	Orange pill	2 gm	Fragrance
5	Tamrind pulp	2.5 gm	Antimicrobial
6	Lemon pill	2 gm	Antifertility
7	Reetha	2 gm	Foming agent

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

8	Salt	2 gm	Preservative
9	Beetroot	10 ml	Colouring agent
10	Potato	6 gm	Softing agent

Evaluation of Poly Herbal Hand Wash

Sr. No.	Parameters	Observations
1	Odour	Orange Like
2	Colour	Light Green
3	pH	7
4	Viscosity	51cp
5	Foam Height	350 ml
6	Foam retention At 4 min	25.2 ml

Physical Evaluation Test

1. Odor: The poly herbal hand wash was found to have an orange-like odor.
2. Color: The color of the hand wash was observed to be light green.
3. pH: Measured using a digital pH meter and found to be 7.
4. Viscosity: Measured using a Brookfield viscometer at 35°C with spindle no. 63 RPM, recorded as 51 centipoise.
5. Stability: Stability tests were conducted at various temperatures (5°C, 20°C, 37°C, and 45°C) for 24 hours. No color change or phase separation was observed.
6. Skin Irritation Test: The hand wash was applied to the skin for 5-10 minutes, and no irritation was noted.
7. Foam Height: 5 grams of the hand wash were dispersed in 50 ml of water, shaken, and the foam height was measured.
8. Foam Retention: Foam volume was measured at 1-minute intervals for 4 minutes.

Fig.17 Foam Ht. for F1

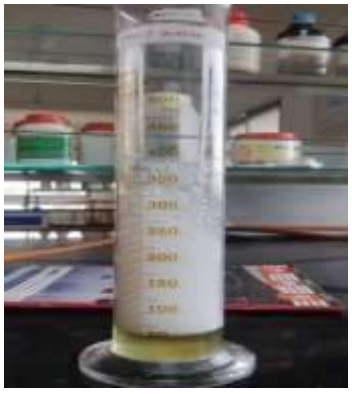


Fig.18 Foam Ht. for F2



Foam Retention

A 100 ml measuring cylinder was filled with 25 ml of the 1% poly herbal hand wash. Hands were placed over the cylinder and it was shaken five times. For 4 minutes, the volume of foam was measured at 1 minute interval

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Results and Discussion

Results:

Sr. No.	Parameters	Observations
1	Odour	Orange Like
2	Colour	Light Green
3	pH	7
4	Viscosity	51cp
5	Foam Height	350 ml
6	Foam retention At 4 min	25.2 ml

Discussions

The organoleptic evaluation results, such as odor, pH, viscosity, foam height, foam retention, stability studies and irritability test given in Table 4. We observed that the poly herbal hand wash showed light green and greenish-yellow in color with a bitter smelly light lemony fragrant. The pH of these formulations ranged between 5.9 - 7.4 that's means suitable for the skin and non-irritating. The viscosity of these formulations was recorded between 50 - 51 centipoises pascal seconds (CPS). During the stability tests, there was no color change or phase separation in the prepared poly herbal hand wash.

CONCLUSION

Hands are the primary source of disease related to skin, respiration, gastro intestinal tract etc. Due to various disease and germs, the bar soap get contaminated which may lead to spread of germs. In this sophisticated world liquid hand washes are used much more frequently than the bar soap. In the pharmaceutical industry, there are numerous marketed liquid formulations such as poly herbal hands wash. Out of them, we found mostly chemical-based preparation. Before evaluation, in these formulations of curry leaves, tamrind purl, turmeric, hibiscus, lemon peel, orange peel, beetroot, salt all ingredients will we taken in powder form without beetroot liquid from. It is the middle viscosity test (Brooke field viscometer), non-irritancy, spread ability, wash ability, etc. The result is good & ready for human use.

FUTURE SCOPE

The main aim of the poly herbal hand wash powder is to promote hand hygiene using natural ingredients. Herbal medicines offer effective remedies for various health conditions. Many commercial hand washes have adverse effects like itching and irritation. This formulation, using Azadirachta indica and Ocimum tenuiflorum, offers antimicrobial activity and protection against disease-causing bacteria, providing a safer alternative to synthetic hand washes.

REFERENCES

1. *Bloomfield, SF et. Al. "The effectiveness of hand hygiene procedures including hand- washing and alcohol-based hand sanitizers in reducing the risks of infections in home and community settings," American Journal of Infection Control, 2007; 35(1): 1-64.*
2. *Scott E., "Microbial Risk Reduction: The Benefits of Effective Cleaning In Preparation", American Journal of Infection Control, 2010; 4: 435-436.*
3. *Palak Vyaset et. Al., "Antimicrobial Activity of Ayurvedic Hand Sanitizers" International Journal of Pharmaceutical &Biological Archives, 2011; 2(2): 762-766.*
4. *Jefferson T, Foxlee R, Del Mar C et al. "Physical interventions to interrupt or reduce the spread of respiratory viruses: systematic review", British Medical Journal, 2007; 336(7635): 77–80.*
5. *Luby SP, Agboatalla M, Feikin DR, Painter J, Billhimmer W, Atref A, Hoekstra RM, "Effectof hand-washing on child health: a randomized control trial", The Lancet Infectious Diseases,2005; 366(9481): 225–33.*
6. *Baker et al. "Association between Moderate-to-Severe Diarrhea in Young Children in the Global Enteric Multicenter Study" (GEMS) and "Types of Handwashing Materials Used by Caretakers" in Mirzapur, Bangladesh, American Journal of Tropical Medicine and Hygiene, 2014; 91(1): 181-189.*
7. *Keeping hands clean. Centers for Disease Control and Prevention website.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

8. *Www.cdc.gov/healthywater/hygiene/hand/handwashing.html. Accessed January 13, 2013.*
9. *Bowen A et al., "Alcohol Based Hand Sanitizers: Assurance and Apprehensions Revisited"American Journal of Tropical Medicine and Hygiene, 2007; 76: 1166-1173.*
10. *Guinan M, Mc Guckin M, Ali Y, "Alcohol Based Hand Sanitizers: Assurance andApprehensions Revisited", American Journal of Infection Control, 2002; 30: 217-220.*
11. *Sandora TJ, Shih MC, Goldmann DA, "Epidemiology and Risk factors for Clostridiumdifficile infection in children", American Journal of Infection Control, 2008; 121: 1555-1562.*
12. *World Health Organization. WHO Guidelines on Health Hygiene in Health Care. Geneva, Switzerland: World Health Organization, 2009.*
13. *Sutra sthana et. Al. Charak Samhita, Chaukhambha Sanskrit Series, Varanasi, 2001, II Edition.*
14. *Astaanga Sangraham Sutra sthana, Indu, Shashilekha, Edited by Vd. Anant Damodar Athawale, Shrimad Atreya Prakashanam, 1980.*
15. *Larson E. "Skin hygiene and infection prevention:More of the same or different approaches?", European Journal of Clinical Microbiology and Infectious diseases, 1999; 29: 1287-1294.*
16. *LTHT Infection Control Policies, Policy No. 4; Hand Hygiene; retrieved on 7/4/2010(http://www.leedsth.nhs.uk/sites/infection_control/documents/hand_hygiene _Nov_06.pdf).*
17. *Hand Washing-Wikipedia, Free encyclopedia; retrieved on 7/4/2010 (http://en.wikipedia.org/wiki/hand_washing).*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

SCREENING, PREVENTION AND EARLY DIAGNOSIS OF BREAST CANCER (REVIEW)

Tashmatova Yu.J., Mamarasulova D.Z., Urmanbaeva D.A.
Republican Specialized Scientific and Practical Medical Center of Oncology and Radiology Andijan branch
Department of Oncology, Andijan State Medical Institute, Andijan city, Uzbekistan

SUMMARY
Screening, prevention and early diagnosis of breast cancer. The article provides data designed to provide healthcare professionals with practical standards for screening, preventive examinations and evaluation of pathological breast tumors. The outlined methodology for the prevention and early diagnosis of breast cancer allows its application at all levels of practical healthcare, starting with examination rooms of the general hospital network.
KEYWORDS: *Screening, prevention, early diagnosis, breast cancer.*

Preserving the reproductive health of the nation is an integral part of the demographic policy of Uzbekistan, therefore the organization of events aimed at improving the prevention, diagnosis and treatment of women with cancer of the reproductive organs remains an urgent problem that needs to be solved at the state level. According to the World Health Organization (WHO), the emergence and development of malignant neoplasms of the female reproductive system is largely determined by environmental conditions, as evidenced by a wide range of fluctuations in incidence rates in different countries of the world, especially pronounced in breast cancer (BC), body and cervical cancer uterus

One of the most characteristic features of the increasing number of cases of malignant tumors in women in economically developed countries is a significant increase in the incidence of cancer, which occupies a leading place in the structure of cancer morbidity and mortality.

In the structure of cancer incidence among women in Uzbekistan, RGD ranks first [1]. At the beginning of 2011, more than 140 thousand people were registered in oncological institutions . n patients with RRD. More than 16.5 thousand cases are registered annually in Uzbekistan . New cases of RD, of which 25% are women of reproductive age. More than 7.8 thousand people die every year . n patients, more than 20% of them are of reproductive age. Over the past 20 years, the incidence of RRD has increased 2.5 times, and the annual increase is more than 2%. The peak incidence of RRD occurs between the ages of 50–75 years [1].

In connection with such statistics, the issues of screening, prevention, diagnosis and treatment of patients with RRD, the organization of which still has significant shortcomings, become particularly relevant. Despite the fact that malignant neoplasms of the mammary gland (GIT) belong to tumors of visual localization, advanced cases in 2012 amounted to 20.5%, and in some regions this figure reached more than 30%. In 2011, during preventive examinations, 47.6% of patients with RD were identified, but the value of this indicator in some regions does not exceed 25%. Special treatment covered 83.4% of patients with newly diagnosed tumors (in some regions from 70.6 to 97.4%) [1].

Deficiencies in the organization of the treatment and diagnostic process lead to death from this pathology during the first year in 10.8% of patients (for comparison, in the USA this figure does not exceed 2%). When treating patients with generalized forms of RDD, costs increase by 25-30 times compared to the treatment of patients with tumors identified at an early or preclinical stage. That is why early diagnosis is of great importance, as it improves the 5-year survival rate of patients with RCD and reduces the cost of antitumor treatment [2,4].

An effective way to improve the detection of malignant neoplasms of the gastrointestinal tract can be the introduction of effective screening, prevention and early diagnosis programs. It is known that due to the introduction of government screening programs in developed countries over the past 15 years, mortality rates from RDD have decreased by 25-30%.

The European Parliament Resolution defines the fight against CBG as a priority task that can be effectively solved in European countries [4].

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Early diagnosis of RRD is possible subject to the following programs : self-examination; medical and preventive examinations, observation and treatment of precancerous pathology; screening examinations and mammography studies (currently in Europe and the USA, the widespread use of screening mammography is recommended for women aged 50-69 years)[9,16] .

It is known that in 80–90% of cases the disease is detected by the patients themselves, in 15–18% by a doctor during a preventive examination, and during mammographic screening – in 4–6% of those examined [5,7]. When conducting screening, it is necessary to take into account the epidemiological, statistical, technical, personnel situation in the region where the screening is carried out, as well as the financial support of the planned study.

The stages of organizing mass screening of gastrointestinal tumors can be divided into :
collection of complete information about the presence of factors contributing to the occurrence of RRD;
examination and palpation of the gastrointestinal tract in women with the aim of preliminary dividing the subjects into risk groups for further in-depth examination ;

Mammography.
For proper planning of organizational measures for the purpose of actively identifying patients with RRD, it is necessary to clearly define the concepts of “screening”, “preventive examination”, “clinical examination”.

Screening is a system of organizational measures for mass periodic examination of a healthy population for the purpose of early (preclinical) detection of cancer diseases, such as breast cancer. Screening studies of the gastrointestinal tract are carried out in women without symptoms of RRD in order to detect the disease as early as possible. The main goal of all screening programs is to reduce mortality through early diagnosis of RRD.

A preventive examination is an active detection of HD disease with the mandatory participation of a medical professional. An individual preventive examination is carried out by a mid-level medical worker in a pre-medical office or a paramedic and obstetric station. The goal is to identify the visual form of cancer. If RRD is suspected, the patient is referred to an obstetrician-gynecologist, therapist, surgeon, or mammologist . A targeted preventive examination is carried out by a mammologist to identify gastrointestinal diseases. A comprehensive preventive examination is carried out by a group of doctors in order to identify various nosological forms of oncopathology , in particular RGD.

Clinical examination is a periodic examination of women registered with a mammologist due to a high risk of developing RZD, as well as those undergoing treatment for benign and malignant neoplasms of the gastrointestinal tract.

In some cases, screening, preventive examination and clinical examination may be combined or be stages of the patient’s diagnostic route. For example, screening → formation of a “risk group” → preventive examination in a risk group → clarification of the diagnosis of HD disease → treatment → medical examination[4,8].

Planning and conducting screening is not fixed and depends on the specific demographic, organizational and economic conditions of providing medical care in the state and even individual regions of one country (for example, the influence of population density, age, gender structure of the population in the screening region).

There is a direct economic relationship between costs and effective detection of preclinical cases of RRD. In some cases, the cost of diagnosing RMS is tens of times higher than the cost of treatment. Even economically prosperous countries experience problems with financial resources in healthcare when carrying out screening and preventive work. It should be remembered that when choosing between economic costs and the effectiveness of screening for a doctor, the interests of the patient must be a priority. It is worth emphasizing that proper planning for the implementation of screening programs can improve 5-year survival rate in RRD by more than 30% [4]. No known treatment method provides such effectiveness.

Based on the results of randomized trials of breast cancer screening, the International Agency for Research on Cancer (IARC), Lyon, France, and the WHO Cancer Division recommend screening all women in the “target” cohort aged 50–69 years using a single test, mammography. , which is repeated every 2 years.

The program for the prevention and early diagnosis of cancer has two main directions: primary (etiopathogenetic) and secondary prevention, which consists of the diagnosis and treatment of precancerous diseases. Since the etiopathogenesis of RZP is not fully understood , the possibilities for primary prevention of RZP are limited [2, 3]. The main efforts of researchers are currently aimed at improving the system of secondary prevention of RRD.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Preventive examination of the patient should begin with an assessment of the degree of risk. At the same time, it should be remembered that approximately 75% of women newly diagnosed with RRD do not have risk factors.

After collecting anamnestic data on risk factors, groups of patients are formed who are subject to mandatory referral for mammography.

The most obvious risk factor is age—the incidence of RDD increases with age. The family history should contain information about immediate relatives (mother, sister, daughter) who had RRD, and the age at which they became ill. A patient diagnosed with perimenopausal breast cancer has a significantly higher risk (4-5 times) of developing the disease than others. If a subject's immediate family has cancer of both gastrointestinal tracts or RGC, the risk for that woman may be 8 to 10 times higher than the risk in the general population. It is very important that the doctor learns about the results of all previous diagnostic biopsies and previously diagnosed HD diseases. For a woman who has had RGC, the risk of developing a new primary cancer of the second gland is approximately 0.5–1% for each remaining year of life[6].

During the examination, the doctor must obtain detailed information about the course of pregnancy and childbirth in the woman, in particular about the number of births and the age at which the woman first gave birth to a child. A woman who has not had children, or who gives birth after age 30, has a significantly higher risk of developing the disease[18].

*Genetic counseling/testing is recommended in the following cases: 1) if there is data in the personal or family history indicating a genetic predisposition to the development of malignant tumors (family history refers to RD or GC). The risk varies depending on the age of the patient and the age of the relative (s) with cancer. Women at very high risk may require earlier screening or additional screening examination) ; 2) whether the test results can be correctly interpreted; 3) if the results contribute to the diagnosis of or influence the medical or surgical management of a patient or family member at hereditary risk of developing malignant tumors.

**Women under 30 years of age who have received radiation therapy to the chest require additional testing.
After the survey, patients are divided into risk zones and given recommendations.

And a risk zone. An examination by a surgeon, therapist or gynecologist is mandatory. If pathology is detected, treatment and medical examination are required. Examination by a mammologist at least once every 12 months using ultrasound in women aged > 40 years. Sonography once a year + mammography once every 2 years for women aged >40 years. Teaching the rules of self-testing.

Risk zone II. Annual mandatory examination by a mammologist , obstetrician-gynecologist, general practitioner, surgeon or local oncologist once every 6 months + sonography for women aged <40 years. Mammography for women aged >40 years once a year. Teaching the rules of self-testing.

Risk zone III. Examination by an obstetrician-gynecologist, therapist, surgeon or local oncologist once a year, at the age of <40 years - sonography once every 6 months, at the age of >40 years - 1-2 times a year; at the age of >40 years - mammography once a year. Teaching the rules of self-testing. An explanation of the influence of risk factors that increase the likelihood of developing HD, recommendations for their elimination, as well as treatment.

The following are risk factors, in cases of ≥3 of which the patient should be referred for mammography.

1. RCD in close relatives or another oncological disease in the patient.
2. Age ≥50 years (annual examination).
3. Dyshormonal hyperplasia of the gastrointestinal tract (localized forms or nodular components, discharge from the nipple, fibrocystic mastopathy).
4. Endocrine disorders (thyroid gland pathology, diabetes mellitus, hypothalamic-pituitary-adrenal diseases, obesity of II and III degrees - excess of normal body weight by ≥20 kg).
5. Reproductive dysfunction: abortion after 35 years, first birth after 30 years, infertility, early or late onset of menstruation.
6. Diseases of the reproductive organs - tumors of the uterus and appendages, inflammatory diseases, menstrual irregularities.
7. Proliferative diseases after treatment (history, according to biopsy).

The low percentage of detection of gastrointestinal tumors by doctors during preventive examinations is due to the virtual absence of mammologists capable of competently assessing the condition of the gastrointestinal tract, conducting appropriate treatment of precancerous diseases and monitoring patients at risk.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

By its nature, a GI review conducted by different specialists is subjective, and therefore different interpretations of the same factors are possible. Let us note the basic requirements for conducting a physical examination of the gastrointestinal tract and the sequence of its elements:

the search must be carried out in a calm environment that ensures confidentiality;
It is recommended to examine the patient in a standing and supine position;
It is necessary to record data on the size, location, mobility and consistency of any tumor formation. Clinically suspicious are slow-moving tumor-like formations that can grow together with surrounding tissues. However, it is known that the clinical manifestations of gastrointestinal tumors are extremely variable. Also note any skin changes such as retraction, erythema, or peeling of the nipple skin;
each nipple should be lightly squeezed to inspect the discharge;

The lymph nodes in the axillary area should be examined. The purpose of their study is to determine whether they are clinically negative (normal size, soft, mobile). If the nodes are suspicious, it is necessary to evaluate their consistency, determine whether they are single or multiple, mobile or stationary;

The results of the examination, even if no pathology is detected, must be fully documented.
Convincing scientific evidence to accurately determine the optimal age for mammography. The results of scientific studies confirm the advisability of performing mammography in women aged 50–70 years [4–7]. There is debate about the frequency of screening for women aged ≥75 years. Routine mammographic screening of women under 40 years of age is not very effective [4–7].

It is known that periodic screening Mammological examination of women who have no complaints reduces mortality from RRD. Screening mammography is the contribution of radiologists to providing comprehensive medical care to patients. Quality criteria for mammography are essentially the same as for other radiological examinations. For radiologists to perform well, it is necessary to establish monitoring and maintenance schedules for equipment, ensure image quality standards, perform standard image evaluation procedures, carefully maintain documentation, and periodically review breast room results.[28]

In regions where there are a sufficient number of mammologists , screening mammography is an x-ray examination method for identifying “hidden” breast cancer at an early stage in women who do not have pronounced symptoms. In addition, during the study, the women examined should be divided into two groups - with low and high risk of the disease. The results may show most women that they do not have any significant abnormalities, while others may be told that they have an abnormality and need further testing. Studies are usually limited to angular views of the craniocaudal and mediolateral regions of each gastrointestinal tract. Additional views are sometimes required to optimally visualize gastrointestinal tissue, but these should not be performed routinely. If pathology is suspected, further imaging studies, diagnostic mammography, or biopsy may be suggested[12].

The goal of all mammography examinations is to facilitate the detection of preclinical forms of breast cancer. Unlike screening mammography, gastrointestinal mammography for special problems (diagnostic mammography and ancillary procedures) is aimed at the specific analytical examination of patients with abnormalities that are detected clinically or during screening. A diagnostic examination of HD should lead the doctor to a final conclusion about the clinical manifestations, as well as verification of the diagnosis, which allows him to give special recommendations for the treatment of the patient.

During preventive examinations of young women (<40 years), mammography can be replaced by sonography . As a result of ultrasound examination, an absolute increase of up to 20% in the detection rate of invasive breast cancer in women with a dense gastrointestinal tract, in whom the sensitivity of mammography decreases, increases the risk of developing breast cancer [6].

If the doctor does not see nodular neoplasms during a gastrointestinal ultrasound, the patient is referred to an endocrinologist-mammologist (in the presence of diffuse mastopathy) or is recommended to undergo a control ultrasound once a year (in the absence of pathology in the gastrointestinal tract).

If nodular neoplasms (fibroadenoma, cyst, etc.) are detected, the patient should be examined using mammography or pneumocystography (Fig. 2). If a fibroadenoma is detected, surgical intervention with histological examination is recommended; in the presence of a cyst, puncture aspiration with cytological examination of the exudate is recommended; If proliferative or malignant processes are suspected, surgical intervention with histological examination is necessary. If the cyst is only punctured, the patient should be re-examined after 1-1.5 months to see if the cyst has recurred. If the cyst recurs rapidly after aspiration, the patient should be referred for surgery.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

If a neoplasm is suspected of being malignant, an urgent sectoral resection of the gastrointestinal tract with histological examination is necessary (the operation should be carried out at an oncology clinic or oncology institute). If the diagnosis of RMS is confirmed, radical surgery should be performed followed by combined treatment.

If, during ultrasound or mammography , the patient is diagnosed with diffuse neoplasms (Fig. 3) in the gastrointestinal tract, treatment and observation are carried out on an outpatient basis. Among the diffuse forms, fibrous forms of dysplasia with ovarian failure of various origins and cystic forms of mastopathy with various concomitant diseases are distinguished. The doctor has the opportunity to use laboratory methods to determine hormonal levels in diffuse forms of gastrointestinal hyperplasia. After this, drug complexes are formed, which are prescribed depending on the level of estrogens, progestins and the clinical form of dyshormonal hyperplasia. The assessment of the situation must be carried out on an individual basis. So, for example, with low estrogen levels there should usually be a picture of hypoestrogenism with the development of mastopathy, but in fact it turns out that concomitant hyperthyroidism, dysfunction of the liver and corpus luteum lead to clinical hyperestrogenism with the development of cystic components of fibroadenomatosis . This situation prompts us to look for a new approach to the formation of treatment tactics, taking into account clinical, radiological, cytohistological data and the results of hormonal studies, which are assessed by their clinical implementation. This indicates the possibility of an integrated approach to assessing the form of dishormonal hyperplasia and prescribing differentiated treatment.

The following forms of dishormonal hyperplasia are distinguished, which simultaneously reflect the degree of their development and differ significantly in treatment tactics: Fibrous ; fibrocystic; adenosis; fibroadenomatosis; involutive-irbromatous; mastopathy with galactophoritis or galactorrhea; mixed diffuse forms; nodular forms of dishormonal hyperplasia.

Treatment of patients with dyshormonal hyperplasia requires an individual approach, taking into account the pathogenesis, concomitant diseases, the woman’s phenotype, the nature of the pathology in the gastrointestinal tract (clinical, radiological data), which is accompanied by certain changes in hormonal homeostasis.

A biopsy is required for solid, dominant and persistent tumor processes. A patient with a solid tumor should be referred to a surgeon, even if the mammogram is negative. In the case of a neoplasm that cannot be palpated (see Fig. 4), but is detected by mammography, it is worth taking targeted images and, if possible, performing a puncture or core biopsy under ultrasound guidance. After receiving a conclusion after a biopsy confirming a benign process, the patient is subject to observation and treatment on an outpatient basis. If the answer is “suspicion of a malignant process” or “malignant process,” surgical treatment is necessary.

Micro- or macrocalcifications are detected on mammographic images, targeted mammography with magnification and compression is mandatory. If, upon enlargement, the process is regarded as benign, X-ray monitoring is necessary after 1 month to determine the tactics of further treatment. If the result is inconsistent, it is imperative to perform a sectoral resection with urgent histological examination and carry out further treatment depending on the histological conclusion.

All nodular forms of dishormonal hyperplasia are subject to cytological or histological biopsy, and if proliferative processes are suspected, surgical treatment with urgent histological examination in an oncology institution, since treatment of cancer patients in a general medical network worsens the prognosis of the disease by more than 3 times. Evaluation of the effectiveness of the results obtained is associated with specific recommendations for practical actions in relation to patients both at the individual, group and population levels.

REFERENCES

1. *Zakharova N. A., Semiglazov V. F., Duffy S. W. Breast cancer screening: problems and solutions [Book]. - M: GEO-TAR-Media, 2011. - p. 176.*
2. *Malignant neoplasms in Russia in 2012 (morbidity and mortality) [Book]/ed. Kaprin A.D. Starinsky V.V., Petrova G.V. - M: FSBI “MNIOI im. P. A. Herzen" Ministry of Health of Russia, 2014. - p. 250.*
3. *Krylov V.V., Tsyb A.F. Radionuclide therapy in Russia: successes, problems and prospects [Journal]//Radiation Oncology and Nuclear Medicine. - 2011 - T. 1. - pp. 68-77.*
4. *Levshin V.F. Screening for breast cancer [Journal]//Bulletin of the Russian Cancer Research Center named after. N. N. Blokhina. - 1999 - T. 4. - pp. 60-67.*
5. *Levshin V.F., Mikhailov E.A. Self-examination as a method of screening for breast cancer [Journal]//Oncology Issues. - 2000 - pp. 627-629.*
6. *Mikhailov E. A. Implementation of the Russian Federation/WHO program to train women in self-examination of the mammary glands in Moscow [Section of the book] // Current problems in the prevention of non-communicable diseases. - 1995.*
7. *Pak D. D., Rasskazova E. A., Ermoshchenkova M. V. Breast cancer [Book]. - M: Triada-X, 2010. - p. 160.*
8. *Petrova G.V., Kaprin A.D., Starinsky V.V., Gretsova O.P. Incidence of malignant neoplasms in the population of Russia [Journal]//Oncology. - 2014 -T. 5. - pp. 5-10.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

9. *Prizova N. S. Methodological aspects, results and prospects of breast cancer screening in a large administrative region // Dis. ...cand. medical sciences - M:, 2014 - p. 114.*
10. *Putyrsky Yu. L. Methods of screening for breast cancer [Journal]//Medical news. - 2007 - T. 11. - p.20-24.*
11. *Semiglazov V.F. Screening for breast cancer: an effective life-saving measure [Journal]//Medical Bulletin. - 2008 - T. 462. - pp. 7-8.*
12. *Semiglazov V.F., Semiglazov V.V. Screening for breast cancer [Journal]//Practical Oncology. - 2010 -T. 11. - pp. 60-65.*
13. *Sdvizhkov A. M., Evtyagin V. V., Borisov V. I. et al. Mammographic screening for breast cancer. Problems of organization and results of implementation [Journal]//Bulletin of the Moscow Oncological Society. - 2006 - T. 11.14. Hakama M. Implementation of screening as a public health policy [Journal]//J. Med. Screen. - 2005. - Vol. 13. - pp. 209-216.*
14. *Kirby I. Bland, III Edward M. Copeland. Breast, 2-Volume Set, Expert Consult Online and Print. -[s. l.]: Expert Consult Online and Print. Comprehensive Management of Benign and Malignant Diseases: Elsevier Health Sciences, 2009. - Vol. 2.*
15. *Ma I., Dueck A., Gray R. et al. Clinical and self breast examination remain important in the era of modern screening [Jour-nal]//Ann. Surg. Oncol. - 2012. - Vol. 19.- pp. 1484-1490.*
16. *Misra S., Solomon N. L., Moffat F. L., Koniaris L. G. Screening criteria for breast cancer [Journal]//Adv Surg. - 2010. - Vol. 44.-pp. 87-100.*
17. *Panieri E. Breast cancer screening in developing countries [Journal]//Obstet. Gynaecol. - 2012. - Vol. 26. - pp. 283-290.*
18. *Ciatto S., Rosselli del Turco M., Catarzi S. et al. Causes of breast cancer misdiagnosis at physical examination [Journal]//Neo-plasma. - 1991. - Vol. 38. - pp. 523-31.*
19. *The breast: comprehensive management of benign and malignant disorders.ed. by K. I. Bland E. M. Copeland, III - 3rd ed. -USA, 2004.*
20. *Friedman G. D., Collen M. F., Fireman B. H. Multiphasic Health Checkup Evaluation: a 16-year follow-up [Journal] //! Chronic Dis. - 1986. - Vol. 39. - pp. 453-63.*
21. *Tabar L., Gad A. Screening for breast cancer: the Swedish trial [Journal]//Swedish trial. Radiology. - 1981. - Vol. 138. - pp. 219-222.*
22. *Tabar L., Chen H. H., Fagerberg G. Recent results from the Swedish Two-County Trial: the effects of age, histologic type, and mode of detection on the efficacy of breast cancer screening [*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

DEVELOPMENT OF MODEL RECIPE FOR MINI DONUTS AS A NUTRITIOUS SNACK FOR SECONDARY SCHOOL LEARNERS

Joyce Lyn P. Gaspar[1]*, Martina Delos-Reyes-Peñalber,Ed.D,[2]
[1]*Central Graduate School,Isabela State University-Echague Campus, Philippines*
[2]*College of Education,Isabela State University-Echague Campus, Philippines*
[*]*Corresponding Author*

Article DOI: https://doi.org/10.36713/epra17543
DOI No: 10.36713/epra17543

ABSTRACT

This experimental study aimed to develop a model recipe for mini donuts as a nutritious snack for secondary school learners. The research was conducted during the S.Y. 2023-2024 at Taliktik Integrated School. The products were subjected to sensory evaluation using the 9-point Hedonic Scale acceptability test in terms of color/appearance, odor/aroma, taste/flavor, texture, and general acceptability. A sensory evaluation was conducted to untrained panel composed of fifty (50) individuals who were randomly selected from among the learners and staff of Taliktik Integrated School, whose age ranged from 12-50 years old. The results of the sensory evaluation were statistically analyzed using the one-way classification of the analysis of Variance (ANOVA). F test, mean and descriptive statistics were used to determine if there is a significant difference among the treatments. In terms of degree of acceptability, the study reveals that respondents prefer Treatment 4 containing 25% of Rice-Based Sagip Nutri-Pack and 75% All-Purpose flour. The results indicate that the Nutri-Pack Powder has significant potential market value. The result on the Acceptability Consumer Index (ACI) revealed that treatment 4 gained the highest rank among the five treatments. Nutrient analysis revealed Treatment 5 had the highest crude protein, crude fat, and ash content, Treatment 1 had the highest moisture content, and Treatment 2 had the highest crude fiber content. ROI analysis indicated that all treatments were profitable, with Treatment 1 being the most cost-effective, followed by Treatments 4, 3, 2, and 5.

KEYWORDS- *Mini donuts, Model Recipe, Nutri-pack, Sagip, Sustainable Development Goals, Zero Hunger*

INTRODUCTION

Undernourished children are a common problem in developing nations. It may turn out from a broad range of aspects like deficiencies of macro and micronutrients, infection, and possibly socioeconomic conditions. Every day, 95 children in the Philippines die from malnutrition. Twenty-seven out of 1,000 Filipino children do not get past their fifth birthday. A third of Filipino children are stunted or short for their age. Stunting after 2 years of age can be permanent, irreversible, and even fatal (UNICEF PH,2018).

As it is known, the Department of Education (DepEd) has initiated a program aimed at addressing the issue of malnourishment among students. According to the data of Taliktik Integrated School, Under the School-Based Feeding Program (SBFP) of October - November 2023, it reveals that 32% of learners are dealing with undernourishment, 6% are stunted and 26% are wasted at ages ranging from 12-15 years old. In their feeding programs, learners received nutritious food products containing milk, fortified snacks, and other Nutri-packs to provide the nutritional requirements for each learner (DepEd Order No. 23,2020).

On the other hand, the researcher proposes a locally inspired snack that could act as a dual solution to address the undernourishment of the learners. This innovative development seeks to not only intrigue the taste buds but also contribute to the larger mission of uplifting the health status and general well-being of learners by addressing the fundamental needs of every learner that is under the SBFP program.

Additionally, through the extension programs of the College of Education, Isabela State University, the Barangay Integrated Development Approach for Nutrition Improvement (BIDANI), adopted the 15 Barangays of Echague, Isabela to help improve their ways of living through extending livelihood programs to promote and improve economic growth and health status of the residents in the community. This program aims to achieve poverty alleviation, good health, food security, and good governance for the general well-being of families and their communities (BIDANI, 2018).
However, the development of this mini donut recipe as a nutritious snack has been enhanced with the Rice-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder which contains rice, mung beans, sesame, cacao pod husk

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

powder, malunggay and turmeric for more nutritional contents that is aligned to the Sustainable Development Goals no.03 good health and well-being. Moreover, this development helps in utilizing the nutritional benefits of Rice-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay, and Turmeric Powder which contains the macro and micronutrients that the body needs to sustain the body structure and functional system.

In connection with the product, Filipinos are known for their diligent work habits, occasionally taking breaks for merienda to recharge. These delightful miniature treats, small yet satisfying size, have become a cherished indulgence, perfectly aligning with the Filipino fondness for sweet snacks that Filipinos love to eat. Beyond just being a treat, mini donuts have evolved into a daily snack that is consistently offered in school canteens due to their affordable price and help to satisfy hunger. This makes them accessible even for students with limited budgets and who have no time to prepare their food in the morning. Aligned with the 17 Sustainable Development Goals (SDGs), particularly the goal of No Poverty and Zero Hunger, along with this nutritious snack, learners are guaranteed with Good Quality Education through these mini donuts incorporated with a specially crafted blend of locally sourced ingredients. In addition, rice flour is a versatile and gluten-free option and offers several health benefits when incorporated into nutrition. It is ideal for individuals with gluten sensitivity or celiac disease, rice flour provides a safe and nutritious substitute for wheat-based flour. It can be easily digested. It provides a quick and accessible energy boost, supporting overall vitality and stamina. It is a favorable choice for those aiming to manage their fat intake and maintain a balanced diet. It is also packed with vitamins and minerals (Axe,2018).

Likewise, mung beans are type of pulse that has a good nutritional balance with plenty of vitamins and minerals. It offers a range of health benefits due to its nutrient-rich composition. Mung beans are a good source of plant-based protein, complex carbohydrates, fiber, and various essential nutrients, including B vitamins (such as folate and B6), potassium, magnesium, phosphorus, zinc, iron, and manganese. The fiber, potassium, and magnesium content in mung beans can contribute to heart health. These nutrients may help regulate blood pressure, reduce cholesterol levels, and support overall cardiovascular function (Tang et al.,2014).

Additionally, sesame seeds are high in oil, protein, minerals, vitamins, and dietary fiber. Sesame oil, derived from conventional oil production processes, is high in unsaturated fatty acids, fat-soluble vitamins, amino acids, and so on. Sesame seeds contain 21.9% protein, 61.7% fat, and are high in minerals including Fe and Ca (Rout et al., 2018).

In addition, proteins, lipids, and antioxidants, particularly polyphenols, are abundant in cocoa husks. Cocoa polyphenols have several effects that may promote good health according to several studies, Cacao pod husk (CPH) is a good source of phenolic compounds, which can act as antioxidants and could be used in functional meals (Valadez-Carmona et al., 2018).

Furthermore, Moringa oleifera is an effective remedy for malnutrition, it is rich in nutrition owing to the presence of a variety of essential phytochemicals present in its leaves, pods, and seeds. While turmeric has gained popularity as a dietary supplement, advocated for diverse conditions such as arthritis, digestive disorders, respiratory infections, allergies, liver disease, and even mental health concerns like depression.

With the above mentioned, there is no doubt that the process of enhancement of the mini donuts recipe will not just combat the deficiencies of learners but also create a market for local farmers by actively involving them in the supply chain, this research will not only support their livelihoods, but it also contributes to the overall economic growth of the community by using the raw, ready ingredients from our local farmers.

METHODOLOGY

Ingredients

Ingredients	T1	T2	T3	T4	T5
Rice-Based Sagip Nutri-Pack	0g	750g	500g	250g	1000g
All-purpose flour	1000g	250g	500g	750g	0g
Granulated Sugar	400g	400g	400g	400g	400g
Baking powder	115g	115g	115g	115g	115g
Salt	6.4g	6.4g	6.4g	6.4g	6.4g
Milk	1816g	1816g	1816g	1816g	1816g
Oil	224g	224g	224g	224g	224g
Egg	400g	400g	400g	400g	400g
Vanilla Extract	34.72g	34.72g	34.72g	34.72g	34.72g

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Collection and Preparation of the Material

The Rice-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay and Turmeric Powder were collected from CEd cafeteria, from Isabela State University, Echague Campus.

In preparing mini donuts, the first thing being done was to prepare all the equipment, tools, materials, and ingredients being used. After the preparation, the mini donut maker was preheated according to the manufacturer's instructions. The dry ingredients were mixed in a bowl and set aside. In a separate bowl, the wet ingredients were whisked and eventually combined. The wet and dry ingredients were mixed until well combined. The batter was poured into a piping bag or a squeeze bottle. The batter was transferred into the molds of the preheated mini donut maker, filling each mold about 2/3 full. The lid was closed and heated for 3-5 minutes or until the donuts turned golden brown. After that a fork or a stick was used to remove the donuts from the molds and were transferred to a wire rack to cool. After completing the final touches in the mini donuts, packaging was the concluding step before they were distributed.

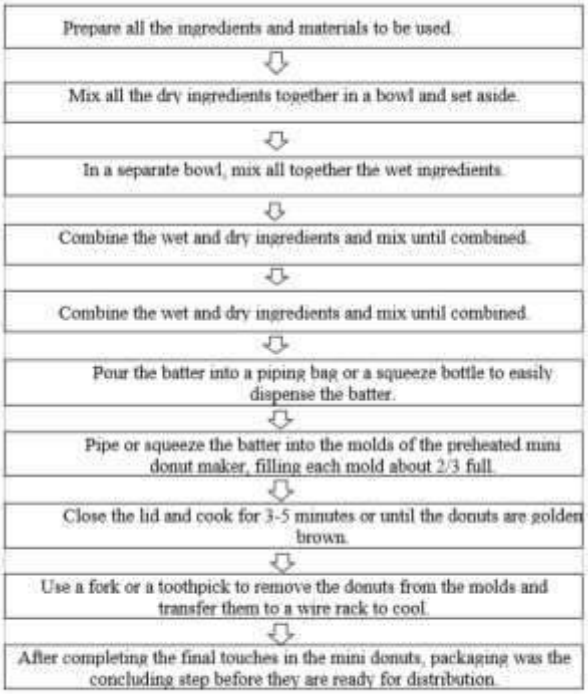


Figure 2. Flow Chart in preparing Mini Donuts

Treatment of the Study

The different proportional levels of Rice-Based Sagip Nutri-Pack Fortified with Cacao Pod Husk (CPH), Malunggay and Turmeric Powder as ingredients in making model recipe for mini donuts which were used as treatment in this study.

T1 = Commercial Mini Donuts
T2 = 75% Rice-based Sagip Nutri-Pack Powder (750g), 25% All-Purpose Flour (250g)
T3= 50% Rice-based Sagip Nutri-Pack Powder (500g), 50%All-Purpose Flour (500g)
T4 = 25% Rice-based Sagip Nutri-Pack Pack Powder (250g), 75% All-Purpose Flour (750g)
T5= 100% Rice-based Sagip Nutri-Pack Powder

Nutrient Analysis

The treatment products of Mini Donuts samples were subjected to nutrient analysis at the Regional Food Technology Development and Incubation Center, Integrated laboratory Division of the Department of Agriculture Regional Government Center, Carig Sur, Tuguegarao City, Cagayan.

Sensory Evaluation

Sensory Evaluation was conducted in Taliktik Integrated School, Taliktik, Cordon, Isabela to determine the consumers' acceptability of the experimental product in terms of color/appearance, odor/aroma, taste/flavor, texture, and general acceptability of model recipe for mini donuts as a nutritious snack for secondary learners. The instrument for data gathering was the 9-Point-Hedonic Scale.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Scale	Range	Descriptive Rating
9	8.50 – 9.00	Like Extremely
8	7.50 – 8.49	Like Very Much
7	6.5 – 7.00	Like Moderately
6	5.5 – 6.49	Like Slightly
5	4.5 – 5.49	Neither Like nor Dislike
4	3.5 - 4. 49	Dislike Slightly
3	2.5 - 3.49	Dislike Moderately
2	1.5 - 2.49	Dislike Very Much
1	1.0 - 1.49	Dislike Extremely

A sensory panel was composed of fifty (50) individuals who were randomly selected among the faculty and learners of Taliktik Integrated School. The qualification of the panelists in terms of age ranged from 12 to 50 years old. They were screened to be non-smokers, not liquor drinkers, and in good health during the sensory evaluation.

The panelist was given a set of coded samples placed in a small tray/plate. They were requested to observe carefully and rate each sample according to their color/appearance, taste/flavor, texture, odor/aroma, and general acceptability. As they tasted the mini donuts, they were asked to drink a sufficient amount of water before and after tasting each sample to rinse their mouth before tasting the next sample and were strictly observed as a standard procedure to ensure the credibility and validity of the results of the study.

Experimental Design

There were five treatments of the study, which were assigned randomly to the experimental units within a block (BLK1, BLK2, BLK3, BLK4 and BLK5). Each treatments have a code (T1-516, T2-728, T3-930, T4-142 and T5-354) to eliminate bias when doing the sensory evaluation.

The grouping of experimental units per block was done as follows:

BLOCK					
1	516^{3}	728^{2}	930^{5}	142^{4}	354^{1}
2	142^{4}	516^{3}	728^{2}	354^{1}	930^{5}
3	930^{5}	142^{4}	354^{1}	728^{2}	516^{3}
4	354^{1}	930^{5}	142^{4}	516^{3}	728^{2}
5	728^{2}	354^{1}	516^{3}	930^{5}	142^{4}

Figure 3. Arrangement of 5 treatments

Cost and Return Analysis

Cost analysis was performed to determine the economic feasibility of the product if it will be sold in the market. This was done by listing down all the cost, labor, and other expenses incurred in producing the different proportions of Model Recipe for Mini Donuts as Nutritious Snack for Secondary Learners and computing the unit cost and the return on investment (ROI) per treatment.

Statistical Data Analysis

Results of the sensory evaluation were statistically analyzed using the one-way classification of the Analysis of Variance (ANOVA). F test, mean, and descriptive statistics were used to determine if there is a significant difference among the treatments in terms of color/appearance, odor/aroma, taste/flavor, texture and general acceptability.

Result

This chapter focuses on data presentation, data analysis and discussion.

Profile of the Respondents

This table presents the profile of the respondents who evaluated the model recipe for mini donuts as a nutritious snack for secondary learners as their age and sex.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 8. Profile distribution of the respondents by age

Age Bracket	Frequency	Percentage
13	4	8.00
14	14	28.00
15	28	56.00
16	2	4.00
17	1	2.00
18	1	2.00
Total	50	
Mean	14.70	

Age. It can be seen from the table that age 15 has the highest frequency,28 or 56%, followed by the age bracket 14 with a frequency count of 14 or 28%. Next was 13 with a frequency count of 4 or 8 %, followed by 16 with frequency count of 2 or 4%. The least of them were from the ages 17 and 18 which consist of 1 respondent or 2% of the total number of panelists.

Table 9. Profile distribution of the respondents by sex

Sex	Frequency	Percentage
Male	23	46.00
Female	27	54.00
Total	50	100.00

Sex. As shown from the table, there were more female respondents, 27 or 54%, compared to male respondents with a frequency count of 23 or 46% a total of 50 evaluators or 100%.

Degree of Acceptability

Color/ Appearance. Table 10 shows the degree of acceptability of model recipe for mini donuts as a nutritious snack in terms of color or appearance by the respondents.

Table 10. Degree of acceptability in terms of color or appearance

TREATMENT	MEAN	QD
1- Commercial flour	8.42	Like extremely
2-25% All-purpose flour, 75% Rice-Based Sagip Nutri-Pack Powder	6.56	Like moderately
3-50% All-purpose flour,50% Rice-Based Sagip Nutri-Pack Powder	6.58	Like moderately
4-75% All-purpose flour, 25% Rice-Based Sagip Nutri-Pack Powder	8.02	Like very much
5-100% Rice-Based Sagip Nutri-Pack Powder	5.04	Neither like nor dislike
SD	1.35	
CV (%)	19.4	

(t = 11.51, P 0.00)

The result shows the degree of acceptability of Rice-Based Sagip Nutri-Pack Powder as alternate to commercial flour in the production of mini donuts significantly improved the color or appearance of the product with approximately by 1.35. There is strong evidence (t = 11.51, P 0.00) that Rice-Based Sagip Nutri-Pack Powder affected the color of the product thus influence its acceptability.

Table shows the degree of acceptability for mini donuts in terms of color or appearance by the respondents. Treatment 1 (Commercial flour) obtained the highest degree of acceptability with a mean of 8.42 which were describe as “Like Extremely” exhibited more appealing color and appearance with comparable mean values of treatment 4 (75% All-purpose flour, 25% Rice-Based Sagip Nutri-Pack Powder) with a mean of 8.02 which were described as “Like Very Much”, Treatment 3 (50% All-purpose flour, 50% Rice-Based Sagip Nutri-Pack Powder) which gained a mean of 6.58. While Treatment 2(25% All-purpose flour, 75% Rice-Based Sagip Nutri-Pack Powder) obtained a mean of 6.56. both were labeled as “Like Moderately.” Lastly Treatment 5(100% Rice-Based Sagip Nutri-Pack Powder) with a mean of 5.04 labelled as “Neither like Nor Dislike”, respectively.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The panelists perceived Treatment 1 as having a more vibrant color due to its higher content of all-purpose flour. The addition of Rice-Based Sagip Nutri-Pack Powder, which contains Cacao Pod Husk, Malunggay, and Turmeric Powder, darkens the color of the mini donuts.

Odor/Aroma. Table 11 presents the degree of acceptability of model recipe of mini donuts as a nutritious snack in terms of odor and aroma.

Table 11. Degree of acceptability in terms of odor or aroma

TREATMENT	MEAN	QD
1- Commercial flour	8.00	Like very much
2-25% All-purpose flour, 75% Rice-Based Sagip Nutri-Pack Powder	6.18	Like slightly
3-50% All-purpose flour,50% Rice -Based Sagip Nutri-Pack Powder	7.02	Like moderately
4-75% All-purpose flour, 25% Rice-Based Sagip Nutri-Pack Powder	8.28	Like extremely
5-100% Rice-Based Sagip Nutri-Pack Powder	4.76	Neither like nor dislike
SD	1.43	
CV (%)	20.92	

(t = 10.69, P 0.00)

As the result shows the degree of acceptability of Rice-Based Sagip Nutri-Pack Powder as alternate to commercial flour in the production of mini donuts significantly improved the odor/aroma of the product with approximately by 1.43. There is strong evidence (t = 10.69, P 0.00) that Rice-Based Sagip Nutri-Pack Powder affected the odor of the product thus influence its acceptability.

As shown in the table, Treatment 4 (75% All-purpose flour, 25% Rice-Based Sagip Nutri-Pack Powder) obtained the highest mean which described as “Like Extremely”. Treatment 1 (Commercial flour) gained a mean of 8.00 with a description of “Like Very Much”. Treatment 3 (50% All-purpose flour, 50% Rice-Based Sagip Nutri-Pack Powder) acquired a mean of 7.02 which describes as “Like Moderately”. Treatment 2 (25% All-purpose flour, 75% Rice-Based Sagip Nutri-Pack Powder) obtained a mean of 6.18 with a description of “Like Slightly” and lastly Treatment 5(100% Rice-Based Sagip Nutri-Pack Powder) which gained a mean of 4.76 which described as “Neither Like nor Dislike”.

The results imply that consumers prefer mini donuts with higher proportions of all-purpose flour together with T4 being the most favored for its odor and aroma due to the addition of 25% Rice-Based Sagip Nutri-Pack and 75% All-purpose flour.

Taste/Flavor. Table 12 shows the degree of acceptability of model recipe of mini donuts in terms of taste or flavor by the respondents.

Table 12. Degree of acceptability of in terms of taste or flavor

TREATMENT	MEAN	QD
1- Commercial flour	7.82	Like very much
2-25% All-purpose flour, 75% Rice-Based Sagip Nutri-Pack Powder	6.06	Like slightly
3-50% All-purpose flour,50% Rice-Based Sagip Nutri-Pack Powder	6.58	Like moderately
4-75% All-purpose flour, 25% Rice-Based Sagip Nutri-Pack Powder	8.52	Like extremely
5-100% Rice-Based Sagip Nutri-Pack Powder	4.70	Neither like nor dislike
SD	1.50	
CV (%)	22.25	

(t = 10.05, P 0.00)

The result shows the degree of acceptability of Rice-Based Sagip Nutri-Pack Powder as alternate to commercial flour in the production of mini donuts significantly improved the taste/flavor of the product with approximately by 1.50. There is strong evidence (t = 10.05, P 0.00) that Rice-Based Sagip Nutri-Pack Powder affected the taste of the product thus influence its acceptability.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

As seen in table 12, Treatment 4(75% All-purpose flour, 25% Rice-Based Sagip Nutri-Pack Powder) has description of "Like Extremely" with mean of 8.52, respectively. Moreover, Treatment 1(Commercial flour) obtained a mean of 7.82 with description of "Like Very Much". Treatment 3 gained a mean of 6.58 with description of "Like Moderately". Treatment 2(25% All-purpose flour, 75% Rice-Based Sagip Nutri-Pack Powder) acquired a mean of 6.02 which describes as "Like Slightly" and lastly treatment 5(100% Rice-Based Sagip Nutri-Pack Powder) garnered a mean of 4.70 which describes as "Neither Like nor Dislike".

The results imply that consumers prefer the taste and flavor of mini donuts with higher Rice-Based Sagip Nutri-Pack Powder content were less liked, indicating that maintaining a higher percentage of all-purpose flour enhances taste and flavor satisfaction due to the addition of Cacao Pod Husk, Malunggay and Turmeric Powder.

Texture. Table 13 shows degree of acceptability of model recipe of mini donuts as a nutritious snack in terms of texture.

Table 13. Degree of acceptability in terms of texture

TREATMENT	MEAN	QD
1- Commercial Mini Donuts	7.64	Like very much
2-25% All-purpose flour, 75% Rice-Based Sagip Nutri-Pack Powder	6.18	Like slightly
3-50% All-purpose flour,50% Rice-Based Sagip Nutri-Pack Powder	6.72	Like moderately
4-75% All-purpose flour, 25% Rice-Based Sagip Nutri-Pack Powder	8.44	Like extremely
5-100% Rice-Based Sagip Nutri-Pack Powder	4.62	Neither like nor dislike
SD	1.35	
CV (%)	20.02	

(t = 10.30, P 0.00)

The result shows the degree of acceptability of Rice-Based Sagip Nutri-Pack Powder as alternate to commercial flour in the production of mini donuts significantly improved the texture of the product with approximately by 1.35. There is strong evidence (t = 10.30, P 0.00) that Rice-Based Sagip Nutri-Pack Powder affected the texture of the product thus influence its acceptability.

As shown in the table, Treatment 4(75% All-purpose flour, 25% Rice-Based Sagip Nutri-Pack Powder), obtained the highest mean of 8.44 which describes as "Like Extremely". Treatment 1(Commercial Mini Donut) gained a mean of 7.64 with a description of "Like Very Much". On the other hand, Treatment 3(50% All-purpose flour, 50% Rice-Based Sagip Nutri-Pack Powder) acquired a mean of 6.72 which was described as "Like Moderately" while treatment 2(25% All-purpose flour, 75% Rice-Based Sagip Nutri-Pack Powder) obtained a mean of 6.18 with a description of Like Slightly" and Lastly treatment 5(100% Rice-Based Sagip Nutri-Pack Powder) which gained a mean of 4.62 which was labeled as "Neither Like nor Dislike".

Consumers prefer the texture of mini donuts with a higher proportion of all-purpose flour. The T4 blend was most liked due to its fluffy texture, while higher Rice-Based Sagip Nutri-Pack Powder content reduced likability. Therefore, using more all-purpose flour improves texture satisfaction.

General Acceptability. Table 14 presents the general acceptability of model recipe for mini donuts as a nutritious snack by the respondents.

Table 14. Degree of acceptability in terms of General Acceptability

TREATMENT	MEAN	QD
1- Commercial flour	8.08	Like very much
2-25% All-purpose flour, 75% Rice-Based Sagip Nutri-Pack Powder	5.86	Like slightly
3-50% All-purpose flour,50% Rice-Based Sagip Nutri-Pack Powder	7.00	Like moderately
4-75% All-purpose flour, 25% Rice-Based Sagip Nutri-Pack Powder	8.42	Like extremely
5-100% Rice-Based Sagip Nutri-Pack Powder	4.58	Neither like nor dislike
SD	1.59	
CV (%)	23.43	

(t = 9.54, P 0.00)

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

As the result shows the degree of acceptability of Rice-Based Sagip Nutri-Pack Powder as alternate to commercial flour in the production of mini donuts significantly improved the general of the product with approximately by 1.59. There is strong evidence (t = 9.54, P 0.00) that Rice-Based Sagip Nutri-Pack Powder affected the general acceptability of the product thus influence its overall acceptability.

The table shows that treatment 4 (75% All-purpose flour, 25% Rice-Based Sagip Nutri-Pack Powder) obtained the highest mean of 8.42 and was describes as "Like Extremely" followed by treatment 1 (Commercial Mini Donuts) that gained a mean of 8.08 which described as "Like Very Much". Moreover, Treatment 3 (50% All-purpose flour, 50% Rice-Based Sagip Nutri-Pack Powder), obtained a mean of 7.00 with a description of "Like Moderately" while Treatment 2(25% All-purpose flour, 75% Rice-Based Sagip Nutri-Pack Powder), acquired a mean of 5.86 which labelled of "Like Slightly". Lastly Treatment 5(100% Rice-Based Sagip Nutri-Pack Powder), gained a mean of 4.58 and described as "Neither Like nor Dislike".

Consumers prefer mini donuts with a higher proportion of all-purpose flour. The 75% all-purpose and 25% Rice-Based Sagip Nutri-Pack Powder blend was most favored, while higher Rice-Based Sagip Nutri-Pack Powder content reduced overall acceptability. Thus, using more all-purpose flour enhances general acceptability.

Acceptability Consumer Index

The table 15 shows the acceptability consumer index (ACI) of model recipe for mini donuts as a nutritious snack for secondary school learners.

Table 15. Acceptability Consumer Index (ACI) for the development of Model Recipe for Mini Donuts as a Nutritious Snack for Secondary School Learners.

	Appearance		Aroma		Texture		Taste		ACI	RANK
T1	8.42	1.85	8	1.52	7.64	1.49	7.82	3.09	7.95	2
T2	6.56	1.44	6.18	1.17	6.18	1.21	6.06	2.39	6.22	4
T3	6.58	1.45	7.02	1.33	6.72	1.31	6.58	2.60	6.69	3
T4	8.02	1.76	8.28	1.57	8.44	1.65	8.52	3.37	8.35	1
T5	5.04	1.11	4.76	0.90	4.62	0.90	4.70	1.86	4.77	5

The ranking of treatments indicates the acceptability consumer index of model recipe for mini donuts as a nutritious snack. Treatment 4 achieved the highest ACI with 8.35, indicating the most acceptable overall performance. Treatment 1 comes in second with an ACI of 7.95. While treatment 3 ranks third with an ACI of 6.69. On another hand, treatment 2 got forth with 6.22. Treatment 5 ranking fifth indicating the least desirable option with an ACI of 4.77.

The implication is that consumers prefer mini donuts that are closer to traditional recipes with more all-purpose flour, implying that maintaining a higher proportion of all-purpose flour enhances overall acceptability as a nutritious snack.

Nutrient Analysis

Table 16 displays the result of nutrient analysis of shows the Nutrient Content of Rice based Sagip Nutri-pack for each treatment.

Table 16. Nutrient Analysis of Rice-Based Sagip Nutri-Pack for the Model Recipe for Mini Donuts as a Nutritious Snack for Secondary School Learners.

TREAMENT	Crude Protein (%)	Crude Fiber (%)	Crude Fat (%)	Moisture (%)	Ash (%)
T_1-Commercial Mini Donut	6.64	0.46	12.85	33.11	1.36
T_2-75% Rice-Based Sagip Nutri-Pack Powder	8.08	2.57	16.83	29.49	1.99

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

T_3-50% Rice-Based Sagip Nutri-Pack Powder	7.36	1.33	15.55	30.73	1.69
T_4-25% Rice-Based Sagip Nutri-Pack Powder	6.82	1.12	15.61	28.11	1.48
T_5-100% Rice-Based Sagip Nutri-Pack Powder	8.62	2.27	19.65	29.66	2.21

In terms of Crude protein, Treatment 5(100% Rice-Based Sagip Nutri-Pack Powder) had the highest percentage with 8.62 followed by the Treatment 4 (25% Rice-Based Sagip Nutri-Pack Powder) with 6.84. Treatment 2(75% Rice-Based Sagip Nutri-pack Powder) has 8.08 percentage while Treatment 3 (50% Rice-Based Sagip Nutri-Pack Powder) with 7.36 percentage and treatment 1(Commercial Mini Donuts) had the lowest percentage with 6.64 percentage.

On the other hand, T2 had the highest percentage in crude fiber with 2.57 followed by T5 with 2.27 percent, T3 with 1.33 percent followed by T4 with 1.12 percent and lastly T1 which contains the lowest percentage with 0.46.

In terms of crude fat, T5 had the highest percentage with 19.65 followed by T2 with 16.83 percent while T4 has 15.61 percent, T3 has 15.55 percent and lastly T1 with 12.85 percent of crude fat.

For its moisture, treatment 1 had the highest percentage with 33.11 followed by T3 with 30.73 percent, T5 with 29.66 while T2 with 29.49 percent. Lastly, T4 with the lowest percentage of 28.11 percent.

Furthermore, in terms of ash, T5 had the highest percentage of 2.21 followed by T2 with 1.99 percent, T3 with 1.69 percent, T4 with 1.48 percent and lastly, T1 with the lowest percentage of 1.36 percent.

This implies that the addition of the Rice-Based Sagip Nutri-Pack Cacao Pod Husk (CPH), Malunggay and Turmeric Powder increases the nutritional value in terms of protein, fiber, and ash while slightly reducing moisture content compared to the commercial mini donut. The 100% Rice-Based Sagip Nutri-Pack Powder (T5) shows the highest values for protein, fat, and ash, making it a more nutrient-dense option compared to the commercial mini donuts. According to Paz et al, the analysis and application of higher protein rice flours could contribute to a large-scale use in baked goods that may aim to naturally increase nutritional value.

Summary Computation of Cost and Return on Investment

Cost of production. Table 17 shows the summary computation of cost of production among all the five treatments.

Table 17. Summary computation of Cost Production

PARTICULARS	**Treatments**				
Ingredients	T1	T2	T3	T4	T5
Rice-Based Sagip Nutri-pack Powder	0.00	37.50	25.00	12.50	50.00
All-Purpose Flour	7.50	1.88	3.75	2.50	0.00
Granulated Sugar	8.25	8.25	8.25	8.25	8.25
Baking Powder	4.00	4.00	4.00	4.00	4.00
Salt	.20	.20	.20	.20	.20
Milk	15.00	15.00	15.00	15.00	15.00
Oil	6.00	6.00	6.00	6.00	6.00
Egg	7.00	7.00	7.00	7.00	7.00
Vanilla Extract	1.00	1.00	1.00	1.00	1.00
Subtotal	**48.95**	**80.83**	**70.20**	**56.45**	**91.45**
Additional Expenses					
Packaging Material	7.00	7.00	7.00	7.00	7.00
Label	3.00	3.00	3.00	3.00	3.00
Subtotal	**10.00**	**10.00**	**10.00**	**10.00**	**10.00**

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Other Operating Expenses					
Electricity	10.00	10.00	10.00	10.00	10.00
Fare	8.00	8.00	8.00	8.00	8.00
Subtotal	**18.00**	**18.00**	**18.00**	**18.00**	**18.00**
Total Cost (Php)	**76.95**	**108.83**	**98.20**	**84.45**	**119.45**

As shown in Table, the cost of Rice-Based Nutri-Pack Powder used in fortifying the five treatments differed. For T2 (Mini Donuts fortified with 90g Rice Based Sagip Nutri-Pack Powder), the amount of Rice-Based Nutri-Pack Powder is Php37.50; T3(Mini Donuts fortified with 60g Rice Based Sagip Nutri-pack Powder), the amount of Rice-Based Nutri-Pack Powder is Php25.00

The amount of Rice-Based Nutri-pack is Php25.00; and for T4(Mini Donuts fortified with 30g Rice-Based Sagip Nutri-pack Powder), the amount of Rice-Based Nutri-pack powder is Php12.50

The same amount or the other ingredients was given for the four treatments; Granulated sugar, Php8.25; Baking Powder, Php4.00; Salt, Php.20; Milk, Php15.00; Oil, Php6.00; Eggs, Php7.00; Vanilla extract, Php1.00.

Considering all the above expenses for the ingredients, the subtotal for T1; T2, T3, T4, and T5 were Php48.95; Php80.83, Php70.20, Php56.45 and Php91.45 respectively.

Additional expenses for all treatments amounted to Php10.00 which includes Packaging Material and Php7.00 and Label at Php3.00. In addition, other operating expenses such as Electricity at Php10.00 and Fare at Php8.00 totaled Php18.00.

Summing up all the above expenses, the cost incurred in producing the products amounted to Php76.95, Php108.83, Php98.20, Php84.45, and Php119.45 for T1; T2, T3, T4, and T5, respectively.

Return and Investment. Table 18 shows the Summary Computation of Return and Investment of each treatment.

Table 18. Summary Computation of Return and Investment

PARTICULARS	**Treatments**				
	T1	T2	T3	T4	T5
Total Production Cost (Php)	76.95	108.83	98.20	84.25	119.45
Number of box (Rice-Based Mini donuts Nutri-Snack x 12 pcs)	3	3	3	3	3
Selling Price	50.00	50.00	50.00	50.00	50.00
Total Sale	150.00	150.00	150	150	150
Income	73.05	41.17	51.8	65.75	30.55
ROI	**95%**	**38%**	**53%**	**78%**	**26%**

As shown in the table, the cost analysis of the production costs, sales, income, and return on investment (ROI) for the five different treatments of mini donuts, fortified with Rice-Based Sagip Nutri-Pack Powder, reveals distinct profitability profiles for each treatment. Each treatment involves the production of three boxes of mini donuts (36 pieces total), with a consistent selling price of Php 50 per box and a total sale revenue of Php 150.

Treatment 1 stands out as the most profitable option. With a total production cost of Php 76.95, it generates an income of Php 73.05, resulting in a remarkable ROI of 95%. This high ROI indicates that T1 is highly efficient in converting production costs into substantial profits. Treatment 4 follows, with a production cost of Php 84.25, yielding an income of Php 65.75 and an ROI of 78%. This makes T4 a viable and attractive option with a strong return.

Treatment 3 shows moderate profitability, with a production cost of Php 98.2 and an income of Php 51.8, resulting in an ROI of 53%. While profitable, T3's ROI is lower than that of T1 and T4, indicating a lesser, but still reasonable, return on investment. Treatment 2, with a production cost of Php 108.83, generates an income of Php 41.17, leading to an ROI of 38%.

Finally, Treatment 5 has the highest production cost at Php 119.45 and the lowest income at Php 30.55, resulting in the lowest ROI of 26%. Although T5 is still profitable, its low ROI indicates that it is the least efficient in terms of cost-to-profit conversion among all treatments.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

In conclusion, Treatment 1 offers the highest profitability and ROI, making it the best option for maximizing returns. Treatment 4 also presents a strong case with a significant ROI. Treatments 2 and 3, while profitable, provide moderate returns, and Treatment 5, despite being profitable, is the least favorable due to its low ROI. This analysis helps in identifying the most efficient and profitable treatments for mini donut produc

Development of Information, Education, and Communication (IEC) Materials

Figure 3 shows the trifold developed Information, Education, and Communication (IEC) Materials to give information and promote the Nutri-Snack to School Learners, Community and to the public. It is also one way of educating the consumers as well as to easily disseminate and advertise the dish which can help in attaining good health and wellness.

This contains the name, ingredients, and procedure of the Mini Donuts. It also gives information about health benefits and other facts of the Mini Donuts. The contact persons are also included in the material.



Figure 4. Developed Information, Education and Communication (IEC) material.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Conclusion

Based on the results of the study, the following conclusion were derived:

1. In terms of color/appearance, Treatment 1 is the most acceptable. In terms of odor/ aroma, taste/ flavor, texture and general acceptability, Treatment 4 is more acceptable among the five treatments.
2. In the result of Acceptability Consumer Index, Treatment 4 rank first (1) Treatment1 is second (2), Treatment 3 rank third (3), Treatment 2 rank forth (4) and Treatment 5 rank fifth (5).
3. Among the five treatments, Treatment 5 has the highest crude protein, crude fat, and ash content. While treatment 2 has the highest crude fat content and Treatment 1 had the highest moisture content.
4. As to net profit, the production of mini donuts, Treatment 1 gained the most cost-effective and profitable followed by Treatment 4, Treatment 3, Treatment 2, and Treatment 5.

Recommendation

Based on the results of the study, the following recommendations are given:

1. Treatment 4 is recommended to be introduced as a new fortification of mini donuts to the consumers since it was rated the most liked in terms of the odor/aroma, taste/flavor, texture and general acceptability among other treatments. However, for its color/appearance it was rated" Like Very much" which make it more recommended to add additional garnishes to enhance the color/appearance.
2. Microbial analysis is encouraged to be conducted to determine the microbial content of the finished product.
3. Shelf-life analysis is advised to be conducted to determine the stability of the products.
4. Conduct further analysis and market testing to validate these findings and explore any potential improvements in production processes or ingredient sourcing that could enhance profitability and ROI across all treatments.

REFERENCES

1. *Alemawor, F., Dzogbefia, V. P., & Oddoye, E. O. K. (2009). Enzyme cocktail for enhancing poultry utilization of cocoa pod husk. Academic Journals 4 (6): 556-557. https://academicjournals.org/journal/SRE/article-abstract/0A4ED3517179*
2. *Al-Othman, H., Maghaydah, S., Abughoush, M., Olaimat, A. N., Al-Holy, M. A., Ajo, R., ... & Angor, M. (2022). Development and Characterization of Nutritious Gluten-Free Doughnuts with Lupin and Inulin Flours. Foods, 11(20), 3237.*
3. *Amir, I. Z., Hanida, H. S., & Syafiq, A. (2013). Development and physical analysis of high fiber bread incorporated with cocoa (Theobroma cacao sp.) pod husk powder. International food research Journal, 20(3), 1301.*
4. *Anilakumar R, Pal A, Khanum F et al. Nutritional, medicinal and industrial uses of Sesame (S. indicum L.) seeds-an overview. Agric Conspec Sci.2010;75(4):159-168. Available from: https://hrcak.srce.hr/file/98744*
5. *Babatope, B. (2005). Rheology of cocoa-pod husk aqueous system. Part-I: steady state flow behavior. Rheol Acta 45, 72–76. https://doi.org/10.1007/s00397-005-0450-7*
6. *Ballesteros, J. F., Abilgos-Ramos, R. G., & Amestoso, N. T. EXPERTS'PERSPECTIVE, CONSUMER PERCEPTION ON RICE-BASED PRODUCTS, AND MARKET TREND ON CONSUMER GOODS FOR RICE-BASED PRODUCT IDEA GENERATION.Rice-Based Biosystems Journal, 27. (2019)*
7. *Blasé M. E. M. Optimisation of Rice Flour Traits for the Production of Indigenous Rice Recipes. Curr Res Nutr Food Sci 2020; 8(1). Doi http://dx.doi.org/10.12944/CRNFSJ.8.1.33*
8. *Britannica, T. Editors of Encyclopaedia (2023, December 22). sesame. Encyclopedia Britannica. https://www.britannica.com/plant/sesame-plant*
9. *Britannica, The Editors of Encyclopaedia. "rice". Encyclopedia Britannica, 16 Nov. 2023, https://www.britannica.com/plant/rice. Accessed 28 November 2023.*
10. *Campos-Vega, R., Nieto-Figueroa, K. H., & Oomah, B. D. (2018). Cocoa (Theobroma cacao L.) pod husk: Renewable source of bioactive compounds. Trends in Food Science & Technology, 81, 172-184. https://doi.org/10.1016/j.tifs.2018.09.022.*
11. *De Sena, A.R.; de Assis, S.A.; Branco, A. Analysis of theobromine and related compounds by reversed phase high-performance liquid chromatography with ultraviolet detection: An update (1992–2011). Food Technol. Biotechnol. 2011, 49, 413–423.*
12. *Dias, A. B., Müller, C. M., Larotonda, F. D., & Laurindo, J. B. (2010).*
13. *Biodegradable films based on rice starch and rice flour. Journal of cereal science, 51(2),213-219.*
14. *Fahey JW. Moringa Oleifera: 2015. A review of the medical evidence for its nutritional, therapeutic, and prophylactic properties. Part I. In: Trees for Life Journal pp. 1-5.*
15. *FAOSTAT. FAO Statistic Division. Food and Agriculture Organization of the United Nations. Available online: http://faostat3.fao.org/home/E (accessed on 31December 2015).*
16. *Frank Hu , MD, MPH, PhD, Harvard T.H. Chan School of Public Health Gujral, H. S., &Rosell, C. M. (2014). Improvement of the breadmaking quality of rice flour by glucose oxidase. Food research international, 37(1), 75-81.*
17. *Heuzé, V., G. Tran, D. Bastianelli, and F. Lebas. "Mung Bean (Vigna Radiata)." Feedipedia - Animal Feed Resources Information System. August 13, 2013. Accessed November 19, 2014. https://www.delish.com/cooking/recipe-ideas/g129/rice- recipes/*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

18. *Ikawa-Yoshida, A., Matsuo, S., Kato, A., Ohmori, Y., Higashida, A., Kaneko, E., & Matsumoto, M. (2017). Hepatocellular carcinoma in a mouse model fed a choline-deficient, L-amino acid-defined, high-fat diet. International Journal of Experimental Pathology, 98(4), 221-233.*
19. *Jaya Singh, Neelma Kunwar and Smita Tripathi. Benefits and nutritive value of sesame seeds. International Journal of Recent Scientific Research Vol. 7, Issue, 9, pp. sepr 2016.*
20. *Kasolo, J. N., Bimenya, G. S., Ojok, L., Ochieng, J., & Ogwal-Okeng, J. W. (2017). Phytochemicals and uses of Moringa oleifera leaves in Ugandan rural communities.*
21. *Lambrides, C. J. ; Godwin, I. D., 2006. Mungbean. In: Chittarajan, K., Genome Mapping and Molecular Breeding in Plants, 3: 69-90*
22. *Lee, J. H., Cho, A. R., Hong, J. Y., Park, D. J., & Lim, S. T. (2019). Physical properties of wheat flour composites dry-coated with microparticulated soybean hulls and rice flour and their use for low-fat doughnut preparation. Journal of cereal science, 56(3), 636-643.*
23. *Lu, F., Rodriguez-Garcia, J., Van Damme, I., Westwood, N. J., Shaw, L., Robinson, J. S., ... & Charalampopoulos, D. (2018). Valorisation strategies for cocoa pod husk and its fractions. Current Opinion in Green and Sustainable Chemistry, 14, 80-88.*
24. *Mallillin, A. C., Trinidad, T. P., Sagum, R. S., de Leon, M. P., Borlagdan, M. P., Baquiran, A. F. P., ... & Aviles, T. F. (2014). Mineral availability and dietary fiber characteristics of Moringa Oleifera. Food Public Health, 4(5), 242-246.*
25. *Mohammed, S. (2022). An overview on nutritional composition and therapeutic benefits of sesame seeds (Sesamum indicum). Int. J. Res. Appl. Sci. Eng. Technol, 10, 1119-1127.*
26. *Nguyen, V.T., Pham, T. D., Vu, L. B., Nguyen, V. H., Tran, N. L. (2021). Microwave- assisted Extraction for Maximizing the Yield of Phenolic Compounds and Antioxidant Capacity from Cacao Pod Husk (Theobroma cacao L.). Bentham Science Publishers, Current Nutrition & Food Science, Volume 17, Number 2, 2021, pp. 225-237(13). https://doi.org/10.2174/1573401316999200503032017*
27. *Ramiro-Puig, E., & Castell, M. (2009). Cocoa: antioxidant and immunomodulator. British Journal of Nutrition, 101(7), 931-940. https://doi.org/10.1017/S0007114508169896*
28. *Paz, G. M., King, J. M., Prinyawiwatkul, W., Tyus, C. M., & Aleman, R. J. (2020). High-protein rice flour in the development of gluten-free muffins. Journal of food science, 85(5), 1397-1402.*
29. *Petruzzello, M. (2023, May 12). mung bean. Encyclopedia Britannica. https://www.britannica.com/plant/mung-bean*
30. *Pratap, A., Gupta, S., Rathore, M., Basavaraja, T., Singh, C. M., Prajapati, U., ... & Kumari, G. (2021). Mungbean. In The beans and the peas (pp. 1-32). Woodhead Publishing.*
31. *Rathaur, P., Raja, W., Ramteke, P. W., & John, S. A. (2012). Turmeric: The golden spice of life. International Journal of pharmaceutical sciences and research,3(7), 1987.Reviewed/Revised Feb 2023*
32. *Rockwood, J. L., Anderson, B. G., & Casamatta, D. A. (2018). Potential uses of Moringa oleifera and an examination of antibiotic efficacy conferred by M. oleifera seed and leaf extracts using crude extraction techniques available to underserved indigenous populations. International Journal of Phytotherapy Research, 3(2), 61-71.*
33. *Rout, K.; Yadav, B.G.; Yadava, S.K.; Mukhopadhyay, A.; Gupta, V.; Pental, D.; Pradhan, A.K. QTL Landscape for Oil Content in Brassica Juncea: Analysis in Multiple Bi-Parental Populations in High and "0" Erucic Background. Front. Plant Sci. 2018, 9, 1448.*
34. *Sánchez-Machado, D. I., Núñez-Gastélum, J. A., Reyes-Moreno, C., Ramírez-Wong, B., & López- Cervantes, J. (2010). Nutritional quality of edible parts of Moringa oleifera. Food analytical methods, 3, 175-180.*
35. *Science Direct Journals and Books: Food Science & Human Wellness Volume 5, Issue 2, 2016-Moringa Oleifera: A review on Nutritive Importance and its Medical Application (Gopalakrishman, 2016)*
36. *Science-Based health Benefits of Moringa Oleifera (Amarzon, 2018)*
37. *Shahrajabian, M. H., Sun, W., & Cheng, Q. (2019). A short review of health benefits and nutritional values of mung bean in sustainable agriculture. Polish Journal of Agronomy, (37), 31-36.*
38. *Shilpa N Bhupathiraju , PhD, Harvard Medical School and Brigham and Women's Hospital;*
39. *Tang, D., Dong, Y., Ren, H. et al. A review of phytochemistry, metabolite changes, and medicinal uses of the common food mung bean and its sprouts (Vigna radiata). Chemistry Central Journal 8, 4 (2014). https://doi.org/10.1186/1752-153X-8-4*
40. *Valadez-Carmona, L., Ortiz-Moreno, A., Ceballos-Reyes, G., Mendiola, J. A., & Ibáñez, E. (2018). Valorization of cacao pod husk through supercritical fluid extraction of phenolic compounds. The Journal of Supercritical Fluids, 131, 99-105. https://doi.org/10.1016/j.supflu.2017.09.011*
41. *Wei, P., Zhao, F., Wang, Z., Wang, Q., Chai, X., Hou, G., & Meng, Q. (2022). Sesame (sesamum indicum l.): A comprehensive review of nutritional value, phytochemical composition, health benefits, development of food, and industrial applications. Nutrients, 14(19), 4079.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

HUMAN ROLE IN THE 6th. MASS EXTINCTION PROCESS

Prof. Dr. Deniz EKINCI
Physical Geography

Article DOI: https://doi.org/10.36713/epra17544
DOI No: 10.36713/epra17544

ABSTRACT

Mass extinction is the large-scale extinction of living things. To date, it is widely believed that there have been 5 mass extinctions due to natural processes such as large volcanic eruptions, asteroid impacts or long-term climate change. Today, a sixth extinction is in the process of accelerating. But unlike the previous ones, this latest extinction is being driven by anthropogenic processes. Destruction of habitats of plants and animals, climate change due to fossil fuel consumption, consumption above the carrying capacity of nature, overpopulation, pollution; nuclear weapons, genetic interventions are among these. The fact that such practices are increasing rapidly and species are gradually decreasing in number and species indicates that mass extinction is continuing at the hands of human beings.

KEY WORDS: *Mass extinct, fossil, human, over population, capacity*

INTRODUCTION

The widespread and rapid decline in biodiversity and the sudden disappearance of large numbers of species over a short geological period, or even suddenly, is considered a mass extinction. This extinction process can sometimes occur as a sudden event, sometimes as a result of changing conditions and the inability of many species to adapt to new conditions or environments. According to all evidence, especially the fossil record (figure 1, 2), there have been five large-scale mass extinctions for which there is evidence in the last 4.6 billion years of geological chronology.



Figure 1. Tyrannosaurus Rex Fossilized Skull and Skeleton, American Museum of Natural History

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Figure 2. **They Were Living on the Earth Once: A Fossil Display of Several Well-Preserved Trilobites That Died in A Mass Extinction Event Around Morocco Several Million Years Ago**

The four mass extinctions in the Ordovician, Devonian, Permian and Triassic were caused by volcanic activity and massive carbon emissions associated with atmospheric degradation. In the Cretaceous, the asteroid impact that killed the dinosaurs was the cause of the other mass extinction. The thylacine, passenger pigeon, mammoth, great auk, dodo, Galapagos tortoise, stallers sea cow, aurochs, quagga, moa are species estimated to have become extinct during this period (figure 3).



Figure 3. Once Upon a Time: Mass Extinct Animals

Objectives

After 5 major mass extinctions, today we are facing a new extinction process. However, unlike its predecessors, this extinction is human-induced, as opposed to natural processes. In this context, is there a mass extinction process? If so, the study focuses on the answers to questions such as what are its origins and causes.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The Main Causes of Mass Extinctions That Have Occurred

Apart from these five major extinctions, there are about 20 similar, albeit controversial, extinction stories. The main causes of these mass extinctions are the onset of glacial cycles and changes in sea level, changes in atmospheric and ocean chemistry, climate changes, and decreasing oxygen levels in the deep oceans.

Based on the principle that "the past is the key to the future", let us take a look at and analyze events and the environment:
The increase of dust and particulate aerosols, pollutants such as sulfur and sulfur-oxides in the atmosphere, sulfur-oxides that precipitate in acid rain and poison many organisms, further contribute to the collapse of food chains. Sudden changes in temperature and pressure also lead to biodegradation and a subsequent increase in methane. Methane is a much more potent greenhouse gas than carbon dioxide, so a methane explosion can cause rapid global warming, or become much more severe if the explosion itself is caused by global warming. A nearby nova, supernova or gamma-ray burst could destroy Earth's ozone layer and leave organisms vulnerable to ultraviolet radiation from the Sun. The Sun's eventual warming and expansion, combined with the eventual depletion of atmospheric carbon dioxide, could result in a globally sterilized world. Thus, once photosynthesizing or breathing organisms are gone, atmospheric oxygen can no longer be regenerated. Eventually, the loss of oxygen will cause the remaining simple aerobic life to suffocate to death.

Is There Mass Extinction Today?

Whatever the cause, living things today are under pressure and stress in the process of mass extinction. The cycle of photosynthesis and the breaking of food chains as a result of the disruption of the carbon cycle on Earth are the biggest drivers of mass extinctions (figure 4).

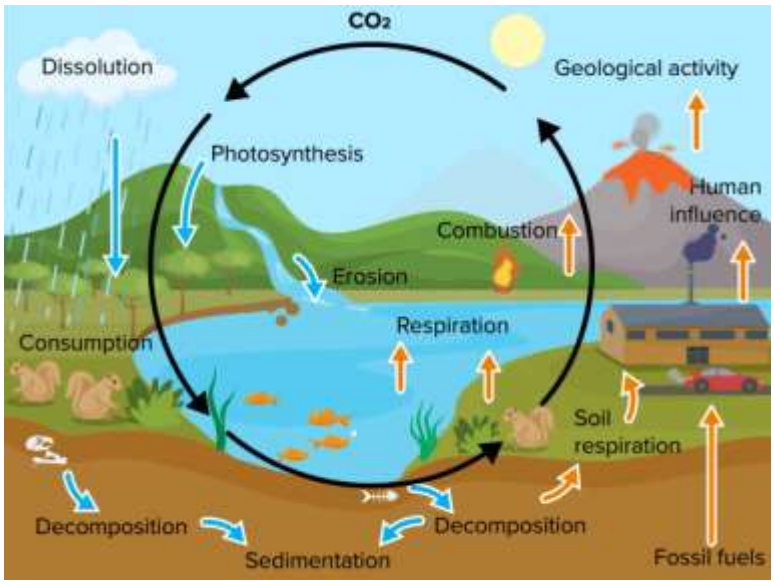


Figure 4. Carbon Cycle Diagram

Although the Earth is a habitable place thanks to the existence of systems. These systems do not exist in isolation, but are interconnected, interdependent and in great interaction with each other. Moreover, they form chain processes with each other. Negativities at any point in the process cause negative repercussions in other systems. Thus, a negative cycle emerges. In today's world, developments in human and environmental relations and the irreversible destruction of natural systems have reached great dimensions whose damages cannot be compensated in any way. By burning fossil fuels, humans inject billions of tons of carbon dioxide and other gases into the atmosphere every year, as in the case of major volcanic activity. This is nothing more than an accelerated artificial imitation of a slow natural phenomenon.

Although previous mass extinctions were fatal events, following the extinction of the non-avian dinosaurs, the numbers and habitat of mammals and birds continued to be the habitat of the planet. But in the current period, is there a total and complete extinction this time? This worries us all.

The extinction since 1900 is 1,000 times more than what has happened so far. It is claimed that 50% of the world's animal species have disappeared and this loss threatens the continuation of human existence.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

These findings indicate that the sixth mass extinction event or the process of biological destruction is ongoing. However, what is happening today, in terms of its size and nature, a possible sixth mass extinction is attributed to a very new reason, unlike the previous natural factors and processes.

Is Mankind a Factor in the Mass Extinction?

Clearly, that reason of the mass extinct is the last guest of the Earth, the human being. In the registration notes of the Roman Empire in 30 AD, it is stated that the world population was approximately 55 million. It is estimated that about 1 million people lived on the African continent at that time.

Based on the estimated population of around 60 million in China, it is estimated that there are less than 100 million people in other parts of Asia. America and Oceania did not have large populations. Approximately 2000 years ago, there were around 250 million people on Earth, most of whom lived in Southeast Asia. With the general acceptance of 300 million in 1000 and 500 million in 1650, it is seen that it took 1650 years for the world population to double. After this date, the world population has entered a rapid development process. 1 billion in 1802; 2 billion in 1927; 3 billion in 1961; 4 billion in 1971; 5 billion in 1987; 6 billion in 1999; 7 billion in 2011; and 8 billion in 2024.

Three major leap periods are remarkable in the increasing momentum of the human population, which is highlighted above. According to this:

The first leap was made when people discovered making tools. Humans struggled with wild animals with the tools they made, began to feed better by hunting them, and thus entered the process of faster reproduction.

The second leap was experienced with the transition of human beings to settled life. In this period, with the transition to the agricultural society, people managed to cultivate the soil, cultivate various crops and stock them in the winter periods, and eat well and comfortably. They also learned to tame animals to take advantage of their products, and they had alternatives sufficient to feed more people.

The third leap was accompanied by the industrial revolution. The highest population increase in the history of mankind has been experienced following this period. The first steam-powered engine in James Watt in Scotland in 1763 was recorded as the start of a new cycle.

In this period, the industry sector has improved, raw material resources have been transformed into new products, production has increased, nutritional and shelter assets have grown, and national economies have grown. With economic development and urbanization, people's purchasing power has increased. Due to the developments in medical technologies and other technological developments, life expectancy has increased and the population has increased rapidly with the increase of living standards and welfare. Thus, along with the industrial revolution, the demographic revolution was experienced in the west. Composing 18.3% of the world population in 1650, Europe increased this share to 22.7% in 1850.

The rapid population growth trend that started after the industrial revolution, has grown exponentially in a short time after 1950 and has been recorded in historical records as a population explosion. In this process, reasons such as development in agriculture, industrialization, and technological developments were improve living conditions, increase in birth rates due to developments in medical science and decrease in mortality rates are the first reasons that come to mind. Rapid population growth is still underdeveloped and continues in developing countries.

As seen, the population, which was around 1 billion at the beginning of the 1900s, has exceeded 8 billion today and moreover, it will exceed 10 million in the near future (figure 5).

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

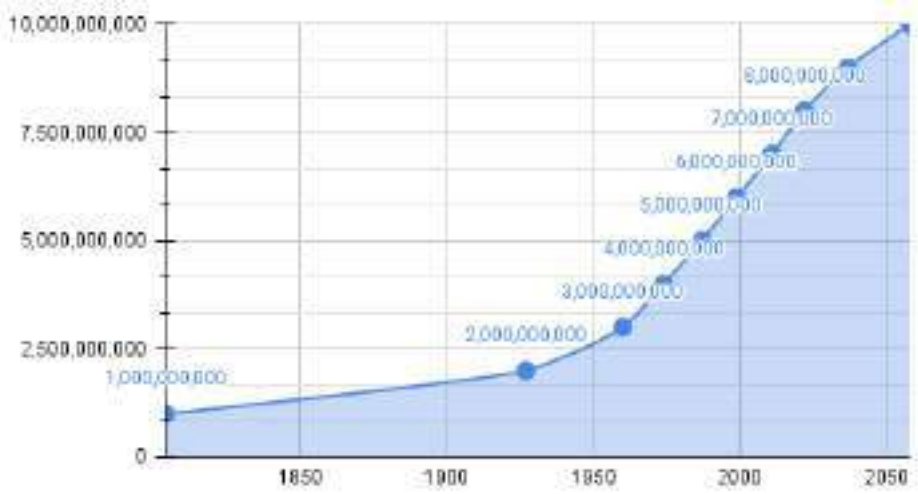


Figure 5. Population Growth Illustration

Prehistoric people were engaged in simple activities on earth for their basic needs. Over time, these activities became complex and multifaceted due to advances in science and technology. The active participation of human beings in earth systems and processes has started in the last ten thousand years and this participation has become an intervention today and has made progress towards becoming the most effective factor and process. Especially after the industrial revolution, human impact has increased rapidly. This impact has directly and indirectly created extremely unfavorable conditions and manifested itself as disasters.

In a 2010 Nobel Prize-winning paper published in the scientific journal Environmental Science & Technology, Dutch atmospheric scientist Paul Crutzen of the University of Mainz, Germany, geoscientists Jan Zalasiewicz and Mark Williams of the University of Leicester, and Will Steffen, head of the Climate Change Institute at the Australian National University, found that the beginning of this new era will also witness the sixth largest mass extinction on Earth. According to the researchers, in just two centuries, humans have undergone such a massive and unprecedented transformation that we may be experiencing the beginning of a new geological epoch that will change the face of our planet for millions of years. The four scientists have coined the name "New Human Era" for the new geological era they propose, in light of massive population growth, mushrooming megacities and the extraordinary increase in the use of fossil fuels. First proposed by Crutzen at the end of the last century, the name "Anthropocene" initially caused controversy in earth science circles.

However, the proliferation of signs of human destruction origin, such as global climate changes, mass extinctions in plant and animal species, has strengthened support for Crutzen's proposal. With the article "Anthropocene: An epoch of our making" written by James Syvitski in the magazine Global Change in 2012, the charts compiled by Steffen and his colleagues reveal a great human-induced change in the world within 250 years. Dr. Ekinci, in his book, "Anthropogenic Geomorphology", indisputably names our age as "Anthropocene" as a period separate from Holocene. This rapid acceleration is the result of "human footprints" and effects on the Earth. Both "the Global Human Impact Index" and "the Global Human Footprint Index" verify this situation.

Current Activities That Could Cause Rapidly Mass Extinction

Three main topics will be evaluated under this title. The first is nuclear technology, nuclear power plants, nuclear weapons, and wars. Second, Biological Warfare, and Terrorism, Man-made virus, bacteria, insect and Fungus outbreaks. Thirdly, Genetic technologies and related applications. Apart from these, there are many conspiracy theories or approaches that can cause mass extinction. But our study focused on probabilities in the light of science.

Nuclear Technology: Power Plants and Weapons

Nuclear technology can be named as processes that involve obtaining nuclear energy, developing nuclear weapons of mass destruction, or applying nuclear information in areas such as medicine. Radioactivity is the tendency of unstable atom nuclei to emit subatomic particles. Radioactivity is the degradation of unstable nuclei of heavy elements such as uranium, and thorium. As a result of this decay, radiation energy is released. The interest in this field has increased steadily in the recent century as the nuclear reaction releases more energy than other chemical reactions.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The main purpose of nuclear reactors (nuclear power plants) is to generate energy. Nuclear power generation is achieved by using nuclear reactions that release nuclear energy in reactors. One way to obtain nuclear energy is the fission, another way is the fusion method.

The raw material element is taken from nature and used in reactors as a fiscal isotope is Uranium-235. The rate of Uranium 235 in natural uranium is 7 per thousand. The rest forms U-238. Today, 2,563 terawatt-hours (TWh), equivalent to 10% of the total energy produced in the world, are produced in electric nuclear reactors. As of March 2020, there are 443 Nuclear fission reactors with 395 gigawatts (GW) combined electrical capacity in the world. Besides, a total of 109 reactors, 56 of which are under construction and 53 in the planning phase, will involve in energy production. The biggest new building activity takes place in Asian countries such as South Korea, India, and China. Leaving aside any accident or mass destruction, nuclear power has the lowest mortality rates per unit of energy produced compared to other energy sources. Moreover, 64 gigaton CO2 equivalent greenhouse gas emissions, which may result in the burning of fossil fuels in the commercialization adventure of about 50 years, prevented the emission of 1.84 million possible fatalities that may occur due to air pollution.

In the civil nuclear power industry, 3 accidents occurred at level 5 or higher, the first of which was the Three Mile Island accident in 1979, a smaller-scale accident rated at IAEA 5. The other two are the Chernobyl and Fukushima accidents level 7(figure 6).

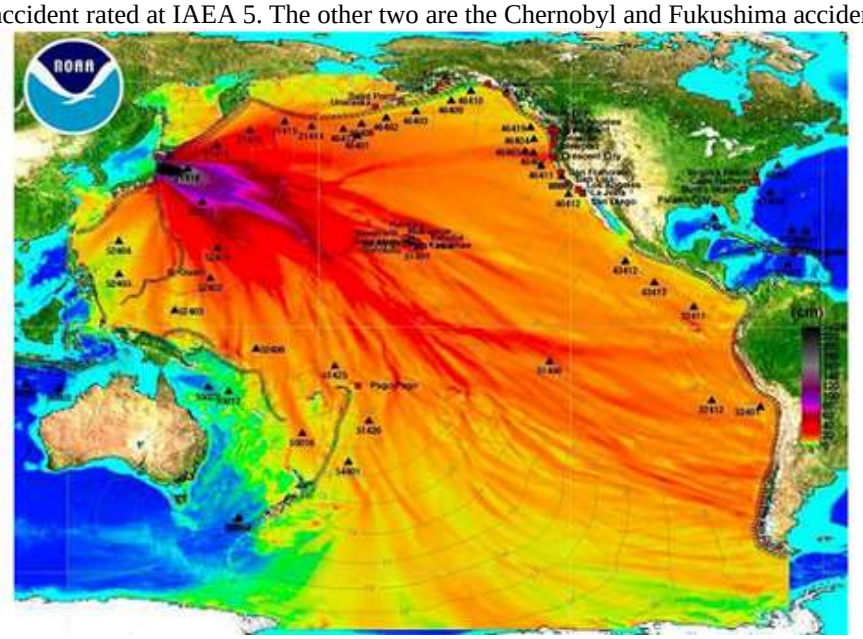


Figure 6. Radiation Spreading from Fukushima Across the Pacific Ocean

The Chernobyl disaster in the Soviet Union in 1986, the Fukushima Daiichi nuclear disaster in Japan in 2011, and the Three Mile Island accident, which took place more in the United States in 1979, provide some clues about mass destruction. Nuclear accidents cause great loss of life and destruction of natural environments. A nuclear accident can also cause social isolation, anxiety, depression, psychosomatic medical problems, reckless behavior, or even suicides. These clues are sufficient to demonstrate that nuclear power contains many irreversible threats to humans and the environment. Despite this, nuclear facilities continue to remain dangerous in many locations around the world (figure 7).

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Figure 7. World Map Nuclear Waste Radioactive Hazard Zone

Mass Destruction Weapons are chemical, biological, radiological and nuclear (KBRN) weapons or substances used to cause mass deaths. Atom, hydrogen, and neutron bombs are nuclear bombs. Nuclear Fission Weapons are also known as atomic bombs. High Uranium (235U) or Plutonium (239Pu) is used in atomic bombs based on fission-type nuclear reactions.

Fusion Weapons are known as hydrogen bombs. It is a destructive nuclear weapon that can provide uncontrolled thermonuclear energy.

The USA developed the first hydrogen bomb in 1952. The first hydrogen bomb was thrown into the Marshall Islands in the Great Ocean in 1954 and tested by the USA. The dropped bomb is about 1000 times more powerful than the atomic bombs dropped on Hiroshima and Nagasaki. The USSR, on October 30, 1961, conducted a 57 Megaton hydrogen bomb experiment, nicknamed Tsar Bomb, in Novaya Zemlya. This bomb is 3,800 times stronger than the atomic bomb dropped on Hiroshima. The flame ball he created could be observed from 1000 km away.

Neutron Bomb is a technically advanced tactical nuclear weapon. 14 million Volt energetic neutrons are emitted from the deuterium and tritium ions that interact during the fusion, which occurs as a result of the merger of the atomic nuclei in the millions of degrees of heat generated by the disintegration of the atom. These neutron beams do not harm the buildings and the environment, but they pose a definite lethal danger to human life.

Today, the United States, Russia, England, France, the People's Republic of China, India, Pakistan, North Korea, Israel (?) And Iran (?) have nuclear weapons (figure 8).

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Figure 8. Nuclear-Weapon States

It is a possible fact that people who have marked their marks on international terrorism will not be able to blow up the buildings in the coming years, and may attempt to threaten an entire city or even an entire country or whole World by using nuclear weapons of mass destruction.

Man-Made Virus, Bacteria, Insect and Fungus Outbreaks, and Biological Warfare and Terrorism

The use of biological toxins or infectious biological threat agents, such as bacteria, viruses, insects and fungi, or bioactive substances to kill or to neutralize people, animals or plants can be described as biological warfare. Animal, plant, bacterial, archaic and synthetic viruses attract attention in these attacks. Most of the pathogens of classical and modern biological weapons can be obtained from a naturally infected plant or animal and converted into a human-modified form.

The fact that a biological agent can cause mass extinction depends on high infectivity, high virulence, and effective delivery, spreading system, and vaccine deficiency. Such agents can kill infected people by 90%. Even the purpose of destroying it on a strategic scale can get out of control and affect the whole world. Some agents may not be fatal or deadly and can be targeted against a single person, a group of people, and even the entire world population. These can be developed, acquired, stocked or distributed by nation-states or different groups. The first is the bio-war, and the second is bio-terrorism. Common human diseases caused by viruses are colds, flu, chickenpox, and herpes. Viruses cause many serious illnesses such as rabies, Ebola virus disease, AIDS (HIV), avian flu, and SARS (figure 9).

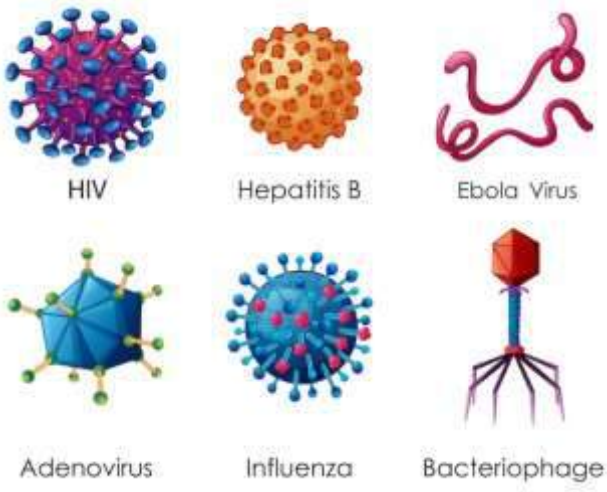


Figure 9. Diagram Showing the Shapes of Viruses: Bacteriophage, Ebolavirus, Hepatitis, Rotavirus, Adenovirus, Papillomavirus, AIDS, and Flu.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Biowarfare or bioterrorism has the potential to kill more people than a nuclear war. So, biological agents can be classified in several categories in terms of risk. These:

Category A

These high priority agents pose a risk to national security, can easily be transmitted and spread, can lead to high mortality, have a potential impact on public health, cause public panic, or require special action to be prepared for public health.

- Tularemia or rabbit fever
- Anthrax
- Smallpox
- Botulinum toxin
- Bubonic plague
- Marburg virus, and Ebola virus viral hemorrhagic fever.

Category B

These are that become widespread and kills if the disease is not treated.

- Brucellosis (Brucella species)
- Salmonella (E Coli O157: H7, Shigella, Staphylococcus aureus)
- Glanders (Burkholderia mallei)
- Melioidosis (Burkholderia pseudomallei)
- Psittacosis (Chlamydia psittaci)
- Q fever (Coxiella burnetii)
- Ricin toxin from Ricinus communis (ritual bean)
- Abrin toxin from Abrus precatorius (Rosary peas)
- Staphylococcal enterotoxin B
- Typhoid (Rickettsia prowazekii)
- Viral encephalitis (for example, alphaviruses: Venezuelan horse encephalitis, eastern horse encephalitis, western horse encephalitis)
- Water supply threats (for example, Vibrio cholera, Cryptosporidium parvum)

Category C

Category C agents are pathogens that can be designed for mass spread due to their availability, ease of production and distribution, high mortality, or ability to cause a significant health effect.

- Nipah virus
- Hantavirus
- Coronavirus

Virus agents that are likely to die if an individual is infected are as follows:

- Marburg virus passing through infected monkeys
- Ebola virus passing through infected people or animals
- Rabies virus passing through infected dogs and other animals
- Human immunodeficiency virus (HIV) infecting a cell
- Smallpox virus
- Hantavirus pulmonary syndrome, which is caused by exposure to the feces of infected mice.
- H1N1 influenza virus called swine flu
- Dengue virus transmitted to humans with an infected mosquito bite
- Rotavirus causing serious diarrheal disease between infants and young children,
- Coronavirus (CoV1, CoV2, CoV19) virus that causes severe acute respiratory syndrome, or SARS that pass from bats to humans like CoV.
- MERS-CoV virus belonging to the same virus family as SARS-CoV and SARS-CoV-2

Entomological wars using insects for attack can also cause mass extinctions. Japan's use of fleas to spread plague in the Second World War is an example of this.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Damages in the Gen and Reproductive System

In the female mammal, two types of gonadal hormones as estrogen, and progestin are secreted. Estrogens are substances that stimulate the beginning of cyclic heat, in which the women are sexually active and open to men. Hormonal balance is an important factor in female fertility, especially concerning the ovarian cycle. Lifestyle factors such as stress, excess body weight, coffee consumption, diet, and excessive exercise can affect a woman's hormonal balance and subsequent ovulation regimen. It is now clear that nutritional activities control hormonal control. There are indications that endocrine-disrupting chemicals such as PCBs and some pesticides can affect hormonal balance, thereby increasing the risk of subfertility.

Pesticides are used in agriculture and public health to control insects, weeds, animals, and disease vectors. The United Nations Food and Agriculture Organization (FAO), as a pesticide, 'human or animal disease vectors, undesirable plant species, or any mixture of substances to prevent, destroy or control any pest, including harmful animals.

Difficulty in breathing, headache, neurological or psychological effects, irritation of the skin and mucous membranes, skin disorders, effects on the immune system, cancer, and reproductive effects are the most known. Some pesticide agents can interfere with female hormonal function, which can lead to adverse effects on the reproductive system by disrupting the hormonal balance necessary for its proper functioning. In epidemiological studies, exposure to pesticides has been associated with menstrual cycle disorders, decreased fertility, long-term pregnancy, spontaneous abortion, stillbirths, and developmental disorders that may or may not be due to impaired female hormonal function.

Researches have revealed that foods, medicines, pesticides and other environmental factors destroy the following steps that are involved in the fertility process. These:

- Intervention in hormone synthesis Disruption of female hormonal function
- Interference with hormone storage and release
- Interference with hormone transport and clearance
- Interaction with hormone receptor recognition and binding
- Binding and activating the estrogen receptor
- Binding without activating the estrogen receptor
- Binding of other receptors
- Intervention with hormone post-receptor activation
- Intervention to thyroid function
- Intervention to the central nervous system

Approximately 25000 genes have been identified in the human genome. Undoubtedly, this information, which will provide great benefits in the diagnosis and treatment of diseases, has brought with it some ethical problems. The application of genetic technologies in the areas of stem cells, cloning, gene therapy, genetic manipulation, gene selection, gender selection and preimplantation has revealed great potential for the human race to affect and change human life on earth, as we know today (figure 10).

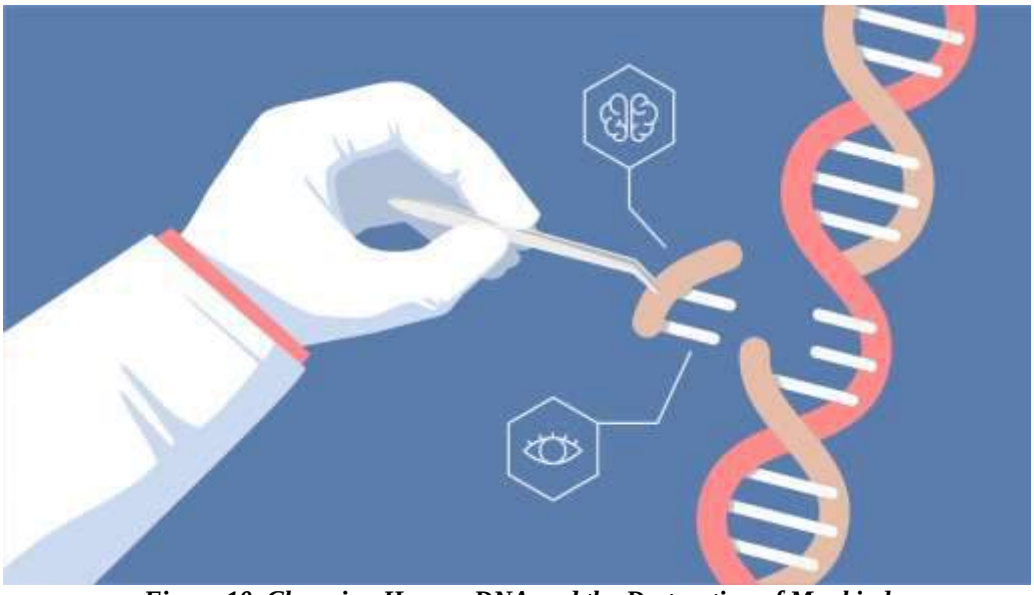


Figure 10. Changing Human DNA and the Destruction of Mankind

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

As can be seen, these new genetic technologies have the potential to change human nature and society at the most basic level. Human cloning, genetic feature selection, genetic modification issues are of great concern. Human cloning refers to the creation of human embryos or human children genetically identical or dead parents. It is suggested that individuals with extra cognitive or behavioral features can be developed with this process, which will form a new version of the human species that cannot reproduce with normal people. therefore, the practice of germline development is seen as a potentially dangerous approach as it has the potential to change human species. It could potentially lead to inequality between a generation without their consent. Also, changing the nature of people, in the long run, can have unpredictable consequences now. Although it shows that many governments and organizations around the world have agreed to ban human reproduction cloning, hereditary genetic modification and social feature selection in front of the screen, it is clear that these are maintained in laboratories behind closed doors.

RESULT

The main triggering factor of the sixth mass extinction process that is happening today is humans. Increasing population as well as developments in technology pose a great risk for biodiversity. Living spaces are disappearing due to habitat destruction. Burning fossil fuels such as oil and coal and releasing excess carbon into the atmosphere causes global climate changes and many chain destructions. Again, people destroy sustainability by exceeding nature's carrying capacity in terms of numbers and consumption. Again, pollution and noise continue to destroy the ecosystem. Increased transportation and access it poses a great risk to isolated populations. Developments in the field of medicine and genetics, virus and bacterial epidemics, and nuclear technologies can be listed as problems that can quickly cause mass extinction.

REFERENCES

1. *Atalay. I., Ekinci, D., Bayrak. M., 2015, Türkiye Kıyılarındaki Bazı Sulak Alanların Antropojenik Süreçlere Bağlı Ekolojik Sorunları, Ulusal Jeomorfoloji Sempozyumu, 15-17 Ekim 2015, Samsun, 395-417*
2. *Ekinci., D., et.al., 2015; Antropojenik Jeomorfoloji, (Anthropogenic Geomorphology), AUZEF Ders Kitaplari, Istanbul*
3. *Evans, Scott D.; Tu, Chenyi; Rizzo, Adriana; Droser, Mary L., 2022, "Environmental drivers of the first major animal extinction across the Ediacaran White Sea-Nama transition". Proceedings of the National Academy of Sciences. 119 (46): e2207475119. Bibcode:2022PNAS..11907475E. doi:10.1073/pnas.2207475119. PMC 9674242. PMID 36343248.*
4. *Hall, S., 2020,. "Familiar culprit may have caused mysterious mass extinction – A planet heated by giant volcanic eruptions drove the earliest known wipeout of life on Earth". The New York Times.*
5. *Bond DP, Grasby SE., 2020), "Late Ordovician mass extinction caused by volcanism, warming, and anoxia, not cooling and glaciation". Geology. 48 (8): 777–781. Bibcode:2020Geo....48..777B. doi:10.1130/G47377.1. S2CID 234740291.*
6. *St Fleur N., 2017, "After Earth's worst mass extinction, life rebounded rapidly, fossils suggest". The New York Times.*
7. *McCallum ML., 2015, "Vertebrate biodiversity losses point to a sixth mass extinction". Biodiversity and Conservation. 24 (10): 2497–2519. Bibcode:2015BiCon..24.2497M. doi:10.1007/s10531-015-0940-6. S2CID 16845698.*
8. *Sutter JD., 2017, "Sixth mass extinction: The era of 'biological annihilation'". CNN.*
9. *Cowie RH, Bouchet P, Fontaine B., 2022, "The sixth mass extinction: Fact, fiction or speculation?". Biological Reviews of the Cambridge Philosophical Society (online preprint). 97 (2): 640–663. doi:10.1111/brv.12816. PMC 9786292. PMID 35014169.*
10. *Ceballos G, Ehrlich PR, Raven PH., 2020, "Vertebrates on the brink as indicators of biological annihilation and the sixth mass extinction". Proceedings of the National Academy of Sciences. 117 (24): 13596–13602. Bibcode:2020PNAS..11713596C. doi:10.1073/pnas.1922686117. PMC 7306750. PMID 32482862.*
11. *Watts J., 2019, "Human society under urgent threat from loss of Earth's natural life". The Guardian. London.*
12. *Bambach RK., 2006, "Phanerozoic Biodiversity Mass Extinctions". Annual Review of Earth and Planetary Sciences. 34 (1): 127–155. Bibcode:2006AREPS..34..127B. doi:10.1146/annurev.earth.33.092203.122654. ISSN 0084-6597.*
13. *Raup DM, Sepkoski JJ., 1984, "Periodicity of extinctions in the geologic past". Proceedings of the National Academy of Sciences. 81 (3): 801–805. Bibcode:1984PNAS...81..801R. doi:10.1073/pnas.81.3.801. PMC 344925. PMID 6583680.*
14. *Jablonski D., 1991, "Extinctions: A paleontological perspective". Science. 253 (5021): 754–757. Bibcode:1991Sci...253..754J. doi:10.1126/science.253.5021.754. PMID 17835491.*
15. *Hallam A, Wignall PB, 1997, Mass Extinctions and Their Aftermath. Oxford: Oxford University Press.*
16. *Signor III, P. W. and Lipps, J. H., 1982, "Sampling bias, gradual extinction patterns, and catastrophes in the fossil record", in Geological implications of impacts of large asteroids and comets on the Earth (ed. L. T. Silver and P. H. Schultz), Geological Society of America Special Publication, vol. 190, pp. 291–296.*
17. *Hallam A, Wignall PB., 2002, Mass Extinctions and their Aftermath. New York, NY: Oxford University Press.*
18. *Erlykin AD, Harper DA, Sloan T, Wolfendale AW., 2017, Smith A (ed.). "Mass extinctions over the last 500 myr: an astronomical cause?". Palaeontology. 60 (2): 159–167. Bibcode:2017Palgy..60..159E. doi:10.1111/pala.12283. S2CID 133407217.*
19. *Müller RD, Dutkiewicz A., 2018, "Oceanic crustal carbon cycle drives 26-million-year atmospheric carbon dioxide periodicities". Science Advances. 4 (2): eaaq0500. Bibcode:2018SciA....4..500M. doi:10.1126/sciadv.aaq0500. PMC 5812735. PMID 29457135.*
20. *Brannen P., 2017, The Ends of the World: Volcanic Apocalypses, Lethal Oceans, and Our Quest to Understand Earth's Past Mass Extinctions. Harper Collins. p. 336. ISBN 978-0-06-236480-7.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

21. *Jerram, Dougal A.; Widdowson, Mike; Wignall, Paul B.; Sun, Yadong; Lai, Xulong; Bond, David P. G.; Torsvik, Trond H.,2016, "Submarine palaeoenvironments during Emeishan flood basalt volcanism, SW China: Implications for plume–lithosphere interaction during the Capitanian, Middle Permian ('end Guadalupian') extinction event". Palaeogeography, Palaeoclimatology, Palaeoecology. 441: 65–73. Bibcode:2016PPP...441...65J. doi:10.1016/j.palaeo.2015.06.009.*
22. *Ernst, Richard E.; Youbi, Nasrrddine, 2017, "How Large Igneous Provinces affect global climate, sometimes cause mass extinctions, and represent natural markers in the geological record". Palaeogeography, Palaeoclimatology, Palaeoecology. 478: 30–52. Bibcode:2017PPP...478...30E. doi:10.1016/j.palaeo.2017.03.014.*
23. *Keller G, Abramovich S, Berner Z, Adatte T., 2009, "Biotic effects of the Chicxulub impact, K–T catastrophe and sea level change in Texas". Palaeogeography, Palaeoclimatology, Palaeoecology. 271 (1–2): 52–68. Bibcode:2009PPP...271...52K. doi:10.1016/j.palaeo.2008.09.007.*
24. *Kiehl JT, Shields CA., 2005, "Climate simulation of the latest Permian: Implications for mass extinction". Geology. 33 (9): 757–760. Bibcode:2005Geo....33..757K. doi:10.1130/G21654.1.*
25. *Watson AJ., 2016, "Oceans on the edge of anoxia". Science. 354 (6319): 1529–1530. Bibcode:2016Sci...354.1529W. doi:10.1126/science.aaj2321. hdl:10871/25100. PMID 28008026. S2CID 206653923.*
26. *Wilde P, Berry WB, 1984, "Destabilization of the oceanic density structure and its significance to marine "extinction" events". Palaeogeography, Palaeoclimatology, Palaeoecology. 48 (2–4): 143–62. Bibcode:1984PPP....48..143W. doi:10.1016/0031-0182(84)90041-5.*
27. *Wei Y, Pu Z, Zong Q, Wan W, Ren Z, Fraenz M, et al., 2014, "Oxygen escape from the Earth during geomagnetic reversals: Implications to mass extinction". Earth and Planetary Science Letters. 394: 94–98. Bibcode:2014E&PSL.394...94W. doi:10.1016/j.epsl.2014.03.018 – via NASA ADS.*
28. *Jump up to:a b c Franck S, Bounama C, von Bloh W., 2006, "Causes and Timing of Future Biosphere Extinction" (PDF). Biogeosciences. 3 (1): 85–92. Bibcode:2006BGeo....3...85F. doi:10.5194/bg-3-85-2006. S2CID 129600368.*
29. *Cascales-Miñana B, Cleal CJ., 2011, "Plant fossil record and survival analyses". Lethaia. 45: 71–82. doi:10.1111/j.1502-3931.2011.00262.x*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

NAVIGATING CLOUD REALMS: AN IN-DEPTH EXPLORATION OF MODELS, DEPLOYMENTS, AND OPTIMIZATION STRATEGIES IN CLOUD COMPUTING

Madhumala G[1], Dr Suma R[2]
[1]*Research Scholar, Siddhartha Academy of Higher Education*
[2]*Associate Professor, Department of Information Science and Engineering, SSIT , Tumkur*

ABSTRACT

Cloud computing, led by major providers like AWS, Azure, and GCP, has revolutionized IT by delivering IaaS, PaaS, and SaaS to businesses, reshaping digital strategies across industries. The core attributes of scalability, cost efficiency, and accessibility make cloud computing a cornerstone for operational efficiency and innovation. The layered cloud model (IaaS, PaaS, and SaaS) allowstailored adoption and scalability. Public clouds offer cost-effective shared infrastructure, private clouds provide exclusivity and control, while hybrid clouds seamlessly integrate both for flexibility. Community clouds suit collaborativeneeds with shared concerns like security. Open-source solutions, including OpenStack, Apache CloudStack, and Eucalyptus, empower cloud management with diverse language support. Optimization becomes paramount in enhancing cloud efficiency, aligning resource utilization with a pay-as-you-go model. Optimization metrics span IaaS, PaaS, and SaaS layers, covering makespan,execution time, resource utilization, cost efficiency, and reliability. Techniques like metaheuristic algorithms, machine learning, and hybrid approaches contribute to efficient cloud workflow scheduling.

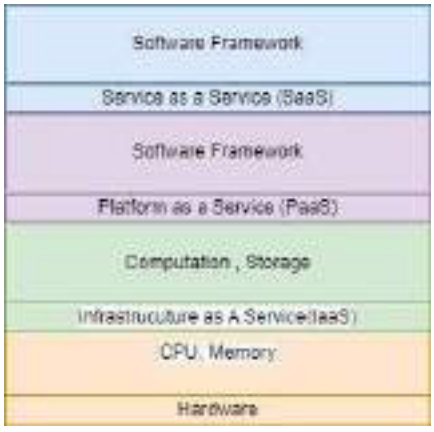
In conclusion, optimization is pivotal for unlocking the full potential of cloud computing, ensuring a harmonious balance between cost-effectiveness,performance enhancement, and environmental sustainability. As cloud computing continues to evolve, embracing trends and optimizing workflows through innovative techniques becomes imperative for businesses seeking a competitive edge in the dynamic digital landscape.

KEY WORDS: *Cloud computing, Deployment models ,Cloud optimization,Scalability, Cloud service providers, Metaheuristic algorithms*

1. INTRODUCTION

Cloud computing, led by CSPs like AWS, Azure, and GCP, has transformed IT services. Offering IaaS, PaaS, and SaaS, it provides scalable, cost-efficient, and accessible solutions. Businesses, from finance to healthcare, leverage the cloudfor operational efficiency and innovation, optimizing operations and reducing costs. Key attributes like scalability, accessibility, and rapid deployment contribute to its widespread adoption. Cloud characteristics, such as scalability and cost-effectiveness, position it as a cornerstone for operational efficiency. Cloud platforms, with a pay-as-you-go model, ensure optimal resource utilization and cost savings. Accessibility over the internet facilitates collaboration, and managed services contribute to economies of scale. Businesses use cloud services to enhance data analytics, security, and expedite application development, reshaping digital strategies efficiently.

1.1 Understanding Cloud Model Layered Architectue



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

There are three services provided by cloud computing that are Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS)[1]. Popular cloud computing examples that the average person uses on a daily basis include Dropbox, Gmail, Facebook, and YouTube. Because of its scalability, flexibility, agility, and simplicity, its application in businesses is growing quickly.

It allows on-demand access to a shared pool of configurable resources, including servers, storage, networks, services, and applications, without requiring direct management or control over the underlying infrastructure. The layered cloud model encompasses IaaS, PaaS, and SaaS, offering a structured approach aligned with diverse user requirements.[1] IaaS, the foundational layer, provides virtualized servers, storage, and networking, enabling users to control operating systems and applications. Suited for flexibility and infrastructure control, IaaS allows resource scaling with a pay-as-you-go pricing model, ideal for tasks like hosting websites and managing scalable computing resources[2]. Moving up the layers, PaaS abstracts infrastructure management, delivering a platform for streamlined application development. With development frameworks, databases, and middleware, PaaS simplifies the application lifecycle. Its subscription-based model reduces infrastructure management burdens, making it suitable for web application development, mobile app backends, and data analytics initiatives. At the top, SaaS delivers fully functional software applications over the internet, eliminating local installations. Its subscription-based model simplifies software management for end-users, finding widespread use in business applications like email services, office productivity suites, CRM, and ERP systems. Integration across layers enables businesses to adopt hybrid deployments, combining services for specific needs. For instance, an organization may use IaaS for infrastructure, PaaS for application development, and SaaS for productivity tools. This layered model allows scalability and cost optimization, letting businesses choose the appropriate layer based on specific requirements and avoiding unnecessary resource allocation. By abstracting complexities, each layer enables organizations to focus on core competencies rather than being burdened by infrastructure management.

1.2 Cloud Deployment Models

Cloud Deployment Models

Cloud deployment models define how cloud computing services are provisioned and provided to users, including public cloud, private cloud, hybrid cloud, and community cloud.

Cloud deployment models, such as public, private, hybrid, and community clouds,cater to diverse business needs. In the public cloud, third-party providers offer cost-effective, scalable solutions suitable for dynamic workloads and startups.[2] Private clouds provide exclusive, customizable environments, ideal for organizations with sensitive data and compliance needs.[2] Hybrid clouds seamlessly integrate public and private elements, offering flexibility, scalability, and cost-effectiveness. Community clouds involve collaborative ownership for shared concerns, delivering customized and cost-effective solutions.[3]Organizations choose deployment models based on factors like data sensitivity, compliance, scalability, and administrative control, often adopting a strategichybrid or multi-cloud approach to meet varied workloads efficiently.

2. OPEN SOURCE SOLUTIONS FOR CLOUD MANAGEMENT [4]

Simulator	Platform	Language Support:	Licensing model	Modeling capabilities,	Scalability	Network modeling	Energy wareness
CloudSim	SimJava	Java	Open Source	Data centers, virtual machines, service brokers, and resource provisioning methods	yes	Lim ited	yes
CloudAnalyst	CloudSim	Java	Open Source	Graphic location of users, location of data centers, number of users and data centers	yes	Lim ited	yes

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

GreenCloud	NS-2	C++, otcel	Open Source	energy consumption in cloud data centers	yes	Full	yes
MDCsim	CSIM	JAVA/C++	Commercial	Analysis of multilayer data centers	yes	Limited	yes
iCanCloud	SIMCAN	C++	Open Source	can modellarge size cloud environments	yes	Full	No
NetworkCloudSim	CloudSim	Java	Open Source	data center resources suchas network and computing resources, parallel application	yes	Full	yes
EMUSIM	CloudSim, AEF	Java	Open Source	Emulation Simulation	yes	Limited	yes
GroudSim	-	Java	Open Source	provisioning of vms, filetransfer, failures at different	yes	No	No
				levels, cost calculation, background load			
MR-CloudSim	CloudSim	Java	Still not available	Mapreduce	yes	Limited	yes
DCSim	-	Java	Open Source	Energy consumption models	No	No	No

Table 2.1: List of Open Source Solutions

3. CRUCIAL ROLE OF OPTIMIZATION IN IMPROVING EFFICIENCY OF CLOUD COMPUTING

Optimization is referred to as the selection of best element from a set of alternatives with regard to some criteria [5]. Optimization is integral to enhancing the efficiency of cloud computing environments, focusing on cost control, performance improvement, and resource management. Aligned with the pay-as-you-go model [5], optimized resource utilization ensures economical computing, effectively controlling costs. Beyond cost considerations, optimization efforts, such as fine- tuning configurations and implementing load balancing, contribute to improved speed, responsiveness, and reduced latency, enhancing the overall user experiencefor cloud-based services.

Moreover, optimization extends to core features like scalability and elasticity in cloud computing. Auto-scaling mechanisms, cost-sharing and maintaining end- user satisfaction are what drive the inspiration behind the mechanism [12]. Thisis a feature of cloud computing that enables resource scalability on demand, thus allowing service providers to deliver resources to their applications without human intervention under a dynamic workload to minimize resource cost and latency while maintaining the quality of service requirements[13]. This is a by- product of optimization. This mechanism would dynamically adjust resources based on demand, offering flexibility during peak periods and cost savings during lower demand periods. This holistic approach encompasses resource efficiency, security,compliance, data management, and adaptability to dynamic workloads, collectively ensuring a positive user experience, reduced downtime, and increased customer satisfaction. In conclusion, optimization is pivotal for unlocking the full potential of cloud computing, maintaining a harmonious balance between cost-effectiveness, performance enhancement, and environmental sustainability.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3.1 Cloud computing optimizing Metrics

OptimizationMetrics	What is it?	Why is itimportant Optimize?	Where is it to be optimized??
Makespan	Total time forworkflow completion.	Minimizing makespan improvesoverall efficiency.	IaaS
Execution Time	Time taken for individual task execution.	Optimizing task Execution timecontributes to overall workflow efficiency	IaaS
Resource Utilization	Degree of utilizationof IaaS resources (CPU,memory,storage).	Efficient resource utilization minimizescosts and improves scalability.	IaaS
Cost Efficiency	Economical use ofIaaS resources.	Optimalcostefficiency involveschoosing cost-effective instancesand minimizing idle time.	IaaS
Workflow Throughput:	Number of workflows completed within a given time.	Maximizing workflow throughputensures high productivity.	PaaS
Data Transfer Time:	Time taken for data transfer between tasksor storage.	Reducing data Transfer time Enhances overall workflow performance	PaaS
Scalability:	Ability to scale resources up or down based on workflow demand.	Scalability optimizes resource usage and adapts to varyingworkloads.	PaaS
Task Dependencies:	Relationships determining task execution order.	Managing task Dependencies iscrucial for optimizingworkflow execution	SaaS
Reliability and Fault Tolerance	Ability to continue execution in thepresence of failures.	Ensuring reliabilityand fault tolerance minimizes workflowdisruptions.	SaaS
SLA Compliance	Degree to which the workflow meets Predefined service-level agreements.	Adhering to SLAsensures performanceexpectations are met.	SaaS
Energy Efficiency	Energy consumption associated with Executing theworkflow.	Improving energy efficiency contributes to sustainability and cost savings.	SaaS
Adaptability	Ability to adapt to changes in resource availability or requirements.	An adaptableworkflow adjusts to dynamic conditions,ensuring optimalperformance.	SaaS

Table 3.1: List of optimizing metri

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4. CLOUD OPTIMIZATION TECHNIQUES

Meta-heuristic Algorithms

Meta-heuristic algorithms [6] such as Genetic Algorithms (GA), Particle Swarm Optimization (PSO), and Ant Colony Optimization (ACO) are widely used for workflow scheduling. Metaheuristic based techniques have been proved to achieve near optimal solutions within reasonable time for such problems.

Machine Learning-Based Approaches [7]

ML techniques are the motivating factor to backend the cloud for emerging paradigms. These including reinforcement learning and deep learning are employed for predicting task execution times, resource availability, and dynamic optimization of workflow schedules.

Hybrid Optimization Techniques [8]

Hybrid approaches uses an integrated optimization approach for scheduling tasks seamlessly and effectively on cloud computing to leverage their complementary strengths. For example, combining a genetic algorithm with a local search algorithm can enhance the efficiency of workflow scheduling.

Energy-Aware Scheduling] 9]

The trend of building large computer facilities has a negative impact on the amount of energy needed to provide dependable services and manage the complexity. Energy-efficient scheduling algorithms aim to minimize the overall energy consumption of data centers. These algorithms consider factors such as task consolidation, resource allocation, and dynamic power management to optimize energy usage.

Cost-Aware Scheduling [10]

Execution of scientific workflow on cloud platform is time consuming and expensive. Algorithms that consider cost factors, including resource usage costs, storage costs, and data transfer costs, to optimize the overall expenses associated with workflow execution in the cloud.

Blockchain-Based Scheduling [11]

Blockchain technology is explored for enhancing security and transparency in workflow scheduling. Smart contracts and decentralized decision-making can contribute to more efficient and secure scheduling in distributed cloud environments.

5. CONCLUSION

Cloud computing has emerged as a transformative model, offering a spectrum of services from storage to applications. Businesses, enticed by its efficiency and pay-as-you-go structure, are gravitating towards cloud solutions, minimizing the costs and time associated with managing physical infrastructure. However, centralized storage in cloud data centers raises security concerns, such as data leakage and potential inside attacks, as users have limited control over their data. Cloud computing's foundational concepts, including virtualization and utility computing, enable users to access shared resources over the internet without local installations. This paper explores the dynamic trends and challenges in cloud computing, emphasizing its pivotal role in reshaping digital strategies across industries. The layered cloud model, encompassing Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS), provides a structured approach for diverse user requirements. Public, private, hybrid, and community cloud deployment models offer flexibility based on data sensitivity, compliance, and scalability needs. Optimization becomes crucial in enhancing cloud computing efficiency, ensuring economical resource usage, and improving features like scalability and elasticity. Cloud optimization metrics span IaaS, PaaS, and SaaS layers, addressing factors such as makespan, execution time, resource utilization, cost efficiency, and reliability. Various techniques, from metaheuristic algorithms to machine learning-based approaches and blockchain- based scheduling, contribute to efficient cloud workflow scheduling, reflecting the continual evolution and significance of cloud computing in meeting dynamic computational needs.

REFERENCES

1. *Mandeep Singh, Dinesh Kumar Maakar "Review Paper on Cloud Computing"2018 IJRAR January 2019, Volume 06, Issue 1*
2. *Karan Gulia ,Sunil Kumar Maakar "A Review Paper on Cloud Computing"JISET - International Journal of Innovative Science, Engineering & Technology,*
3. *Vol. 8 Issue 7, July 2021*
4. *Paraschos Maniatis , "Comparison of Public, Private, Hybrid, and Community Cloud Computing in Terms of Purchasing and Supply Management: A Quantitative Approach" international journal of multidisciplinary research and analysis ISSN(print): 2643-9840, ISSN(online): 2643-9875 Volume 06 Issue 06 June 2023*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5. *Arif Ahmed ,Abadhan Saumya Sabyasachi "Cloud Computing Simulators: A Detailed Survey and Future Direction " 2014 IEEE International Advance Computing Conference (IACC) 978-1-4799-2572-8/14/$31.00 c 2014 IEEE*
6. *Konatham, Sumalatha & Anbarasi, Murugan. (2019). "A review on various optimization techniques of resource provisioning in cloud computing". International Journal of Electrical and Computer Engineering (IJECE). 9. 629. 10.11591/ijece.v9i1.pp629-634.*
7. *Mala Kalra a, Sarbjeet Singh b "A review of metaheuristic scheduling techniques in cloud computing" Egyptian Informatics Journal*
8. *Volume 16, Issue 3, November 2015, Pages 275-295*
9. *Dinesh Soni, Neetesh Kumar, "Machine learning techniques in emerging cloud computing integrated paradigms: A survey and taxonomy", Journal of Network and Computer Applications, Volume 205, 2022, 103419,ISSN 1084-8045, https://doi.org/10.1016/j.jnca.2022.103419. (https://www.sciencedirect.com/science/article/pii/S1084804522000765)*
10. *Kaur, M. ., & Singh, S. . (2024)." A Hybrid Optimization Approach in Cloud Computing Based on Yellow Saddle Goatfish and Particle Swarm Optimization Algorithms for Task Scheduling". International Journal of Intelligent Systems andApplications in Engineering, 12(20s), 08–19. Retrieved from https://ijisae.org/index.php/IJISAE/article/view/5114*
11. *Pandey, Dr-Ashish & Yadav, Abhishek & Pandey, Akarsh & Tech, B &Student, B. (2022). "A Comprehensive review of energy optimization techniques in cloud computing". 10. b294-b301.*
12. *Kumar G, Santhosh & C A, Dr. (2024). "Cost and performance aware scheduling technique for cloud computing environment". International Journal of Reconfigurable and Embedded Systems (IJRES). 13. 9-19. 10.11591/ijres.v13.i1.pp9-19.*
13. *Mallikarjun Reddy Dorsala, V.N. Sastry, Sudhakar Chapram, "Blockchain-based solutions for cloud computing: A survey", Journal of Network andComputer Applications, Volume 196, 2021, 103246, ISSN 1084-8045, https://doi.org/10.1016/j.jnca.2021.103246. (https://www.sciencedirect.com/science/article/pii/S1084804521002447)*
14. *Pooja Kumari Jha , Dr Deepika Pathak "AUTO SCALING TECHNIQUES IN CLOUD COMPUTING" , JOURNAL OF CRITICAL REVIEWS ISSN- 2394-5125 VOL 7, ISSUE 19, 2020*
15. *ZargarAzad, M., Ashtiani, M. An Auto-Scaling Approach for Microservices in Cloud Computing Environments. J Grid Computing **21**, 73 (2023). https://doi.org/10.1007/s10723-023-09713-7*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

ESTIMATION OF QUININE SULPHATE BY USING PHOTO FLUOROMETER

Rutuja Santosh Aghav[1*] Yogiraj P. Muley[2] Gokul Nagorao Rathod[3]
[1]*Student of bachelor's in pharmacy, Dr. Babasaheb Ambedkar Technological University, Raigad, Lonere.*
[2]*Department of Pharmaceutical Chemistry, Faculty of Pharmaceutical Chemistry, Dr. Babasaheb Ambedkar Technological University, Raigad, Lonere*
[3]*Student of bachelor's in pharmacy, Dr. Babasaheb Ambedkar Technological University, Raigad, Lonere*

[*]*Corresponding Author: Rutuja Aghav*

ABSTRACT
Estimation of Quinine Sulphate Using a Photo Fluorometer Quinine sulphate, a widely used antimalarial drug, can be accurately quantified using photo fluorometry due to its inherent fluorescence properties. This study aims to develop and validate a sensitive, precise, and reproducible method for the estimation of quinine sulphate in pharmaceutical formulations.

The procedure involves preparing standard solutions of quinine sulphate and measuring their fluorescence intensity at an excitation wavelength of 350 nm and an emission wavelength of 450 nm. The calibration curve, constructed by plotting fluorescence intensity against quinine sulphate concentration, demonstrates linearity within the range of 0.1 to 10 µg/mL, with a correlation coefficient (R^2) greater than 0.99. The method exhibits high sensitivity, with a detection limit of 0.05 µg/mL and a quantification limit of 0.1 µg/mL.

KEYWORDS : *Quinine sulphate, Photo fluorometry, Fluorescence, Pharmaceutical analysis, Method validation, ICH guidelines.*

1. INTRODUCTION

The estimation of quinine sulphate using a photo fluorometer involves a procedure that utilizes fluorescence spectroscopy to determine the concentration of quinine sulphate in a sample. This method is based on the fluorescent properties of quinine sulphate when excited by specific wavelengths of light.

Key steps in this process include preparing standard quinine solutions of known concentrations, measuring their fluorescence intensity, plotting a calibration curve, measuring the fluorescence of the unknown sample, and using the calibration curve to determine the sample's concentration. Fluorescence spectroscopy offers a fast, simple, and cost-effective approach for quantifying analyte concentration through its fluorescence behaviour under specific light excitation.

The estimation of quinine sulphate using a photo fluorometer involves utilizing the fluorescence properties of quinine sulphate to quantitatively determine its concentration in a solution. Quinine sulphate is a compound known for its fluorescent properties when exposed to ultraviolet (UV) light. This characteristic makes it suitable for analysis using a photo fluorometer, a device designed to measure the intensity of fluorescence emitted by a substance.

The introduction may also briefly describe the principle behind fluorescence spectroscopy, emphasizing how molecules like quinine sulphate absorb light energy at specific wavelengths and re-emit it at longer wavelengths, resulting in fluorescence. This phenomenon allows for sensitive and selective detection of quinine sulphate in solution.

2.RESARCH PROBLEM

2.1 Malaria

Malaria is caused by parasite transmitted from one person to another through the biting of certain species of mosquitos in parasite endemic regions.Those at creates risk of severe from of the disease the age of 5 years & pregnant women. An infection caused by a plasmodium parasite transmitted by the bite of infected mosquitoes.

Malaria mostly spreads to people through the bites of some infected female Anopheles mosquitoes. Blood transfusion and contaminated needles may also transmit malaria. Left untreated, P. falciparum malaria can progress to severe illness and death within 24 hours.

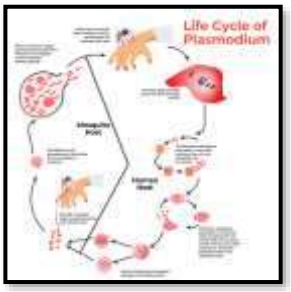
SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- **Life cycle of Malaria**

When a person is bite by a mosquito, sporocytes that are formed in the blood of the mosquito (from male and female hematocytes) enter the body. Then, sporocyte leaves circulation and localizes in the hepatocytes whereby they transform, multiply and develop into tissue schizonts. The primary asymptomatic tissue stage lasts for fifteen days and tissue schizonts rupture. Every tissue schizont releases thousands of merozites. Released merozites nvade more RBCs to continue the cycle.

Synchronous rupture of RBCs and release of merozites into the circulation leads to febrile patter attacks on day one and three; hence, designation is Tertian malaria'. Then the flagellation of male gametocyte is followed by male gametogenesis and fertilization of The female gametocytes in the mosquito's gut. The resulting zygote, which develops as an bocyte in the gut wall, finally gives rise to infective sporozoite, which invades the salivary glands of the mosquito. Then, by taking a blood meal, mosquito may infected another human.

Fig. 1 - Life Cycle of Malaria



- **History**

Malaria has troubled humans for thousands of years. Disease resembling malaria has been described for more than 5000 years. In 2700 BCE, tertian and quartan fever due to malaria was described in Nei Ching (The Canon of Medicine). The father of medicine Hippocrates noted the symptoms of malaria like disease in 4th century. He also linked malaria to appearance of Sirius the Dog Star. In Susruta (Sanskrit medical literature), the description of malaria like symptoms are given. Vedic literature (1500-800 BCE) called malaria the 'king of diseases'. Malaria is not seen in the books of Mayans or Aztecs. Alexander Great may have died of malaria. Romans attributed malaria disease to the swamps.[1]

- **Causative Agent**

Malaria is caused by protozoa of the genus Plasmodium.
Four species cause disease in humans:

1. Plasmoium falciparum
2. Plasmodium vivax
3. Plasmodium ovale
4. Plasmodium malariae[2]

- **Symptoms**

Requires a medical diagnoses: Chills, fever and sweating, usually occurring a few weeks after being bitten.
People may experience

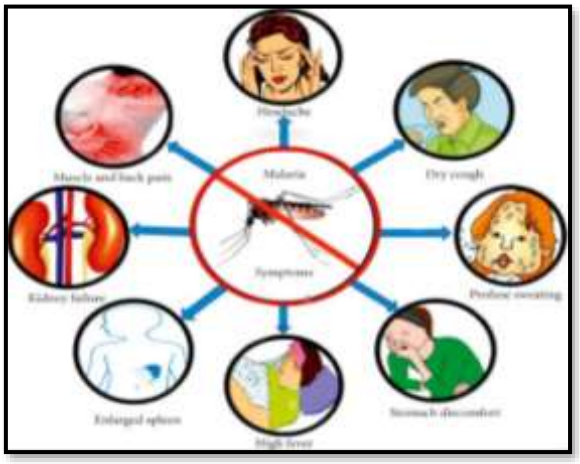
Pain areas: In the abdomen or muscles

Whole body: Chills, Fatigue, Fever, Night Sweats, Shivering, Or Sweating

Gastrointestinal: Diarrhoea, Nausea, Or Vomiting.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Fig.2 - Symptoms of Malaria



2.2 **Nocturnal Leg Cramps**

Tired muscles and nerve problems occurs nocturnal leg cramps. Kidney failure, diabetic nerve damage cause night leg cramps. The risk of night leg cramps increase with age, pregnant females are most likely the have night leg cramps.

Nocturnal leg cramps are common in older people. Such cramps are associated with many common diseases and medications. Physiological methods may be useful for preventing cramps in some people, but there have been no controlled trials of these approaches. Quinine is moderately effective in preventing nocturnal leg cramps. In patients with severe symptoms, a trial of 4±6 weeks' treatment with quinine is probably still justified, but the efficacy of treatment should be monitored, for example using a sleep and cramp diary.[3]

3.HYPOTHESIS STATEMENT

Hypothesis: The concentration of quinine sulphate in a solution can be accurately estimated using a photo fluorometer due to the direct proportionality between the fluorescence intensity emitted by the quinine sulphate and its concentration in the solution.

Explanation

Quinine sulphate is known to exhibit fluorescence when exposed to ultraviolet light. A photo fluorometer measures the intensity of this fluorescence, which is expected to be directly proportional to the concentration of quinine sulphate in the solution. Therefore, by calibrating the photo fluorometer with standard solutions of known quinine sulphate concentrations, it should be possible to estimate the concentration of unknown samples accurately.

4. METHOLOGY

4.1 Photo Fluorometer

Fluorometer is an instrument for measuring the intensity of fluorescence. A fluorometer involves using a beam of light, usually ultraviolet light. The emitted light is proportional to the concentration of the analyte being measured (up to a maximum concentration).

A fluorometer measures the fluorescence or light emitted by different fluorescing object. Fluorescence occurs when light of specific wavelength hits and excites electrons in a sample, and the electrons in that sample instantly emit or fluoresce light of a different wavelength.[4]

Common detector configurations of fluorometer include photomultiplier tubes and photodiodes. These parameters are used to identify the presence and the amount of specific molecules in a medium.

Photo Fluorometer designed for analysis of fluorophores such as vitamin, quinine, fluorescence metal complexes, etc. The Fluorescence is caused by the absorption of radiant energy and the re-emission of some of its energy in the form of light.[5]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- **History of Fluorometer**

Clair Loring Farrand (1895-1981), an inventor best known for his work with the cone loudspeaker, began his career as a Marconi radio operator. He established the Farrand Optical Company in 1941, bought a factory in the Bronx, and made optics for the U.S. Army and Navy during World War II. The firm moved to Mount Vernon, New York, in the mid-1960s.



Fig.4 – First Fluorometer

Definition of Fluorescence is a spontaneous emission of radiation from an electronically excited species (or from a vibrationally excited species) not in thermal equilibrium with its environment.

4.2. Fluorescence

When a beam of light is incident on certain substances they emit visible light or radiations. This is known as fluorescence. Fluorescence starts immediately after the absorption of light and stops as soon as the incident light is cut off. The substances showing this phenomenon are known as flourescent substances.

Fluorescence is one of two kinds of emission of light by a substance that has absorbed light or other electromagnetic radiation. Fluorescence involves no change in electron spin multiplicity and generally it immediately follows absorption; phosphorescence involves spin change and is delayed. [6]

4.3. Fluorescence Spectroscopy or Fluorometry

An analytical technique for identifying and characterizing minute amounts of a substance by excitation of the substance with a beam of ultraviolet/visible light and detection and measurement of the characteristic wavelength of fluorescent light emitted.

Fluorescence spectroscopy is a very sensitive and selective analytical technique for detecting and measuring trace amounts of organic compounds. The selective nature of this technique arises because each compound is characterized by an excitation.

- **X-ray Fluorescence Method**

In these methods, X-rays are generated within the sample and by measuring the wavelength and intensity of the generated X-rays, one can perform qualitative and patative analysis, X-ray fluorescence method is non-destructive and frequently requires very sample preparation before the analysis can be carried out.[7]

4.4. Principle

When any molecule absorbs UV/Visible radiation, its electrons transmit from singlet ground state to singlet excited state and as this excited state is not stable, it emits the radiation and returns to the stable singlet ground state. This phenomenon of emission of radiation is known as fluorescence. The fluorimeter is the measurement of this emitted radiation.

The emitted radiation (fluorescence intensity) is directly proportional to the concentration of the substance present which can be measured by fluorimeter. Quinine sulphate in 0.1 N sulphuric acid gives blue fluorescence and the fluorescence intensity can be measured by fluorimeter with the excitation wave length of 360 nm using primary filter and with the emission wave length of 485 nm using secondary filter.[8]

4.5. Instrumentation of Photo Fluorometer

- **Photo fluorometer is consist of –**
  1. Light source
  2. Filters or monocromators

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3. Sample holder
4. Detector
5. Galvanometer[9]

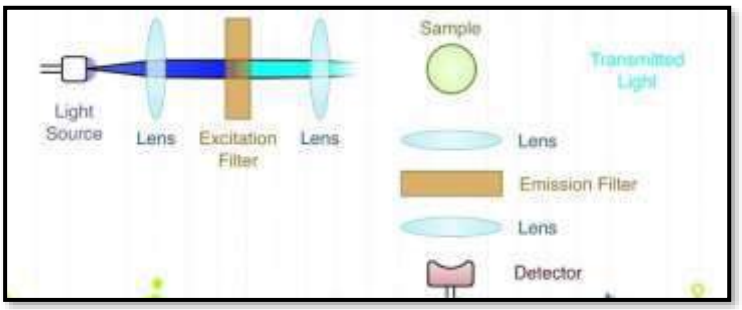


Fig.5 – Instrumentation of Photo fluorometer

A. Light Source

A mercuric vapour lamp with glass or fused silica is commonly used as source.

For more sophistication Instruments, high pressure xenon lamp used as source of radiation

I. **Deuterium and Hydrogen lamps**

A pair of electrodes is enclosed in a glass tube containing hydrogen or deuterium gas. When current is passed in electrodes electron discharge is occurring which exited the gas molecule which results in the emission of radiation (UV & Visible).

Wavelength: 160-800 am

Quartz window must be employed.





Fig. 4 Deuterium lamp **Hydrogen lamp**

II. **Xenon arc Lamp:** It consists of two tungsten electrodes form an arc at a specific distance and xenon gas is stored (under pressure) in quartz or fused silica tube. It emits radiation with a higher intensity (500 nm) than a hydrogen discharge lamp.

Wavelength: 750-1000 nm.



Fig. 2 - Xenon arc Lamp

III. Tungsten Halogen Lamp:

It is also known as a halogen lamp. It is an incandescent light source. It is consists of a filament made up of tungsten enclosed in a quartz vessel containing an inert gas and a small quantity of iodine or bromine (Halogen).

Its 85% emitted light lies in IR and near IR region, 15 % in the visible region, and less than 15% in the UV region.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Fig. 3 – Tungsten halogen lamp

IV. Mercury Vapor Lamp

These lamps are ideal light sources that provide high-intensity light in the deep UV to visible regions. It consists of 2 alloys (tungsten) electrodes which are placed together in a medium containing mercury vapor and 25-50 torr of pure argon gas. These electrodes are enclosed in an elliptically shaped in a silica glass tube. It provides clear white light, high intensity with 24000 Hrs. of life.



Fig. 4 - Mercury Vapor Lam

B. Filter And Monochromator

i. Filter

Filter is a device used to get selected wavelength. It allows the light pass through it but absorbed the light of different wavelength may partially and fully. A specific filter is used to obtain the desired wavelength for special analysis like Primary filter and Secondary filter.

Primary filter-absorbs visible radiation and transmit UV radiation.

Secondary filter-absorbs UV radiation and transmit visible radiation.

ii. Monochromator

They convert polychromatic light into monochromatic light. They can isolate a specific range of wavelength or a particular wavelength of radiation from the source.

a) **Excitation monochromators:** Provides suitable radiation for excitation of molecules.
b) **Emission monochromators:** Isolate only the radiation emitted by the fluorescent molecules.

C. Sample Holder

Cuvettes are used for the handling of samples. These are rectangular or cylindrical in shape with two rough and two smooth sides, and made up of glass, quartz or fused silica.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Fig.6. Sample Holder

D. Detector

Detector in a device which transforms light energy into electrical signals that are observed on recorder. The characteristic of ideal detector is give quantitative response, high sensitivity, low noise, shot response time, and response quantitative to wide spectrum of radiation received.Some commonly used detectors are as follows.

a) Barrier layer cell/Photovoltaic cell

It is consist of a coated silver of gold thin layer of metallic film which acts as an electrode and another metal plate acts another electrode. Both of the layers are separated by selenium layer that act semiconductor. When UV radiation falls on selenium layer, an electron become mobile and is taken up by transparent metal layer that results a potential difference between the electrodes & causes the flow of current.

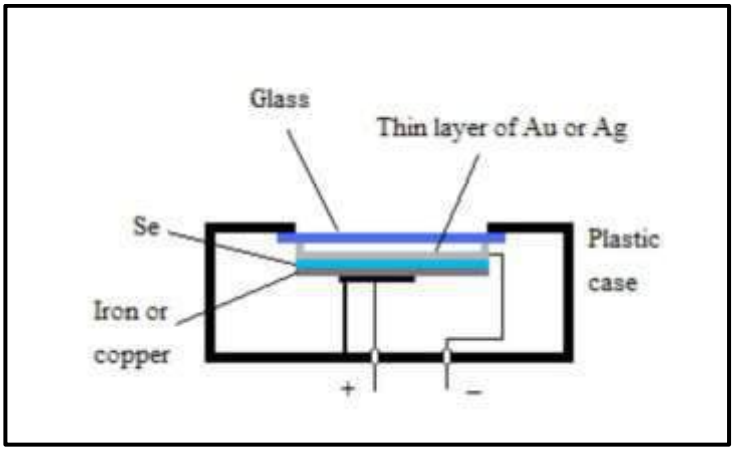


Fig. 8 - Barrier layer cell

b) Phototubes/ Photo emissive tube

It is consists of an evacuated glass tube with a photocathode and a collector anode. The surface of photocathode is coated with a layer of elements like cesium, silver oxide and its mistures. When radiant energy falls on photosensitive cathode, electrons are emitted which are attracted to anode causing flow of current. It is more sensitive than barrier layer cell.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

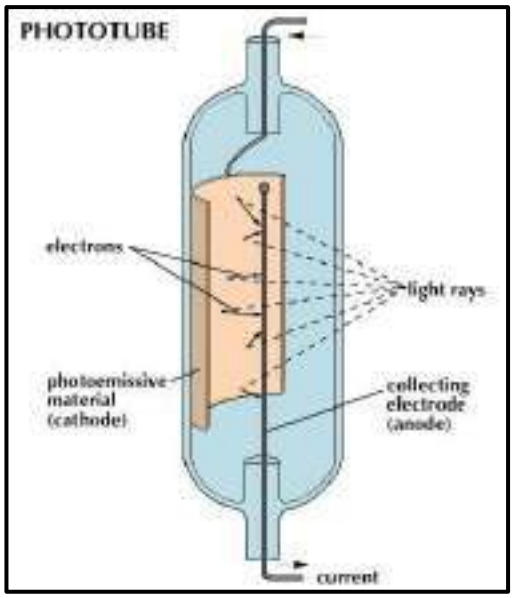


Fig. 9 - Phototubes

c) Photomultiplier Tube

Photomultiplier tube is multiply the photoelectrons by secondary emission of electrons. A primary photo-cathode is fixed in a vacuum tube which receives radiation from the sample. Some 08 to 10 dynodes are fixed each with increasing potential of 75-100V higher than preceding one. Near the last dynode electron collector electrode is fixed. It is extremely sensitive to light and detect weaker or low radiation.[10]

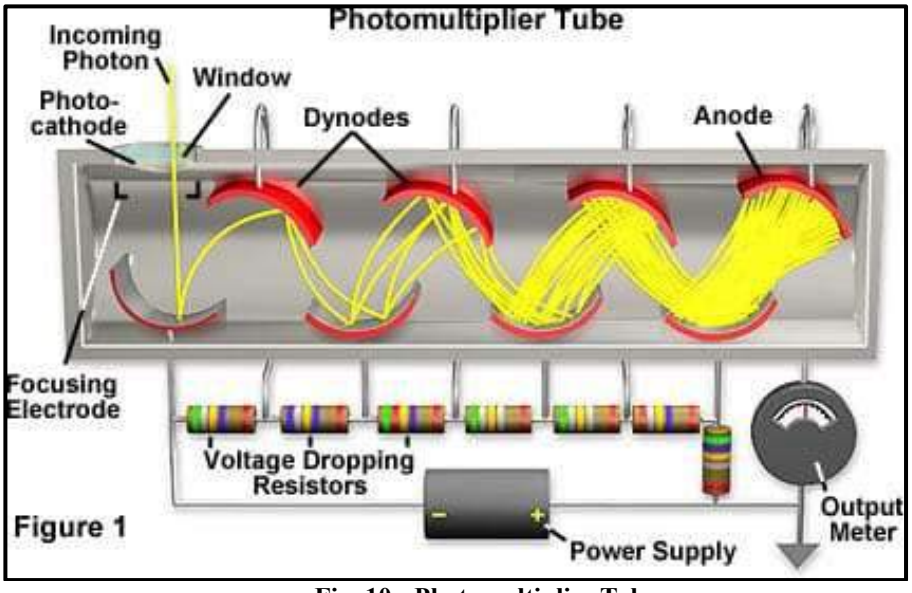


Fig. 10 - Photomultiplier Tube

4.8 Types of Photo Fluorometer:

Two main types of Photo Fluorometer –

1)Single beam photo fluorometer

2) Double beam photo fluorometer

1) Single beam Photo Fluorometer

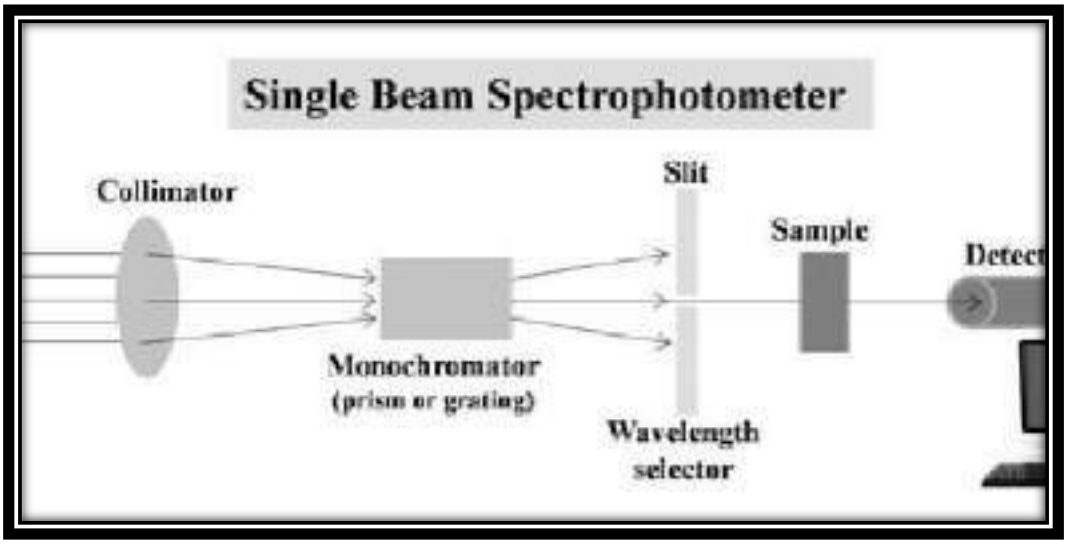
In single beam fluorimeter, all the light waves pass through the sample.

Primary filter-absorbs visible light.

Secondary filter-absorbs UV light.

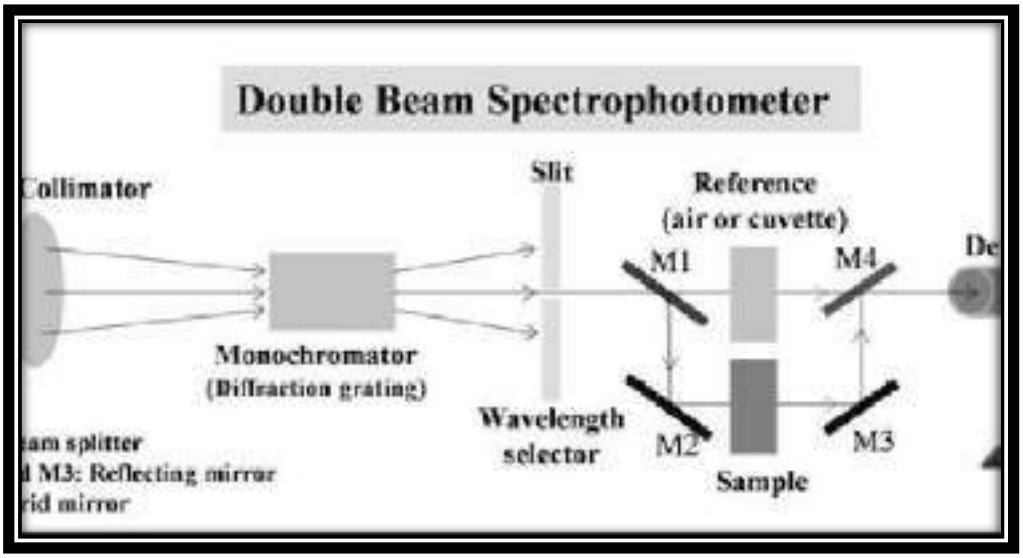
Reference and sample cant be analysed simultaneously.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



2) Double Beam Photo Fluorometer

In double beam fluorimeter the light beam splits into two parts and only one part passes through the sample.
Primary filter-absorbs the light and passes to the sample.
Secondary filter - absorbs the light from the sample and sent to detector.
Reference and sample can be analyzed simultaneously.



4.6. Uses

- **Dairy Industry**

Fluorimetry is widely used by the dairy industry to verify whether pasteurization has been successful. This is done using a reagent which is hydrolysed to a fluorophore and phosphoric acid by alkaline phosphatase in milk. If pasteurization has been successful then alkaline phosphatase will be entirely denatured and the sample will not fluoresce.[11]

- **Protein aggregation and TSE Detection**

Thioflavins are dyes used for histology staining and biophysical studies of protein aggregation. For example, thioflavin T is used in the RT-QuIC technique to detect transmissible spongiform encephalopathy-causing misfolded prion

- **Oceanography**

Fluorometers are widely used in oceanography to measure chlorophyll concentrations based on chlorophyll fluorescence by phytoplankton cell pigments. Chlorophyll fluorescence is a widely-used proxy for the quantity (biomass) of microscopic algae in the water.

- **Molecular Biology**

Fluorometers can be used to determine the nucleic acid concentration in a sample.[11]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4.9 Advantages

1) **Sensitivity:** it is give accurate result even sample is present in microgram concentration in solution.
2) **Precision:** upto 1% can be achieved easily.
3) **Specificity:** This method is more specific than absorption method.

4.10. Disadvantages

1. Change in pH effect fluroscence
2. oxygen may decrease fluroscence.
3. Heavy metal presence are also decrease fluroscence.

4.11. Applications of Photo Fluorometer

1) Inorganic/organic chemistry

i. Determination of ruthenium
ii. Determination of aluminium in alloys
iii. Estimation of bismuth
iv. Determination of beryllium in Silicates
v. Determination of cadmium
vi. Assay of thiamine
vii. Estimation of quinine sulphate
viii. Investigation of chemical structures and reactions.

2) Biochemical Analysis

Fluorimetry helps in the analysis of concentration, structure, and interactions of compounds such as proteins, and nucleic acids, and their quantification.

Fluorometer is used in determination of alkaline phosphatase enzyme in milk.[12]

3) Biology & Biotechnology

Fluorometer are used to measure the chlorophyll fluorescence to investigate plant physiology.

Fluorescence spectroscopy is mainly used to determine the content of certain components in biological samples, analysis of biotechnology and immunotechnology, such as the determination of deoxyribose and deoxyribonucleic acid, DNA, antibodies, antigens, and other aspects of research. Fluorometer can be used to determine the nucleic acid concentration in sample.

4) Pharmaceutical Industry:

Fluorescence detection is used for dissolution testing of tablets and products in the pharmaceutical industry when the use of UV absorption is not appropriate.

4.12. Factor Affecting Fluorescence

- **Effect of Structure:**

The nature of the chemical structure of a molecule in terms of flexibility and rigidity is of made influence on the fluorescence and phosphorescence signal. Molecules that have a high degree of flexibility will tend to decrease fluorescence due to higher collisional probability. However, more rigid structures have a lower probability of collisions and thus have more potential.

Effect of Solvent:

Solvents affect the luminescent behaviour of molecules. There are three common effects can be recognized-

a. **The polarity of Solvent:** A polar solvent is preferred as the energy required for the P is lowered.
b. **The viscosity of Solvent:** Highly viscous solvent is perfected since collisional deactivation will be lowered at higher viscosities.
c. Heavy Atoms in Solvent: Solvents contain heavy atoms, fluorescence quantum efficiency will decrease and phosphorescence will increase.

- **Effect of Temperature**

Molecule experiences larger collisional deactivation at high temperatures due to an increase in the movement and velocity of molecules. Therefore, lower temperature are preferred for analysis.

- **Effect of Dissolved Oxygen**

Dissolved oxygen affects florescence at large scale. Molecules experience microsystem crossing due to it is paramagnetic nature.

- **Effect of Concentration**

The Fluorescence is directly proportional to the amount of absorbed radiation. When the concentration of the fluorescent molecules increases in a sample solution, the fluorescence intensity is reduced.

5. PLAN OF WORK

Estimating quinine sulphate using a photo fluorometer involves measuring the fluorescence emitted by quinine sulphate solution under specific conditions. Here's a general plan of work for this estimation:

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5.1. Preparation of Solutions:

Prepare a stock solution of quinine sulphate of known concentration. Dissolve a known mass of quinine sulphate in a known volume of solvent (usually distilled water or buffer solution) to obtain a desired concentration (typically in mM or μm).

5.2. Instrument Setup:

Calibrate the photo fluorometer according to the manufacturer's instructions. This involves setting the appropriate excitation and emission wavelengths for quinine sulphate fluorescence.

6.Material Requirenment :

6.1 Apparatus: Cuvette, Primary Filter, Secondary Filter, Volumetric Flask, Beaker, Measuring Cylinder.

6.2 Chemical: Quinine Sulphate, Sulphuric Acid (H_2SO_4), Distilled Water.

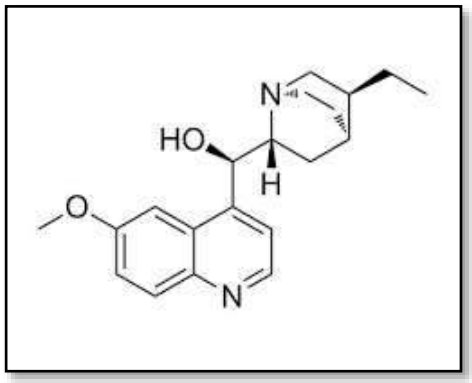
6.3 Instrument: Photo Fluorometer.

- **Definition**

The sulfate of a natural substance, quinine, obtained from the bark of various species of cinchona including Cinchona succirubra, Pavon. (red cinchona); Cinchona officinalis, Linn; Cinchona calizaya, Wenddell; Cinchona ledgeriana, Moens.

Quinine is used to treat malaria caused by Plasmodium falciparum. Plasmodium falciparum is a parasite that gets into the red blood cells in the body and causes malaria. Quinine works by killing the parasite or preventing it from growing.[13]

- **Structural formula:**



- **Molecular formula:** $C_{40}H_{50}N_4O_8S$
- **IUPAC Name:** (R)-[(2S,4S,5R)-5-ethenyl-1- azabicyclo[2.2.2]octan-2-yl]-(6-methoxyquinolin- 4-yl)methanol; sulfuric acid .
- **Formula weight:** 782.96.
- **Mechanism of Action:** It has many mechanisms of action like reduction of oxygen intake and carbohydrate metabolism, disruption of DNA replication and transcription via DNA intercalation and reduction of the excitability of muscle fibers via alteration of calcium distribution. It is toxic to malarial parasite, Plasmodium falciparum'. It interferes with the parasite's ability to break down and digest haemoglobin.[14]
- **Metabolism:** It is metabolized into 3-hydroxyquinine (major metabolite, less active than Quinine), 2-quinone, O-dimethylquinine, and 10,11-dihydroxydihydroquinine mainly by the liver oxidative cytochrome P450 (CYP) pathways. Then, these primary metabolites are further metabolized into six secondary metabolites.[15]
- **Clinical uses**: Antimalarial, Analgesic, Mild antipyretic, Non-narcotic, Flavouring agent, Muscle relaxants
- **Adverse effects:** Headache, Low blood platelets Irregular heartbeat**,** Sweeting[16].

7. EXPERIMENTAL METHODOLOGY :

7.1) Calibration of instrument:

Taken 5ml of Dis. water in cuvette and calibrate the photo fluorometer.

7.2) Preparation of 0.1N H_2SO_4:

Adding 5.4 ml of concentrated H_2SO_4 in 100ml of H_2O and dilute in 1L (for standard).

Adding 0.54 ml of conc. H_2SO_4 in 10ml and dilute with 100ml of H_2SO_4.

7.3) Preparation of standard solution:

1) Weight accurately 100mg of Quinine sulphate powdered drug.
2) Dissolve in 100ml of 0.1N H_2SO_4 (1mg/ml)
3) Taken 10ml of above solution and dilute to 100ml with 0.1 N H_2SO_4.
4) Again taken 10 ml of above solution dilute to 100ml with 0.1N H_2SO_4.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

5) To get the resulting solution of 0.5, 1.0, 1.5, 2.0, and 2.5 µg/ml of above solution respectively and dilute to 10ml with 0.1N H_2SO_4.

7.4) Preparation of sample solution: Pipette 1ml of given sample solution and make up the volume to 10ml with 0.1 N H_2SO4.



Fig. 13 – Stock solutions

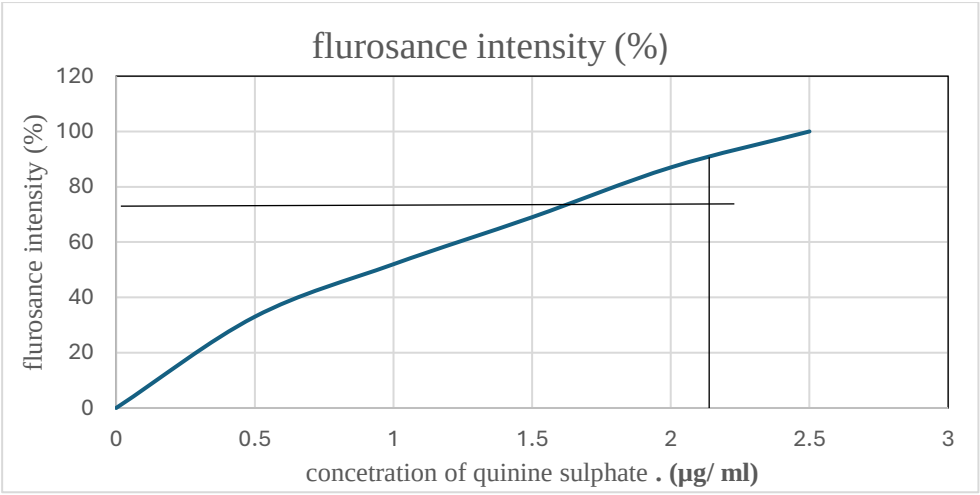
7.5) Operation of fluorimeter

1) Switch on the instrument and stabilized for 10min.
2) Keep the primary and secondary and secondary filters at the wavelength of 3486A and 4308A respectively in instrument.
3) Set the fluorescence intensity to 0% using 0.1 N sulphuric acid as blank.
4) Set the fluorescence intensity to 100% by using highest concentration of the standard solution (2.5 µg/ml)
5) Measure the percentage fluorescence intensity of different standard solution (0.5,1,1.5,2 µg/ml)
6) Measure the percentage fluorescence intensity of the sample solution.
7) Plot a graph between concentrated verses fluorescence intensity and determine concentration of sample by extrapolating the fluorescence intensity.

7.6) Observation table

Sr. no	Conc. (µg/ml)	Fluorescence intensity (%)
1	0.0	0
2	0.5	13
3	1.0	36
4	1.5	52
5	2.0	78
6	2.5	100
7	3.0	64

- **Graph**



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

➢ **INFERANCE**

Estimating quinine sulphate using a Photo fluorometer involves measuring the fluorescence emitted by the compound when exposed to specific wavelengths of light. By comparing this fluorescence to a standard curve of known concentrations, you can infer the concentration of quinine sulphate in your sample. This method is sensitive and precise, commonly used in pharmaceutical and research settings for quantifying various compounds, including quinine sulphate.

RESULT:

Concentration of unknown sample of quinine sulphate was found to be 2.1 (µg/ml) by using photo fluorometer.

CONCLUSION

In conclusion, the estimation of quinine sulphate using a photo fluorometer proved to be an effective method with several notable findings. Through calibration curves generated at various concentrations, we established a linear relationship between the intensity of fluorescence and the concentration of quinine sulphate. Our experimental data exhibited high precision and accuracy, as evidenced by low standard deviations and minimal deviation from theoretical values.

Furthermore, the method demonstrated good sensitivity, with the photo fluorometer capable of detecting even minute concentrations of quinine sulphate. This sensitivity is particularly advantageous in pharmaceutical analysis, where precise quantification of active ingredients is essential for quality control.

REFERANCES

1. *De, A., & Kumar, R. (Year). Life cycle of malaria. In A Textbook of Medicinal Chemistry (pp. 4.2-4.12). Rizali Publication.*
2. *Bhise, S. B., & Mis, R. (Year). Causative agent. In A Textbook of Pharmacology - III (p. 3.53). Mitali Publication.*
3. *Butler, J., Mulkecsin, E. C., & O'Keefe, S. T. (Year). Nocturnal leg cramps. Unit IV, Merlin Park Regional Hospital, Galway, Iceland.*
4. *Shinde, M. A., & Department of Chemistry, Savitribai Phule Pune University. (Year). Photo fluorometer. [Additional details if available]. Pune, India.*
5. *Wotsfold, P. J., Clinch, J. R., & Cazay, H. (Year). Spectrophotometric method for analysis. Analytica Chimica Acta, 5, [pages].*
6. *Valeur, B., & Berbern, M. (Year). [Title of the work]. Conservatoire National des Arts et Métiers, 292 Rue Saint Martin, F-75008 Paris, & Institut d'Alembert, Laboratories PPSM, ENS Cachan, 61 Avenue du Président Wilson, F-94235 Cachan Codex, France. Centro de Quimica - Física Molecular & Nanoscience, Instituto Superior Técnico, Nanotechnology, 1049-007 Lisbon, Portugal.*
7. *Chatwal, G.R., & Anand, S.K. (2014).A Textbook of Instrumental Methods of Chemical Analysis. Himalaya Publishing House.*
8. *Pal, R., & Pandey, P. (M.Pharm). Pharmaceutics, NAMS Institute of Pharmacy, MIMS University, Jaipur, Rajasthan, India.*
9. *Mahadik, K.R. (2010). A Textbook of Instrumental Methods of Analysis, (pp. 4.6-4.7). Sathiyrical Publication.*
10. *Skoog, D.A., Holler, F.J., & Crouch, S.R. (2007).Principles of Instrumental Analysis (6th ed.). Cengage Learning.*
11. *Beckett, A.H., & Stenlake, J.B. (2001).** Practical Pharmaceutical Chemistry, Volume 2 (4th ed.). CBS Publishers & Distributors.*
12. *Jolanta Geazyna Rola, Maciej Sonowsks. Animal Department of Origin, Rational Veterinary Research Institute, 24-100, Pulawy, Poland.*
13. *Kathryn Lawson Wood, Kieran Fuans. Perkin Elmer Inc., Seer Green, UK. In Journal of Applied Fluorescence Spectroscopy.*
14. *D.T. Patil, S.I. Bhatter, G.B. Kolekar, S.R. Patil. Fluorescence Spectroscopy Research Laboratory, Department of Chemistry, UniDefine, Hapur.*
15. *Martin Smilkstein, Mangluk Seiwilaijazoen, Jane Xu Kelty, Prapan Wilaitat, Michal Riscoe. Medicinal Research Service, Department of Veterans Affairs Medical Center & Oregon Health & Science University, Portland, Biochemistry Department, Mahidol University, Bangkok.*
16. *Sawyer, D. I., Heineman, W. R., & Beebe, J. M. (Year). Chemistry Instrumental Method. Biochemical Analysis, 15, 16.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

DETERMINATION OF ELEMENT BY USING FLAME PHOTOMETRY

Archana Shivaji Jamdhade[1*], Yogiraj P. muley [2], Ankit Kantilal Sanap[3]
[1]Student of Bachelor in Pharmacy, Dr. Babsaheb Ambedkar Technological University, Raigad, Lonere.
[2]Department of Pharmaceutical chemistry , Faculty of Pharmaceutical chemistry,
Dr. Babsaheb Ambedkar Technological University, Raigad, Lonere
[3]Student of Bachelor in Pharmacy, Dr. Babasaheb Ambedkar Technological University, Raigad, Lonere

**Corresponding author: Archana Shivaji Jamdhade*

ABSTRACT
The need of soil testing is very important for getting overall physical, chemical and biological behavior of soil. When we see the soils are not responding after sowing of crop and applied fertilizers, definitely soil and crop are suffering from deficiency of nutrients. Therefore we cannot achieve optimum growth of crop, productivity and soil health. Ultimately soil and crop nutrient balance is negative.
KEYWORD: *soil composition, role of physiochemical properties, soil precautions Precautionary measure soil, potassium status, potassium fertilization, crop response.*

1. INTRODUCTION

The soil of India is a complex and diverse resource that plays a crucial role in sustaining the country's agricultural productivity and supporting various ecosystems. It is a result of intricate interactions between geological processes, climate, vegetation, and human activities over thousands of years. India's vast territory and varied topography give rise to a wide range of soil types, each with distinct characteristics and capabilities.

Thus, soil testing is widely accepted and used in most advanced crop- production areas of the world to determine fertilization needs for crops. Soil testing can also be used to identify application The use of fertilizers without first testing the soil is like taking medicine without first consulting a physician to find out what is needed. It is observed that the fertilizers increase yields and the farmers are aware of this.

But are they applying right quantities of the right kind of fertilizers at the right time at the right place to ensure maximum profit Without a fertilizer recommendation based upon a soil test, a farmer may be applying too much of a little needed plant food element and too little of another element which is actually the principal factor limiting plant growth.

This may not only be uneconomical use of fertilizers, but also in some cases crop yields actually may be reduced because of use of the wrong kinds or amounts, or improper use of fertilizers. A fertilizers recommendation from a soil testing laboratory is based on carefully conducted.[24]

2. RESEARCH PROBLEM

2.1What is electrolytes

Electrolytes are substances that have a natural positive or negative electrical charge when dissolved in water.
Electrolyte in soil play a vital role in providing essential nutrients to plants. These minerals help in conducting electrical signals within the soil, facilitating the movement of water and nutrients to plant roots.

They also influence the pH levels of the soil, affecting nutrient availability for plant uptake. By maintaining proper electrolyte balance in the soil, plants can thrive and grow healthily. Electrolytes in soil can have a significant impact on plant growth and overall soil health.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2.2What is soil testing?
The process by which elements such as phosphorus, potassium, calcium, magnesium, sodium, Sulphur, manganese, copper and zinc are chemically removed from the soil and measured for their available content within the sample of soil is called Soil Testing. This is an important diagnostic tool for determining the nutrient for plants.

2.3 Why soil testing is important?
Knowing the exact nutrient found in your farm soil and the pH is the first step of any healthy crop production program. Crops are usually grown on a very wide variety of soil types and different fertilizer requirements, depending on the soil's health and condition. The Application of many nutrients can result in an imbalance in soil and eventually affecting the Environment and contaminating water and the creatures beneath. Regular, repeated soil Sampling is best management practice. The better you know your soil, the easier it will be to Get the best out of it.Improved crop yields, Sustainable land management. [26]

A) Sodium Chloride
Salinity is a major problem affecting crop production all over the world: 20% of cultivated land in the world, and 33% of irrigated land, are salt-affected and degrade Introduction Soil salinization is a major factor contributing to the loss of productivity of cultivated soils. Although difficult to estimate accurately, the area of salinized soils is increasing, and this phenomenon is especially intense in irrigated soils.

B) Potassium Chloride
Potassium (K) is an essential nutrient for plant growth. Because large amounts are absorbed from the root zone in the production of most agronomic crops. It is classified as macronutrient Plants require K for photosynthesis, ATP production, translocation of sugars, starch production in grains, nitrogen fixation in legumes, and protein synthesis. In corn and other crops, K strengthens stalks and stems, thus helping with disease. [6]

3. HYPOTHESIS STATEMENT
The hypothesis suggest that by sodium and potassium level present in body. How much concentration can be present in human body determined using flame photometer so that prophylaxis that the disease condition related with sodium potassium ion can be done easily.. This method aims to make it easier to address conditions related to sodium and potassium imbalances in the body.

4. LITERATURE REVIEW
The whole literature from the peer-reviewed research was collected using the web sources viz. Google search (http//www.google.co.in), Researchgate, Google scholars (http//www. Scholars. Google.co.in), CERA facility, HAU/ICAR [25]

5. METHODOLOGY
5.1 Flame Photometer
In flame photometry we will determine high sensitivity and high reliability of element first two column of the periodic table. Falme photometer a traditional and simple basic method for determination sodium and potassium in biological fluid involved in technique for emission photometry.

Flame photometry is a branch of spectroscopy in which the species are examined in a spectrometer are in a form of atom. A flame photometer is instrument used in inorganic chemical analysis to determine the concentration of certain metal ions (mainly sodium potassium calcium lithium)

Flame photometry is also called flame emission spectroscopy because of fame provide energy excitation to ion introduced into flame. Flame photometry is a sample rapid method for routine determination of element can easily excited.

This relies on the principle that on alkali metals salt drawn into a non luminous flame will ionise absorb energy form the flame then emit light of characteristic wavelength as the excited atom decay to the unexcited ground state.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

History
During 1980s Bowling Barners, David Richardson Johnson Berry and Robert Hood development and instrument to measured the low concentration sodium and potassium in a solution. They name the instrument as flame photometer. Type of flame photometry .

5.2 Type of flame photometer
1]Single Elements Flame Photometer
Flame photometry, an analytical chemistry technique, is critical in determining the concentration of metal ions in a solution.
Flame photometers are crucial tools in flame photometry, offering a variety of capabilities to fulfill a variety of analytical demands. The most basic version of this device is the single-channel flame photometer that works by passing a sample solution through a flame, which atomizes the elements present. The heat of the flame then excites the atoms, causing them to release distinctive light. Flame photometers are used to determine the metal ion concentration of environmental samples such as water and soil.

2]Dual-Channel Flame Photometer
This type of instrument is capable of detecting multiple element typically (sodium calcium potassium). Dual-channel flame photometers are an improvement over single-channel versions in that they can assess two separate elements in a sample at the same time.
This tool can be used by environmental scientists to test samples containing numerous metal ions, allowing them to estimate pollution levels in water and soil.

3]The Multi-Channel Flame Photometer
The multi-channel flame photometer is an invaluable tool for laboratories dealing with complex samples including many components. It facilitates the analysis of several elements in a single sample run. These devices have numerous flame systems and detectors, each calibrated to a different element.

This equipment is extremely useful in environmental analysis for examining materials containing different metal ions, such as water and soil. This aids in the monitoring of pollutant levels and the comprehension of ecosystem health.
Medical laboratories benefit from simultaneous measurements of multiple elements in biological fluids. This aids in diagnosing and managing medical conditions.

4]Atomic Absorption Flame Photometer
Atomic absorption flame photometers take the technology a step further by employing the atomic absorption spectroscopy principle. In this method, a hollow cathode lamp emits light at a specific wavelength, which corresponds to the resonance wavelength of the element being analyzed.
The sample solution is introduced into the flame, and the amount of light absorbed by the excited atoms is measured. This absorption is directly proportional to the concentration of the element. In medical laboratories, simultaneous measurement of elements such as sodium and potassium in biological fluids aids in diagnosing and monitoring medical conditions.

5]Digital Flame Photometer:
Digital flame photometers have been developed as a result of modern technical breakthroughs. These instruments feature digital interfaces, touch screens, and computer connectivity, which improves user experience and data administration. They frequently include software for data processing and reporting, which speeds up the analytical process.
Industries that require strict quality control benefit from the precision of the equipment in quantifying metal ions in their goods, assuring consistency and conformity.

6. PRINCIPLE
The flame photometry principle is based on measuring the intensity of emitted light.when metal is introduced into the flame the colour of the wavelength and its intensity both reveals information about the elements present in the given sample and their relative concentration respectively.

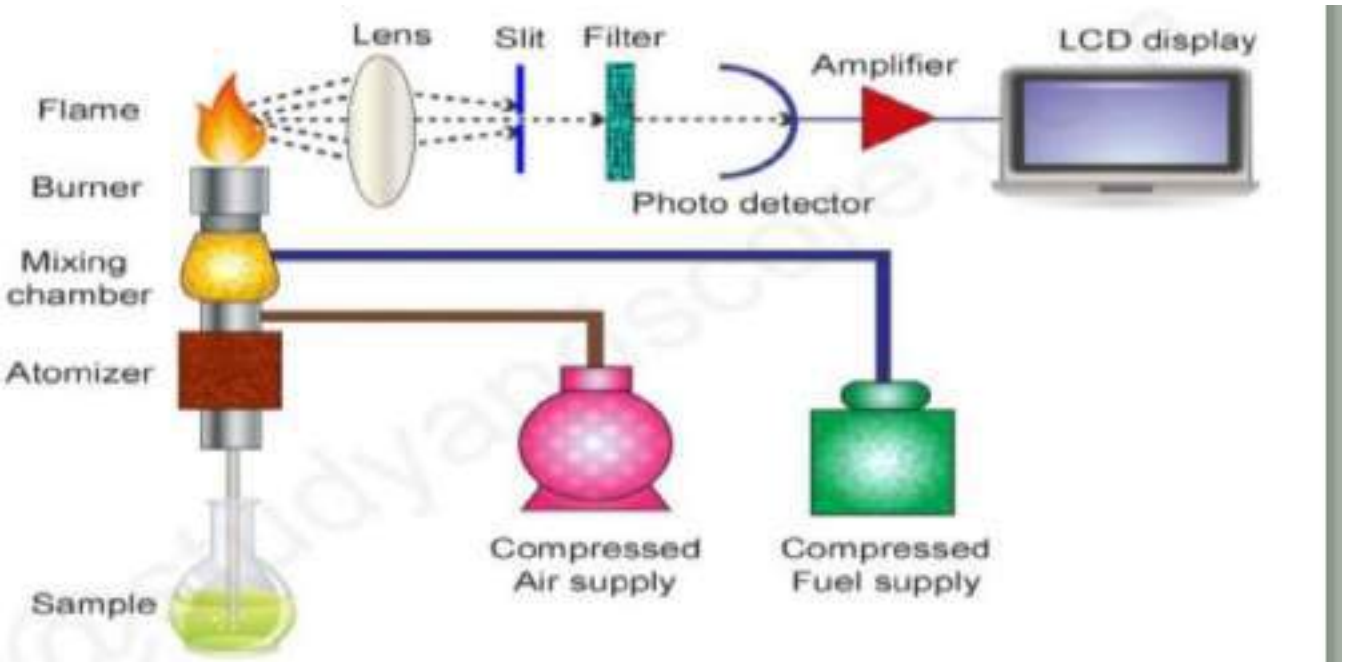
As a result this atom which unstable at greater level return to the ground state when these items return to their ground state they emit of specific wavelength primary in visible range when a solution containing significant amount of metal is injected into flame following event occur in a fast succession. Atom emits light when transition from excited state to lower energy state.

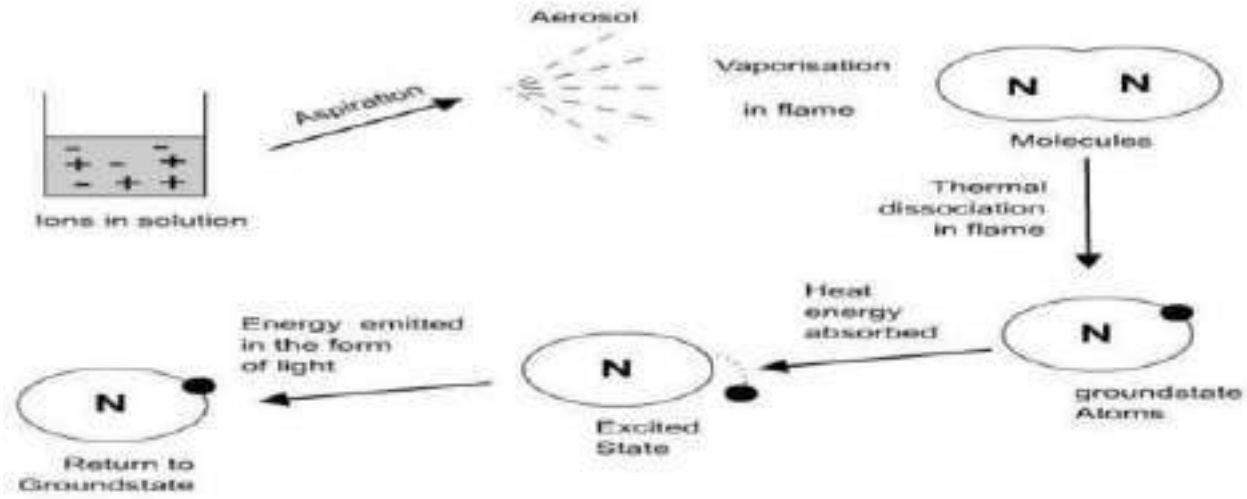
SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Flame atomization Sample solution is spray into flame where atom are vaporise and excited. Light measurement flame Photometer detect and measure the emitted light to quantity the element concentration.

In the 1920's Lundegardh largely overcame these difficulties by introducing a nebulizer that enabled the Sample to be presented to the air/acetylene flame in aerosol form.

6.1 Construction of Flame Photometer





SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

6.2 Instruments

1. Sample
2. Source
3. Mirrors
4. Slits
5. Monochromators/Filters
6. Detector

1) Sample

There are Three components for introducing the liquid sample. Nebulizer: It breaks up the liquid into small droplets. Nebulization is Conversion of sample to a mist of finely divided droplets using a jet of Compressed gas.

A flaw carries the sample into atomization region.Nebuliser is a device used for sample introduction into the flame.

The process is called Nebulization and consists of thermal vaporization and dissociation of aerosol particles at highTemperatures producing small particle size with high residence time. A number of nebulization methods are available.

A few are listed below:

- Pneumatic nebulization
- Ultrasonic nebulization
- Electrothermal vaporization

Hydride generation (used for certain elements only) However, we would discuss about the pneumatic nebulization only. It is the most commonly Employed nebulization method in flame photometers.

Pneumatic nebulizer is the most commonly Used nebulizer for introducing aqueous/ liquid samples. In this the sample solution is fed or Aspirated into the nebulizer which converts liquid into a fine mist, or aerosol which into the flame. A common type of pneumatic nebulizer is called concentric pneumatic nebulizer.

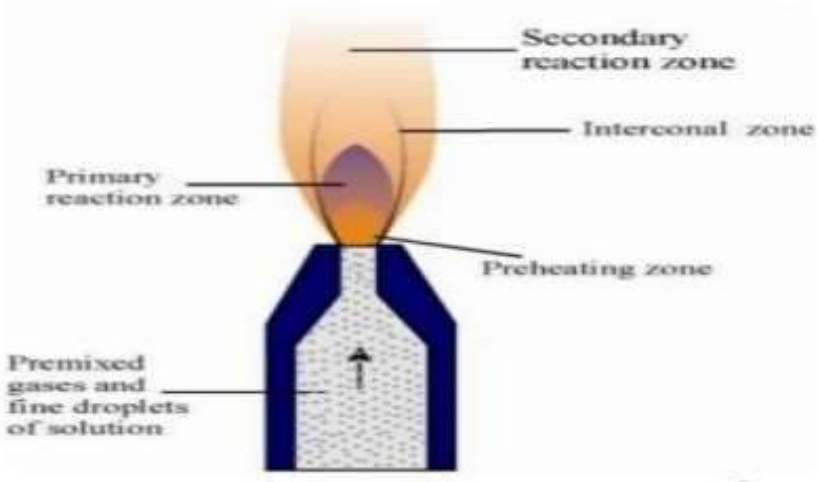
2) Source/Burner

The flame used in in instrument must possess these function the flame should possess the ability to evaporate the liquid droplets from the sample solution. Resulting in the formation of solid residues.

The flame should decompose the compound in the solid residue, resulting in the formation of atoms.

In flame photometry, several burners and fuel oxidant combinations have been used to produce The analytical flame. Including Meckel, Lundergarph, Total consumption burner, Premix of Laminar air flow burner, Shielded burners, Nitrous Oxide-Acetylene flames. The flame that atomizer needs, is obtained by the burner.

If a gas that gives cooler Flame is used then the atoms couldn't get excited. So, ion concentration of aqueous solutions cannot be Determined effectively.



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Preheating zones
- Primary reaction zone or inner zone
- Internal zone
- Secondary reaction zone

The first or the innermost region of the flame is the preheating zone where the combustion Mixture is heated to the ignition temperature by thermal conduction from the primary reaction Zone.

The second zone is the primary reaction zone or inner zone. This zone is about 0.1 mm Thick at atmospheric pressure and is visible by virtue of its blue green light ascribed to radicals C2 and CH.

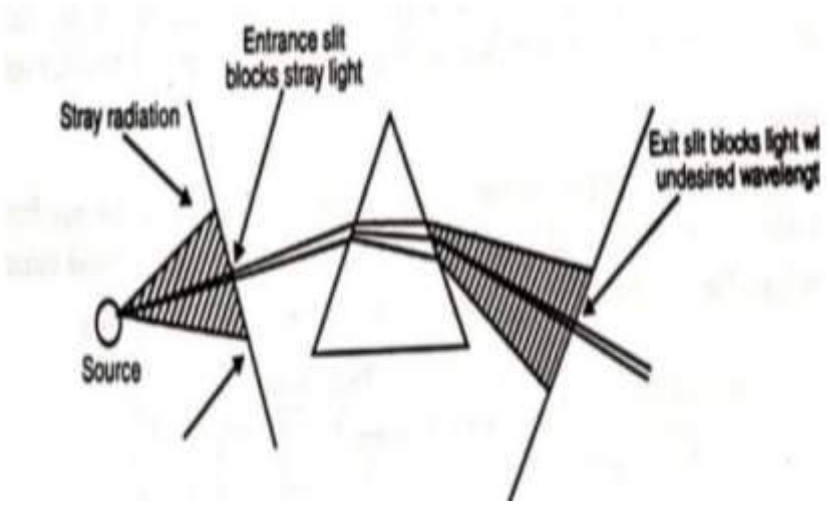
There is no thermodynamic equilibrium in this zone and the concentration of ions And free radicals is very high. This region is not used for flame photometry Immediately above the primary reaction zone lies the third or interconal zone or the reaction free Zone which can extend up to considerable height.

3) Mirrors

The radiation from the flame is emitted in all direction in space. In order to maximize the amount of radiation used in the analysis, a mirror is located behind the burner to reflect the radiation back to the entrance slit of the Monochromators. This mirror is concave and covers as wide angle from the flame as possible.

4) Slits

Entrance and exit slits are used before and after the dispersion elements. The entrance slit cuts out most of the radiation from the surroundings and allows only the Radiation from the flame and the mirrored reflection of the flame to enter the optical system.



5) Monochromators: In simple models the Monochromators is the prism, but in expensive models, the gratings are. Prisms- Quartz is the material most commonly used for making prisms.

When a filter Is kept between the flame and detector, the radiation od desired wavelength from the flame will Be entering the detector and be measured. The remaining undesired wavelength will be absorbed by the filter and not measured.

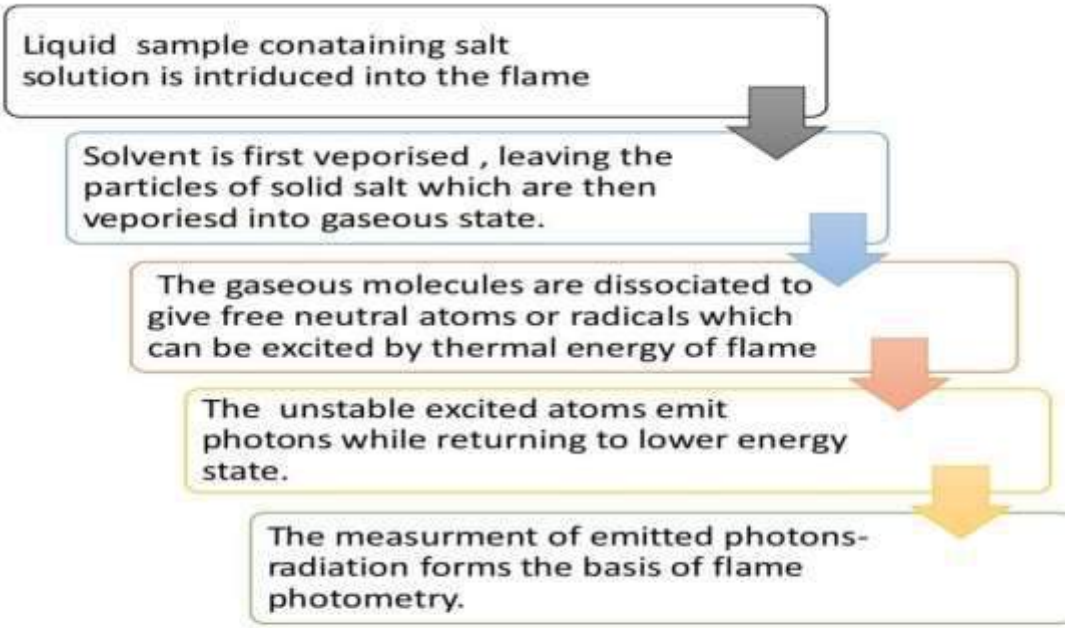
Types of Monochromators:

- Grating Monochromators
- Prism Monochromators

6) Detectors: The radiation coming from the optical system is allowed to fall on the detector which measure The intensity of radiation falling on it.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The detector should be sensitive to radiation of all Wavelengths that may be examined. In good flame photometer, the photomultiplier detectors are Employed which produce an electrical signal from the radiation falling on them



: Under constant and controlled conditions, the light intensity of the characteristic wavelength produced by each of the atoms is directly proportional to the number of atoms that are emitting energy, which in turn is directly proportional to concentration of the test sample.



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

6.3 Flame photometer handling procedure

Ensure that the compressor unit, LPG pipe are properly connected and secured.

A. Switch ON the main unit and compressor unit.
B. Adjust the air regulator knob to achieve a reading between 0.4-0.6.
C. Open the regulator valve from LPG cylinder.
D. Open the Fuel control valve from main unit.
E. Insert the igniter on the burner and ignite the flame. If the flame is not ignited within few Attempt increase the fuel flow gradually once the flame is ignited it will be yellow nonoxidizing flame. Slowly reduce the flame so as to get a blue oxidizing flame. Allow the Flame to stabilize for 5 min.
F. Take distilled water in the beaker and insert the capillary aspirator insert the required Filter.
G. Adjust the zero control to "00"On display. Remove the distilled water and place the Beaker containing the repaired sample of known concentration and select appropriate Filter.
H. Allow the flame to stabilize for 1-2 min.
I. Adjust the calibration knob to adjust the value of the standard on display.
J. Repeat the operations given in 8 & 10 above.
K. On pressing freeze switch the reading will be averaged and stored.
L. Remember to aspirate with distilled water between two readings to flush out earlier content .
M. At the end of the experiment shut 'OFF' the fuel valve first when the flame is Extinguished close the air valve and shut down the main unit and compressor unit

Elements	Emitted wavelength	Flame colour
Sodium	589 nm	Yellow
Potassium	766nm	Violet
Barium	554nm	Lime green
Calcium	622nm	Orange
Lithium	670nm	Red

For certain concentration range the intensity of emission is directly proportional to the number of atom returning to ground state and the light emitted in turn proportion to the concentration of samples amp.

6.4 Flame photometer working

Desolvation: Dissolution involved drying a sample in solution the metal particle in solvent are dehydrated by flame and the solvent is evaporated.
Vaporization: The metal particle in the sample are dehydrated and this also lead to the operation of the solvent.

Atomization: Atomization is the separation of all atom in chemical substance and the metal ion in sample are reduced to the metal item by the flame.
Excitation: The electrostatic force of attraction between electron and nucleus of atom help them to absorb particular amount of energy.
Emissions : The higher energy sale state is unstable the atom jump back to ground state or low emit radiation is measured by the photo detector. The elements are dissociated into atoms by the thermal energy provided by the flame element.

6.5 Advantage

- The method to carry out detection of elements by flame photometry is fast, simple and if carried out with care, quite reliable.
- It does not provide Information about the molecular structure of the compound present in the sample solution.
- Non radiating element such as carbon, hydrogen and halides cannot be detected. These can only be determined under special circumstances.
- The need for a rapid, accurate method to determine quantitatively Na and K present together in biological fluids has been met by the procedures to be described

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

6.6 Disadvantaged

- There are some difficulties. It does not provide information about the molecular structure of the compound present in the sample solution.
- The necessity of separating these elements prior to their determination by the various chemical methods usually employed has led to procedures which are often prohibitively tedious and time-consuming.

6.7 Application of flame photometer

A) **Qualitative Analysis:**

- Flame photometry is used to detect elements of groups l and ll of the periodic table. These are Na, K, Li, Mg, Ca etc.
- Identification is done by Peak matching technique, where at least 3 peaks Of emission spectrum should match when sample and standard spectra are recorded.

B) Quantitative Analysis:

- Concentration of calcium in serum.
- Concentration of Na, K, Ca, and K in urine.
- Amount of Ca, Na, K, and Mg in intravenous fluids, ORS.

The concentration or the amount of elements can be determined by any of the following four methods.

1) direct comparison method
2) Calibration curve method.
3) Standard addition method.
4) Internal standard method.

Flame photometer helps to determine the amount of the metals present in the sample of serum, urine, and other body fluids such as sodium, potassium, calcium, and lithium.

7. EXPERIMENTAL METHODOLOGY

7.1 Type of soil in India

A) White soil B) Sandy soil C) Black soil D) Red soil



A) White soil :

white soil also called calcareous soils are defined as soils containing amounts of calcium carbonate affect distinctly the soil properties related to plant growth, whether they are physical, such as soil – water relations, and soil crusting, or chemical such as the availability of plant nutrients (Talbot al. 2019). Calcareous soils are those which contains enough free calcium carbonate and which gives or produces effervesce on reaction with (0.1N) dilute HCL. Calcareous soils can contain from 3% to >25% $CaCO_3$ by weight with pH values with a range of 7.6 to 8.3. They are relatively widespread in the drier areas, in large part of arid and semiarid

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

regions of the earth. Calcareous soil contains enough amount of potassium but due to higher concentration of calcium uptake of potassium ion is affected. Hence, deficiency of potassium is observed in plants. For example grapes become too acidic in calcareous soil due to less uptake of potassium. Therefore, potassium should be added in quantity more than its recommend dose under calcium content in soil. [21]

B) Sandy soil

This type has biggest particle and the size of particle does determine degree of aeration and drainage that soil allow. It is granular and consists of rock and mineral particle that are very small Therefore the texture is gritty and sandy soil is formed by and sandy soil is formed of disintegration and weathering of rock such as limestone granite quitez and shale sandy soil easy to cultivate if it is rich in organic material but then it allow drainage and dehydration plant in summer it worm very fast in spring seasons

C) Black soil

Black soil also called because of their black coloration and derived from the Basalt rock under semi-arid conditions. It is also known as "Regur" or black cotton soil as it is best suited for cotton cultivation. In India black soil are largely found over decant trap region namely the states of Maharshtra, Madhya Pradesh, parts of Andhra Pradesh, Northern part of Karnataka, Gujarat, parts of Tamil Nadu and Rajasthan. Black soil occupies 24.12% (74 Mha)of the total soil cover of the country with chief crops grown on it such as cotton, sugar cane, ground-nuts, millets, maize, pulses, sunflower, wheat and chilies. Brief about black soil v They are rich in Iron, line, calcium, magnesium, Carbonate and alumina, poor phosphorous, nitrogen and organic content. V Crops grow- under rainfed condition Cotton, sorghum, millet, soybean, pigeon pea, etc. Under irrigated condition such as sugarcane, wheat, citrus plantation. V Regur means cotton – best soil for cotton cultivation. V Most of the Deccan is occupied by Black soil. Mature soil and high water retaining capacity. Swells and will become sticky when wet and shrink when dried .

D) Red soil

These are generally reddish to brownish in colour obtained from weathering of granites, gneisses, and crystalline rocks and grade. These soils are ideal for cultivation of, ragi ground-nuts, millets, tobacco and potato. They are rich in Iron, containing small amount of Humus as they about retain moisture and are slightly acidic with poor quantity of phosphorous, nitrogen and organic contents. From poor, thin and light colored soils on the uplands to that of fertile deep dark colour soils of plains and valley. Red soils in India occupying 29.08% . red soils Seen mainly in low rainfall area. Also known as Omnibus group. Porous, friable structure and absence of lime, kantar (impure calcium carbonate). Colour is red because of Ferric oxide. The lower layer is reddish yellow or yellow. The texture is Sandy to clay and loamy Crop grow in these soils can be profitably used for a variety of agriculture, horticulture and plantation crops. Such as millets, rice, groundnut, maize, soybean, pigeon pea, green gram, jute, tea, cashew, cocoa, mango, etc. Also known as laterite soil, is a type of soil that is typically red or orange in colour due to the high Concentration of iron oxide. It is commonly found in tropical and subtropical regions that experience high levels of rainfall, where the weathering of rock and minerals leads to the development of this distinctive soil types.

7.2 Requirements

a) Chemical **:** Ammonium acetate(1 normal)
Potassium chloride (1.907 gm)
Soil sample

b) Instrument: conical flask
Pipette
Filter paper
Volumetric flask

1N Ammonium Acetate Solution: (a) Dissolve 77.08 g ammonium acetate in Distilled water and dilute it to 1 liter. Mix thoroughly, adjust pH to 7.0With dilute ammonium hydroxide/ammonia solution or acetic acid. OR (b)Dissolve 77.08 g ammonium acetate in 800 ml deionized water. Add 57 ml99.5% glacial acetic acid and then add 69 ml of concentrated ammonium Hydroxide or ammonia solution (Specific gravity 0.91) in it. After cooling adjust pH at 7.0 by the addition of more of NH4OH or CH3COOH and make Up the volume to 1 liter.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Standard potassium stock solution: Dissolve 1.908 g AR grade KCl (dried in oven at 70°C wit For 2 hr.) in deionized water and make volume to 1 liter. This will give stock Solution of 1000 ppm K. Take 100 ml of this stock solution and dilute it with Neutral normal ammonium acetate (extracting solution) up to 1 liter.

This Gives solution of 100 ppm K. From this solution, take 0, 5, 10, 15, 20, 25, 30And 40 ml in volumetric flasks of 100 ml capacity and make the volume by Further adding normal neutral ammonium acetate solution. This will give a Series of standard solutions having 0, 5, 10, 15, 20, 25, 30 and 40 ppm K,

7.3 Procedure
Transfer 5.0 g air dried soil in a 100 ml conical flask. Add 25 ml neutral 1 N ammonium acetate solution and shake the flask for5-10 minutes.

Filter it through Whatman filter paper No. 1.Determine K in the extract with the help of flame photometer. Set the K filter Compressor and light the burner of flame photometer.

Keep air pressure atlas and adjust the gas feeder so as to have a blue sharp flame cones. Adjust zero reading on the scale by feeding extract solution (CH3COONH4In the flame photometer Feed standard K solution of the highest volume in the standard series (40ppm K) and adjust the flame photometer to read full scale 100 reading.

Now take reading of each standard solution. Plot a standard curve between concentration and readings of standard potassium solution extracts of sample and Concentration and readings of standard K solution.

Standard sodium stock solution(1000 ppm) : weight accurately 5.85 gram Nacl dissolve 75 ml water and diluted 100 ml with distilled water in volumetric flask.[4]

Sodium chloride (salinity) is a major problem affecting crop production all over the world: 20% of cultivated land in the world, and 33% of irrigated land, are salt-affected and degrade Introduction Soil salinization is a major factor contributing to the loss of productivity of cultivated soils. Although difficult to estimate accurately, the area of salinized soils is increasing, and this phenomenon is especially intense in irrigated soils.

Salt affect plant growth due to increasing soil osmotic pressure and to interference with plant nutrition. A high salt concentration in soil solution reduces the ability of plants to acquire water, which is referred to as the osmotic or water-deficit effect of salinity. Damage occurs when the concentrations high enough to begin reducing crop growth.

Ammonium acetate : Dissolve 77.08 g ammonium acetate in Distilled water and dilute it to 1 liter.

Standard Sodium stock solution(100 ppm) :weight accurately 0.585gram of Nacl dissolve in 75 ml distilled water and diluted 100 ml with distilled water in volumetric flask.
Calculations:1000= 5.85 100 = ? 100×5.85÷1000 = 0.585

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Standard sodium stock solution (200 ppm) : weight accurately 2.34 g sodium chloride dissolve in 75ml distilled water and diluted 100 ml with distilled water in volumetric . Calculations: 1000=11.7

200 = 200× 11.7÷ 1000

= 2.34

Potassium stock solution (100) :weight accurately 0.1908gram of kcl dissolve in 75 ml distilled water and diluted 100 ml distilled water in volumetric flask.

Calculation: 1000 = 1.908

100 = ?

100×1.908÷ 1000

0.1908

Standard potassium stock solution (500 ppm) weight accurately 0.954 gram of kcl dissolve in75 ml distilled water and diluted 100 ml distilled water in volumetric

Calculations: 1000 =1.908

500 = ?

0.95



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Process: Transfer 20g air dried soil in a 100 ml conical flask. Add 25 ml neutral 1 N ammonium acetate solution and shake the flask for5-10 minutes. Filter it through Whatman filter paper No. 1.Determine K in the extract with the help of flame photometer. Set the K filter start Compressor and light the burner of flame photometer Keep air pressure atlas and adjust the gas feeder so as to have a blue sharp flame cones. Adjust zero reading on the scale by feeding extract solution (CH3COONH4In the flame photometer Feed standard K solution of the highest volume in the standard series (40ppm K) and adjust the flame photometer to read full scale . 100 reading. Using this process determine certain type of soil sample sodium and potassium concentration. Calcareous soil b) Red soil c) Black soil d) Sandy soil [3]

8. CALCULATION

Estimation of soil samples using following formula:

Formula: R × volume of exact/ weight of soil in taken× 2.24× 1000000÷ 1000000 R= part per million of soil samples.
Volume of exact= using ammonium acetate solution
Weight of soil = 20 gram
2.24 = soil depth weight
10-6= reading kg divided 10000 hector in soil**.**

1) Determination sodium concentration in red soil samples

Formula: R × volume of exact/ weight of soil in taken× 2.24× 1000000
56× 25 ÷ 20× 2.24×1000000÷ 10000
156.7



2) Determination potassium concentration in red soil samples

Formula: R × volume of exact/ weight of soil in taken× 2.24× 1000000÷1000000
182× 25÷ 20× 2.24× 1000000÷1000000
=509.6



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3) Determination sodium concentration in black soil samples

Formula: R × volume of exact/ weight of soil in taken× 2.24× 10000000

191×25÷20×2.24×1000000× 1000000

=534.8



4) Determination potassium concentration in black soil samples

Formula: R × volume of exact/ weight of soil in taken× 2.24× 10000000

199×25÷20×2.24×1000000×1000000

= 462



5) Determination sodium concentration in White soil (calcareous soil)samples

Formula: R × volume of exact/ weight of soil in taken× 2.24× 1000000÷1000000

189 ×25÷20×2.24×1000000×1000000 =529

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



6) Determination potassium concentration in White soil (calcareous soil)samples

Formula: R × volume of exact/ weight of soil in taken× 2.24× 1000000÷1000000

183 ×25÷20×2.24×1000000×10000

=512.4



7) Determination sodium concentration in sandy soil samples

Formula: R × volume of exact/ weight of soil in taken× 2.24× 10000000

96×25÷20×2.24×1000000×1000000

=268.8



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

8) Determination potassium concentration in sandy soil samples

Formula: R × volume of exact/ weight of soil in taken× 2.24× 10000000

187 ×25÷20×2.24×1000000×1000000

=523.6

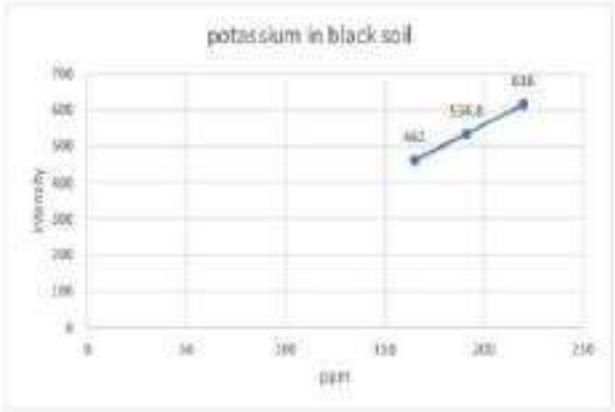


	Standard sodium value	Standard potassium value
High	>560	>280
Medium	280-560	180-280
Low	<280	108

9. Result And Interpretation

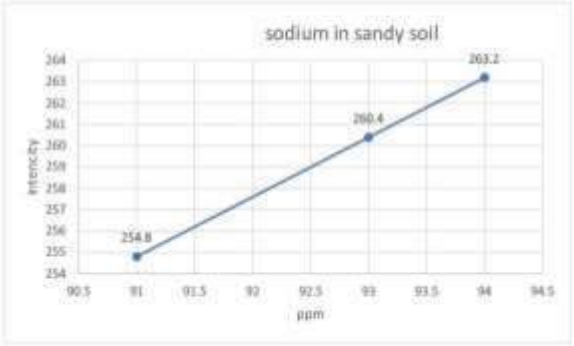
ppm

ppm	intensity
151	538.8
165	462
220	616

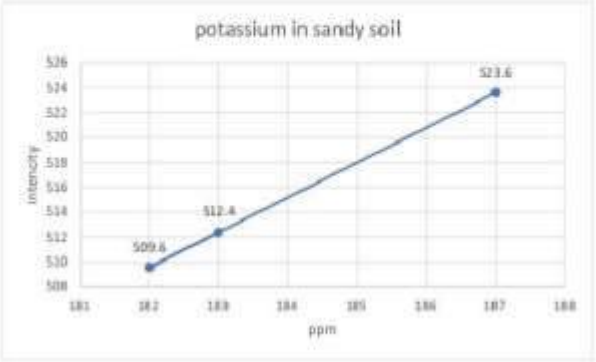


SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

ppm	intencity
94	263.2
93	260.4
91	254.8

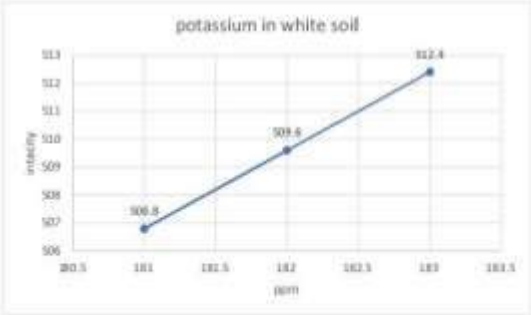


ppm	intencity
187	523.6
182	509.6
183	512.4

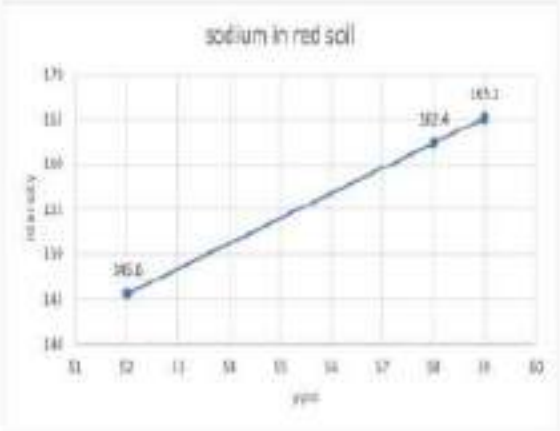


SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

ppm	intencity
182	509.6
181	506.8
183	512.4

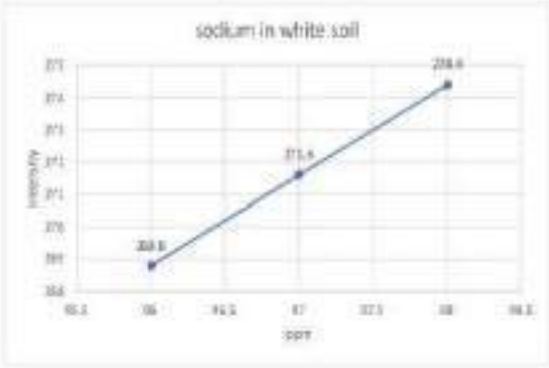


ppm	intensity
52	145.6
58	162.4
55	165.2

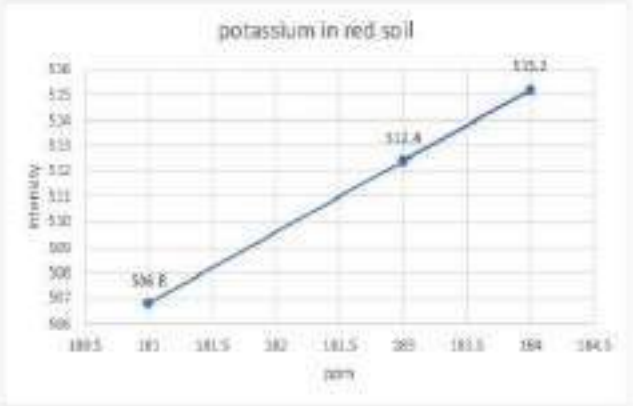


SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

ppm	intensity
96	268.8
97	271.6
98	276.8



ppm	intensity
183	512.4
184	515.2
181	506.8



SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

10. CONCLUSION

Conventional agriculture has been largely dependent on intensive chemical inputs which plays an important role in improving food productivity to meet human demands. In recent years, most of the farmers are using the excess amount of fertilizers and pesticides. Due to excess use of chemicals soil quality decreases. Small crop also affected due to large use of fertilizers and pesticides. So it becomes essential to analysis of soil parameter Above information help to farmers for use integrated nutrient management practice to maintain optimum concentration of all the essential nutrients for plants.

Organic agriculture dose not use synthetic fertilizers and pesticides and attempt to close nutrient cycle on their farms, protect environmental quality and enhance beneficial biological interaction and processes But farmers preference to the inorganic fertilizers as compare to organic because the nutrients are more readily available form and rapidly released after application.

To obtain high yield many farmers are using artificial and inorganic fertilizers. The nutrients from these fertilizers are not taken up directly by the plants and hence they may remain in the soil for several years, due to this the soil quality will be changed Like as a fertilizers, there is a wide range of chemicals used as pesticides. But the most harmful are those which either do not degrade or degrade very slowly in nature.

These hazardous chemicals that enter our food chain begin to increase their concentration at successive trophic levels in the food chain. The environmental problems associated with fertilizers application, a number of problems arise from the use of pesticides. These include persistence in the environment, toxicity in soil, vegetation and water supplies and its application for human health.
The persistence and toxicity of many pesticide compounds dependent on a number of soil characteristics. It also help to the farmers about the proper supply of nutrients for healthy growth and to increase the yield of crop. [18]

11. REFERENCE

1. *Skoog DA, West DM, Holler FJ, Crouch SR. Analytical Chemistry An Introduction, 7th Chapter 23: 594-631.Technologies UK Ltd. A guide to Flame Photometer Analysis.*
2. *Indian Standard (1980) "Method for determination of sodium and potassium (Flame Photometric)*
3. *International Journal of Scientific & Engineering Research, Volume 8, Issue 1, January2017 133ISSN 2229-5518*
4. *International Journal of Scientific & Engineering Research, Volume 8, Issue 1, January2017 134ISSN 2229-5518IJSER © 2017*
5. *Han way, J.J. and Heidel, H. 1952. Soil analysis methods as used in Iowa State Colleges oil testing Laboratory. Iowa Agriculture 57: 1-31.*
6. *Jackson ML. Soil chemical analysis. Prentice Hall of India (P) Ltd., New Delhi; c1973.4.*
7. *Research Scholar, Department of Agronomy, Chandra Shekhar Azad University of Agriculture and Technology Kanpur, 208002, Uttar Pradesh, India. Research Scholar,*
8. *1Department of Soil Science and Agricultural Chemistry, Chandra Shekhar Azad University of Agriculture and Technology Kanpur, 208002, Uttar Pradesh, India*
9. *Atomic Spectroscopy, A Guide to Selecting the Appropriate Technique and System www.perkinelmer.com/Atomic Spectroscopy*
10. *Xiandeng Hou and Bradley T. Jones, Inductively Coupled Plasma/Optical Emission Spectrometry, R.A. Meyer*
11. *The application of atomic absorption spectra to chemical analysis, Spectrochim. AA. Walsh (1955), The*
12. *Lundegardh, H., Die quantitative Spektralanalyse der Elemente, Jena, pt. 1(1929) ; pt. 2 (1934).*
13. *FOA (2016). Management of Calcareous Soils (accessed 01.04.16).*
14. *Marcher, H. (1995). Mineral Nutrition of Higher Plants. Academic Press, London.*
15. *Vol. 3 Issue-4, December 2022*
16. *Talban A. S., Ageeb G.W. Siam H. S. and Mahmoud S. A. (2019).Some Characteristics of Calcareous soils.A review.Middle East Journal of Agriculture Research, 8 (1) : 96-105*
17. *Vol. 3 Issue-12, August 2023 (e-ISSN: 2582-8223)*
18. *Agriculture Observer 1(2): July 2020*
19. *Vol.1 Issue-10, JUNE 2021 (e-ISSN: 2582-8223)*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

УДК 564.48.01

DEVELOPMENT OF NEW STRUCTURING POLYMERS FOR SOILS ARAL REGION

Allamuratov Makhmud Omarovich[1], Anarbekova Gulshat Dzhumabaevna[2]
[1]Doctor of Philosophy in Chemical Sciences, Associate Professor of the Department of Ecology and Soil Science Karakalpak State University named after. Berdaha ,The Republic of Uzbekistan
[2]Candidate of Biological Sciences, Associate Professor, Department of Biology Kazakh National Women's Pedagogical University, The Republic of Kazakhstan

ANNOTATION
The article discusses methods for developing new structure-forming polymers for soils in the Aral Sea region. The main problem is the consolidation of saline sands of the drained bottom of the Aral Sea, the creation of durable surface structures that do not interfere with plant growth and protect against weathering due to strong aerodynamic flow, is the most pressing problem of modern polymer chemistry and ecology in general.
KEY WORDS: *Aral Sea, dried bottom, problem, ecology, polymer, soil, Aral region.*

The problem of drying up the Aral Sea is a global problem of our time. This problem is aggravated by the fact that the shifting sands of the drained bottom of the Aral Sea are highly saline and contain a huge amount of various harmful chemical reagents that are part of various mineral fertilizers and dust. One of the serious factors in the deterioration of the environmental situation in the Aral Sea region is the removal of salts and dust from the territory of these areas [1].

In this context, the problem of fixing saline sands of the drained Aral Sea bottom, creating durable surface structures that do not interfere with plant growth and protect against weathering due to strong aerodynamic flow, is a pressing problem of modern polymer chemistry and ecology in general [2].

It is known that the dried bottom of the Aral Sea is covered with a layer of saline mobile sands with an area of more than 2,400 thousand hectares. The content of water-resistant macrostructures in them greater than 0.25 mm, which are important for the cultivation of salt-resistant plants on these sands, is insignificant and often amounts to no more than 5-7% of the total mass of sand, as a result of which their rational use in the agricultural sector of the economy is difficult. In this connection, the problem of securing sand from wind erosion through the creation of a strong surface crust, which ensures the fixation of mineral particles and salts in places of their formation in order to prevent deflation, is important [3].

In this aspect, the goal of our recent research work is to protect shifting sands from wind erosion by chemical fixation using high-molecular composition additives obtained from industrial waste from chemical enterprises of our republic.

In this regard, we have conducted research on the synthesis and development of technology for the production of water-soluble polymers based on methacryloyl chloride (PAMU-1) and epichlorohydrin (PAMU-2) with phosphorus-containing compounds obtained from the waste of JSC Maham-Ammophos, because . It is known from the literature that these monomers easily enter into an electrophilic substitution reaction with such electropositive centers as nitrogen and phosphorus. The latter predetermined the opportunity to study the behavior of new polymers as a soil structure-former and sand fixer.

Creating an artificial structure in soils using water-soluble polymers changes their physical, agrochemical and other properties, which helps increase crop yields. The filtration properties of the soil are of particular importance. A study of water filtration through a structured soil layer showed that increasing the dose of polymer helps accelerate this process. Thus, for typical and light gray soil (a layer of three-year-old and old cotton crops), the filtration rate increased 4 times with an increase in polymer dispersion by 10 times. Significant accelerations in the passage of structural soil are observed when studying filtration and absorption by the capillary rise method (Table 1).

It has been shown that the height of the structural layer of the soil plays a significant role in the absorption process. It was maximum with a 5-cm structural soil layer. The greatest increase for water was observed at a dosage of 0.5% polymer to a sample of soil. The

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

effect of the polymer turned out to be somewhat weaker than the polymer, which is in good agreement with the value of the filtration coefficient. The effect of increasing the rate of filtration and water absorption with increasing polymer content in the soil and the height of the artificial structured soil layer depends on the degree of dispersion of the initial sample.

Table 1.
Dependence of some applied soil properties on the amount of polymer and the height of the structured soil layer

Концентрация в почве,%	Высота от структурен-ного слоя, см	Засоленная почва Приаралья				Светлый серозем (богара)			
		ПАМУ-1		ПАМУ-2		ПАМУ-1		ПАМУ-2	
		B	*υ/t*	*B*	*υ/t*	*B*	*υ/t*	*B*	*υ/t*
0	0	110	1,2	118	1,4	92	2,8	96	3,0
0, 5	3	76	4,6	82	5,4	72	4,2	68	3,6
0, 5	5	60	6,2	68	6,0	58	5,4	48	4.8
1,0	3	72	3,5	76	4,2	70	6,4	62	4,9
1,0	5	46	6,8	54	7,2	44	6,6	40	6,2
1,5	3	64	4,2	66	4,6	66	6,8	64	5,0
1,5	5	32	8,4	42	8,0	34	8,6	36	7,4

As dispersion increases, the rate of filtration and water absorption decreases. This is understandable - as the size of the aggregates increases, the porosity increases, which causes the rapid passage of water from top to bottom. The latter, as shown in laboratory tests, helps remove water-soluble salts present in the soil. It should be added that after repeated tillage of the soil, the artificial structure created with the help of the polymer is preserved (Table 2).

Thus, it has been established that under the influence of polymer preparations of the PAMU-1 and PAMU-2 series, water permeability, absorption and capillary rise of water increase. In combination with surfactants, on the contrary, these properties are suppressed the more, the higher the dose of the surfactant. When structuring the soil with developed polymers, moisture evaporation during watering from below decreases compared to the control. With increasing surfactant content, this decrease becomes even more noticeable (2-3 or more times). We investigated the effects of the water polymers we developed on the physical evaporation of water from water. Experimental studies have shown that if we take evaporation in the control variant as 100%, then the PAMU-1 polymer reduces it by 40.2%, and the PAMU-2 polymer by 34.6%.

Table 2
Effect of PAMU-1 polymer on the cleaning of saline soils

Почва	Количество полимера в почве	Водопрочные агрегаты			Размер отструктуренных агрегатов, мм
		До рассолонения	ле ссолонения	Сохраняемость, %	
Засоленная почва Приаралья	0,5	12,8	заливается	-	-
	1.0	34,3	18,6	18,2	4,0-0,2
	1,5	54,2	32,4	38,4	6,2-0,2
Светлый серозем	0,5	24,4	заливается	-	-
	1.0	46,2	28,4	36,6	8,0-0,2
	1,5	60,2	32,6	50,2	12,4-0,2

In other words, the influence of the developed polymers on the soil has a beneficial effect the following year. One of the important properties of soil is its ability to swell in the presence of moisture. We conducted studies of the swelling processes of various soils in our republic. At the same time, we gave priority to soil imported from the Aral Sea region.

Conducted studies of the nature of swelling and the process of disintegration of lumps in structured soils using optical methods, depending on the concentration of the developed polymers, showed that when the structural aggregate is enlarged at the same concentration of the PAMU-1 polymer, the number of cycles (periodic moistening and drying at air), in which they retain their structure, increases in each cycle, the change in the size of the lumps when they are moistened and then dried passes through a maximum. A study of the soil of the Aral Sea region treated with ordinary water showed that its lumps are not waterproof and, under the influence of the disjoining pressure of capillary water, quickly collapse, breaking up into small particles. When treating the soil with a polymer solution imported from the Aral region, the aggregates become more durable and retain their shape for a long time.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Determination of the swelling of structured soil treated with a polymer solution with water by a microscopic method showed that when structured soil interacts with water, the polymer film located on the surface of the soil particle swells first.

When interacting with water, the polymer film that envelops the soil particle becomes swollen, and the size of the lumps is larger than the original one. After the water evaporates, the swollen lump has a loose appearance, decreases in volume and practically retains its original size. A comparison of data from microscopic studies of the swelling of structured soils with the results of microaggregate formation in soil dispersions under the influence of a structure-forming polymer allows us to conclude that when a solution of the polymer we developed is introduced into the soil, along with microaggregate formation, stabilization of large aggregates occurs, which are enveloped in a polymer film, as a result of previously non-water-resistant units gain strength. The creation of sufficiently strong aggregates in structured soils contributes to a significant reduction in irrigation erosion, i.e. soil erosion.

LITERATURE

1. *Allamuratov M.O., Yesimbetov A.T., Ametov Ya.I. - New methods and reagents for fixing moving sands of the dried bottom of the Aral Sea Chemical industry, 2017.*
2. *Zhumabaev B.A. Study of the influence of new additives on the structure formation of saline sands / Sb.resp. scientific and technical conference of graduate students, doctoral students and applicants. T. 2007, pp. 104-107.*
3. *Karimov I.A. Uzbekistan on the threshold of the 21st century. Guarantees of stability and security threats. T. Uzbekistan - 1997*
4. *Mukhamedgaliev B.A. Ecological problems of the biosphere // Ecological Bulletin of Uzbekistan". No. 1, 2011 - P. 10-12.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

UDC 633.88

BIOMORPHOLOGICAL AND ECOLOGICAL CHARACTERISTICS OF THE PLANT LYCIUM BARBARUM

Saitova Azima Kalzhanovna[1], Idrisov Kamalatdin Abatbaevich[2], Ametova Dame Kutlymuratovna[3]

[1]Candidate of Biological Sciences, Associate Professor, Department of Agroecology and Introduction of Medicinal Plants, Karakalpak State University named after. Berdakha
[2]Deputy Director of the International Innovation Center of the Aral Sea region under the Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Uzbekistan
[3]4th Year Student, Department of Agroecology and introduction of medicinal plants Karakalpak State University named after. Berdakha The Republic of Uzbekistan

ANNOTATION

The article discusses the biomorphological and ecological characteristics of the plant Lycium barbarum. Lycium barbarum is used in the food industry and in the production of natural dyes. Its fruits are known throughout the world as Goji. The main feature of goji fruits is that their composition is rich in anti-cancer elements. The fruits of the plant contain a large amount of ascorbic acid, vitamins and biologically active substances consisting of 18 amino acids, 8 of which are important.

KEY WORDS: *fruit, dye, medicinal plant, biomorphology, berry, China.*

INTRODUCTION

Goji (lat. Lycium) is a family of plants belonging to the nightshade family, or wolfberry (Lycium barbarum) [4]. It is a deciduous tall shrub native to China, Asia and Southeast Europe. Reaches a height of 1-3 meters and has thin arched branches. Leaves are lanceolate, pointed. The flowers are purple, arranged in groups of 1-3 in the leaf axils. The fruits are bright orange-red ellipsoidal berries up to 4 cm long and 1-2 cm in diameter; another name for goji is “wolf berry” [5].

The original homeland of wolfberry (Lycium barbarum) is China. There are more than 90 species of wolfberry in the world. There are 3 wild species in Uzbekistan. The fruits, roots and leaves of the plant are used in medicine

It is also used in the food industry and in the production of natural dyes. Its fruits are known throughout the world as Goji. The main feature of goji fruits is that their composition is rich in anti-cancer elements. Unfortunately, it is very rare in nature.

Widely used in Italy, Germany, USA, Canada, China, Korea and Middle East countries. It is included in the pharmacopoeias of 7 Eastern countries.

Goji berries have been grown in China for over 600 years on the Yellow River Plain. The plant has been actively used in traditional Chinese, Korean, Vietnamese and Japanese medicine since at least the 3rd century AD. Since about 2000, goji berries and products made from them have become very popular in developed countries as a health food or even a “superfood” and alternative medicine [5,6].

The fruits have also been a component of traditional Chinese, Korean and Japanese medicine since at least the 3rd century. In pharmacopoeias, the fruits of the plant are called in Latin lycii fructus, and the leaves are called Herba lycii [3].

Today, the main supplier of goji berry products in the world is China. More than 95,000 tons are collected here every year. Recently, goji has begun to be grown as a garden plant all over the world, and seedlings can be purchased in nurseries in many countries. In technical botanical nomenclature, *L. barbarum* is called the wedding vine [1,2].
The fruit has very high antioxidant activity. For this reason, goji berries are widely used to improve metabolism, restore mental and physical fatigue, slow down the aging process, increase the production of endocrine glands in the body, restore immunity, treat anemia, diabetes, diseases of the circulatory system and skin.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Chemical composition: The fruits of the plant contain a large amount of ascorbic acid, vitamins and biologically active substances. The ripe fruits of the plant are very rich in carotene, vitamins B_1, B_2, PP, C. It contains a large amount of amino acids and proteins, polysaccharides, taurine, tetraterpenes, physalein, betaine and many macro- and microelements.

The chemical composition of goji berries consists of 18 amino acids, 8 of which are important. The plant contains lycine, which is a betaine similar to lycine. Goji berries contain polysaccharides (5-8% in dry product and up to 40% in extracts), zeaxanthin, carotenoids (β-carotene, neoxanthin, β-cryptoxanthin), hydrocyanic acid, terpenes, alkaloids, cerebrosides, cyclic peptides, betainetaine, physalin, taurine. The fruits of the plant contain a unique complex of natural phenolic derivatives, bioflavonoids, 45% of which are quercetin, miracetin, kaempferol and rutin.

Goji berries contain carbohydrates (46%), proteins (13%), fats (2.2%) and dietary fiber (16%), 21 minerals (calcium - up to 60 mg; iron - 5.4 mg, potassium - 434 mg , zinc). And also 1.48 mg of magnesium, copper, manganese, phosphorus, iodine, selenium, germanium, etc.) and vitamins B_1 (0.23%), B_2 (0.33%), B_6, E, PP, choline. In addition, it has been shown that 100 g of berries contain 48 mg of vitamin C [2,4].

It is noteworthy that this plant also grows in saline soils. The purpose of our research is to develop a technology for growing 1 species and 1 form (Chinese form) of the introduced medicinal plant Lycium for our republic and the creation of their primary seed plantations.

As part of the project, mutual agreements were concluded with the Syrdarya forestry and the Obad Yurt Bogalari farm in the Khovos region, the Zomin forestry in the Jizzakh region and the Kutchi farm for the creation of medicinal queen cells “Lycium barbarum” within the framework of the project. The seeds of the goji plants were planted on the land allocated to them.

METHOD OF PLANTING FROM SEEDS

The year is long, even the simplest harvest has to wait up to three years. However, goji seeds have excellent germination rates and are an excellent option when seedlings are unavailable (or expensive).

Sow indoors 6-8 weeks before the last frost, sometimes in early to mid-February. Plant a few seeds in a 15cm pot, press them lightly into the soil and keep them moist in a bottle until sprouting. Make sure the soil gets plenty of light. After germination, reduce watering, but keep the plant in bright, direct sunlight. There is no need to add fertilizers to the soil. After the third true leaf appears, each seedling is transplanted into a separate container.

REPRODUCTION

Vegetatively - propagated by semi-lignified cuttings about 10 cm long, but you need to make sure that there is old wood on the shoots. To do this, dip the cut part with the roots and plant it in a greenhouse or under film in July-August. When propagated by cleaned cuttings, it takes root faster. From autumn to the end of winter it should be stored in a cool or insulated cool place.

The reaction of the soil for planting goji can be slightly acidic-strongly alkaline, but in principle it can grow in any soil composition. Preference should be given to sunny places for planting.

We prepare a hole 50-60 cm wide and about 40 cm deep for a goji seedling; the holes are placed for several plants at a distance of 1.5-2 meters from each other. To fill the soil, you need to add 150-200 g of superphosphate, 8-10 kg of compost (humus, peat), 30-40 g of potassium sulfate or wood ash and mix well. Seedlings should be buried a little after planting, watered well and mulched with peat or humus.

CARE

Watering and pruning should be the focus. Since watering was discussed above, let us dwell on the rules of pruning in order to get the maximum yield of berries. You can't prune the first year. You need to let the plant take root and get stronger. In winter, for example, at the end of February, remove weak, weakened branches with dead or diseased wood.

Most goji berries develop on new growth branches. In the second or third year, when many new shoots are growing at the base, choose a strong, straight branch as the main part of the bush to encourage lateral growth, and during the upward growth period, prune all dominant stems. which go straight up because you only want to encourage lateral growth. Remove excess roots and most of the old branches, leaving only two or three old branches.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

CONCLUSIONS

Currently, in order to meet the needs of the population for food, medicine and other products, the republic is widely developing the cultivation and processing of medicinal plants that are of great importance for the national economy, and research work is being carried out. According to a project of close cooperation with the United States Agency for International Development (USAID) and the International Center for Innovation of the Aral Sea region, the Muynak experiment was carried out to create plantations of the medicinal plant "Lycium barbarum". On an area from 7.6 hectares to 0.19 hectares, 238 goji plants from seedlings and cuttings were planted; the planting area was 4x2 m.

LITERATURE

1. *Classification for Kingdom Plantae Down to Genus Lycium L. ". US Department of Agriculture, Natural Resources Conservation Services (2017).*
2. *Lee, H. W.; Kim, Y.H.; Kim, Y.H.; Lee, G. H.; Lee, M. Y. (2014). "Discrimination of Lycium chinense and Lycium barbarum by taste pattern and betaine analysis." International Journal of Clinical and Experimental Medicine. 7 Int J Clin Exp Med. 2014; 7(8): 2053–2059. Published online 2014 Aug 15.*
3. *Ray Upton et al., editors (2010): "Lycium chinense Mill, L. barbarum L., Lycium fruit, Lycii fructus." In American Herbal Pharmacopoeia Botanical Pharmacognosy: Microscopic Characterization of Botanical Medicines, page 468. Published by CRC Press.*
4. *Flint, Harrison Leigh "Lycium barbarum",. Landscape plants for eastern North America: exclusive of Florida and the im-mediate Gulf Coast. Chichester: John Wiley & Sons, 1997 - 326 bet. ISBN 978-0-471-59919.*
5. *Goji berries in the middle zone - personal experience/ https://www.botanichka.ru/article/yagodyi-godzhi-v-sredney-polose-lichnyiy-opyit/*
6. *Goji berries (Lycium chinense Mill.) https,://lektrava.ru. yagody-goji.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

UDK 517.947.5

THE METHODS FOR SOLVING PROBLEMS OF CIRCULAR MEMBRANE OSCILLATIONS

Tanirbergenov M.B.
Candidate of Physical and Mathematical Sciences, Associate Professor of the Department "Differential Equations",Karakalpak State university named after Berdakh

SUMMARY
This work shows solutions to several specific examples of vibrations of circular membranes by the method of separation of variables using Bessel functions.
KEY WORDS: *Bessel equation and function, vibration equation of a circular membrane, mixed problem, Fourier method.*

INTRODUCTION

From the general theory it is known that the solution of the mixed problem for the wave equation by the method of separation of variables was reduced to the Sturm–Liouville problem. If the area in which we construct a solution to the mixed problem is a segment (vibrations of a string), a rectangle (oscillations of a rectangular membrane), then the corresponding Sturm–Liouville problem is posed for a linear differential equation with constant coefficients. If the area in which we are looking for a solution to a mixed problem is a circle, a cylinder, or a ball, then the corresponding Sturm–Liouville problem is posed for a linear equation with variable coefficients. A characteristic feature of these equations is that the coefficient of the highest derivative vanishes at at least one point of the domain boundary. One such equation is the Bessel equation (equation of cylindrical functions)

$$y''(\xi)+\frac{1}{\xi}\,y'(\xi)+\left(1-\frac{n^2}{\xi^2}\right)y(\xi)=0,\qquad n=\text{const}\ge 0, \tag{1}$$

and the Bessel function $J_n(\xi)$ with index n, is a solution to the differential equation (1), limited at zero with its first derivative, i.e.

$$\left|J_n(0)\right|<\infty,\qquad \left|J_n'(0)\right|<\infty.$$

We present without proof the basic properties of the functions $J_n(\xi)$:

I. For any fixed value, $n=0,\,1,\,2,\,\ldots$ the Bessel function $J_n(\xi)$ generates $[0;R]$ a complete orthogonal system on the interval $\left\{J_n\left(\mu_k^{(n)}\frac{\xi}{R}\right)\right\}$ $k=1,\,2,\,\ldots$ with weight $\rho(\xi)=\xi$:

$$\int_0^R \xi\,J_n\left(\mu_k^{(n)}\frac{\xi}{R}\right)J_n\left(\mu_l^{(n)}\frac{\xi}{R}\right)d\xi=\begin{cases}0, & k\ne l,\\ \dfrac{R^2}{2}\,J_{n+1}^2(\mu_k^{(n)}), & k=l,\end{cases} \tag{2}$$

where are $\mu_1^{(n)},\ \mu_2^{(n)},\ \ldots$ – the zeros of the function $J_n(\xi)$.

II. Any function $f(\xi)$ that is piecewise smooth on an interval $[0;R]$ and satisfies the boundary conditions is expanded into a convergent Fourier series according to the system of Bessel functions for each fixed $n=0,\,1,\,2,\,\ldots$, i.e.

$$f(\xi)=\sum_{k=1}^{+\infty}a_k J_n\left(\mu_k^{(n)}\frac{\xi}{R}\right), \tag{3}$$

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

where

$$a_k = \frac{\int_0^R \xi\, f(\xi) J_n\left(\mu_k^{(n)} \frac{\xi}{R}\right) d\xi}{\int_0^R \xi\, J_n^2\left(\mu_k^{(n)} \frac{\xi}{R}\right) d\xi} = \frac{2}{R^2 J_{n+1}^2(\mu_k^{(n)})} \cdot \int_0^R \xi\, f(\xi) J_n\left(\mu_k^{(n)} \frac{\xi}{R}\right) d\xi. \quad (4)$$

1–task. Find a solution to a mixed problem

$$u_{tt} = u_{xx} + \frac{1}{x} u_x + f(t) J_0(\mu_k x), \quad (1.1)$$

where is μ_k – the positive root of the equation $J_0(\mu) = 0, \quad 0 < x < 1,$

$$u\big|_{x=1} = u\big|_{t=0} = u_t\big|_{t=0} = 0, \quad \left|u\big|_{x=0}\right| < \infty,$$

if $f(t) = t^2 + 1.$

Solution. Since we have zero boundary and initial conditions, we will look for a solution to this problem in the form of a series

$$u(x,t) = \sum_{l=1}^{+\infty} T_l(t) J_0(\mu_l x) \quad (1.2)$$

by the eigenfunctions of the corresponding homogeneous problem, where $T_l(t)$ – the unknown functions are , and $J_0(\mu_l x)$ – the eigenfunctions of the problem of oscillations of a circular membrane are:

$$y'' + \frac{1}{x} y' + \lambda^2 y = 0, \qquad y\big|_{x=1} = 0. \quad (1.3)$$

Substituting (1.2) into equation (1.1), and assuming the validity of term by term differentia-tion of the series, moving all terms to the left, we obtain

$$\sum_{l=1}^{+\infty} \left[T_l''(t) + \mu_l^2 T_l(t)\right] J_0(\mu_l x) = (t^2+1) J_0(\mu_k x).$$

From here we find that when $l \neq k$

$$T_l''(t) + \mu_l^2 T_l(t) = 0, \quad (1.4)$$

and when $l = k$

$$T_k''(t) + \mu_k^2 T_k(t) = t^2 + 1. \quad (1.5)$$

From the initial conditions we have

$$T_l(0) = 0, \qquad T_l'(0) = 0, \qquad l = 1, 2, \ldots \quad (1.6)$$

Then the corresponding solution to the Cauchy problem for the homogeneous equation (1.4) under zero conditions (1.6) is only a trivial function $T_l(t) \equiv 0, \quad l \neq k.$ When $l = k$ we obtain the following Cauchy problem:

$$T_k''(t) + \mu_k^2 T_k(t) = t^2 + 1; \qquad T_k(0) = 0, \qquad T_k'(0) = 0. \quad (1.7)$$

The general solution to equation (1.7) has the form:

$$T_k(t) = A_k \cos \mu_k t + B_k \sin \mu_k t + T_k^*(t),$$

where is $T_k^*(t) = a t^2 + b t + c$ – the private solution. Then from

$$2a + \mu_k^2 (a t^2 + b t + c) = t^2 + 1$$

should

$$a = \frac{1}{\mu_k^2}, \quad b = 0, \quad 2a + c\mu_k^2 = 1 \quad \Rightarrow \quad c = \frac{1}{\mu_k^2}\left(1 - \frac{2}{\mu_k^2}\right) = \frac{\mu_k^2 - 2}{\mu_k^4}.$$

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Thus,

$$T_k(t) = A_k \cos \mu_k t + B_k \sin \mu_k t + \frac{1}{\mu_k^2}\left(t^2 + \frac{\mu_k^2 - 2}{\mu_k^4} \right).$$

From the initial conditions (1.7) we have

$$T_k(0) = A_k + \frac{\mu_k^2 - 2}{\mu_k^4} = 0 \quad \Rightarrow \quad A_k = -\mu_k^{-4}(\mu_k^2 - 2),$$

$$T_k'(0) = \mu_k B_k = 0 \quad \Rightarrow \quad B_k = 0.$$

Finally, we can write the solution to the original problem in the form:

$$u(x,t) = \left[\mu_k^{-4}(\mu_k^2 - 2)(1 - \cos \mu_k t) + \mu_k^{-2} t^2 \right] J_0(\mu_k x).$$

2–task. Find a solution to a mixed problem

$$u_{tt} = u_{xx} + \frac{1}{x} u_x, \quad 0 < x < 1,$$

$$\left| u \big|_{x=0} \right| < \infty, \qquad u \big|_{x=1} = g(t), \qquad u \big|_{t=0} = u_0(x), \qquad u_t \big|_{t=0} = u_1(x),$$

if:

$$g(t) = \sin^2 t, \qquad u_0(x) = \frac{1}{2}\left[1 - \frac{J_0(2x)}{J_0(2)} \right], \qquad u_1(x) = 0.$$

Solution. In this problem, heterogeneity enters only into the boundary condition. Therefore, in order to transform the problem to homogeneous boundary conditions, we introduce a new required function

$$u(x,t) = \upsilon(x,t) + \omega(x,t), \tag{2.1}$$

where $\omega(x,t)$ we construct the function so that it satisfies the inhomogeneous boundary condition, i.e.

$$\omega \big|_{x=1} = \sin^2 t = \frac{1}{2}(1 - \cos 2t). \tag{2.2}$$

Then the function $\upsilon(x,t)$ will satisfy the homogeneous boundary condition.

The function $\omega(x,t)$ in the form of a series

$$\omega(x,t) = \sum_{k=0}^{+\infty} (A_k \cos kt + B_k \sin kt) J_0(kx) \tag{2.3}$$

by Bessel functions. Substituting $\omega(x,t)$ into the boundary condition, we find

$$\omega \big|_{x=1} = \sum_{k=0}^{+\infty} (A_k \cos kt + B_k \sin kt) J_0(k) = \frac{1}{2}(1 - \cos 2t),$$

$$B_k = 0, \quad k = 0, 1, ..., \quad A_0 = \frac{1}{2}, \quad A_2 = -\frac{1}{2J_0(2)}, \quad A_k = 0, \quad \forall k \neq 0; 2.$$

Thus,

$$\omega = \omega(x,t) = \frac{1}{2} - \frac{J_0(2x)}{2J_0(2)} \cos 2t. \tag{2.4}$$

Now, taking into account (2.4) , we transform this problem to the new desired function $\upsilon(x,t)$:

$$\upsilon_{tt} + 2\frac{J_0(2x)}{J_0(2)} \cos 2t = \upsilon_{xx} + \frac{1}{x}\upsilon_x - \frac{\cos 2t}{2J_0(2)} \left[J_0''(2x) + \frac{1}{x} J_0'(2x) \right] =$$

$$= \upsilon_{xx} + \frac{1}{x}\upsilon_x + 2\frac{J_0(2x)}{J_0(2)} \cos 2t, \quad \text{those}$$

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

$$\upsilon_{tt} = \upsilon_{xx} + \frac{1}{x}\upsilon_x, \quad 0 < x < 1, \tag{2.5}$$

$$\upsilon\big|_{x=1} = 0, \qquad \upsilon\big|_{t=0} = u\big|_{t=0} - \frac{1}{2} + \frac{J_0(2x)}{2J_0(2)}\cos 2t\Big|_{t=0} =$$

$$= \frac{1}{2}\left[1 - \frac{J_0(2x)}{2J_0(2)}\right] - \frac{1}{2}\left[1 - \frac{J_0(2x)}{2J_0(2)}\right] = 0,$$

$$\upsilon_t\big|_{t=0} = u_t\big|_{t=0} - \frac{J_0(2x)}{J_0(2)}\sin 2t\Big|_{t=0} = 0.$$

The solution to the homogeneous equation about free vibrations of a circular membrane (2.5) under zero boundary and initial conditions is only a zero function, i.e. $\upsilon(x,t) \equiv 0.$

Consequently, the solution to the mixed problem will be written in the form

$$u(x,t) = \omega(x,t) = \frac{1}{2}\left[1 - \frac{J_0(2x)}{J_0(2)}\cos 2t\right].$$

3–task. Solve a mixed problem

$$u_{xx} + \frac{1}{x}u_x = u_{tt} + u, \quad 0 < x < 1, \tag{3.1}$$

$$\left|u\big|_{x=0}\right| < \infty, \qquad u\big|_{x=1} = \cos 2t + \sin 3t, \qquad u\big|_{t=0} = \frac{J_0\left(x\sqrt{3}\right)}{J_0\left(\sqrt{3}\right)}, \qquad u_t\big|_{t=0} = \frac{3J_0\left(2x\sqrt{2}\right)}{J_0\left(2\sqrt{2}\right)}.$$

Solution. As in the previous example, when the inhomogeneity is contained both in the equation and in the boundary condition, we look for a solution to this problem in the form of a sum

$$u(x,t) = \upsilon(x,t) + \omega(x,t), \tag{3.2}$$

where $\omega(x,t)$ we construct the function so that it satisfies the inhomogeneous boundary condition, i.e.

$$\omega\big|_{x=1} = \cos 2t + \sin 3t. \tag{3.3}$$

Further, as usual in the Fourier method, we formally assume

$$u(x,t) = X(x)T(t) \tag{3.4}$$

and find partial solutions that satisfy the homogeneous boundary condition.

Differentiating function (3.4), then substituting (3.1) into this equation and separating the variables, we obtain:

$$\frac{T''(t)}{T(t)} = \frac{X''(x) + \frac{1}{x}X'(x) - X(x)}{X(x)} = -\lambda^2. \tag{3.5}$$

Equalities (3.5) are reduced to two equations:

$$T''(t) + \lambda^2 T(t) = 0, \tag{3.6}$$

$$X''(x) + \frac{1}{x}X'(x) + (\lambda^2 - 1)X(x) = 0. \tag{3.7}$$

One of the particular solutions to equation (3.7) in the notation $\mu^2 = \lambda^2 - 1$ is the function

$$J_0(\mu x) = J_0\left(x\sqrt{\lambda^2 - 1}\right). \tag{3.8}$$

Thus, it becomes clear that the function $\omega(x,t)$ can be constructed as a series:

$$\omega(x,t) = \sum_{k=1}^{+\infty}(A_k \cos kt + B_k \sin kt)J_0\left(x\sqrt{k^2 - 1}\right). \tag{3.9}$$

From the boundary condition (3.3) it follows that

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

$$\sum_{k=1}^{+\infty}(A_k\cos kt+B_k\sin kt)J_0\left(\sqrt{k^2-1}\right)=\cos 2t+\sin 3t.$$

From here

$$A_2J_0\left(\sqrt{3}\right)=1,\quad B_3\sqrt{8}=1.\quad A_k=0,\quad \forall k\neq 2;\quad B_k=0,\quad \forall k\neq 3.$$

Then

$$\omega(x,t)=\frac{J_0\left(x\sqrt{3}\right)}{J_0\left(\sqrt{3}\right)}\cos 2t+\frac{J_0\left(2x\sqrt{2}\right)}{J_0\left(2\sqrt{2}\right)}\sin 3t. \tag{3.10}$$

In our case, in the transformation

$$u(x,t)=\upsilon(x,t)+\omega(x,t)$$

the function $\omega(x,t)$ was found in such a way that it satisfies not only the boundary condition, but also the equation, and also, as is easy to see, the initial conditions. Therefore, the solution to this problem is the function

$$u(x,t)=\omega(x,t)=\frac{J_0\left(x\sqrt{3}\right)}{J_0\left(\sqrt{3}\right)}\cos 2t+\frac{J_0\left(2x\sqrt{2}\right)}{J_0\left(2\sqrt{2}\right)}\sin 3t.$$

4–task. Solve a mixed problem

$$u_{tt}=u_{xx}+\frac{1}{x}u_x-\frac{u}{x^2},\qquad 0<x<1, \tag{4.1}$$

$$\left|u\big|_{x=0}\right|<\infty,\qquad u\big|_{x=1}=\sin 2t\cos t,\qquad u\big|_{t=0}=0,\qquad u_t\big|_{t=0}=\frac{J_1(x)}{2J_1(1)}+\frac{3}{2}\frac{J_1(3x)}{J_1(3)}.$$

Solution. First, let's translate the inhomogeneity in the boundary condition into an equation; to do this, we'll construct a function $\omega=\omega(x,t)$ that satisfies the boundary condition , i.e.

$$\omega\big|_{x=1}=\sin 2t\cos t=\frac{1}{2}\sin t+\frac{1}{2}\sin 3t. \tag{4.2}$$

The function $J_1(\mu x)$ satisfies the equation

$$J_1''(\mu x)+\frac{1}{x}J_1'(\mu x)-\frac{1}{x^2}J_1(\mu x)=-\mu^2J_1(\mu x), \tag{4.3}$$

therefore $\omega(x,t)$ can be constructed in the form of the following series

$$\omega(x,t)=\sum_{k=0}^{+\infty}(A_k\cos kt+B_k\sin kt)J_1(kx) \tag{4.4}$$

by Bessel functions. Then from the boundary condition (4.2) it follows that

$$\sum_{k=0}^{+\infty}(A_k\cos kt+B_k\sin kt)J_1(k)=\frac{1}{2}\sin t+\frac{1}{2}\sin 3t,$$

$$A_k=0,\quad k=0,1,\ldots,\quad B_1J_1(1)=\frac{1}{2},\quad B_3J_1(3)=\frac{1}{2},\quad B_k=0,\quad \forall k\neq 1;3.$$

Thus,

$$\omega(x,t)=\frac{J_1(x)}{2J_1(1)}\sin t+\frac{3}{2}\cdot\frac{J_1(3x)}{J_1(3)}\sin 3t. \tag{4.5}$$

Now, taking into account (4.5), we transform this problem to the new desired function: $\upsilon(x,t)$, i.e. we'll make a replacement

$$u(x,t)=\upsilon(x,t)+\omega(x,t) \tag{4.6}$$

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

$$\upsilon_{tt} - \frac{J_1(x)}{2J_1(1)}\sin t - \frac{9}{2}\cdot\frac{J_1(3x)}{J_1(3)}\sin 3t =$$
$$= \upsilon_{xx} + \frac{1}{x}\,\upsilon_x - \frac{\upsilon}{x^2} + \left[J_1''(x) + \frac{1}{x}J_1'(x) - \frac{1}{x^2}J_1(x)\right]\cdot\frac{\sin t}{2J_1(1)} +$$
$$+ \left[J_1''(3x) + \frac{1}{x}J_1'(3x) - \frac{1}{x^2}J_1(3x)\right]\cdot\frac{\sin 3t}{2J_1(3)} =$$
$$= \upsilon_{xx} + \frac{1}{x}\upsilon_x - \frac{\upsilon}{x^2} - \frac{J_1(x)}{2J_1(1)}\sin t - \frac{9}{2}\cdot\frac{J_1(3x)}{J_1(3)}\sin 3t,$$

from here

$$\upsilon_{tt} = \upsilon_{xx} + \frac{1}{x}\,\upsilon_x - \frac{\upsilon}{x^2}, \quad 0 < x < 1, \tag{4.7}$$
$$\upsilon\big|_{x=1} = 0, \qquad \upsilon\big|_{t=0} = 0, \qquad \upsilon_t\big|_{t=0} = 0. \tag{4.8}$$

The solution to the homogeneous equation (4.7) under zero initial and boundary conditions (4.8) is only a trivial function, i.e. $\upsilon(x,t) \equiv 0.$

Thus, the solution to this problem is

$$u(x,t) = \frac{J_1(x)}{2J_1(1)}\sin t + \frac{J_1(3x)}{2J_1(3)}\sin 3t.$$

Let us now consider a somewhat more general problem about forced oscillations of a circular membrane of radius R, fixed along the edge.

It is known that the eigenvalues and eigenfunctions of the Laplace operator $-\Delta_{r,\varphi}$ in a circle of radius R, i.e. next boundary value problem

$$-\Delta_{r,\varphi}u = \lambda u \quad \Rightarrow \quad -\left(u_{rr} + \frac{1}{r}\,u_r + \frac{1}{r^2}\,u_{\varphi\varphi}\right) = \lambda u; \qquad u\big|_{r=R} = 0,$$

are defined as follows:

$$\text{at} \quad \lambda = \left(\frac{\mu_k^{(0)}}{R}\right)^2, \quad k = 1, 2, \ldots \text{ and } \quad Y_0^k(r,\varphi) = J_0\left(\mu_k^{(0)}\frac{r}{R}\right)\cdot 1,$$

$$\text{at} \quad \lambda = \left(\frac{\mu_k^{(n)}}{R}\right)^2, \quad k = 1, 2, \ldots \text{ and } \quad Y_n^k(r,\varphi) = \begin{cases} J_n\left(\mu_k^{(n)}\frac{r}{R}\right)\cdot\cos n\varphi, \\ J_n\left(\mu_k^{(n)}\frac{r}{R}\right)\cdot\sin n\varphi. \end{cases}$$

5–task. Solve a mixed problem

$$u_{tt} = \Delta u + J_2(\mu_4^{(2)}r)\cos 2\varphi\cos(\mu_4^{(2)}t), \quad r < R, \tag{5.1}$$
$$u\big|_{r=1} = 0, \qquad u\big|_{t=0} = f(r)\sin\varphi, \qquad u_t\big|_{t=0} = J_2(\mu_4^{(2)}r)\cos 2\varphi, \tag{5.2}$$

where $u = u(r,\varphi,t), \qquad \Delta u = u_{rr} + \frac{1}{r}\,u_r + \frac{1}{r^2}\,u_{\varphi\varphi}.$

Solution. All eigenfunctions form a complete orthogonal system, then the function $u(r,\varphi,t)$ in the domain $\Omega = \{r < R,\ 0 < \varphi < 2\pi,\ t > 0\}$ can be represented as

$$u(r,\varphi,t) = \sum_{k=1}^{+\infty} J_0\left(\mu_k^{(0)}\frac{r}{R}\right)\cdot 1\cdot T_{0,k}(t) +$$

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

$$+\sum_{n=1}^{+\infty}\left[\sum_{k=1}^{+\infty}J_n\left(\mu_k^{(n)}\frac{r}{R}\right)\cdot\cos n\varphi\cdot T_{n,k}(t)+\sum_{k=1}^{+\infty}J_n\left(\mu_k^{(n)}\frac{r}{R}\right)\cdot\sin n\varphi\cdot\tilde{T}_{n,k}(t)\right]. \tag{5.3}$$

Now we expand the inhomogeneity in the equation and in the initial conditions into a series according to the eigenfunctions of the operator Δ in the region $\Omega,\ R=1.$

Let us first note that $J_2(\mu_4^{(2)}r)\cos 2\varphi$ is one of the eigenfunctions $J_n(\mu_k^{(n)}r)\cos n\varphi$, then we write out the expansion

$$f(r)=\sum_{k=1}^{+\infty}a_k J_1(\mu_k^{(1)}r), \tag{5.4}$$

since $\sin\varphi$ it is a one-time simple function. From here

$$a_k=\frac{\int_0^1 f(r)J_1(\mu_k^{(1)}r)\,r\,dr}{\int_0^1 J_1^2(\mu_k^{(1)}r)\,r\,dr}=\frac{1}{\left\|J_1(\mu_k^{(1)}r)\right\|^2}\cdot\int_0^1 f(r)J_1(\mu_k^{(1)}r)\,r\,dr, \tag{5.5}$$

where $\left\|J_1(\mu_k^{(1)}r)\right\|^2=\int_0^1 J_1^2(\mu_k^{(1)}r)\,r\,dr=\frac{1}{2}\left[J_1'(\mu_k^{(1)})\right]^2.$

Thus, taking into account these expansions in terms of the eigenfunctions of the operator Δ, it is enough to look for a solution to the problem of forced oscillations of a circular membrane of radius 1, fixed along the edge in the form:

$$u(r,\varphi,t)=J_2(\mu_4^{(2)}r)\cos 2\varphi\cdot T_{2,4}(t)+\sum_{k=1}^{+\infty}J_1(\mu_k^{(1)}r)\sin\varphi\cdot\tilde{T}_{1,k}(t). \tag{5.6}$$

Substituting the last expression into this equation and into the initial conditions, we get:

$$J_2(\mu_4^{(2)}r)\cos 2\varphi\cdot T_{2,4}''(t)+\sum_{k=1}^{+\infty}J_1(\mu_k^{(1)}r)\sin\varphi\cdot\tilde{T}_{1,k}''(t)=$$
$$=-(\mu_4^{(2)})^2J_2(\mu_4^{(2)}r)\cos 2\varphi\cdot T_{2,4}(t)-$$
$$-\sum_{k=1}^{+\infty}(\mu_k^{(1)})^2J_1(\mu_k^{(1)}r)\sin\varphi\cdot\tilde{T}_{1,k}(t)\ +\ J_2(\mu_4^{(2)}r)\cos 2\varphi\cos(\mu_4^{(2)}t), \tag{5.7}$$

and the initial conditions

$$J_2(\mu_4^{(2)}r)\cos 2\varphi\cdot T_{2,4}(0)+\sum_{k=1}^{+\infty}J_1(\mu_k^{(1)}r)\sin\varphi\cdot\tilde{T}_{1,k}(0)=\sum_{k=1}^{+\infty}a_kJ_1(\mu_k^{(1)}r)\sin\varphi,$$
$$J_2(\mu_4^{(2)}r)\cos 2\varphi\cdot T_{2,4}'(0)+\sum_{k=1}^{+\infty}J_1(\mu_k^{(1)}r)\sin\varphi\cdot\tilde{T}_{1,k}(0)=J_2(\mu_4^{(2)}r)\cos 2\varphi.$$

Next, we collect similar terms

$$J_2(\mu_4^{(2)}r)\cos 2\varphi:\qquad\begin{cases}T_{2,4}''(t)=-(\mu_4^{(2)})^2T_{2,4}(t)+\cos(\mu_4^{(2)}t),\\ T_{2,4}(0)=0,\quad T_{2,4}'(0)=1,\end{cases} \tag{5.8}$$

$$J_1(\mu_k^{(1)}r)\sin\varphi:\qquad\begin{cases}\tilde{T}_{1,k}''(t)=-(\mu_k^{(1)})^2\tilde{T}_{1,k},\\ \tilde{T}_{1,k}(0)=a_k,\quad \tilde{T}_{1,k}'(0)=0.\end{cases} \tag{5.9}$$

$\tilde{T}_{1,k}(t)$ – the general solution of the homogeneous equation has the form:

$$\tilde{T}_{1,k}(t)=C_1\cos\mu_k^{(1)}t+C_2\sin\mu_k^{(1)}t,$$
$$a_k=\tilde{T}_{1,k}(0)=C_1,\quad 0=\tilde{T}_{1,k}'(0)=C_2\mu_k^{(1)},\quad \mu_k^{(1)}>0\ \Rightarrow\ C_2=0.$$

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Thus , $\tilde{T}_{1,k}(t) = a_k \cos(\mu_k^{(1)} t).$

The general solution $T''_{2,4} = -(\mu_4^{(2)})^2 T_{2,4} + \cos(\mu_4^{(2)} t)$ of the inhomogeneous equation has the form:

$$T_{2,4}(t) = A\cos(\mu_4^{(2)} t) + B\sin(\mu_4^{(2)} t) + T^*(t), \tag{5.10}$$

where a particular solution should be sought in the form

$$T^*(t) = at\cos(\mu_4^{(2)} t) + bt\sin(\mu_4^{(2)} t). \tag{5.11}$$

$$\frac{d}{dt}: \; a\cos(\mu_4^{(2)} t) - at\mu_4^{(2)}\sin(\mu_4^{(2)} t) + b\sin(\mu_4^{(2)} t) + bt\mu_4^{(2)}\cos(\mu_4^{(2)} t),$$

$$\frac{d^2}{dt^2}: \quad -2a\mu_4^{(2)}\sin(\mu_4^{(2)} t) - at(\mu_4^{(2)})^2\cos(\mu_4^{(2)} t) +$$

$$+ 2b\mu_4^{(2)}\cos(\mu_4^{(2)} t) - bt(\mu_4^{(2)})^2\sin(\mu_4^{(2)} t) =$$

$$= -at(\mu_4^{(2)})^2\cos(\mu_4^{(2)} t) - bt(\mu_4^{(2)})^2\sin(\mu_4^{(2)} t) + \cos(\mu_4^{(2)} t) \;\Rightarrow$$

$$\Rightarrow \; -2a\mu_4^{(2)} = 0 \;\Rightarrow\; a = 0; \qquad 2b\mu_4^{(2)} = 1 \;\Rightarrow\; b = \frac{1}{2\mu_4^{(2)}}.$$

Let us substitute the found values a and b into the expression for $T^*(t)$, then

$$T_{2,4}(t) = A\cos(\mu_4^{(2)} t) + B\sin(\mu_4^{(2)} t) + \frac{t}{2\mu_4^{(2)}}\sin(\mu_4^{(2)} t). \tag{5.12}$$

From the initial conditions we determine the unknown coefficients A and B:

$$T_{2,4}(0) = 0 \;\Rightarrow\; A = 0; \qquad T'_{2,4}(0) = 1 \;\Rightarrow\; B\mu_4^{(2)} = 1.$$

Then

$$T_{2,4}(t) = \frac{1}{\mu_4^{(2)}}\left(1 + \frac{t}{2}\right)\sin(\mu_4^{(2)} t) \tag{5.13}$$

and the final answer is:

$$u(r,\varphi,t) = \frac{1}{\mu_4^{(2)}}\left(1 + \frac{t}{2}\right)J_2(\mu_4^{(2)} r)\cdot\cos 2\varphi\cdot\sin(\mu_4^{(2)} t) +$$

$$+ \sum_{k=1}^{+\infty} a_k J(\mu_4^{(2)} r)\cdot\sin\varphi\cdot\cos(\mu_4^{(2)} t),$$

where the coefficient a_k is determined by formula (5.5)

$$a_k = \frac{1}{\left\|J_1(\mu_k^{(1)} r)\right\|^2}\cdot\int_0^1 r\, f(r) J_1(\mu_k^{(1)} r)\, dr.$$

CONCLUSION

The results obtained can be used in the theory of linear differential and integral operators, in mathematical physics when integrating nonlinear equations.

REFERENCES

1. *Aramanovich I.G., Levin V.I. Equations of mathematical physics. Moscow, "Science", 1969, 288 pp.*
2. *Vladimirov V.S. Equations of mathematical physics. Moscow, "Science", 1971.*
3. *Tikhonov A.N., Samarsky A.A. Equations of mathematical physics. Moscow, "Science",1972.*
4. *Salohiddinov M. Mathematician and physics tenglamalari. Tashkent, "Uzbekiston" nashriyoti, 2002.*
5. *Shubin M.A. Lectures on the equations of mathematical physics. Moscow, MCNMO, 2003.*
6. *Budak B.M., Samarsky A.A., Tikhonov A.N. Collection of problems in mathematical physics. Moscow, "Science", 1972.*
7. *Collection of problems on equations of mathematical physics // Ed. V.S. Vladimirova, Moscow, Fizmatlit, 2001.*
8. *Yu.D. Panov, R.F. Egorov. Mathematical physics. Methods for solving problems. Ekaterinburg, 2005.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

UDK 591

ORTHOPTERA INSECTS ON THE LOW HILLS OF KARAKALPAKSTAN (UZBEKISTAN)

Yusupova Amangul
An Independent Researcher, Institute of Zoology, Academy of Sciences of the Republic of Uzbekistan

ABSTRACT
In this study, the field research results conducted between 2021 and 2024 on the study of the current state of the fauna of representatives of a large family of insects, the impact of environmental factors on their distribution, and the biological diversity of species in the areas of Kara tau, Sultan Wais, i.e., Kuskhana tau, which are all the low hills in Karakalpakstan, are presented. There are 6 orders, 15 families, 42 species, and subspecies belonging to 36 genera. It has been found that 3 species of Mantoptera, termites, 1 species of Rlecoptera, Phasmatoptera, Blattoptera, and Dermaptera, and 38 species of Orthoptera are distributed in the studied area. The identified 42 species are divided into 9 zoogeographic and 16 ecological groups.
KEY WORDS: *low hills, insecta, Orthopteroidea, order, genera, zoogeographic grouping, ecological grouping.*

INTRODUCTION

More than 30,000 species of Orthoptera insects are well-known around the world, and more than 700 of them can be found in Central Asian countries, including the Republic of Uzbekistan [1, 3, 5.].

The study on the fauna and species composition of Orthoptera insects in Central Asia began at the end of the 18th century. For the first time, the members of the expedition under the leadership of A.P. Fedchenko analyzed the materials collected for the identification of the species of Orthoptera insects and determined the taxonomic status of some species [7].

It is worth mentioning the research conducted by A.A. Bekuzin [1] on the distribution, fauna, and evolution of Orthoptera insects in Uzbekistan. His work on the study of the species composition of the locusts of the Sultan Uais mountain range located in Karakalpakstan is one of the important studies conducted in the area we are studying. According to his results, 23 species of grasshoppers were identified.

Of the works on the study of Orthoptera insects in the territory of Karakalpakstan, undoubtedly the researches of M.V. Stolyarov [6] are important, in which it is shown that 68 species of insects distributed in this area are distributed in different landscapes. Of these, 58 species belong to the family of grasshoppers, 7 species of locusts and 5 species of katydids. During this period, the number of Orthoptera insects in the territory of Karakalpakstan, and other species known, until M.V. Stolyarov studied, together made up 68 species. Distribution of grasshoppers in different stations and landscapes along the Southern Aral Sea G.Sh. Shamuratov and L.M. Kopaneva [8], in which the authors, based on scientific sources and according to the results of their research, provided information about 58 species of grasshoppers.

Especially, during the independence periods, a number of scientific works were carried out on the fauna, ecology, inter-landscape distribution and the development of ecologically harmful control measures. In particular, the formation of the fauna of Orthoptera insects of the South Aral Sea region along the landscape and its distribution in various agrocenoses were studied. However, studies on categories such as Blattoptera, Mantoptera, Dermaptera, Rlecoptera, Phasmatoptera have hardly been conducted.

MATERIALS AND METHODS

A total of 2,948 insect samples in the larval and imago stages were collected and studied from 21 coordinates of Kara tau, Sultan Wais, Kuskhana tau regions as the low hills of Karakalpakstan during the period of 2021-2024.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Figure 1. The map of the research areas (based on Google Earth).



Grasshoppers, stick insects, cockroaches, termites, springflies and insects belonging to the large order of the Orthoptera family and plant species of different stations where they are distributed and found in the studied areas were taken as research materials.

RESULTS AND DISCUSSION

As a result of the research, on the low hills of the Karakalpakstan six orders of Orthoptera insects, 15 families, 42 species and subspecies belonging to 36 genera have been found. Of the identified species, 36 species are distributed in the Kara tau region, and 15 species are distributed in the Kuskhana tau region. These species are divided into 16 ecological groups according to life forms, and 9 groups according to zoogeography (Table 1). The major Physlum are as follows: Arthropoda, Hexapoda, Insecta, Pterygota, Neoptera, Orthopteroidea.

Note: *+ - very rare species; ++ - rare species; +++ - permanent species.*

Herpetobionts - Herp. Biont, Facultative hortobionts - fac.xor.b, Psammobionts - psammo.b., Hortobionts - hortob., Tamnobionts - tamnob., Specialized phytophile - Spe.phyt., Eremobionts - eremob., Hortobionts with spikes - hort.b, Fissurobionts - fissurob., Layered geophile, Geobionts - geob, Geophile ambusher - geo. amb, Phytophilic ambusher - phytophus. amb., Flying Migrant

Table 1

Distribution of species of white-whiskered Orthoptera insects in South Uzbekistan by landscape.

№	Studied species	Low hills and their surrounding			
		Kara tau	Kuskhana tau	Ecological groups	Zoogeographic groups
1	2	3	4	5	6
Blattoptera,					
Ectobiidae					
1.	*Blattella germanica*	+++	-	syn.trop	1
Isoptera					
Hodotermitidae					
2.	*Anacanthotermes ahngerianus*	+++	-	geo. amb	8
Mantoptera					
Mantidae					

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3.	*Mantis religiosa*	+	+	flying. mig.	1
4.	*Iris polystictica*	+	+	flying. mig	4
Empusidae					
5.	*Empusa pennicornis*	-	+	phytophus. amb	1
Dermaptera					
Labiduridae					
6.	*Embia tartara*	++	-	geo. amb.	8
Plecoptera					
Nemouridae					
7.	*Amphinemura mirabilis turkestanica*	++	-	hydrob	8
Phasmatoptera					
Diapheromeridae					
8.	*Sceptrophasma bituberculatum*	-	+	hortob	7
Orthoptera					
Tettigonioidae					
9.	*Decticus verrucivorus* (Lin)	++	-	geobionts - geob	1
10.	*Decticus albifrons P.*	+++	-	geobionts – geob	4
11.	*Semenoviana plotnikovi* (Uv, 1914)	+	-	herbi.e.t.c	8
12.	*Platycleis intermedia* Serv.	+++	++	fac.xor.b	2
Grylloidae					
13.	*Melanogryllus desertus*	++	+	issurob.	3
14.	*Tartarogryllus tartarus* Sauss.	+	-	issurob	7
15.	*Velarifictorus bolivari* (Uv)	+	-	issurob.	8
16.	*Oecanthus turanicus*Uv.	-	++	spe.phyt	7
Gryllotalpidae					
17.	*Gryllatalpa unispina* Sauss.	++	-	geo. amb.	1
Tridactylidae					
18.	*Bruntrydactilus tartarus* (Saussure)	++	-	geo. amb.	1
Tetrigidae Ramb.					
19.	*Tetrix bolivari* Saulcy.	++	-	geo. amb	1
Pyrgomorphidae Brunner					
20.	*Pyrgomorpha bispinosa deserti*..	+++	++	fac.xor.b	7
Pamphagidae					
21.	*Thrincnus turcmenus* B.-Bien.	+	-	psammo.b	8
Acrididae					
22.	*Dericorys albidula* Aud.-Serv.	+++	-	tamnob	6
23.	*Dericorys tibilalis* (Pall.)	+++	-	tamnob	8
24.	*Anacridium aegyptium* (L.)	++	+	tamnob.	4
25.	*Calliptamus italicus italicus* (L.)	+++	++	hortob	3
26.	*Calliptamus turanicus* Serg.Tarb	+++	-	hortob	7
27.	*C.barbarus cephalotes* (Costa)	+++	++	hortob.	2
28.	*Heteracris littoralis littoralis*	+	-	tamnob	9
29.	*Heteracris adspersa* (Redt.)	-	++	tamnob.	8
30.	*Duroniella gracilis* Uv.	++	-	fac.xor.b	8
31.	*Aiolopus thalassinus* (F.).	++	-	fac.xor.b	1
32.	*Locusta migratoria migratoria* L.	-	++	flying. mig	1
33.	*Oedipoda miniata* (Pall.)	+++	-	eremob.	3
34.	*Acrotylus insubricus* (Scop.)	+++	++	eremob.	3
35.	*Sphingonotus nebulosus*	+	-	eremob	6

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

36.	*Sph. satrapes* Sauss.,	+	-	eremob	8
37.	*Sphingoderus. carinatus* (Sauss.)	-	++	hortob	5
38.	*Psevdoshingonotus savignyi* Sauss.	++	-	eremob	8
39.	*Helioscirtus moseri* Sauss.	+++	-	eremob	9
40.	*Notostaurus albicornis* (Ev.)	++	-	fac.xor.b	3
41.	*Eremippus simplex simplex* (Ev.)	++	-	tamnob	5
42.	*Glyptobothrus biguttulus* (L.)	+	-	hortob	1
Total: number of species and groups		36	15	16	9

Flying. mig., Synanthropic species - syn.trop., Hydrobiont species - hydrob., Herbivorous xortobiont - Herbi.e.t.c.. 1- Transpolearctic species, 2 – Europe – Siberia species, 3 – Europe – Kazakhstan species, 4 – Europe – Central Asia species, 5 – Kazakhstan – Western Mongol species, 6 – Kazakhstan - Mongol, 7 – Central asia – Kazakhstan species, 8 – Central asia species, 9 – Central asia, Kazakhstan species.

The main species of studied insects are *Anacanthotermes* Jacob 1903., *Platycleis* Fieb., 1852., *Decticus* Aud-Serv., 1831., *Velarifictorus* Rand., 1964., *Pyrgomorpha* Aud. Serv., 1839, *Dericorys* Serville, 1838., *Calliptamus* Aud. Serv., 1831. species of the genus are dominant.

Among these species, the largest number of 11 species (26.2%) is the Transpolearctic species group, while the least two species (4.8%) are Euro-Siberian, Kazakhstan-West Mongolian species, Kazakhstan-Mongolian species, Central Asia, Kazakhstan species groups.

In the ecological grouping according to life forms, it was found that hortobionts and eremobionts are the most, and at least one species is synanthropus, geophilous ambusher, hydrobiont, herbivorous hortobiont, specialized phytophile, herpetobiont, psammobiont, flying migrant group. Natural climatic conditions of the studied area play an important role in such distribution of ecological groups. This can be explained by the fact that species such as *Calliptamus turanicus* Serg.Tarb *Dericorys tibilalis* (Pall.) were not found by researchers for 10-12 years until 2015, only because the amount of rain has increased in these areas [4,6,8].

To conclude, in the low hills of Karakalpakstan there are 6 orders, 15 families, 42 species and subspecies belonging to 36 genera. It was found that 3 grasshopers, termites, bohorikors, sticklebacks, water beetles, and 38 species of arachnids are distributed in the studied area. These species are divided into 9 zoogeographic and 16 ecological groups.

REFERENCE

1. *Бекузин А.А. Фауна саранчовых хребта Султан-Уиздаг и его окружения // Вестн. Каракалпакск. фил. АН УзбССР, 1962 - 1(7). - С. 84-91.*
2. *Крыжановский О.Л. Состав и распространение энтомофаун земного шара. Москва, 2002. – 242. - с.*
3. *Насекомые Узбекистана. Под ред. Азимова Д.А. Ташкент, "Фан", 1993. – 320 с.*
4. *Медетов М.Ж. Ўзбекистон арид худудларининг тўғриқанотли ҳашаротлари (Insecta: Orthoptera). // Биология фанлари доктори диссертация автореферати (DSc). Ташкент, 2018- 60 с.*
5. *Правдин Ф.Н., Мищенко Л.Л. Формирование и эволюция экологических фаун насекомых в Средней Азии. М., 1980. – 155 с.*
6. *Столяров М.В. Видовой состав прямокрылых (Orthoptera) Каракалпакии и некоторые особенности их экологического распределения., //Зоологический журнал, 1966. - том XLV. – вып.7. - С.1017-1021.*
7. *Соссюр Г. Прямокрылые (Orthoptera). – // Путешествие в Туркестан А.П. Федченко, Т. 2, Ч.5.- Изв. о-ва любителей естввестзнаний, антропо и этногрогаф., 1874. - Т 11. - №4. – С.1-52.*
8. *Шамуратов Г.Ш., Копанева Л.М., Саранчовые в Каракалпакии.Нукус: Издательство «Каракалпакстан», 1984. - 112 с.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

UDC 574

ANALYSIS OF THE ACCUMULATION OF MICROELEMENTS IN THE BODY OF SMALL MAMMALS UNDER CONDITIONS OF EXPLOITED ECOSYSTEMS OF THE ARAL REGION

Mambetullaeva Svetlana Mirzamuratovna[1], Bekmuratova Dilaram[2]
[1]Doctor of Biological Sciences, Professor, Karakalpak Research Institute of Natural Sciences KKO Academy of Sciences of the Republic of Uzbekistan
[1]Assistant, Karakalpak State University named after Berdakh The Republic of Uzbekistan

ANNOTATION
The article discusses the results of an analysis of the accumulation of microelements in the body of small mammals in the conditions of exploited ecosystems of the Aral Sea region. The level of content of various toxic elements in the body of small mammals is associated with the characteristics of their biology, primarily with the food specialization of the species. A high level of pollution is typical for both technogenic and adjacent territories in the Southern Aral Sea region.

KEY WORDS: *micromammals, technogenic territories, microelements, pollutants, monitoring, nature conservation.*

In modern conditions of social development, one of the most difficult problems is environmental protection and rational use of natural resources. Systematic research into the impact of global technogenic environmental pollution on living organisms is one of the most important tasks of modern ecology, since microelement pollution of the environment inevitably leaves its mark on them. In connection with the increase in environmental pollution by emissions from industrial enterprises, there is a need to conduct accelerated diagnostics of the state of natural systems near them and assess the impact of industrial pollutants on these systems.

Without knowledge of the peculiarities of the biology of mammals in the technogenic environment, it is impossible to comprehensively solve the problems of monitoring and nature conservation. In recent years, a large arsenal of methods has been developed to identify the effect of various impacts on the environment. Adaptation of rodent populations to anthropogenic transformation of the landscape occurs mainly at the community level due to changes in species composition, the ratio of species with different food specializations [3,4,6,12,14].

And, if high concentrations of a pollutant lead to clearly defined effects, then low concentrations cause chronic damage, which often remains hidden and can only be detected through physiological and biochemical studies [6]. Therefore, new knowledge of the compensatory and adaptive capabilities of the body in conditions of industrial pollution of the environment is important both for solving problems of environmental protection and for urgent measures to diagnose and prevent the development of pathological, irreversible processes in the body [4,11].

The Southern Aral Sea region is a unique region in natural terms and is of great interest in studying the characteristics of the distribution of animals across biotopes. The total area of the Southern Aral Sea region (about 1 million sq. km) covers the northwestern parts of Uzbekistan (eastern part of the Ustyurt plateau, northwestern part of the Kyzylkum, middle and lower reaches of the Amu Darya) and Turkmenistan (Zaunguz Karakum, southern Ustyurt) [5]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Fig. 1. Transformation of the ecosystem in the territory of the KSP (2024)

Kungrad Soda Plant (KSP) is the only large manufacturing enterprise in Central Asia producing soda ash. The work is based on the results of studies conducted in 2018–2023. on the technogenic territory of the sanitary protection zone of the Kungrad Soda Plant (KSP) and control (background) areas located in the Kungrad district of the Republic of Karakalpakstan. Relative counts of small mammals were carried out in several areas remote from the territory of the KSP: at a distance of 1 and 2 km southeast of the KSP; at a distance of 2 and 4 km northwest of KSP [1].

The distribution of species in the communities of micromammals within the village boundaries was radically different from those in the desert. Inside settlements, *Mus musculus dominated* in all areas, making up about 57% in the general community, and about 80% in the "green" zones. The second most abundant species in the demutating ecosystem was the population of *Rhombomys opimus,* (just over 18%), followed by *Citellus fulvus* (about 11%).

Dominance in desert and semi-desert ecosystems in terms of species composition and values occupied an intermediate position between desert and intra-village communities. On the first transects, closest to the development, *Mus musculus* dominated everywhere. The different nature of the response to the consequences of natural catastrophic impacts indicates a decrease in the population size of *Meriones erythrourus* and *Citellus fulvus* during the middle stages of restoration succession and, on the contrary, an increase in the abundance of *Mus musculus* and *Allactaga elator* populations.

To study the patterns of microelements accumulation in the body of small mammals, we studied the composition and concentration of heavy metals in the body of natural populations of micromammals living on the territory of the Kungrad soda plant of the Southern Aral Sea region.

Samples were taken from 11 samples of organs and tissues of small mammals: the great gerbil (*Rhombomys opimus*) and the yellow ground squirrel (*Citellus fulvus*). The content of elements in organs and tissues was determined by performing ICP-MS spectral analysis in the physicochemical laboratory of the Karakalpak Research Institute of Natural Sciences. As a result, the average content of 21 chemical elements was determined: Al, Si, P, S, Cl, K, Ca, Cr, Mn, Fe, Ni, Cu, Zn, As, Br, Rb, Sr, Mo, Ag, Se, Nb.
Analysis of communities of small mammals in technogenic and background territories shows that the species composition and number of individuals of individual species in the compared territories differ. The analysis of the average content of elements in the body of the studied species of small mammals in technogenic and natural areas showed the species-specific nature of their accumulation, regardless of territorial zones (Fig. 1-4).

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

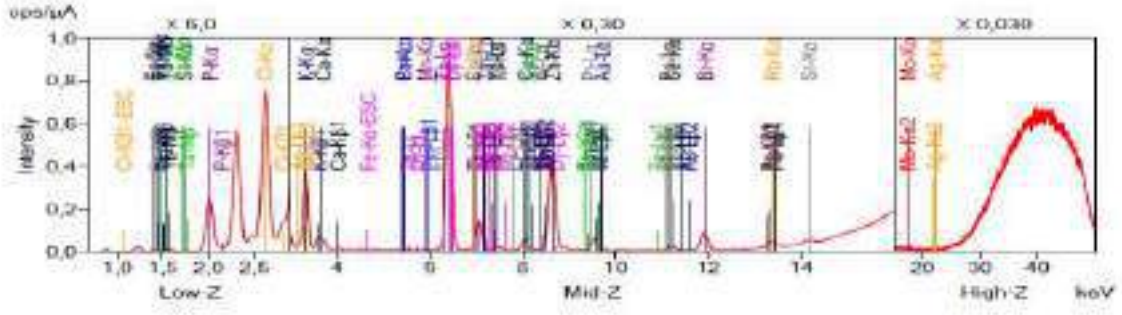


Fig.1. Spectral analysis of the content of microelements in the body of Rhombomys opimus (KSP)

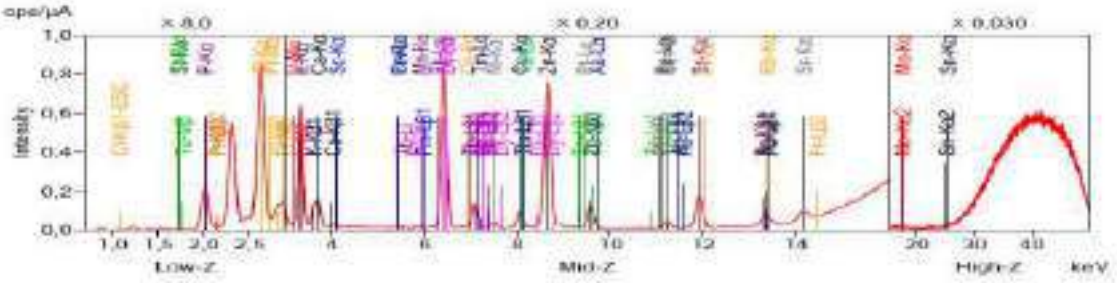


Fig.2. Spectral analysis of the content of trace elements in the body of Rhombomys opimus (control)

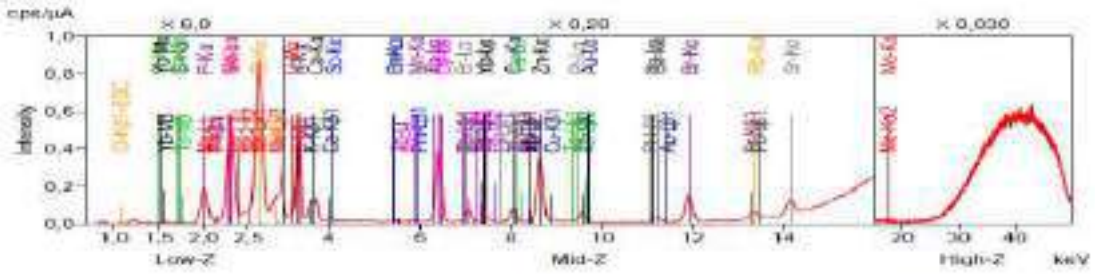


Fig.3. Spectral analysis of the content of microelements in the body of Citellus fulvus (CSZ)

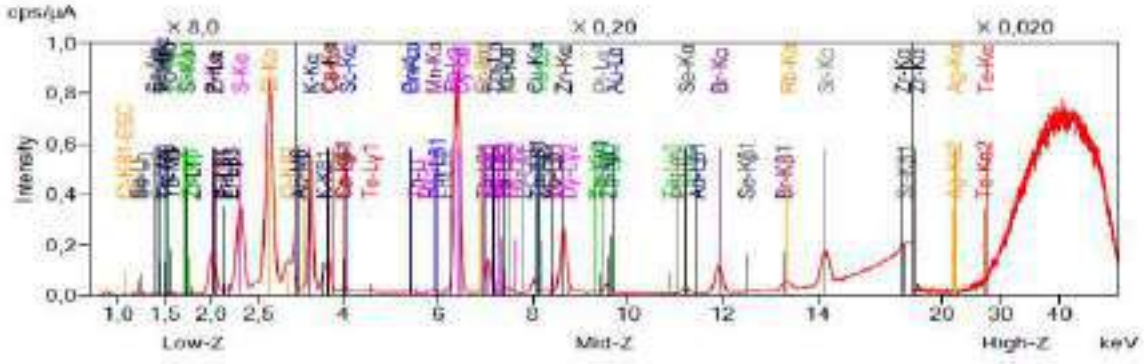


Fig.4. Spectral analysis of the content of microelements in the body of Citellus fulvus (control)

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

As a result of the analysis of the data obtained, *Rhombomys opimus* has an excess of 5 elements in the control and 6 elements in the experiment, while Al, S, As, Ag, Nb are absent in the control, and S, As, Nb are absent in the experiment.

Citellus fulvus has an excess of 5 elements in the control and 12 elements in the experiment, while there are no elements such as Mo, Nb (in the control), Ag, Nb (in the experiment) (Table 1).

Table 1

Average content of microelements in the body of the studied species of small mammals, mass%

Elements	Microelements content, mass%			
	Rhombomys opimus *(n=5)*		***Citellus fulvus*** *(6)*	
	опыт	контроль	опыт	контроль
Al	5,96	-	4,26	3,76
Si	0,651	1,39	1,49	0,745
P	20,7	18,5	12,8	12,5
S	-	-	15,3	13,7
Cl	17,5	21,8	27,6	21,7
K	40,2	41,0	38,3	34,2
Ca	4,83	10,7	8,21	7,54
Cr	0,0441	0,0317	0,0359	0,0416
Mn	0,0373	0,0333	0,0412	0,0351
Fe	8,41	4,89	5,08	4,16
Ni	0,0645	0,0715	0,0485	0,0458
Cu	0,203	0,189	0,135	0,0914
Zn	1,16	1,20	0,462	0,318
As	-	-	-	-
Br	0,0780	0,0916	0,0630	0,0468
Rb	0,0226	0,0154	0,0100	0,0052
Sr	0,0151	0,0197	0,0271	0,0370
Mo	0,0094	0,0082	0,0063	-
Ag	0,0049	-	-	0,0034
Se	0,0199	0,0217	0,0110	0,0087
Nb	-	-	-	-

The yellow ground squirrel usually avoids large tracts of sand and vast areas with monotonous landscape conditions, but inhabits them along the edges, reaching the highest numbers in areas with a mosaic combination of various biotopes of desert and semi-desert zones. The main food of the yellow gopher is the succulent aboveground and underground parts of herbaceous plants. The yellow gopher (*Citellus fulvus*), which predominantly feeds on underground parts of plants that accumulate toxic substances, demonstrates the highest levels of microelements with maximum accumulation doses in the organs and tissues of the body.

In spring, the main food of *Rhombomys opimus* consists of ephemeral and ephemeroid plants: bluegrass, desert and sandy sedges, succulent shoots and branches of herbaceous plants and shrubs. In autumn and winter, the food of the great gerbil mainly (up to 95%) consists of above-ground shoots and seeds of ephemeral and ephemeral plants, branches of saxaul and kandym. Accumulation rates in the body of the great gerbil (*Rhombomys opimus*) are also high because In the summer, she digs up succulent bulbs and rhizomes of bluegrass, onions, and ebelek and uses assimilating shoots - wormwood, seline, solyanka, cherkes, boyalych, sand acacia and saxaul, which also accumulate toxic substances.

According to the literature, it is noted that the level of accumulation of toxic elements and heavy metals in the body is mainly associated with the food specialization of species [6, 8, 9]. The sources of high concentrations of microelements in natural areas, where, in addition to the highway, passing near the territories of the KSZ, require additional study. Toxic elements and heavy metals found in the body of the studied species of small mammals are a consequence of contamination of soil, water, air and vegetation in the study areas in the territory of an ecological extreme situation in the Southern Aral Sea region.

Thus, in the conditions of the technogenic landscape of the sanitary protection zone of the KZZ, communities of small mammals are characterized by a decrease in the abundance of species by an average of 18%. Under the conditions of technogenic pressure, monodominant communities are formed with a predominance of a single species – *Mus musculus*, which has the greatest plasticity and resistance to technogenic factors. The ecotone conditions of the "green" zone created additional conditions for greater species

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

diversity of the lower layers of vegetation and, accordingly, communities of small mammals, which is consistent with the general provisions on ecotones.

The level of content of various toxic elements in the body of small mammals is associated with the characteristics of their biology, primarily with the food specialization of the species. A high level of pollution is typical for both technogenic and adjacent territories in the Southern Aral Sea region. At the same time, the features of the accumulation of heavy metals in the body of small mammals depend on a number of factors related both to the biology of the animals themselves and to the patterns of transmission of trace elements from the source of pollution with subsequent accumulation in various substrates, including biological ones.
The results of complex studies of model rodent species (*Rhombomys opimus and,Citellus fulvus*) showed that they can be used not only for the purpose of bioindication of environmental pollution at the local, regional levels and to justify ecotoxicological regulation, but also for long-term environmental forecasting tasks.

LITERATURE

1. *Bekmuratova D.M. Assessment of ecological parameters of small mammals under conditions of technogenic impacts // Universum: chemistry and biology: electron. scientific magazine 2022. 8(98). URL: https://7universum.com/ru/nature/archive/item/14136 (access date: 05.26.2024).*
2. *Bykova E.A., Esipov A.V., Rudenko A.A., Grazhdankina E.I. Content of toxic elements and heavy metals in the bone tissue of the marmot Menzbir // Marmots in the steppe biocenoses of Eurasia. 8th meeting on marmots of the CIS countries. – Cheboksary-Moscow, 2002. pp. 13-14.*
3. *Gashev S.N. Mammals in the environmental monitoring system (on the example of the Tyumen region) // Diss. ... doc. biol. Sciences. - Tyumen, 2003. - 396 p.*
4. *Treasurer V.P. Modern aspects of adaptation. Novosibirsk: Nauka, 1987.- 191 p.*
5. *Kudaibergenova U.K. Geographical, ecological, structural features of regions and associated diseases of the population of the southern Aral Sea region // Eurasian Union of Scientists (ESU) #12(81), 2020]*
6. *Kudyasheva A.G., Shishkina L.N., Zagorskaya N.G., Taskaev A.I. Biochemical mechanisms of radiation damage to natural populations of mouse-like rodents. St. Petersburg: Nauka, 1997. - 153 p.*
7. *Mukhacheva S.B., Bezel B.C. Levels of toxic elements and the functional structure of the population of small mammals under conditions of technogenic pollution // Ecology. 1995. - No. 3. - P. 237-240.*
8. *Reimov R. Experience of ecological and morphophysiological analysis of the mammal fauna of the Southern Aral Sea region - Nukus: Karakalpakstan.-1972. – 412 s.*
9. *Reimov R. Rodents of the Southern Aral Sea region. - Tashkent, FAN. - 1987. - 125 p.*
10. *Reimov R.R. Adaptation of mammals to extreme living conditions in the Southern Aral Sea region // Bulletin of the KCO Academy of Sciences of the Republic of Uzbekistan. – Nukus. – 1995. – No. 3. – 13–19 p.*
11. *Satonkina O.A. Ecological and physiological characteristics of small mammals of natural and technogenic landscapes of the Ural region // abstract of dissertation ..... candidate of biological sciences. - 2004. - 35 p.*
12. *Rocky A.B. Diagnosis and prevention of microelementosis taking into account the results of medical and environmental examination // Fundamentals of system analysis in environmental and hygienic research. St. Petersburg, 2000.-S. 175-197.*
13. *Tikhonova G. N., Tikhonov I. A., Bogomolov P. L. Features of the ecology of four background species of rodents in the Tsimlyansky Sands // Zool. magazine 2008. T. 87, No. 4. - 495 – 504 p.*
14. *Khulamkhanova M.M., Khaidukova O.B., Bittirova Zh.A., Atabieva A.Z., Dzhappueva L.M. Study of the structure and dynamics of the population of background species of small mammals in zones of technogenic pollution in the Central Caucasus NovaInfo.Ru - 123, 2020 pp. 5-8*
15. *Shaniyazov U. B., Mambetullaeva S. M., Utemuratova G. N. Analysis of the Dynamics of the Number of Dominating Species of Rodent Desert Ecosystems of the Aral Sea // International Journal of Science and Research (IJSR). - 2019.- Volume 8 Issue 12, p . 1383-1385.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

UDC 597.2/.5

FEATURES OF PARASITEFAUNA OF FISH RESERVOIRS OF THE REPUBLIC OF KARAKALPAKSTAN

Kurbanova Alfiya Ismailovna
Candidate of Biological Sciences, Associate Professor of the Department of General Biology and Physiology Karakalpak State University named after. Berdakha The Republic of Uzbekistan

ANNOTATION
The article presents the results of ichthyoparasitological studies of fish in some reservoirs of the Republic of Karakalpakstan. The species composition of parasites of individual species of tested fish is given, indicating the extent and intensity of invasion.
KEY WORDS: *ichthyoparasites, extensively, intensively, specimen, reservoirs.*

Fish parasites of Uzbekistan have been studied and described in relatively detail in the scientific works of many scientists [6,5,7]. Ichthyoparasitological studies were carried out in a number of reservoirs of the Republic of Karakalpakstan. Some fish species in this region have been extremely insufficiently studied parasitologically [3,4]. In this regard, we considered it necessary to study the ichthyoparasites of this region. During 2016 - 2023 We carried out parasitological studies of fish on lakes Dautkul, Karateren, Akchakul, where 5 species of fish were studied.

The study used the method of complete parasitological dissection, developed by Professor V.A. Dogel (1933) and described by I.E. Bykhovskaya-Pavlovskaya (1985). The taxonomy of parasites was carried out according to the three-volume book "Identifier of parasites of freshwater fish" [2].

In the examined fish, 53 species of parasites were found, belonging to the classes Myxosporidium (12 species), Cyrtostomata (1), Membraniostomata (1), Circulociliate (4), Monogenea (27), Cestodes (7), Trematodes (4), Nematodes (7), acanthocephalans (3), leeches (1) and crustaceans (5 species).

In the studied reservoirs, 5 species of fish were examined, in which 53 species of parasites were registered. Among them, the richest fauna of parasites was observed in marinka (30 species) and carp (19 species), and the smallest in sabrefish (1 species), rudd (1), and snakehead (2). Below we present the species composition of parasites of individual species of tested fish, indicating the extent and intensity of invasion (Table 1).

Table 1
Types and numbers of studied fish in the reservoirs of the Republic of Karakalpakstan

Species name	LA (sample)	LK (sample)	LD (sample)	Total (sample)
Common marinka-Schizothorax intermedius McClelland	14	35	-	49
Carp-Cyprinus carpio (L)	16	28	12	56
Chekhon-Pelecus cultratus (L.)	-	-	8	8
Rudd-Scardinius erythrophthalmus (L.)	5	-	10	15
Snakehead-Channa argus warpachowskii Berg.	-	-	10	10
	35	63	40	138

Note, hereinafter: OA - Lake Akchakul; OK - Lake Karateren; OD – Lake Dautkul.

Common marinka ***(Schizothorax intermedius McClelland)*** - or "akbalyk" (white fish), a genus of fish of the carp family. The surveyed marinkas were infested with 30 species of parasites, belonging to myxosporidians (8 species), orochoridia (5), monogenea (6), cestodes (2), trematodes (1), nematodes (3), acanthocephalans (3), leeches (1) and crustaceans.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Carp ***(Cyprinus carpio)*** is a species of freshwater ray-finned fish of the carp family. The total contamination of this fish was 80.6%. It was found to have 29 species of parasites, which belong to myxosporidians (4 species), origoriformes (4), monogeneas (6), cestodes (6), trematodes (1), nematodes (2), acanthocephalans (2 and crustaceans (4 species)**.**

Chekhon ***(Pelecus cultratus)*** is a species of schooling semi-anadromous fish of the carp family, the only species of the genus Pelecus. The total infection of the studied individuals was 8 infections. In sabrefish, only a specific gill fluke, Dactylogyrus simplcimalleata, in the amount of 3, has been identified.

Rudd ***(Scardinius erythrophthalmus)*** is a species of freshwater fish of the cyprinid family. The overall infection rate of this fish was 88.2%. The three studied individuals (17.6%) were infected only with the acanthocephalan Pomphorhynohus laevis at an intensity of 1 specimen.

Snakehead ***(Channa argus)*** is a freshwater fish of the snakehead family (Channidae). The total invasion of this Far Eastern fish was 76.9%. It was infected with ciliates - Ichthyophthirius multifiliis (57.7%) and Trichodina pediculus (11.5%), which were recorded in single specimens.

Thus, 53 species of parasites have been registered in 5 fish species. It was noted that among these fish, the most parasites were found in marinka and carp, and the smallest - in sabrefish, rudd, and snakehead.

LITERATURE

1. *Bykhovskaya-Pavlovskaya I.E. Fish parasites. Study Guide. Leningrad. - 1985. - 120 p.*
2. *Dogel V.A. Problems of studying the parasitic fauna of fish // Proceedings of the Leningrad Natural Science Society. - No. 62 (3). - 1933.*
3. *Karaev R.M. Epizootic state of the studied water bodies. Collection: Reservoirs of Uzbekistan and their fishery significance. - Tashkent: Fan. 1994, p. 33-41.*
4. *Karimov S.B. On changes in the parasitic fauna of fish in the Kairakkum reservoir over a long period // Parasitology, volume 23. - Leningrad, 1988, p. 250-260.*
5. *Kurbanova A.I., Urazbaev A.N., Yusupov O.D. Changes in the parasite fauna of some fish of the Southern Aral Sea region under the influence of anthropogenic pressure // Bulletin of Zoology of the Academy of Sciences of Ukraine. - volume 36. - pp. 29-34.*
6. *Osmanov S.O. Parasites of fish in Uzbekistan. T: Fan. -1971. - 532 s.*
7. *Osmanov S.O., Arystanov E., Ubaydullaev K.K. and others. Parasites of fish and aquatic invertebrates in the lower reaches of the Amudarya. T: Fan. - 1980. - 156 p.*
8. *Yusupov O, Urazbaev A.N. Parasitic ciliates (Peritricha: urceolariidae) of fish of the Aral Sea // Parasitology, volume 14. - 1980. - p. 504-510.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

UDC 595.7

BIOECOLOGICAL FEATURES OF THE POLISTES WASP

Nagashybaeva Aigerim Leather kizi
Assistant, Department of Ecology and Soil Science, Karakalpak State University named after. Berdakha, The Republic of Uzbekistan

ANNOTATION
The article discusses the biological features of the polistes wasp. belonging to the genus Polistes. Worldwide, there are more than 200 recognized species of wasps polistes; social insects are widespread on the planet, inhabiting almost all biotopes. The polistes wasp is characterized by a variety of nest-building and protective instincts, structure and organization of families and populations.
KEY WORDS: *genus, family, species, female, male, phase, development, life cycle, nest.*

Insects are a class of invertebrate arthropods. Together with millipedes, they belong to the tracheal subphylum. About 1 million species of insects are known. They have the greatest diversity of all other animals on Earth [2].

Insects actively participating in the cycle of substances, insects play a global planetary role in nature. The order Hymenoptera is one of the largest orders of insects, which includes more than 155 thousand species from 9100 genera. They are combined into 2 suborders, 28 superfamilies, more than 100 families (89 recent and 37 extinct. The famous Swedish naturalist Carl Linnaeus was the first to combine insects with membranous wings, including bees, wasps and ants under the name Hymenoptera [3].

Polistes is a cosmopolitan genus of paper wasps and the only genus in the tribe Polistini. Common names for the genus include umbrella wasp, coined by Walter Ebeling in 1975 to distinguish it from other paper wasp species by the shape of their nests, and umbrella paper wasp [4].

Polistes is the largest genus in the family Vespidae, with over 200 recognized species. They usually build nests in human habitats. Polistes wasps are covered with short and inconspicuous hair, have a clypeus or clypeus with a pointed apex, have a wide genome along the entire length, the tubercle of the 1st metasoma in profile is almost straight or slightly curved, the tibia of the middle leg has two spurs, and the legs end in simple tarsal claws [5].

Polite wasps are a relatively small group of social insects (about 200 species are known on the globe), distributed on all continents except Antarctica. They inhabit mainly open landscapes and construct cardboard nests without a shell, which are attached to the substrate using a stalk. These social insects are widespread on the planet, inhabiting almost all biotopes [7].

These insects are characterized by a variety of nest-building and protective instincts, structure and organization of families and populations. They have two main ways of family and population functioning:

- Resociality - the family is founded by single female founders; the existence of a family is limited to the life of one generation of reproductive individuals with cyclical repetition of the single and family phases; there is an incomplete separation of the two spheres of functioning; there are no morphologically separate castes
- Nomosociality - a family is founded by a swarm, its existence is not limited by the life span of specific reproductive individuals, the family can function without the stage of resocialization; morphologically separate castes are observed in species that are characterized by complete separation of two spheres of functioning [8].

Polystea exhibits sexual dimorphism: males have seven externally visible metasomal segments, and females have six. Polistes species have single-layer umbrella-shaped nests with cells open to the air from below and no layer enveloping the nest. The nests are suspended from the surface by a petiole and are made of a paper-like substance consisting of a mixture of saliva and wood fibers chewed off from old and soft wood or dry twigs.

The general life cycle of Polysthes can be divided into four phases:

- foundation phase;
- working phase;
- reproductive phase;

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

 intermediate phase.

The founding stage begins in the spring when a lone "foundress" female or a small group of related females initiates nest construction. The wasps begin by forming a petiole, a short stalk that will connect the new nest to the substrate, and build a single brood cell at its end. Additional cells are added to the side in a hexagonal pattern, with each cell surrounded by six others. nests always retain their basic shape: petiolate, single-scaled, unprotected and open [6].

The eggs are laid by the founder directly into the blood cells and are guarded by the founder and helping females. After the first larvae hatch, the founder feeds them using gradual feeding. Each of this first seasonal brood of new paper wasps is exclusively female and destined for a subordinate work position within the nest; they do not establish their own nests, but instead assist their mother in caring for future sisters [2].

Some founder wasps do not build their own nests, but rather try to usurp another female's nests. These attempts at usurpation may or may not be successful, but almost always result in spectacular displays of aggression and violence. Females may also choose a more peaceful alternative reproductive strategy by joining the nest of a close relative and working as female helpers [5,6].

The breeding phase usually begins in early summer, about two months after the colony begins, with the appearance of the first workers. These new females take on most of the work responsibilities of the colony: foraging for food, caring for the brood, and maintaining the structure of the nest. Around this time, those females who helped establish the nest are driven from the nest by aggressive behavior on the part of the founder and leave either to establish their own nests at the end of the season or to usurp others [5,6].

The reproductive phase of a colony begins when the first reproductive females emerge from their brood cells. These reproductive individuals differ from their worker sisters in their increased levels of fat reserves and cryoprotective carbohydrate compounds, which allow them to survive the wintering period. These reproductive individuals pass on their genes directly to the next generation, while their worker sisters usually pass on their genes indirectly [5,6].

As soon as reproductive males appear, females and males leave the nest for nuptial flights, the so-called intermediate phase begins. Brood care and foraging decline, and worker numbers decline as dying individuals are no longer replaced by new ones. Internally, colonial aggression increases and nest social cohesion decreases [5,6].

The reproductive behavior of Polistes wasps provided one of the first pieces of evidence for mathematician-biologist W. D. Hamilton's theory of kin selection, formulated in 1964.

Morphologically, the founder and the subordinate reproductive members of the colony differ little. However, behavioral differentiation occurs among females both between and within generations.

The entire development cycle from the moment of egg laying to the emergence of the imago lasts on average 38 days. The lifespan of a working individual ranges from 21-40 days. The intensity of reproduction in polystyreous wasps strongly depends on the weather conditions of the warm season of the year [1].

Thus, insects of the genus Polistes are characterized by a variety of nest-building and protective instincts, structure and organization of families and populations.

LITERATURE

1. *Abasheev R.Yu. Ecological and biological features of polystyrene wasps (Hymenoptera, Vespidae, Polistinae) in Southwestern Transbaikalia // Bulletin of the Buryat State University. Biology. Geography. - 2010.- P. 162 -169.*
2. *Kipyatkov V. E. The world of social insects. - L.: Leningrad University Publishing House. 1991. 408 - p.*
3. *Nagashybaeva A. The ecological role and significance of the wasp (insecta: hymenoptera) in nature // "World Science" No. 6 (27) 2019. / science-j.com. - P.336-338.*
4. *Paper wasps https://ru.wikipedia.org/wiki/*
5. *Polistes – Polistes https://ru.wikibrief.org/wiki/Polistes*
6. *Polistes / https://hmong.ru/wiki/Polistes*
7. *Rusina L.Yu. Population structure and social organization of ospolites (HYMENOPTERA: VESPIDAE) in the lower Dnieper // diss. 1999-260 pp.*
8. *Rusina L. Yu. Principles of organization of the population of polystine wasps (Hymenoptera, vespidae) // Zoological Journal, 2015, volume 94, No. 10, p. 1226-1240*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

EMPOWERING WOMEN: A TECHNOLOGICAL APPROACH TO WOMEN'S DEVELOPMENT THROUGH SELF-HELP GROUPS IN THE DIGITAL AGE

Mrs.Chanchalakshi[1], Dr. Parameshwara[2]

[1]*Assistant Professor, Besant women's College Mangalore, Department of Commerce, Research Scholar, Mangalore University, Dakshina Kannada District, Karnataka State*

[2]*Associate Professor, Department of Commerce, Mangalore University, Dakshina Kannada District, Karnataka State*

ABSTRACT

In rural India, Women's Self-Help Groups (SHGs) are a valuable and efficient means of advancing women's financial inclusion, social mobilization, and empowerment. A growing array of digital tools have surfaced, with the potential to accelerate women's empowerment, increase the effectiveness of current efforts, offer pathways for knowledge improvement, and establish new channels for women to interact and exchange information. One of the primary forces of change in this century is digital technology. It is changing governments, economies, and all facets of progress.

This research paper, titled "Empowering Women: A Technological Approach to Women's Development through Self-Help Groups in the Digital Age," investigates the transformative potential of combining Self-Help Groups (SHGs) and technology to empower women. In an era dominated by digital advancements, this study explores how the synergy between SHGs and technology can enhance women's socio-economic development, digital literacy, and overall empowerment. The study explores how Self-Help Groups (SHGs) affect women's empowerment and evaluates how they contribute to social resilience, economic independence, and psychological health. Additionally, the study analyzes the integration of technology within SHG initiatives, examining the effectiveness of digital communication, financial technologies, and online resources in augmenting the outcomes of SHG programs.

Furthermore, the research investigates the impact of SHGs and technology on healthcare access, entrepreneurship, and decision-making processes. It identifies challenges faced in the integration of technology within SHGs, including issues of accessibility, digital literacy, and infrastructure, and proposes strategies to overcome these barriers. The findings of this research not only contribute to the academic understanding of the intersection between SHGs, technology, and women's development but also offer practical insights for policymakers, practitioners, and organizations seeking to enhance women's empowerment in the digital age.

KEYWORDS: *Empowering women, self-help groups, women's development, digital technology, technological approach.*

INTRODUCTION

It is impossible to overestimate how much technology has shaped societal ideas in the quickly changing 21st century. We must acknowledge the revolutionary potential of technology as we travel in the digital age, especially in terms of empowering women. This article, which makes use of innovation, investigates a new strategy for women's growth by incorporating technology into self-help groups, which are an effective means of group advancement and support.

Historically, self-help groups have played a pivotal role in enabling communities, especially women, to pool resources, share experiences, and collectively address socio-economic challenges. This paper explores how technology can be used to improve self-help groups' effectiveness and assist women become more economically independent, socially equitable, and empowered individuals.

By examining the intersection of technology, self-help groups, and women's development, we aim to uncover innovative solutions that can bridge existing gaps and create a more inclusive and equitable future. As we embark on this journey, it is essential to recognize the potential pitfalls and challenges that may arise, ensuring that our technological interventions are not only effective but also sensitive to the diverse needs of women across different contexts.

Objectives:

- To assess the impact of Self-Help Groups (SHGs) on women's empowerment
- To analyze the integration of Technology within Self –Help Group Initiatives
- To study the Government Schemes for women empowerment through digitalization and self-help group

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- To Identify the challenges and barriers to the integration of technology within SHGs

Research Methodology
The present study is based on primary and secondary data. The data has been collected with the help of a well-structured questionnaire. The study has been conducted among the SHG members. The secondary data has been collected from the research articles and journals.

Review of Literature
According to Esther Duflo (2012) from the study, he observed that Women's empowerment and economic development are closely interrelated. While development itself will bring about women's empowerment, empowering women will bring about changes in decision making which will have a direct impact on development.

According to Simonetta Zarrilli, Chiara Piovani, and Carlotta Schuster, more women need to participate in the process of innovation to make digital technologies more attuned to their needs. Letting digital technologies widen gender gaps and ignoring the specific challenges that women face in the process of digitalization would contradict the hope for a world where opportunities are equally shared and nobody is left behind.

According to Imania Imtiyaz & Dr. S.K. Bhogal (2020) from the study they observed that Digital technology access has opened new horizons of freedom for the women of the third world. Since the internet is value-neutral, it offers third-world women the greatest degree of freedom in a society where women still do not have equal access to physical space.
Women can effectively promote their own well-being by challenging prevailing norms and cultural practices through the process of women empowerment. The involvement of women in Self Help Groups (SHGs) has had a noteworthy effect on their empowerment in terms of social and economic domains. The engagement of women in Self-Help Groups has undoubtedly had a significant impact on the patterns and lifestyles of poor women, empowering them on multiple levels not just as individuals but also as members of their families, communities, and society at large. They gather together to use mutual aid and self-help to find solutions to their shared issues. In India, self-help groups can be a more effective means of promoting financial inclusion, particularly in rural areas.

INDIAN GOVERNMENT SCHEMES FOR DIGITAL LITERACY FOR WOMEN IN MANAGING SELF-HELP GROUPS

Ministry of Women and Child Development has encouraged women by launching a direct online link Mahila E-Haat to support upcoming Women Entrepreneurs, Self-Help Groups and Non-Governmental Organizations to exhibit the products made and services rendered by them. This is an initiative taken by the government authorities towards Digital India Initiative Programme. Women can register themselves in registering in any of the self-help groups with the innovative ideas and techniques which enhance them from bringing up change in the society.

1. "BETI BACHAO, BETI PADHAO": This is a campaign which focuses on eradication of female feticide and raising awareness on welfare services. "SAVE THE GIRL CHILD" Movement was launched on 22nd January 2015, is a joint initiative run by Ministry Of Women and Child Welfare Department, Ministry Of Health and Family Welfare and The Ministry Of Human Resource Development. In India the child gender ratio in the age group of 0-6 years stood at 931 girls for 1000 boys and it dropped to 918 girls for every 1000 boys in 2011. In 2020, male to female ratio for India was 108.18 males per 100 females. Male to female ratio of India increased from 105.4 males per 100 females to 108.18 males per 100 females in 2020 growing at an average annual rate of 0.19%. Selective abortion or female feticide in India has led to the sharp decline in the ratio of girls born in contrast to the boys in some states in country. The wide gap in child gender ratio was noted ever since. To bridge the gap between the birth of girl and boy infants, the government of India has taken up an initiative to promote BetiBachaoBetiPadao. These campaigns also have received support from the Indian Medical Associations.

2. SAKHI: It was implemented on 1st April 2015 with 'Nirbhaya' fund. The one stop centers are established at various locations in India for providing shelter police does legal medical and counseling services to victims of violence under one roof integrated in 24 hours helpline. The toll free helpline number is 181. Centers can be contacted for the help and in emergency: Emergency response and rescue services, medical assistant in lodging FIR/NCR psycho-social support counseling legal aid and counseling shelter video conferencing facility to record statements.

3. SWADHAR GREH: It was launched by the Union Ministry of Women and Child Development in 2002 for rehabilitation of women in difficult circumstances. The scheme provides shelter, food, clothing and care to the marginalized women/girls who are in need. The

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

women beneficiary includes widowed, prisoners. Natural calamities victims, terrorist survivors, extremist violence etc. the implementing agencies are mainly NGOs.

4. STEP (THE SUPPORT TO TRAINING AND EMPLOYMENT PROGRAMME FOR WOMEN): This scheme aims to provide skills that give employability to women and to provide competencies and skill that enable women to become self-employed entrepreneurs. A particular project will be for duration of up to 5 years depending upon the nature, kind of activities and the number of beneficiaries to be undertaken. It includes certain sectors like- agriculture, horticulture, food processing, handlooms, tailoring, stitching, embroidery, zari, handicrafts, computers and IT enable services along with soft skills and skills for the workplace such as spoken English, gems and jewelry, travel and tourism, hospitality etc.

5. NARI SHAKTI PURUSKAR: This is a national level awards recognizing the efforts made by women and institutions in rendering distinguished services for the cause of women. The awards are presented by the President of India every year on 8th March, International Women's Day at Rashtrapati Bhavan in New Delhi.

DATA ANALYSIS AND INTERPRETATION

Age wise respondents

AGE	Response in Numbers	Percentage
Below 25 years	09	9%
26-35 years	23	23%
36-45 years	32	32%
46-55 Years	21	21%
Above 55 Years	15	15%
Total	**100**	**100%**

The study involved 9% of respondents belonging to the age group of below 25 years , 23% of the respondent's age group 26-35, 32% of the respondent of the age group 36-45,21% of respondents belonging to the age group 46-55, and 15% of the respondents belong to above 55 years.

Educational Background

	Response in Numbers	Percentage
Illiterate	15	15%
Primary	43	43%
High school	19	19%
Under – Graduation	07	07%
Graduate	16	16%
Total	**100**	**100%**

The study shows that 15%of the respondents are illiterate, 43% of the respondents are primary, 19% high school, 7% undergraduate and 16% respondents are graduated.

Occupation:

	Response in Numbers	Percentage
Housewife	18	18%
Agriculture Labour	06	06%
Business /Self-employment	02	02%
Front Office &Back office Employees	-	0
Beedi Roller	19	19%
Any other	55	55%
Total	**100**	**100%**

The study involved 18 % of the respondents are house wives, 6% are agriculture laborers, 2% are business peoples and 19 % of the respondents are Beedi rollers and 55% of the respondents are working in other areas.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Duration of involvement in Self-Help Group (in years):

	Response in Numbers	Percentage
2000-2005	30	30%
2006-2010	22	22%
2011-2015	20	20%
2016-2020 till date	28	28%
Total	**100**	**100%**

The study shows that 30% of the respondents joined the shgs between 2000-2005, 22% of the respondents joined between 2006-2010, 20% of the respondents joined between 2011-2015, and 28% of the respondents joined in 2016 to till date.

Contribution of SHG for the Women Empowerment

	Response in Numbers	Percentage
Never	-	-
Rarely	08	08%
Sometimes	04	04%
Often	10	10%
Always	78	78%
Total	**100**	**100%**

The study shows that the relative contribution of SHGs to women's empowerment is 85%, sometimes contribution is 4%, often 10%, always contributed to women's empowerment is 78%.

Use of Digital Communication tools in SHGs

	Response in Numbers	Percentage
Daily	-	-
Weekly	05	5%
Monthly	25	25%
Rarely	54	54%
Never	16	16%
Total	**100**	**100%**

The study showed that daily there will no a usage of digital tools, weekly usage of digital tools in SHGs is 5%, Monthly usage is 25%, rarely usage is 54%, and never used is 16%.

Use of technology within SHGs influenced the members to access healthcare information

	Response in Numbers	Percentage
Strongly agree	34	34%
Agree	32	32%
Neutral	20	20%
Disagree	08	08%
Strongly disagree	06	06%
Total	**100**	**100%**

The study showed that 34 % of the respondents strongly agreed that the Use of technology within SHGs influenced the members to access healthcare information, 32% of the respondents agreed, 20 % the respondent are neutral, 8% of the respondents disagreed and 6 % of the respondents have strongly disagreed.

MAJOR FINDINGS

- 32% of the respondents of the age group 36-45
- 43% of the respondents are primary
- 55% of the respondents are working in other areas
- 28% of the respondents joined in 2016 to till date
- Respondents are Always contributed to women's empowerment is 78%

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Respondents rarely usage is 54%
- 34 % of the respondents strongly agreed that the Use of technology within SHGs influenced the members to access healthcare information

➢ Training needs: Proper training is necessary in technology
➢ Infrastructure challenges: Poor technology infrastructure, including unreliable electricity supply and limited internet connectivity, will affect the smooth integration of technology into SHG activities
➢ Language barriers: Language barriers also affect communication and the use of technology effectively
➢ Cost constraints: Acquiring and maintaining technology is expensive. The cost of devices, internet connectivity, and software is prohibitive for some members, impacting their participation in tech-based activities
➢ Digital literacy: Lack of familiarity with digital tools and platforms
➢ Limited technology access: Some members may need access to smart phones, computers, or the internet, particularly in rural areas

SUGGESTIONS

SHGs and implementing organizations may need to invest in digital literacy programs, provide financial support for technology adoption, offer customized solutions, and ensure ongoing support and training for members. Digital literacy programs should be implemented to enhance women's skills in using technology. Proper training should be given on basic computer skills, internet usage, and relevant applications. Explore partnerships with organizations that can help provide devices at reduced costs. Develop and provide technology solutions in local languages to overcome language barriers. Creation of content in an easily understandable form for all the members. Providing training on digital payment systems and mobile banking to empower women economically. Providing training on using technology for entrepreneurship, such as online marketing and e-commerce. Collaboration with government agencies, NGOs, and private sector entities to leverage resources and expertise for technology integration. Identify the existing programs and initiatives that will promote women's development through technology.

CONCLUSION

It is essential to note that the successful integration of technology in women's development through SHGs requires addressing potential challenges such as digital literacy gaps, access to technology, and ensuring the inclusivity of all members. Local contexts and community-specific needs should be taken into account when implementing digital initiatives within SHGs. SHGs can create an inclusive and supportive environment for women, fostering their development through the effective use of technology.

REFERENCE

1. *Sintayehu Hailu Alemu, Luuk Van Kempen & Ruerd Ruben (2018) Women Empowerment Through Self-Help Groups: The Bittersweet Fruits of Collective Apple Cultivation in Highland Ethiopia Journal of Human Development and Capabilities, 2018*
2. *Esther Duflo Journal of Economic Literature 2012, 50(4) Women Empowerment and Economic Development*
3. *Simonetta Zarrilli, Chiara Piovani and Carlotta Schuster Sustainable development and women's empowerment: the challenges and opportunities of digitalization*
4. *Tabasum Niroo, W., & Crompton, H. (2022). Women's empowerment through the use of technology. Asian Journal of Distance Education, 17(2), 135-152.*
5. *Rajeshwari G M , Lavanya B, Mizba Saher "Digital Literacy Revolution of Women Empowerment through Self-Help Groups" Online International Interdisciplinary Research Journal, {Bi-Monthly}, ISSN 2249-9598, Volume-12, May 2022 Special Issue*

https://iwwage.org/empowering-women-through-digital-innovations/#:~:text=Women's%20Self%2DHelp%20Groups%20(SHGs,financial%20inclusion%20in%20rural%20India.
https://www.livemint.com/opinion/online-views/selfhelp-groups-play-a-big-role-in-the-empowerment-of-women-11646670524028.html
https://press.un.org/en/2023/wom2224.doc.htm
https://www.undp.org/egypt/speeches/future-empowering-women-era-digital-transformation
https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2015/06/DigitalLiteracy_v6_WEB_Singles.pdf

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

PERFORMANCE OF UCB AND CUSTOMERS SATISFACTION TOWARDS TUCBL

Dr. S.A Mohamed Ali[1], Ms. Najma B[2]
[1]*Principal, CMS Academy of Management & Technology, Coimbatore-49.*
[2]*Research Scholar, CMS Academy of Management & Technology. Coimbatore -49.*

Article DOI: https://doi.org/10.36713/epra17517
DOI No: 10.36713/epra17517

ABSTRACT
UCB (Urban Cooperative Banks) as part of cooperative banking are deemed as the integral part of Indian economic growth. UCB channelise the deposits and saving accumulated into productive loans extended to small and medium scale business ventures. UCBs offers prime banking service to the urban poor i.e., both banking and financial assistance. This research article assessed performance of UCBs and various categories of customers satisfaction towards UCBs is assessed. The study considered 410 TUCBLs (Tirchur Urban Cooperative Limited) customers as sample. The article findings confirmed that 81.80 per cent are pleased with the TUBL staff behaviour towards their customers, they also appreciated the account opening procedure followed by TUBCL (80.40 per cent) and account closing procedures (78.20 per cent). The article also found that there exists association between nature of deposits owned, loan borrowed and services availed by TUCBL customers and their satisfaction towards overall services cum performance of TUCBL. The article concluded with the note that definitely, with able governance and controlling mechanism adoption the UCBs can perform well and support of the apex financial regulation agencies and RBI. In addition, customers play a greater role in sustainability of the UCBs, with their patronage UCBs functioning in Kerala can achieve new highest and new mile-stones.
KEY WORDS: *Cooperative Bank, Urban Cooperative Bank, Customers Satisfaction.*

INTRODUCTION

Cooperative movement aims to promote fairness, friendship, humanity, being empathy towards community and concern for upliftment of the socio-economic status of the poor. In relevance to this objective, cooperative movement plays a major role in upliftment of socio-economic status of marginal poor men and women throughout the Kerala state. Through cooperative societies number of employment opportunities are created to the people of Kerala (Anubumani, 2007). UCB (Urban Cooperative Banks) as part of cooperative banking are deemed as the integral part of Indian economic growth. UCB channelise the deposits and saving accumulated into productive loans extended to small and medium scale business ventures. UCBs offers prime banking service to the urban poor i.e., both banking and financial assistance. The UCBs operative with the feature of simplicity, complete involvement and ultimate commitment to its members cum customers (Khan, 2018). UCBs functioning in Kerala are observed to be showcasing better financial performance, efficient in loan recovery, retaining health assets quality, maintaining valuable capital adequacy status, adequately liquidating and earning enough profits (Amala and Kumar, 2021).

RATIONALITY OF THE STUDY

UCBs caters to the various banking needs of the untouched section of the society and promotion their small business ventures and SHGs (Self-Help Group) operations. UCBs functions are primarily encircled with their customers and operative for collective benefits. UCBs has number of merits and it exists even before the formal banking system was established in the country. Yet, till date UCBs on the whole holds only three (3) per cent share in the banking operations in the country and it faces stiff competition from both public and private sectors banks in term of offering high-end services to their customers and in retaining their customer bases.

AIM OF THE PAPER

This research article assessed performance of UCBs and various categories of customers satisfaction towards UCBs is assessed.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

HYPOTHESIS

- There exists association between nature of deposits owned, loan borrowed and services availed by TUCBL customers and their satisfaction towards overall services cum performance of TUCBL.

METHODOLOGY

For the construct of this article author adopted mixed research techniques i.e., qualitative analysis i.e., literatures assessment of the study concepts and theoretical discussion and qualitative analysis for data assessment and analysis. The study considered 410 TUCBLs (Tirchur Urban Cooperative Limited) customers as sample.

LITERATURE SURVEY

Literature survey through light on the study concept and support the researcher in better understanding of the study topic and various factors /dimensions that influences the study variables. A brief summary of the literatures collected for the study are presented in this portion.

(i) Operative Performance of UCBs in India

Importance of UBCs is emphasised, Ramu (2013) highlights the features of the UCBs functioning in India. The author says that the UCBs functioning in India are formed as "Unit Banks" adopting the American bank model and it is not based on the British Bank Model i.e., branch banking system. Mayilvaganan and Soundararajan (2013) says that in the recent years UCBs have adopted three-prime financial inclusion strategies of SCBs i.e., adoption to banking correspondents' practices, enabling no-frill accounts and promoting micro-financing activities. Chandrashekar (2015) claim that UCBs plays a crucial role in adoption and promotion of financial inclusion. Balwinder and Soni (2015) registered that satisfied customers plays a superior role in promotion, long-exciting relationship and competitive status of UCBs. Tripathy et al., (2021) summarised that cooperatives functioning in Kerala are observed to be very competitive and well performing in nature.

On a Negative note, Giram (2014) claims that UCBs functioning are more hindered by the political interfaces' effects the growth and health performances of these banks. To ensure its growth and support to the urban poor, the authorities have to focus on need more professional managements and adoption of effective operation controlling mechanism. Agrawal (2017) concluded that UCBs have to free from the restriction of co-operative system to realise self-reliant and being self-supportive. Raju (2018) inferred that UCBs faces number of challenges that effects its financial health and issues created due to poor governance. In addition, the base norm of UCBs that functioning on mutual lending of credit between UCBs that are failed to monitored, controlled and collected. As per Paul and Selvakumar (2020) though UCBs pays crucial role in extending credit to the urban poor. Yet Financial performance of UCBs is observed to be less comparative compared to the both public and private sectors banks functioning in India. The performance of the UCBs is found to be excellent in certain parameters and it falls below the bench marks in certain parameters.

On a positive note, Pai et al., (2023) found that the UCBs functioning in Ernakulam districts depicts a positive performance, each UCBs have exemplary high performance in one or other parameters, thus, their performance varies from one UCB to others. Financial performance of UCBS functioning in Mattancherry is ranked as the high and followed by performance of UCBs functioning in Muvattupuzha has recorder as second and The UCBs functioning in Kerala has greater potentials of growth in the near future in Kerala.

(ii) Customers Satisfaction towards UCB Services

Sharma (2016) identified that the prevails wider gap between customers expectation and satisfaction towards performances and services offered by UCBs functioning in Pune. Sharmi and Prabhakar (2017) concluded that the customers value high the relationship with them by the IUCB employees, nature of service to them and professional practice of IUCB. Sujith and Sumathy's (2019) article summarised that customers satisfaction towards primary lending agencies varies from one to another based on the different dimensions of operations like: location of the society, interest rate, behaviour of staff and long-term relationship build etc. Kulkarni and Metre (2020) also claims that customers expressed their satisfaction towards their banks in different dimensions or say parameters. Sukthankar et al., (2020) noted that customers of Goa UCB were satisfied with overall services offered by the Goa UCB, its profit earning capacity and operating income earned. Kundaragi (2021) study concluded that farmers the customers of UCBs expressed higher degree satisfaction with the tangible features of UCBs functioning in their district, followed by its service features like: assurance of UCBs, staff behaviour i.e., their empathy towards the customers, being responsive to the farmers queries and offering highly reliable service. Arya and Thapa (2024) found that UCBs customers were satisfied with the interest charged on loans, variety of banking service offered, documentation process adhered, grievances redressal practices and time taken in loan approval.

Continuity and survival of the UCBs are purely depended on its members support and retaining them satisfied to the maximum extent. Even though UCBs operates in small number and individual unit performance are different from one another, it plays a

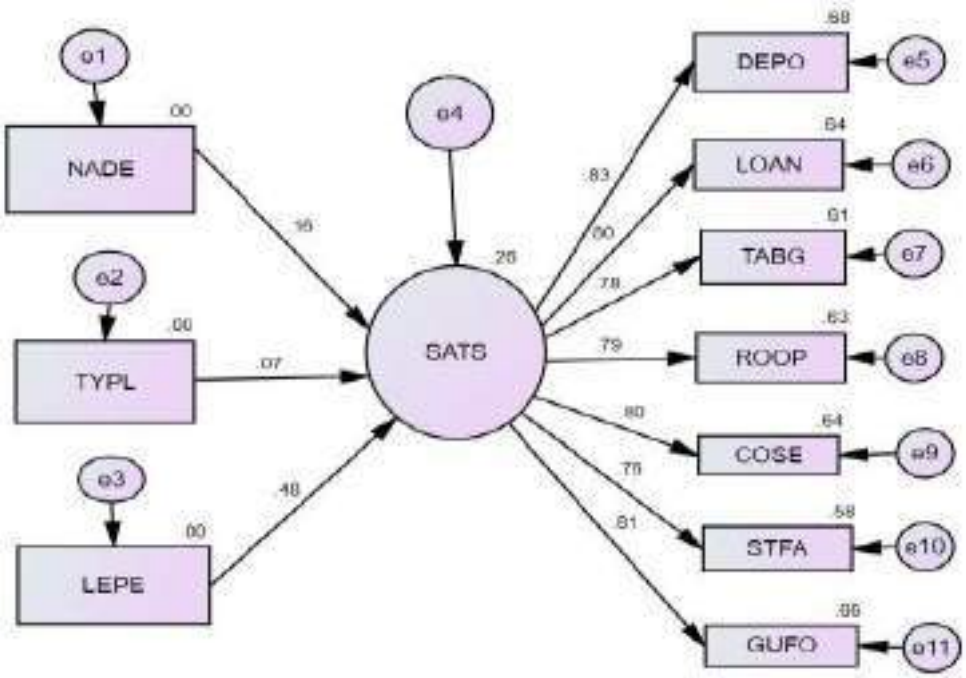
SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

crucial role in promoting the financial inclusion programme of the Government of India and in addressing the financial issues of the neglected section of the society i.e., poor cum small traders, business and urban households. Definitely, with able governance and controlling mechanism adoption the UCBs can perform well and support of the apex financial regulation agencies and RBI.

RESULTS AND DISCUSSIONS

Participation in the Co-operative societies' operation is part of Indian culture and these societies actively functioning in upliftment of the socially vulnerable and excluded section of the society. UCBs aims to mobile funds from its members and non-members, extent credit facilities to the small borrowers at comparatively lower interest, offer safety lockers and other banking services to its customers. In a survey conducted among 410 TUCBL customers, it was noted that 42.93 per cent of the samples were men and 42.07 per cent of the samples are women. Over, 53.17 per cent of the samples are in the age group of 26-35 years and 13.66 per cent of the samples are aged between 36-45 years. Above 51.95 per cent of the samples are graduates. It was observed that above 54.15 per cent of the customers operate account in TUCBL for the past three years and just 10.49 per cent of the samples operate accounts in TUCBL for the past 10 years or more. Different type of deposits is owned by TUCBL customers of which majority i.e., 59.27 per cent own a saving account and 27.32 per cent own a current account. Over, 32.78 per cent of the TUCBL customers have borrowed personal loan, 17.56 per cent have owed jewel loan and 11.95 per cent have borrowed vehicle loan. The study confirmed that 81.80 per cent are pleased with the TUBL staff behaviour towards their customers, they also appreciated the account opening procedure followed by TUBCL (80.40 per cent) and account closing procedures (78.20 per cent).

EXHIBIT: 1.1
ASSOCIATION BETWEEN UCBS BANKING PRACTICES AND THEIR SATISFACTION TOWARDS SERVICES



Note: NADE- Nature of Deposit Operation, TYPL- Type of Loan, LEPE- Level of Perception on Convenience, DEPO- Deposits, LOAN- Loans, TABG- Tangibility, ROOP- Routine Operational Factors, COSE- Counter Services, STFA- Staff Factors, GUFO- Guidance Facility and Other Services.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

TABLE: 1
CONFIRMATORY FACTOR ANALYSIS CHI-SQUARE RESULT AND GOODNESS OF FIT INDICES OF THE PROPOSED MODEL

Fit Indices	Obtained Value	Accepted Thresholds Levels	Acceptable Value
2 (CMIN)	98.064	NA	NA
DF	35	NA	NA
P	.000	NA	NA
Scaled 2/df	2.802	<0.05	<0.05
Goodness of Fit Index (GFI)	.875	Value Greater than 0.95	0-1
Adjusted Goodness of Fit Index (AGFI)	.803	Value Greater than 0.95	0-1
Tucker-Lewis Index (TLI)	.862	Value Greater than 0.95	0-1
Comparative Fit Index (CFI)	.893	Value Greater than 0.95	0-1
Normed Fit Index (NFI)	.880	Value Greater than 0.95	0-1
Parsimonious Normed Fit Index (PNFI)	.884	0=Poor Fit, 1=Good Fit	0-1
Parsimonious Comparative Fit Index (PCFI)	.894	0=Poor Fit, 1=Good Fit	0-1
Relative Fit Index (RFI)	.845	0=Poor Fit, 1=Good Fit	0-1
Incremental Fit Index (IFI)	.893	0=Poor Fit, 1=Good Fit	0-1
Root Mean Square Approximation Method (RMSEA)	.001	Range between 0.05-0.08	.05 or less would indicate a close fit of the model

Level of Significance: 5 % , Minimization : .016 Miscellaneous : .406, Bootstrap: .000, Total: .422

The CFA results are presented in Table: 1 and Exhibit: 1. The fit indices indicate that the measure has a good fit overall. On the basis of these measurements, the result of the study shows that the proposed model has a Good data fit χ^2 (CMIN) = 98.064 (p=.000), GFI=.875, AGFI=.803, TLI=.862, CFI=.893, NFI=.880, PNFI=.884, PCFI=.894, RFI=.845, IFI=.893, RMSEA=.001, indicative of a good fit, although not all of the values to the right of the observed variables represent standardised factor loadings (β), it is represented in the following Table: 2.

TABLE: 2
CONFIRMATORY FACTOR ANALYSIS PATH ANALYSIS STRUCTURE MAXIMUM LIKELIHOOD –REGRESSION WEIGHTAGE

Path			Unstandardised Estimates	Standardised Estimates	S.E	C.R	P Value	Relationship
SATS	<---	NADE	.129	.163	.037	3.459	**.000**	**Significant**
SATS	<---	LEPE	.430	.476	.046	9.362	**.000**	**Significant**
SATS	<---	TYPL	.022	.074	.014	1.528	**.000**	**Significant**
COSE	<---	SATS	.900	.802	.045	19.911	**.000**	**Significant**
ROOP	<---	SATS	.801	.793	.042	18.984	**.000**	**Significant**
DEPO	<---	SATS	1.000	.827	.041	12.563	**.000**	**Significant**
LOAN	<---	SATS	.909	.801	.045	19.986	**.000**	**Significant**
TABG	<---	SATS	.858	.779	.046	18.688	**.000**	**Significant**
STFA	<---	SATS	.871	.760	.049	17.837	**.000**	**Significant**
GUFO	<---	SATS	.942	.811	.048	19.570	**.000**	**Significant**

Level of Significance: 5 per cent

Association between customers perception towards UCBS banking practices and their satisfaction towards services was assessed the inter-correlation between the variables are tested as: SATS vs NADE (β=.163, p=.000), SATS vs LEPE (β=.476, p=.000) and SATS vs TYPL (β=.074, p=.000). The intra-correlation between the variables of satisfaction were summed as: COSE vs SATS

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

(β=.802, p=.000), ROOP vs SATS (β=.793, p=.000), DEPO vs SATS (β=.827, p=.000), LOAN vs SATS (β=.801, p=.000), TABG vs SATS (β=.779, p=.000), STFA vs SATS (β=.760, p=.000), GUFO vs SATS (β=.811, p=.000) are positively correlated and found to be significant. Therefore, the hypothesis framed is accepted that there exists association between nature of deposits owned, loan borrowed and services availed by TUCBL customers and their satisfaction towards overall services cum performance of TUCBL.

CONCLUSION

UCBs plays a valuable role in enhancing financial inclusion and act as a barricade in protecting the poor and vulnerable urban and semi section of the society in the clutches of high interest charging money lenders. In addition, it offers number of banking services in par with an SCB. Continuity and survival of the UCBs are purely depended on its members support and retaining them satisfied to the maximum extent. Even though UCBs operates in small number and individual unit performance are different from one another, it plays a crucial role in promoting the financial inclusion programme of the Government of India and in addressing the financial issues of the neglected section of the society i.e., poor cum small traders, business and urban households. The article findings confirmed that 81.80 per cent are pleased with the TUBL staff behaviour towards their customers, they also appreciated the account opening procedure followed by TUBCL (80.40 per cent) and account closing procedures (78.20 per cent). The article also found that there exists association between nature of deposits owned, loan borrowed and services availed by TUCBL customers and their satisfaction towards overall services cum performance of TUCBL. The article concluded with the note that definitely, with able governance and controlling mechanism adoption the UCBs can perform well and support of the apex financial regulation agencies and RBI. In addition, customers play a greater role in sustainability of the UCBs, with their patronage UCBs functioning in Kerala can achieve new highest and new mile-stones.

REFERENCE

1. *Amala K.A and Anil Kumar .K (2021), Examining the Financial Efficiency of Urban Co-Operative Banks in Kerala-A CAMEL Model Analaysis, Commerce & Business Researcher, Volume.No.14, Issue.No.2, PP: 105-116, December.*
2. *Anbumani. K (2007), Marketing of Cooperative products: Challenges and Social Benefits, International Marketing Conference on Marketing & Society, 8-10 April, 2007, PP: 91-102, IIMK, http://dspace.iimk.ac.in/xmlui/bitstream/handle/2259/635/91-102.pdf?sequence=1.*
3. *Anil Kumar (2024), Co-Operative Banks in India: Significance and Challenges, Likindin, 24th January, https://www.linkedin.com/pulse/cooperative-banks-india-significance-challenges-anuj-kumar-oklaf.*
4. *Aparna A. Kulkarni and Sujit.G. Metre (2020), A Comparative Study of Customer Satisfaction of Urban Co-Operative Bank with Special Reference to Pune, Mumbai and Nagpur Regions, International Journal of Management (IJM), Volume.No.11, Issue.No.9, PP: 1192-1199, September.*
5. *Balwinder Singh and Jalandhar Ruchika Soni (2015), Customer Satisfaction in Urban Cooperative Banks, International Journal of Research in Finance and Marketing, Volume.No.5, Issue.No.8, ISSN: 2231-5985,PP: 6-32,December.*
6. *Chandrashekar .B. S (2015), Growth and Financial performance of Urban Cooperative Banks in India, Paripex –Indian Journal of Research, Volume.No.4, Issue.No.2, ISSN: 2250-1991, PP:19-21, February.*
7. *Hajera Fatima Khan (2018), Current Scenario of Urban Co-Operative Banks in India, International Journal of Management Research & Review (IJMRR), Volume. No. 8, Issue.No.10, Article No:3, ISSN: 2249-7196, PP: 27- 38, October.*
8. *Lawrence Seekan Paul. K and Xavior Selvakumar. A (2020), Financial Performance of Urban Cooperative Banks in Nagappattinam District – A Study, International Journal of Management (IJM), Volume.No.11, Issue.No.11, ISSN: 0976-6502 (P), ISSN: 0976-6510PP:4290-4305 (O), November.*
9. *Mani Parthasarathy (2023), Wednesday Insight-Shaping the Customer Experience in Urban CoOperative Banks, Likindin, 5th July, https://www.linkedin.com/pulse/wednesdayinsight-shaping-customer-experience-urban-parthasarathy.*
10. *Mayilvaganan .S and Soundararajan .E. (2013), Urban Co-Operative Banks in India – an Overview - Paripex – Indian Journal Of Research, Volume.No.2, Issue.No.8, ISSN:2250-1991, PP: 42-44, August.*
11. *Ramu. N (2013), Dimensions of Non-performing Assets in Urban Cooperative Banks in Tamil Nadu, Global Business Review, Volume.No.10, Issue.No.2, PP: 279-297.*
12. *Rosybala Sharmi. G and Prabhakar L. (2017), Customer Satisfaction in Imphal Urban Co-operative Bank Ltd, Manipur, IOSR Journal of Business and Management, Volume.No.19, Issue.No.1, Version: 5, PP: 73-78, January.*
13. *Sanjivkumar. S. Agwal (2017), A study of Customer Services and Financial Performance of Selected Urban Cooperative Banks in Marathwada, UGC Minor Research Project, UGC, New Delhi, https://www.toshniwalcollege.ac.in/uploaddata/Downloads/2016_17/Report_MRP_AgrawalSS_2016.pdf.*
14. *Seema Sharma (2016), Using SERVQUAL to Assess the Customer Satisfaction Level: A Study of an Urban Cooperative Bank, Journal of Economics and Public Finance, Volume.No.2, Issue. No. 1, ISSN 2377-1038 (P), ISSN 2377-1046 (O), PP: 57-85.*
15. *Sujith T.S, and Sumathy .M (2019), Customer or Member Satisfaction of Primary Agricultural Credit Societies in Kerala, International Journal of Scientific & Technology Research, Volume.No,8, Issue.No.12, ISSN 2277-8616, PP:2665-2670, December.*
16. *Sukthankar S.V, Chonkar Vedant, Rath Ramesh Chandra and Jain Vikash Kumar (2020), An Appraisal of Goa Urban Cooperative Bank: An Empirical Study, Splint International Journal of Professionals, Volume.No.7, Issue.No.4, ISSN: 2349-6045 (P), PP:94-100.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

17. *Sumeet Giram (2014) - A Study Performance of Urban Co-Operative Banks in Beed District, Abhinav International Monthly Refereed Journal of Research in Management & Technology, Volume.No.3, Issue.No.7, ISSN: 2320-0073(O), PP: 8-13, July.*
18. *Swati Raju (2018), Assessing the Efficiency of Urban Co-Operative Banks In India, The Central European Review of Economics and Management (CEREM), ISSN 2544-0365, WSB University in Wrocław, Wrocław, Volume.No.2, Issue.No.1, PP: 11-42,*
19. *Tripathy .K.K, Manish Paliwal and Nishita Nistala (2021)Good Governance Practices and Competitiveness in Cooperativeness in Cooperatives: An Analytical Study of Kerala Primary Agricultural Credit Societies, International Journal of Global Business and Competitiveness, Volume.No.16, PP: 153-161, June.*
20. *Yogitha G. Pai, Akhila Sukesh and Shabu. K.R (2023), A Study on the Financial Performance of Urban Co-Operative Banks in Ernakulam District, European Chemical Bulletin, Volume.No.12, Special Issue.No.6, PP:5526-5241.*
21. *Prakash B. Kundaragi (2021), A Systematic Analysis of Service Quality and Customers' Satisfaction in Urban Co-Operative Banks by Servqual, Wesleyan Journal of Research, Volume.No.14, Issue.No.8, ISSN: 0975-1386, PP:89-100, May.*
22. *Vivek Kumar Arya and Shalini Thapa (2024), A Study of Customers Satisfaction Level in Almora Zila Sahkari Bank Ltd, International Education & Research Journal (IERJ), Volume. No. 10, Issue.No.1, ISSN: 2454-9916 (E), PP: 88-91, January.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

THEORETICAL PROBLEMS OF THE SEMANTIC CATEGORY OF LANGUAGE LEXICON

Komilova Nargiza Xusanboy qizi
Trainee-Teacher, Uzbekistan State University of World Languages, Uzbekistan

ANNOTATION

The concept of a field in modern linguistics is perceived as a kind of structural and semantic category that has the property of invariance, uniting the largest semantically related parts of the general language system and subdivided into private associations that reveal the hierarchical relationships between the smaller associations that make up it. Based on this, semantic fields are divided into various structural and semantic associations connected by particular semantic features.

KEY WORDS: *language lexicon, theoretical problems, structural and semantic category, modern linguistics.*

In modern linguistic science, the problems of semantics have acquired paramount importance due to the need to substantiate the patterns of functioning of speech units in the communication process. The description of language at the surface level of its representation, undertaken in various areas of linguistics using formalized methods and modeling methods, has expanded our knowledge of the internal interaction of linguistic elements in the system and structure of language. However, the study of language from the point of view of its communicative purpose and from the point of view of its semantic content inevitably requires going beyond the surface forms of language to the level that determines the informative value of linguistic units. That is why linguistics has recently turned to explaining the deep patterns of the linguistic mechanism, in connection with which a number of new problems have come to the fore, related to both the general methodological and methodological approach to linguistic semantics.

In the linguistic literature, they are called thematic groups (series, fields), lexico-semantic groups, etc. The starting point of the research of the thematic groups is the fact that in the vocabulary of each language there are rows of words that more or less closely coincide in their basic (core) semantic content. However, it should be noted that, despite the widespread use of the field analysis method in the systematic presentation and study of vocabulary, linguistic studies indicate significant disadvantages that this method has. First of all, it points out the heterogeneity and significant differences in the results obtained when using this method by different researchers. Depending on what is meant by the common meaning (content) that unites lexical units into structural and semantic fields, classes and groups, different studies produce different results of the systemic relations that make up the semantic associations of components. As proof, we can compare the results of the most famous researchers, in which the semantic community of field elements correlates with the designated or general concept or with the presence of a common semantic feature in their semantics, with the nature of reflection of the phenomenon of objective reality, with similarity or direct opposite in basic meaning, etc.

The terms "system" and "structure" are widely used in modern linguistics. These concepts became widely known after the advent of structural linguistics, the founder of which is considered to be Ferdinand de Saussure. According to his scientific concept, linguistics was divided into external and internal, where the latter deals with the study of language as a system. In the systemic understanding, one language unit does not matter, it makes sense only when combined with others, while all language units are interconnected and interdependent. The systematic understanding of vocabulary, unlike other sections of linguistics, has been and remains difficult for the following reasons:

— incalculability of lexical units;
— theoretically and practically unlimited possibility of combinatorics of words;
— complexity and heterogeneity of types of verbal connections in the system of language and speech;
— extralinguistic determinism of words, their great historical mobility.

As noted in the research, the semantic associations and groupings identified by scientists as a sign of the systemic organization of vocabulary are in many ways unequal and even incomparable. The main thing in studying the consistency of vocabulary is the nature of the correlation of linguistic and non-linguistic phenomena, in which "semantics turns out to be subordinate, unrelated to its own subject, goals and objectives." Therefore, one of the main disadvantages attributed by linguists, especially those who are critical of the presence of consistency in vocabulary and, in particular, to the criteria for field allocation, is the lack of a purely linguistic basis for dividing vocabulary into fields. Researchers of lexical fields are accused of choosing not specific linguistic features of words as the basis for the allocation of fields, but their external correlation with objective reality, and the system is based

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

not on the linguistic nature of words and their lexical meaning, semantics, but on connections and relationships in the material world. Many modern linguistic schools are characterized by the understanding of semantics as a special component of a complete description of language, which in turn is thought of as a formal device that models the linguistic behavior of people.

In order to get an idea of the language model in general and its semantic component in particular, it is necessary to understand what skills make up the phenomenon called "linguistic behavior", "language proficiency". In modern linguistics, both individual types of language fields (functional-semantic, word-formation, derivational-semantic, lexico-grammatical, associative, metaphorical, syntactic, etc.) and the field character of the language as a whole are studied. The general field principle of the organization of the language system becomes a method of analyzing linguistic phenomena and categories. Various ontological and epistemological problems of the semantic field as a system education are studied, in particular, the problem of the linguistic essence of the field, the allocation of the semantic field, the differences between fields of different types from other lexical groupings.

In order to determine the semantic structure of a word, first of all it is necessary to identify the order of internal cohesion and subordination of heterogeneous semantic elements in a word, then to establish by what linguistic means the intra—verbal semantic differentiation of lexico-semantic variants of a word is carried out. The lexical meaning of a word is determined by its correlation as a nominative sign with the phenomena of real reality, generalized in human consciousness with the help of representations and concepts. "The lexical meaning of a word is the content of a word, a representation of some phenomenon of reality, assigned to a certain sound and grammatical form". It is the lexical meaning that enables the word to perform the main nominative function.

The study of the grammatical aspect of speech activity implies the need to take into account the structural-systemic and functional-semantic characteristics of the studied language units. The organization of linguistic material is based on the two directions of functional grammar existing in linguistics:

1) semasiological (from linguistic form to content), according to which the organization of linguistic units acquires a linear structure, i.e. the analysis of meanings is concentrated within individual grammatical units, their categories and forms;

2) onomasiological (from the content to the linguistic form), it excludes the linear construction of the material. The language material is transmitted according to logical and semantic groups.

The existence of two leading trends in the history of linguistics was pointed out by many linguists — V. Mathesius, F. Bruno, O. Jespersen, G. Ahrens, etc. These directions were called in different ways - formal and functional (V. Matesius), traditional and logical (F. Bruno), morphological and syntactic (O. Jespersen), empirical and rational (G. Ahrens), etc. Traditionally, research on language material has been conducted in these areas.

In the first case, we are talking about grammars based on the needs of the listener, and in the second — on the needs of the speaker. An integrated approach is often presented: first, a functional-semantic (conceptual) field is established through the meanings of linguistic forms, then semasiologically the meanings expressed by linguistic means relating to a certain field are investigated. The concept of "function" as a separate structure of language and the theory of the functional-semantic field, which are the basic concepts for functional grammar, acquire special importance within the framework of two functional-semantic directions. These functions correspond to three types of statements - narrative, exclamation and motivational. The communicative function is associated with intellectual thinking and the way of communication. It is contrasted with the function of expression (affective, emotive, emotional function), which is interpreted psychologically as a contact of "infection" of the listener using intonation and phonetic means. Prague linguists developed the idea of language as a functional system, defining language as a system of means of expression "serving a specific purpose. The term "function" is understood by Prague scientists not in a mathematical sense as an expression of strict dependence, but as a target setting of a speech utterance. The introduction of the concept of function led to the establishment of the so-called teleological (i.e. target) point of view, according to which any linguistic phenomenon should be evaluated from the point of view to which it is directed.

The functional–semantic field (FSF) is a system of multilevel means of a given language (morphological, syntactic, word—formation, lexical, as well as combined — lexico-syntactic, interacting on the basis of the commonality of their functions based on a certain semantic category. FSP of aspectuality, temporality, collateral, locativity, etc. They are varieties of language categories. The term FSF is associated with the idea of grouping (an ordered set) of interacting language tools and their system-structural organization. The concept of FSF is included in the system of concepts and terms of grammar, which examines linguistic units not only in the direction from form to meaning, but also from meaning to form.

Each functional and semantic field is based on a certain semantic category - the semantic invariant that unites heterogeneous linguistic means and determines their interaction. Thus, the semantic invariant of aspectuality, which consists in transmitting the nature of the course and distribution of actions (and other types of predicates) over time, is revealed in a system of meaningful options, including such features as the ratio of action to limit, phase (designation of the beginning, continuation and completion of

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

action), perfection, i.e., the designation of the relevance of the consequences of action (intersection fields of aspectuality and temporality). Each semantic variant within the framework of this FSF is associated with certain means of formal expression. The FSF is a two-way (content-formal) unity covering the specific means of a given language with all the features of their form and content.

There are two main types of FSF:

1) FSF with a morphological core that are identical to functional and semantic categories such as temporality, modality, pledge, etc.

2) FSF with a functional semantic invariant expressed by means of only one level. These are grammatical and lexical fields. Grammatical fields consider one side of the language, belong to the same language level, and the FSF cover a wider linguistic sphere (grammatical categories and related elements belonging to different language levels). FSF is one of the ways of structuring the semantic space of a language, which allows you to explore the system of central and peripheral linguistic means of expressing a particular meaning. FSFs based on the same semantic category, but on multilingual material, may differ significantly in their structure. So, if in Slavic languages the center of the field of aspectuality is the grammatical category of the type, then in German, where there is no type as a grammatical category, various lexical and grammatical means of expressing the limit/non-limit of action play a central role, and in English the category of the pledge plays a major role. The zones of intersection of fields are distinguished (areas of interaction of semantic elements of different fields, for example, semantic complexes with aspectual-temporal, aspectual-modal elements, with the possible participation of elements of quality, etc.).

The description of the FSF system of a particular language can be considered as one of the tasks of functional grammar. FSFs play an important role in the formation of various functional areas. Functionalism, being one of the leading approaches to language learning, defines new tasks in the study of units and categories of different language levels. The functional direction considers in a single system the means that belong to different language levels, but are combined on the basis of the commonality of their semantic functions. In the concept of function as the purpose of a particular unit of language, two aspects should be distinguished: potential and effective. A function in a potential aspect is the inherent ability of a particular unit in a language system to fulfill a certain purpose and to function accordingly. A function in the effective aspect is the result of the functioning of a given unit in interaction with its environment, i.e. the purpose as a goal achieved in speech. These aspects of the concept of function are reflected in linguistic analysis.

In modern linguistics, there is great interest and development in areas related not only to the concept of function, but also based directly on the close interaction of language and man. One of these areas is the cognitive approach in linguistics, a discipline that allows you to understand the linguistic characteristics of a person and understand? How his speech and statements affect not only the behavioral and communicative aspects of his life, but also internal psychological processes and states. They see more general conceptual categories behind the categories of linguistic semantics, which can be represented as the result of mastering the world in the process of human cognition. The attention of cognitive linguistics to semantic problems and its methodological proximity to linguistic semantics explains the desire of a number of authors, especially in Uzbek language, to talk specifically about cognitive semantics, and not about cognitive linguistics or grammar. Thus, in modern linguistics there is a clear trend towards the development of areas related not only to the concepts of "function", "field", but also industries that are based on an anthropocentric approach, cognitive factors that determine the structure of language and human development, the interaction of these concepts at different levels of civilization development.

The lexical meaning correlates with other lexical meanings, and collectively they all represent the language system. In this system, two types of units are distinguished: the first is a polysemous word with all its meanings, the second is a single meaning (this is how the word is represented in speech), it also represents a complex formation, a set of individual components (sema), which are established based on a comparison of different lexical meanings. Thus, the analysis of the semantic structure of the word makes it possible to more accurately correlate the polysemous words and polysemous words in general. These observations are important for the lexicographic description of the language. The analysis of the semantic structure of a word also allows you to objectively group different words into semantic classes: lexico-semantic groups of words, semantic fields, etc. The lexical meaning is the inner side of the linguistic sign, the plan of the word's content, and the sound (and spelling) is its outer side, the plan of expression.

REFERENCES

1. *Verschueren J. Problems of lexical semantics //Lingua. – 1981. – T. 53. – №. 4. – C. 317-351.*
2. *Nargiza K. LINGUOCULTURAL STUDY OF THE CATEGORY OF ADJECTIVES IN ENGLISH AND UZBEK ARTISTIC TEXTS //E Conference Zone. – 2024. – C. 70-76.*
3. *Farxodjonova N. F. THE IMPORTANCE OF THE SPIRITUAL HERITAGE OF THE JADIDS IN THE DEVELOPMENT OF SOCIETY //Экономика и социум. – 2022. – №. 10-2 (101). – C. 33-35.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4. *Babajanova Y. M. METHODS FOR IMPROVING THE EFFECTIVENESS OF TEACHING FOREIGN LANGUAGES //Мировая наука. – 2019. – №. 5 (26). – С. 10-12.*
5. *Bierwisch M. On classifying semantic features //Semantics: An Interdisciplinary Reader in Philosophy, Linguistics and Psychology. – 1971. – С. 410-435.*
6. *Nargiza K. Modern pedagogical techniques in teaching modal verbs to secondary school pupils //Journal of Pedagogical Inventions and Practices. – 2022. – Т. 6. – С. 16-17.*
7. *Qizi F. N. F. Modernization And Integration Of National Culture In The Condition Globalization And Its Importance In The Restoration Of The New Uzbekistan //Turkish Online Journal of Qualitative Inquiry. – 2021. – Т. 12. – №. 6.*
8. *Babajanova Y. M. INNOVATIVE EDUCATIONAL TECHNOLOGY IN THE TRAINING PROCESS //Экономика и социум. – 2018. – №. 10 (53). – С. 27-29.*
9. *Soriano C. Linguistic theories of lexical meaning //Components of emotional meaning. – 2013. – С. 63-80.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

STUDY OF THE HERITAGE OF IMAM MATURIDI AT THE IMAM MATURIDI INTERNATIONAL SCIENTIFIC RESEARCH CENTER: ANALYSIS AND PROSPECTIVE PLANS

Dr. Jamoliddin Karimov
Doctor of Philosophy on Historical Sciences, Director of the Imam Maturidi International Scientific Research Center

ANNOTATION
In recent years, large-scale work has been carried out in Uzbekistan to comprehensively study the rich scientific and spiritual heritage of great thinkers, to promote it to the public, and to educate the young generation in the spirit of national and religious values.
KEY WORDS: *spiritual heritage, Imam Maturudi, Imam Maturidi international scientific research center, historical monuments, Islamic civilization.*

In particular, the decision PD-126 of the President of the Republic of Uzbekistan Shavkat Mirziyoyev dated February 10, 2022 "On additional measures to improve the system of preservation and research of ancient written sources"[1] was adopted. This decision serves to study the manuscripts of the great scholars and thinkers who lived in our country and made an invaluable contribution to the development of world science and Islamic civilization, including the preparation of their scientific and explanatory translations and modern publications in Uzbek, and to raise the process of using the obtained results in practice to a completely new level.

The Imam Maturidi International Scientific Research Center was established by the Decision PD-4802 of the President of the Republic of Uzbekistan dated August 11, 2020. One of the main tasks of the Center is to deeply study the huge scientific, religious, and spiritual heritage of Imam Maturidi and his followers, scholars who made an incomparable contribution to the development of creed and the science of kalam, to publish scientific and explanatory translations and comparative texts of the works they created, to make them widely available among the people and the world community, and systematic organization of scientific research on these topics[2].

MAIN PART

It is known that Uzbekistan is one of the oldest cradles of world civilization. From this land, many scientists grew up who have created a fruitful work in various fields of science and left a huge scientific and spiritual heritage related to universal development. Today, their manuscripts are kept in the rare resource fund of the most prestigious libraries not only of our country, but also of the world. In Uzbekistan alone, the Manuscript Fund of the Institute of Oriental Studies named after Abu Rayhan Biruni of the Academy of Sciences of the Republic of Uzbekistan holds 26,000 volumes of manuscripts and about 40,000 volumes of lithographic sources related to various fields. Currently, only a small part of the written sources stored in the libraries of our country has been studied. Therefore, there is a great need to research many manuscripts.

Today, special attention is being paid to the research and wide dissemination of manuscript sources at the Imam Maturidi International Research Center. It should be noted that the Center is tasked with the in-depth study of the heritage of Imam Abu Mansur Maturidi, the founder of the Maturidi school, and his followers, the publication of scientific and explanatory translations and comparative texts of the works written by them, and the collection of original and electronic copies of the manuscripts and lithographic works of great scholars stored in the library and manuscript collections. A number of important and urgent tasks have been set, such as conducting research on them and passing them on to the next generation.

At the same time, the Center is carrying out systematic work on the formation of the scientific-theoretical basis for the research, preservation and restoration of written sources, and the training of specialists who have the skills and qualifications to work with manuscript sources related to the field. In particular, in 2022, a number of scientific staff of the Center directly participated in the training course "Intensive: extended study of manuscripts" organized at the Research Center of Manuscript Sources of the Republic of Turkey. Also, in order to further increase the scope and quality of advanced training aimed at the study of manuscripts, the Center

[1] *PD-126 dated 10.02.2022. On additional measures to improve the system of preservation and research of ancient written sources (lex.uz)*
[2] *PD-4802 dated 11.08.2020. On measures to establish the Imam Maturidi International Scientific Research Center (lex.uz)*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

organized one-week training sessions on the topic of "Researching Manuscript Sources" for all specialists from Uzbekistan in June 2022 with the participation of Dr. Hamza al-Bakri, professor of Ibn Khaldun University of the Republic of Turkey. The Uzbek translation of the book "Theoretical Foundations of Manuscript Research"[3] by Dr. Mahmud al-Misri was published. Facsimiles and electronic copies of about 50,000 manuscripts written by Mawarannahr scholars stored in the Republic of Turkey, the Arab Republic of Egypt, the United Arab Emirates, Saudi Arabia and European manuscript funds have been collected.

At the same time, large-scale practical work on the study and promotion of manuscript sources is also being carried out at the Center. In particular, the scientific translation into Uzbek language and the critical text of "Kitab al-Tawhid" by Imam Maturidi was prepared based on the only manuscript copy in the world kept in the library of Cambridge University in Great Britain[4].

The translation of "Kitab al-Tawhid" by Imam Maturidi International Scientific Research Center has a special value as it is the first attempt to translate the book into Uzbek language. It should be noted that there have been few attempts to translate the work into different languages in the whole world. It requires sufficient experience and knowledge, great effort from the specialist who started to translate it because of the complex phrases and sentences characteristic of Imam Maturidi's method in the work, the uniqueness of the chosen topic, the fact that more than ten centuries have passed since the time when the book was written until now, and the features of the language changed significantly.

"Kitab al-Tawhid" is the masterpiece written by Imam Maturidi to ensure the purity of faith, and it is considered the primary and most reliable source of the teachings of Maturidiyya. The fact that the work refutes the destructive ideas of the misguided sects that were active during the time when Imam Maturidi lived, on the basis of narrative and rational evidence, increases its practical importance and scientific value today.

As mentioned, a critical text of the work was prepared based on a comparative study of modern editions published in Egypt (in 1970) and Turkey (in 2003) and the only copy of the manuscript in the world kept in the library of Cambridge University in Great Britain and published in "Maktabat al-Ghanem" publishing house in Jordan[5].

The first attempt to publish "Kitab al-Tawhid" was made by Dr. Fathullah Khulaif. After that, Bekir Topaloglu and Muhammad Aruchi were engaged in this work. The services of these researchers cannot be overlooked. However, as a result of closely familiarizing with "Kitab al-Tawhid" and studying the scientific heritage of Imam Maturidi, some critical comments were born in this regard. For example, the edition of Fathullah Khulaif is the first modern edition of this book, and a great effort was spent on its publication. This publication is an important source for researchers in further research. However, it shows cases such as not being able to read some words[6], neglecting to compare the text of the existing copy with the words of other copies listed in the margins, giving some comments and additions in order to explain or fill in some defects in the phrase.

In 2003, Bekir Topaloglu and Muhammad Aruchi published a critical edition of "Kitab al-Tawhid" in Ankara. The work was reviewed and republished by the Islamic Studies Center (ISAM) in 2019[7].

In the preface of the book, they said: "We have worked on a special method that has not been used before and has no equal among researchers in terms of research. We decided to rely only on the manuscript copy and added the first edition of Kitab al-Tawhid to it. We took it into consideration as a second handwritten copy,"[8] they write. They reread the manuscript and made some minor additions. Like Dr. Khulaif, they made many comments between the text.

However, there are some shortcomings in this research. In particular, it is possible to encounter situations such as not being able to read some words and phrases in the original copy and in the margins, making the margins difficult.

Despite these considerations, it should be noted that the research was carried out to the extent that it was possible to read and familiarize with Imam Maturidi's thoughts. Despite all the comments, this work remains the first edition of the book.

[3] *Mahmud Misriy. Qo'lyozmalarni tadqiq qilishning nazariy asoslari, trans. Z.Abdullayev. – Tashkent: "International Islamic Academy of Uzbekistan" publishing-printing association, 2023. - 132 p.*
[4] *Imom Moturidiy. Kitob at-Tawhid. -Tashkent. "Hilal-Nashr" publishing house, 2024. - 660 p.*
[5] *أبو منثور الماتريدي. كتاب التوحيد. عمان: مكتبة الغانم للنشر والتوزيع، 2023. – 960 ص.*
[6] *Abu Mansur Maturidi. Kitab al-Tawhid, ed. Fathullah Khulaif. - P. 58.*
[7] *Imam Maturidi. Kitab al-Tawhid, ed. by Bekir Topaloglu and Muhammad Aruchi. - Turkey: Maktaba al-Irshad, 2019.*
[8] *Ibid., - P. 63.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

While studying the previous editions of the book "Tawhid", the above-mentioned critical aspects in them indicated the need for re-research of this work. The scientific staff of the Imam Maturidi International Scientific Research Center aimed to present the text to the reader as it was left by Imam Maturidi and as read by his followers. It was decided to change it only in cases where it was concluded that there was an error and there was no possibility of interpretation or there was no explanation. What was included was also mainly in the footnotes and did not touch the main text as much as possible.

The research carried out by the Center is distinguished by a number of features. The most important of them are:

1. In order to make the language of Imam Maturidi appear before our eyes and to keep the original text as it is, it has been made free of other additions.
2. Attempts have been made to simplify the text with some of the following:

a) some explanatory words that are not long were written in the text;
b) the book is divided into chapters and sections;
s) headings were added;
d) paragraphs are numbered.

3. Attention was paid to the reading of the text through a single original manuscript, and the closest and most correct reading was put forward in comparison with the readings of previous studies. Then the text is often free of typographical errors.
4. This edition includes all the margins of the original copy. At the same time, comparisons between copies, corrections, comments and annotations were indicated separately. All of them have been carefully read to ensure the most accurate reading.
5. It was tried to make the text free of missing words[9].

In a word, this edition has used the most important previous studies and eliminated the mistakes made in them as much as possible.

It is known that the second work of Imam Maturidi that has come down to us is "Ta'wilat al-Qur'an". The work is considered the most authoritative tafsir written in the 10th-11th centuries. It includes terms and expressions in the field of language, culture and sciences of the 10th-11th centuries. Translating the work in the 21st century and expressing it in a language that ordinary readers can understand requires a great responsibility from a specialist.

The translation of the work began first of all with the compilation of the translation guide. Because, if the method of the translators is regulated, the general direction of the work will be proportional to each other, and it will provide comfort to the readers in the future. If the books being translated in areas such as the Qur'an, hadith, aqidah, and fiqh require a specialist to know this field, the science of interpretation requires a specialist to know different branches of science. Because, in it, belief, jurisprudence, mysticism, history and other fields are explained.

During the implementation of the translation, the following was determined:

- for the translation, the modern research of the work "Ta'wilat al-Qur'an" published under the editorship of Bekir Topaloglu was accepted as the main source[10].
- It was recommended to take the translation of the verses of the Qur'an from Sheikh Abdulaziz Mansur's "Translation of the Noble Qur'anic Meanings" and "Translation of the Meanings of the Qur'an" by Sheikh Muhammad Sadiq Muhammad Yusuf. When there was a difference between the translations of the Qur'anic meanings published in the Uzbek language in the understanding of Qur'anic verses, it was decided to carry out the translation based on Imam Maturidi's opinion. For example, verse 196 of Surah "Shuara":

وَإِنَّهُ لَفِي زُبُرِ الْأَوَّلِينَ

It is translated as **"Certainly, it (Qur'an) is also in the books of the predecessors"** or **"Certainly (some messages in the Qur'an) are also in the books of the predecessors"**[11]. In "Ta'wilat al-Qur'an" the following is given regarding the meaning of this verse: "Some people of ta'wil interpreted it as: "**Certainly, it**, that is, the sending of Muhammad, may God bless him and grant him peace, as a prophet, and his qualities were described in the books of the previous ones." The phrase "**Certainly, it**" in the verse means "In the previous books it was mentioned that the Holy Qur'an was revealed to Muhammad, may God bless him and grant him peace." This verse should not be interpreted as "the Holy Qur'an itself is in the previous books." Or it should not be understood that the verse says, "Not all of the Qur'an is mentioned, but some of it."[12]

In such cases, if Uzbek language translations are used directly, a situation contrary to Imam Maturidi's views will arise.

---

[9] أبو منثور الماتريدي. كتاب التوحيد. عمان: مكتبة الغانم للنشر والتوزيع، 2023. – 960 ص.
[10] أبو منثور الماتريدي. تأويلات القرآن. إستانبول. دار الميزان، 2005.
[11] *Qur'oni karim ma'nolarining tarjima va tafsiri. Translated and interpreted by Abdulaziz Mansur. – Tashkent: "Tashkent Islamic University" publishing association, 2018. - P. 375.*
[12] أبو منثور الماتريدي. تأويلات القرآن. إستانبول. دار الميزان، 2005.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- After the original Arabic text of the Qur'anic verses, the Uzbek translation was given. The names of the sura and verses are given in the main text after the verse in the following order: (Surah al-Anbiya, verse 28).

Example:

﴿وَنَزَّلْنَا مِنَ السَّمَاءِ مَاءً مُبَارَكً﴾

"We sent down blessed water from the sky" (Surat al-Qaf, verse 50).

- the terms and phrases specific to the work are cited first in Arabic form, then transcription in parentheses, and then translation in quotation marks through a hyphen.

Example:

الْمَلِك [al-Malik] is a general word that expresses the meanings of "ruling", "imposing command", "sultan", and "leadership".

- comments given by the researchers are given below the main text.

- without giving the Arabic text of the hadiths cited as evidence, the translation is written in italics and their sources are shown in the following form (narration of Imam Bukhari).

Example:

The following hadith of the Prophet, may God bless him and grant him peace, proves that there is good for himself in the inheritance he left to the heirs: "To leave your heirs rich is better than to leave them poor, begging from people" (narrated by Imam Bukhari).

- the sentence included in the main text as a comment by the translator was given between two brackets.

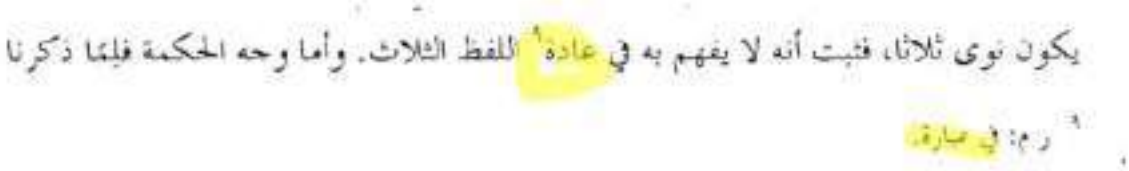
Example:

Because when people are interested in donating their wealth to influential people in the hope of benefit, it is a highly rewarding deed to spend wealth in the way of Allah **(who is considered the greatest)**, and this **(spending wealth in the way of Allah)** is a **(deed)** worthy of encouragement.

- during the translation process, critical editions under the editorship of Fatima Yusuf Khaimi, Majdi Basallum, and Bekir Topaloglu were used. When encountering problematic places in the text, the manuscripts stored in the Institute of Oriental Studies named after Abu Rayhan Biruni, Laleli, Murad Bukhari, Nuri Usmaniya, and Hamidiya were consulted.

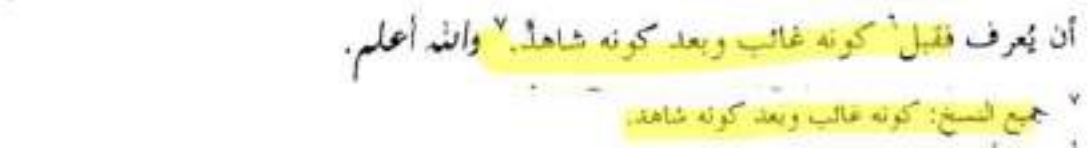
It should be noted that each of the three copies of the "Ta'wilat al-Qur'an" that have been published in full until now has its own characteristics, and their research methods are also different from each other. For this reason, when translating the work into Uzbek, it was tried to make good use of these three copies. Any phrases that caused difficulties in one copy were corrected through other copies, and the most appropriate and correct one was selected among them in the translation. For example:

- in some copies, a quoted phrase from another copy may be more correct than the phrase given in the main text, judged to be correct by the researcher. For example, in the following case, it can be seen that the word عبارة is more appropriate than the word عادة.


يكون نوى ثلاثا، فثبت أنه لا يفهم به في عادة[٩] اللفظ الثلاث. وأما وجه الحكمة فلما ذكرنا

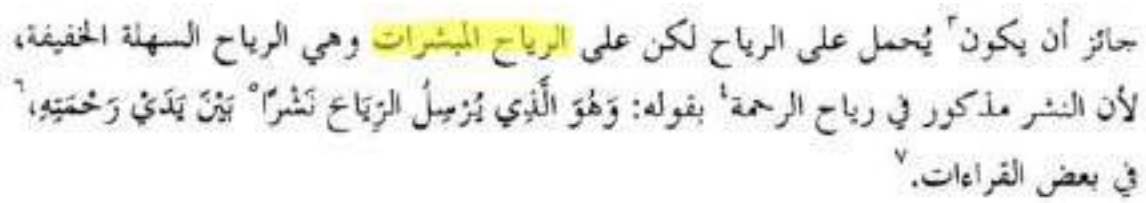
[٩] ر م: في عبارة.

- also, in some places in the modern researched edition, discrepancies between the main text and other copies are obscured. In particular, you can see that the differences between the main text and the quotation are sometimes the same. In this case, it will be difficult to understand which one is wrong.


أن يُعرف قبل[٦] كونه غائب وبعد كونه شاهدا.[٧] والله أعلم.

[٧] جميع النسخ: كونه غائب وبعد كونه شاهد.

- errors in some copies were corrected based on manuscript copies of "Sharh at-Ta'wilat". For example, in the interpretation of verse 1 from Surah al-Mursalat, in the copy checked by Turkish researchers, it came in the form of المبشرات:


جائز أن يكون[٢] يُحمل على الرياح لكن على الرياح المبشرات وهي الرياح السهلة الخفيفة،
لأن النشر مذكور في رياح الرحمة[٤] بقوله: وَهُوَ الَّذِي يُرْسِلُ الرِّيَاحَ نُشُرًا[٥] بَيْنَ يَدَيْ رَحْمَتِهِ،[٦]
في بعض القراءات.[٧]

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The same phrase appears in the Hamidiyyah version of Sharh at-Ta'wilat in the form of المنشرات:
During the translation, it was found that the word المنشرات is suitable for the context.

In addition to the above, tasir books and dictionaries were also used to clarify some phrases during the translation. For example, in the commentary of the 21st verse of Surah al-Insan, the word الحجال is given in the form of الأحجال in the research of Majdi Basallum and Turkish researchers. But in Fatima Yusuf Khaimi, this phrase is correctly used in the form of الحجال. This phrase is also defined as الحجال in Ibn Kathir's tasir and dictionaries.

RESULT

The new edition of Imam Maturidi's book "Kitab al-Tawhid" mentioned in the article was presented in February 2024 at the 55th Cairo International Book Fair in Cairo, the capital of the Arab Republic of Egypt, and in May at the Doha International Book Fair.

The publication of the critical text and its presentation at major international book exhibitions were recognized by the world community and the international scientific community as a high result of the reforms being carried out in the religious and educational sphere in Uzbekistan.

Chapters 1-6, 21-30 of Imam Maturidi's second masterpiece "Ta'wilat al-Qur'an" have been translated into Uzbek and published. The translation of the remaining parts is also being steadily worked on.

In addition to the study of the scientific heritage of Imam Maturidi, scientific staff of the Center are conducting a number of researches on the life and scientific activity of the Maturidi scholars. In particular, it is also appropriate to mention the ongoing work. For example, popular treatises are being published under the heading "Our Great Ancestors" that provide information about the Maturidi scholars. Also, the work on the creation of a scientific and explanatory translation of "Usul ad-Din" by Imam Bazdawi, "Bahr al-Kalam" by Abu al-Muin Nasafi, and "Rawdat al-Ulama wa Nuzhat al-Fudala" by Imam Zandavisti, one of the scholars of Maturidiyya, is being conducted.

CONCLUSION

In conclusion, it can be said that studying and preserving the works of our ancestors and passing them on to future generations is one of the most urgent and important tasks facing scientific research institutions, and through this, there is an opportunity to create a solid scientific and theoretical foundation for the Third Renaissance.

The Center aims to consistently continue the work focused on researching and widely promoting manuscripts in the future. In particular, it is set as the priority tasks to gradually publish in Uzbek the sources related to the teachings of Maturidiyya, to prepare and publish the critical texts of works written by scholars of our country, to convey the universal good ideas, educational tools, and moral standards that came from the rich scientific and spiritual heritage of our ancestors to our people, especially to the young generation.

REFERENCES

1. *Abu Mansur al-Maturidi. Ta'wilat al-Qur'an. – Isanbul: Dar al-Mizan, 2005.*
2. *Abu Mansur al-Maturidi. Kitab al-Tawhid. – Amman: Maktaba al-Ghanem, 2023.*
3. *Mahmud Misriy. Qo'lyozmalarni tadqiq qilishning nazariy asoslari, trans. Z.Abdullayev. – Tashkent: "International Islamic Academy of Uzbekistan" publishing-printing association, 2023. - 132 p.*
4. *Imom Moturidiy. Kitob at-Tawhid. -Tashkent. "Hilal-Nashr" publishing house, 2024. - 660 p.*
5. *Abu Mansur Maturidi. Kitab al-Tawhid, ed. Fathullah Khulaif. - P. 58.*
6. *Imam Maturidi. Kitab al-Tawhid, ed. by Bekir Topaloglu and Muhammad Aruchi. - Turkey: Maktaba al-Irshad, 2019.*
7. *Qur'oni karim ma'nolarining tarjima va tafsiri. Translated and interpreted by Abdulaziz Mansur. – Tashkent: "Tashkent Islamic University" publishing association, 2018. - P. 375.*
8. *Islomov Z. International Islamic Academy of Uzbekistan–a result of the reforms worth to the centuries //The Light of Islam. – 2018. – T. 1. – №. 1.*
9. *Islamov Z. et al. WRITING DOWN OF HADITHS IN THE VII-VIII CENTURIES: APPROACHES AND METHODS //PSYCHOLOGY AND EDUCATION. – 2021. – T. 58. – №. 1. – C. 5536-5545.*
10. *Maxsudov D. Развитие исламоведения (корановедения) в Узбекистане: история и современность //Вестник КазНУ, Серия Религиоведение. – 2020. – Т. 21. – №. 1. – С. 60-67.*
11. *Makhsudov D. Manuscripts of abul barakat al-nasafi's works on furu'Al-Fiqh //Asian Journal of Multidimensional Research. – 2023. – T. 12. – №. 1. – C. 31-34.*
12. *Makhsudov D. R. Mufassirs of Mawarannahr //ISJ Theoretical & Applied Science, 12 (80). – 2019. – C. 539-543.*
13. *Makhsudov D. R. МУФАССИРЫ МАВЕРАННАХРА В СРЕДНИХ ВЕКАХ //Theoretical & Applied Science. – 2019. – №. 12. – С. 539-543.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

14. *Arslonov Z., Ergashev H. ALIKHANTORA SOGUNIY'S VIEWS ON POLITICAL GOVERNANCE IN EAST TURKESTAN //Студенческий вестник. – 2020. – №. 32-2. – С. 84-85.*
15. *Ugli A. Z. Z., Farxodjonova N. Alikhantura Soguniy Role in State Administration in East Turkestan //Journal of Modern Islamic Studies and Civilization. – 2024. – Т. 2. – №. 02. – С. 128-132.*
16. *Zokirjonugli Z. A. Approaches to studying the scientific heritage of Alikhantora Soguni //Asian Journal of Multidimensional Research. – 2022. – Т. 1*
17. *Arslonov Z. Z. THE PLACE OF ALIKHANTORA SOGUNIY IN THE HISTORY OF EAST TURKESTAN //Colloquium-journal. – Голопристанський міськрайонний центр зайнятості= Голопристанский районный центр занятости, 2020. – №. 24-2. – С. 9-11.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

SCIENTIFIC-THEORETICAL FOUNDATIONS OF RESEARCHING THE ACTIVITY OF DESTRUCTIVE ASSOCIATIONS

Komiljon Shermukhamedov
Doctor of Philosophy on Historical Sciences (PhD),
Associate Professor of the International Islamic Academy of Uzbekistan

ANNOTATION
Today, threats of global importance, threatening peace and stability in various regions of the world, are increasing. Prevention of extremism, terrorism, and radicalization, ensuring security remains an urgent issue on the agenda of the world community. These threats are a phenomenon formed on the basis of complex socio-political processes, and by studying its inhuman, anti-religious, especially anti-Islam character, it is possible to expose the true purpose of the political groups that portray Islam as a destructive force in the international arena. In this way, there is a need to implement new methods and approaches in the fight against organizations acting under the guise of religion.
KEY WORDS: *activity of destructive associations, religion, spiritual heritage, values, extremism and terrorism.*

As the President of Uzbekistan Shavkat Mirziyoyev stated in his speech at the opening ceremony of the 43rd session of the Council of Foreign Ministers of the Organization of Islamic Cooperation on October 18, 2016, "It is the honorable duty of each of us to preserve and appreciate our sacred religion, which embodies our ancient values and moral qualities. Islam means understanding the truth, it encourages people to do good deeds, calls each of us to goodness and peace, teaches to be a real person. We strongly condemn and will never compromise with those who try to use Islam for the purposes of violence and bloodshed. We will always protect our holy religion."[1]

The most dangerous aspect of the process of turning extremism and terrorism into a global threat is the striving for power through the politicization of religion and attempts to use religion to create conflict between people, to carry out subversive activities, and to realize malicious interests. First of all, it is important to study their evolution in order to determine the reasons for the emergence of destructive associations in the modern form.

In the sources, the emergence of sects that caused the first conflicts in the history of Islam, their spread, activities and specific directions are analyzed in detail. For example, Abdul Qahir ibn Tahir ibn Muhammad Baghdadi states that the first conflict between Muslims began to appear after the death of the Prophet Muhammad (peace be upon him).[2]

Abu al-Izz al-Hanafi and Ibn Kathir mention in their books that the origin of the Kharijites goes back to the sedition started against Caliph Uthman.[3] Orientalist scholar A. Hasanov agrees with this idea that the first reason for the intensification of internal conflicts among Muslims and the emergence of different directions in the history of Islam is the issue of the management of the state, which expanded 2-3 times in a short period of time, that is, the issue of the caliphate, and during the time of Caliph Osman, these conflicts reached their highest level.[4]

The assassination attempt against Uthman, a member of the Umayyad dynasty, in 656 can be considered the first religious-political act in the history of Islam. Later, such actions led to the emergence of violent methods of struggle for power.

Regarding the origin of Kharijites, Abu al-Hasan al-Ash'ari says that this name was used for those who opposed Caliph Ali. As one of the reasons for this, he cites the opinions of this faction that they did not agree with Ali's judgment and acted on their own.[5] The famous muhaddith Ibn Hajar al-Asqalani supports the above opinions by saying that the Kharijites opposed Ali on the day of the arbitration, abandoned him and Uthman and their descendants, and waged war against them.[6]

Thus, the Kharijites who carried out destructive activities in the name of religion and became famous for their terrible deeds and crimes caused the death of many people as a result of wars of extermination against communities that did not agree with their creed. The way they followed was completely contrary to the basic principles of Islam, especially the belief methods of Ahl al-Sunna wal-Jama'a.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Therefore, the activities of the Kharijites, based on destruction and violence, which threatened the religious unity, were strongly condemned by the scholars of their time and persecuted by the rulers. This can also be seen when the Umayyad and Abbasid caliphs pursued a policy of complete extermination of the Kharijites.

The ideas and forms of practice of the above currents also developed in later periods. As the socio-political development progressed, there were new requirements to justify one or another tenets of Islam, as well as to recognize the superiority of different forms of movements. This point of view also applies to the 19th and 20th centuries, when debates arose between supporters of Muslim traditionalism, Islamic "reformers" and supporters of secular principles of historical development.

Later, the above-mentioned views were partially formed in the teachings of the Muslim Brotherhood organization, which arose in Egypt in the 20th century. "Ideologues" such as Hasan al-Banna, who were originally from Egypt, Sayyid Qutb, Shukri Mustafa, Muhammad Abdul Salam Faraj, Ayman Zawahiri, and Salih Sarriya served to make these ideas more acute during their activities.

In short, bigotry-based conflicts caused endless conflict, tension, and even bloody wars in their time, causing huge losses and society's turning towards crisis. In this place, Kharijites is cited as the first extremist movement in Islam, since the first differences caused by them later led to major divisions. In the end, all such sects, which are alien to the essence of Islam, have declined, but the fact that the destructive ideas promoted by them have created the basis for the emergence of new forms of destructive organizations can be evidence that the ideological struggle is more dangerous than any threats.

REFERENCES

1. *Mirziyoyev Sh. Milliy taraqqiyot yo'limizni qat'iyat bilan davom ettirib, yangi bosqichga ko'taramiz. – Tashkent: Uzbekistan, 2019. – P. 30.*
2. *Abdulqahir ibn Tahir ibn Muhammad Baghdadi. Al-Farq bayna al-Firaq. – Beirut: Dar al-Ma'rifa, 1986. – P. 6-7; Ibn Batta Akbari. Al-Ibana al-kubra, ed. Rida Mu'ti, Uthman Asyubi and others. – Sudan: Dar ar-raya li an-nashr wa at-tawdi', 1994. Vol. 1. – P. 368.*
3. *Abu al-Izz Hanafi. Sharh Aqida at-Tahawiyya. – B. 563; Ibn Kathir. "Al-Bidaya wa an-Nihaya". – P. 202.*
4. *Hasanov A., Komilov N., Uvatov U., Azimov A., Rahimjonov D., Zohidov Q. Islom tarikhi. Study guide. – Tashkent: "Tashkent Islamic University" publishing-printing association, 2008. – P.149-150.*
5. *Abu al-Hasan al-Ash'ari. Maqalat al-Islamiyyin. 1/207.*
6. *Ibn Hajar al-Asqalani. Fath al-Bari fi Sharh Sahih al-Bukhari. – P. 283.*
7. *Islomov Z. International Islamic Academy of Uzbekistan–a result of the reforms worth to the centuries //The Light of Islam. – 2018. – T. 1. – №. 1.*
8. *Islamov Z. et al. WRITING DOWN OF HADITHS IN THE VII-VIII CENTURIES: APPROACHES AND METHODS //PSYCHOLOGY AND EDUCATION. – 2021. – T. 58. – №. 1. – C. 5536-5545.*
9. *Maxsudov D. Развитие исламоведения (корановедения) в Узбекистане: история и современность //Вестник КазНУ, Серия Религиоведение. – 2020. – Т. 21. – №. 1. – С. 60-67.*
10. *Makhsudov D. Manuscripts of abul barakat al-nasafi's works on furu'Al-Fiqh //Asian Journal of Multidimensional Research. – 2023. – Т. 12. – №. 1. – С. 31-34.*
11. *Makhsudov D. R. Mufassirs of Mawarannahr //ISJ Theoretical & Applied Science, 12 (80). – 2019. – С. 539-543.*
12. *Makhsudov D. R. МУФАССИРЫ МАВЕРАННАХРА В СРЕДНИХ ВЕКАХ //Theoretical & Applied Science. – 2019. – №. 12. – С. 539-543.*
13. *Arslonov Z., Ergashev H. ALIKHANTORA SOGUNIY'S VIEWS ON POLITICAL GOVERNANCE IN EAST TURKESTAN //Студенческий вестник. – 2020. – №. 32-2. – С. 84-85.*
14. *Ugli A. Z. Z., Farxodjonova N. Alikhantura Soguniy Role in State Administration in East Turkestan //Journal of Modern Islamic Studies and Civilization. – 2024. – Т. 2. – №. 02. – С. 128-132.*
15. *Zokirjonugli Z. A. Approaches to studying the scientific heritage of Alikhantora Soguni //Asian Journal of Multidimensional Research. – 2022. – Т. 1*
16. *Arslonov Z. Z. THE PLACE OF ALIKHANTORA SOGUNIY IN THE HISTORY OF EAST TURKESTAN //Colloquium-journal. – Голопристанський міськрайонний центр зайнятості= Голопристанский районный центр занятости, 2020. – №. 24-2. – С. 9-11.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

FORMAL EDUCATION AND SUSTAINABLE DEVELOPMENT FOR BIRHOR COMMUNITY IN PURULIA DISTRICT: ISSUES AND SOLUTIONS

Tapas Singh Sardar[1], Dr. Pratap Kumar Panda[2]
[1]Research Scholar, Department of Education (S.K.B.U), Purulia
[2]Ph.D. supervisor and Principal, Ramananda Centenary College, Laulara, Purulia

ABSTRACT

In the globalized era, people live in a healthy and comfortable environment. However, some communities have found themselves in a precarious situation due to their inability to meet their basic needs, which are essential for their daily survival. The Birhor (PVTGs) community is one of the very backward tribes; they are still like primitive humans.

This paper investigates the lifestyle challenges of the primitive tribe of 'Birhor' in the Purulia district. The investors are trying to understand their overall socio-cultural perspective and education. Who should improve sustainable development? The ethnographical method introduced investors to the qualitative research approach. Data collection involved the use of personal interviews and participatory observations. Consequently, this study connected investors to important issues and solutions regarding the barriers to formal education and sustainability development.

KEYWORDS: *Birhor Community, Purulia district, Formal Education, Sustainable Development,*

INTRODUCTION

'**BIRHOR**' is one of the Particularly Vulnerable Tribal Groups (PVTGs) that lives in Purulia district. This community resides in very remote areas of Purulia, including Jhalda - I, Baghmundi, and Balarampur blocks. The words 'BIR' and 'HOR' determine the etymological meaning of 'Birhor'. BIR signifies 'forest', while HOR refers to men, i.e., 'forest people'. The problem lies in the rapid development of India's socio-economic, socio-cultural, and free and compulsory education systems, while the PVTGS has not significantly altered their lifestyle. It appears that they are still living like primitive humans. Daily life is very difficult. They exhibit all the imperfections inherent in human existence. They still live a nomadic life. They don't have a fixed source of income. Special. They rely heavily on nature and the forest for their livelihood (Mukhopadhyay, G. 2020). They are still hunting wild animals, such as pigs and rabbits, trapping birds, collecting honey in the forest, and selling local hats. The Birhor people speak their own unique Birhor language, which is partly related to the Austroasiatic language family. This language shares some similarities with the Santhali and Mudari languages. The most alarming thing is that this tribe's education rate in Purulia District is shallow.

RATIONALE OF THE STUDY

The 'Right to Education Act of 2009' in India mandates that every child, regardless of caste, creed, color, and religion, receives compulsory and free quality education. The Constitution also mentions education, prompting both the state and central governments to take significant steps to address this horrible issue and ensure formal education for Birhor children. Without proper education, this primitive tribe cannot increase their social mobility. In the present situation, we must examine the social isolation and lack of awareness of the benefits of formal education in this community.

Sustainable development is a dynamic approach to ensuring every individual's socio-economic growth, social equality, optimal health, and well-being. Birhor people have no opportunity to make sure their lives are sustainable. From this perspective, researchers have focused on the main challenges facing the Birhor tribe to ensure formal education and sustainable development. Also, researchers try to find some possible strategies for improvement.

OBJECTIVES OF THE STUDY

- To explain the primary issues the Birhor community faces in pursuing formal education in Purulia District.
- To investigate the primary obstacles hindering the sustainable growth of the Birhor community in Purulia District.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- To understand the strategies for enhancing the Birhor Community's formal education and sustainable development.

METHODOLOGY

In this study, researchers have conducted qualitative research based on the ethnographic method. Open-ended interviews and participatory observation served as the primary data collection methods, while government reports, books, and journals served as secondary sources.

STUDY AREA

The researchers conducted this study in three blocks of the Purulia district in West Bengal. Researchers have shown the study area in the table and map below.

Name of the Block	Name of the Village
1. Jhalda – I	a) Khamar, b) Ulgara, c) Mahultarh
2. Baghmundi	a) Bhupatipally, b) Bareriya
3. Balarampur	a) Bersa

Figure no. 1: Map of Purulia District block wise (West Bengal)



Source of image: http://purulia.gov.in/distAdmin/blocks/blocks.html

DISCUSSION

- To explain the primary issues the Birhor community faces in pursuing formal education in Purulia District.

Issues of Pursuing Formal Education:

Socio-Economic factor:

a) **Poverty-related issue:** The people of the Birhor tribe are largely below the poverty line, which limits their ability to afford minimum educational expenses, uniforms, and other school-related accessories.

b) **Livelihood Dependence Factor**: The Birhor people are still part of the ancient nomadic lifestyle and labor class, and as a result, their awareness of schooling has not yet developed.

2. Cultural Issues:

a) **Language barrier:** Birhor children struggle to understand and participate because their language differs from the medium of instruction in most schools, which is mainly Bengali or Hindi.

b) **Cultural issue:** The resulting situation of the Birhor people further strengthens the negative attitude towards schooling as their upper-class Indian society does not embrace intercultural assimilation. We should focus on this aspect of the Indian education system.

3. Educational Infrastructure issues

a) **Support and community involvement:** In this regard, the present insightful education system does not offer special extra tenement, personal consultation, or community participation options for Birhor people. This small tribe finds it difficult to adopt a formal educational system.

b) **Lack of Quality of Education:** These communities are severely deficient in qualified personnel and textbooks, and they often do not have opportunities to attract qualified teachers.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4. Social issues

a) **Caste-based discrimination** is the main problem in India's tribe community, where SC and ST students still face discrimination based on caste in school education.

b) **Community awareness:** In the Purulia area's Birhor community, they're not aware of the importance of education to their children.

5. Government and Policy Issues

a) **Lack of fruitful policy implementation:** Although governments and NGOs are now paying special attention to these primitive tribes, their overall development is not improving due to the successful implementation of these policies.

b) **Inadequate Assistance Initiatives:** The various social welfare organizations should not provide Birhor parents with adequate support and assistance regarding education.

Sustainable Development Issues

1. Economic Development

a) **Limited Economic Opportunities:** the livelihood of these tribes is very low, even in the current society. These tribes' financial incomes remain dependent on daily labor and forest resources.

b) **Lack of Skill Development:** There is a lack of emphasis on vocational training and skill development to enhance their efficiency for the improvement of socio-economic status.

2. Environmental Sustainability Issues

a) **Environmental Degradation:** Birhor tribes rely heavily on wild resources, which pose a threat to deforestation and environmental sustainability.

b) **Climate Change:** One of the primary factors destroying natural resources is climate change, which will have an impact on tribal lifestyles.

3. Adequate Healthcare and Nutrition Issues

a) **The Birhor community,** living in remote areas of Purulia, lacks access to healthcare. They are unable to access the primary medical facilities provided by the government.

b) **Malnutrition:** The unsanitary lifestyle of the Birhor community has resulted in high levels of malnutrition among some children. As a result, children do not develop mentally or physically.

4. Social Inclusion Issues

a) **Marginalization:** The Birhor marginalized community. People from these groups face discrimination and exclusion from social, political, and economic spheres.

b) The Birhor tribes lack empowerment and representation in local governance.

Strategies for Solutions

1) **Community Engagement and Awareness:** Conducting community awareness programs is mandatory for this primitive tribe to enhance their understanding of education and sustainability. The government and NGOs can take initiatives in this regard.
2) **Culturally Relevant Education:** Develop an integrated curriculum that places a special emphasis on the student's culture and language.
3) We should build suitable infrastructure in the residential schools for the children of these tribes.
4) **Economic Support Programs**: The government has developed its socio-economic status by utilizing its indigenous knowledge and vocational training. The Birhor people need a skill development program.
5) **Environmental conservation initiatives:** It enhances the sustainable utilization of natural resources and engages the community to respond to the long-term challenges that endanger the environment.
6) **Healthcare and Nutrition Programs:** introduce health and nutritional programs for the Birhor community, which can promote a healthy lifestyle for tribal people and contribute to their overall development and educational achievement.
7) Ensuring the effective implementation of the government's formulated policies is the goal of fruitful policy-making.

CONCLUSION

India is a culturally diverse country. In Indian culture, so many primitive tribal groups preserve indigenous knowledge and rich cultural identities. Birhor is one of the embryonic tribal communities. They basically lived in the states of West Bengal, Jharkhand, Chhattisgarh, and Odisha. According to reports, the current Purulia District has a very low standard of living. Their socio-economic status and rate of literacy are very low. Despite the West Bengal government's efforts to improve their lifestyle, the lack of a positive attitude has hindered the development of these tribal communities to enhance their social and sustainable development. The tribe's self-awareness will prevent them from assimilating into society.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

REFERENCES

1. *Barman, N. (2017). Government's initiative for the advancement of Indigenous Ethnic Group in India: A case study of 'Birhor' – A Primitive Tribe in Purulia District, West Bengal, India. American Journal of Humanities and Social Sciences Research (AJHSSR).*
2. *Dhibor, T, et al. (2022). NUTRITIONAL STATUS OF AGED TRIBAL PEOPLE: A STUDY OF BIRHOR COMMUNITY IN PURULIYA DISTRICT, WEST BENGAL. IJFANS International Journal of Food and Nutritional Sciences. Vol.11, Iss.11, pp. 618-621*
3. *Firdos, S. (2005). Forest degradation, changing workforce structure and population redistribution: The case of Birhors in Jharkhand. Economic and Political Weekly, VOL. 40(8), PP. 773–778.*
4. *GOVT. of India- Ministry of Tribal Affairs (STWGS DIVISION)-ShastriBhavan Newdelhi2019-Project Appraisal Minutes.*
5. *Mukhopadhyay, G. (2020). BIRHOR TRIBE AND THEIR OWN WORLD – TRADITIONS VERSUS MODERNITY: A FIELD STUDY IN PURULIA DISTRICT (WEST BENGAL). nternational Journal of Creative Research Thoughts (IJCRT). Volume 8, Issue 7. PP. 1376-1380.*
6. *Nadal, D. (2014). Hunting monkeys and gathering identities: Exploring self-representation among the Birhor of Central-East India. La Picerca Folklorica, VOL. 69, PP. 263–278.*
7. *Orang, S. (2024). Social Mobility status of Birhor Tribes in India. INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN TECHNOLOGY. VOL. 10, ISSUE 10, PP. 607-616*
8. *Roy AG, et al. (2022). Study on the Diet and Health Status of the Working Population of the Birhor, PVTG of Purulia. Cell & Cellular Life Sciences Journal (CCLSJ).*
9. *Sahu, C. 2000. Encyclopedia of Indian Tribes. Sarup and Son's: New Delhi.*

APPENDICES







SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

TO FORMULATE AND EVALUATION OF MOISTURIZING CREAM BY USING CUCUMBER EXTRACT

Khambayatkar Shruti M.[1], Sachin Dighole [2], Maniyar Alfisha[3]
Department Of Pharmaceutics, Institude Of Pharmacy, Badnapur , Jalna -431203 (MS) .India .

ABSTRACT
The main purpose of herbal cosmetics is to enhance and preserve an individual's appearance. A moisturizing cream is a semi-solid substance used to improve skin tone. Herbal creams are superior to synthetic creams in various ways. Most of the face creams that are currently on the market are composed of synthetic drugs and offer increased facial fairness; however, they also come with a number of unfavorable side effects, such as allergic reactions and inflammation. Herbal creams do not have any side effects; instead, they nourish the skin. Creating and testing a herbal moisturizing cream using cucumber extract, glycerine, rose water, and vitamin E capsules was the goal of the current study project. The herbal cream stated above was evaluated according to several criteria, such as pH, viscosity, greasiness, washability,appearance (colour), and homogeneity by visual and tactile means.
KEYWORD: *emollients ,cosmetics , dry skin., hydrated skin , antiwrinkle, antioxidant.*

INTRODUCTION

One of the most popular cosmetic preparations, moisturizers are utilized extensively to help customers' skin feel softer. Moisturizers are useful in the fight against dry skin, which can result in tingling, stinging, soreness, tightness, and/or itching. This review's objective is to assess published research on the background, components, methods of preparation, traits, functions, and applications of moisturizers. Because moisturizers improve the appearance and health of skin, they serve as a link between consumer goods and medicine. Creams are emulsions that are semisolid and are meant to be applied to the skin or mucous membranes. The cream might be thick and sticky or water-miscible and easily removed, depending on the water to grease ratio. It's the most frequently recommended topical medication.One of the most popular cosmetic preparations, moisturizers are utilized extensively to help customers' skin feel softer. Moisturizers are useful in the fight against dry skin, which can result in tingling, stinging, soreness, tightness, and/or itching. This review's objective is to assess published research on the background, components, methods of preparation, traits, functions, and applications of moisturizers. Because moisturizers improve the appearance and health of skin, they serve as a link between consumer goods and medicine. Creams are emulsions that are semisolid and are meant to be applied to the skin or mucous membranes. The cream might be thick and sticky or water-miscible and easily removed, depending on the water to grease ratio. It's the most frequently recommended topical medication.

WHY DO WE NEED MOISTURIZERS?

Maintaining a healthy skin appearance is crucial because poor presentation might lower one's self-esteem. Using moisturizers on a regular basis helps smooth out fine wrinkles on the skin and hydrate it, all of which can enhance a patient's quality of life, social life, and psychological well-being. Furthermore, the right use of moisturizers can be quite beneficial for both normal skin and dermatoses with signs of dry skin. The impression of dry skin is characterized by alterations in the skin's sensory components and visual and tactile changes, which manifest as symptoms of dry skin. Tightness, soreness, itching, stinging, and tingling are some of the discomforts and dryness sensations that accompany these symptoms. When used in conjunction with moisturizers, dermatoses that cause dry skin can be effectively conquered, breaking the cycle of dry skin and preserving skin smoothness. (6)

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

PHYSIOLOGY OF HUMAN SKIN

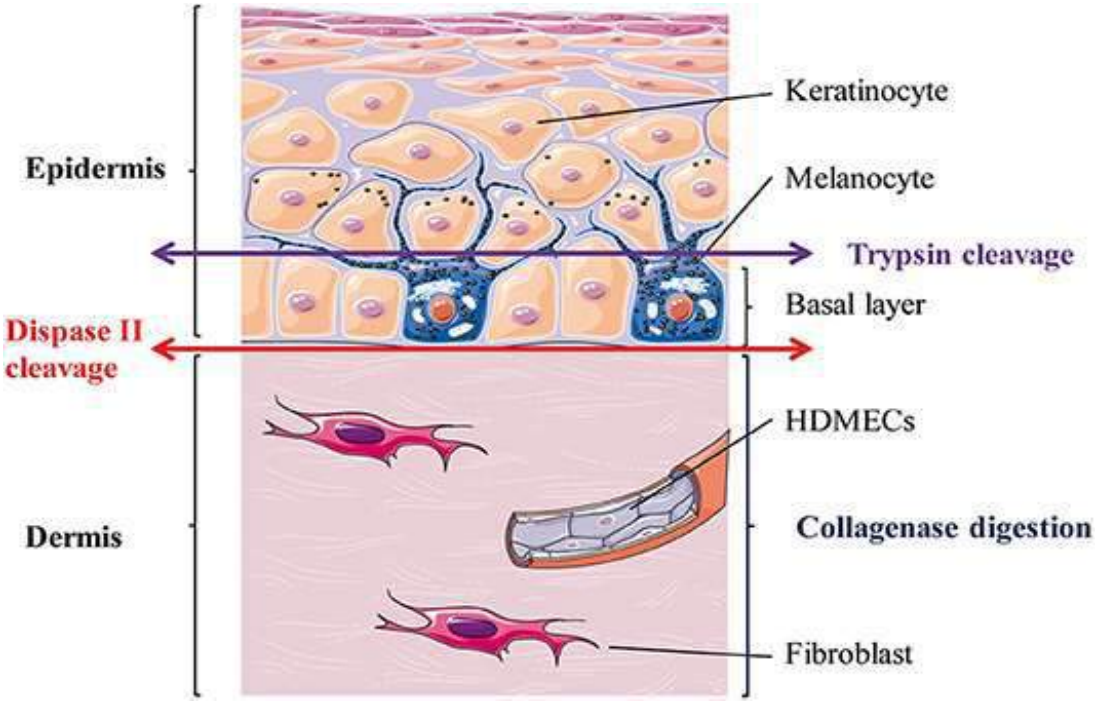


Figure 1 Skin

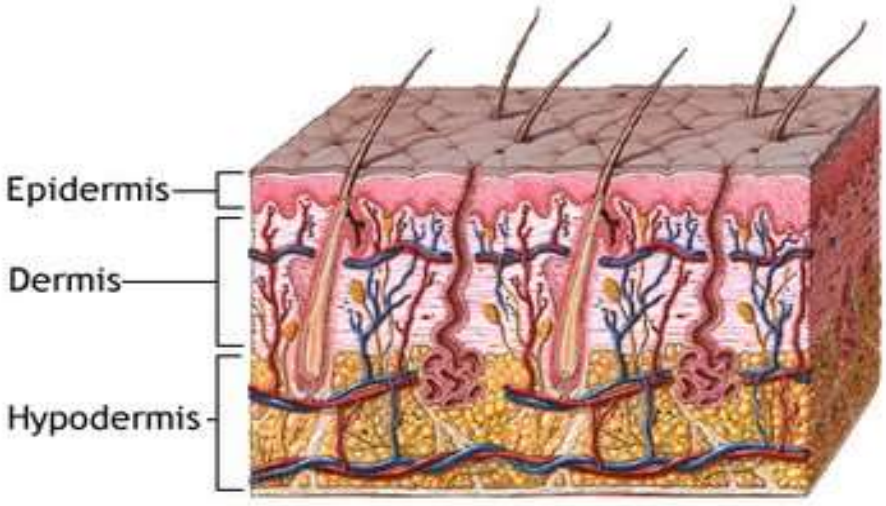


Figure 2 Skin

Epidermis

The stratified keratinized scaled epithelium that makes up the epidermis, the topmost subcaste of skin, varies in consistence depending on the area of the body. The triumphs of hands and the soles of bases have the loftiest attention of it. The epidermis lacks blood vessels and whim-whams consummations, but the dermis's interstitial fluid, which supplies nutrition and oxygen and escapes as lymph, is submerged in its deeper layers.

Dermis

The dermis is elastic and hardy. It's made of connective towel, and the matrix is made up of collagen and elastic filaments entwined. Stretch marks, also known as patient striae, are a result of the rupture of elastic filaments in the skin, which can be during gestation or after rotundity. Wrinkles appear as a result of the aging process because collagen filaments lose their capacity to bind water and

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

give the skin its tensile strength. The primary cells in the dermis are mast cells, fibroblasts, and macrophages. Varying situations of adipose(fat) towel and areolar towel taradiddle under its deepest subcaste.

Subcutaneous Gland

These are made up of secretory epithelial cells that come from the hair follicle's source towel. They're set up in the skin of every area of the body, with the exception of the triumphs of the hands and the soles of the bases, and they transude an unctuous material called sebum into the hair follicles. The skin of the groin, axillae, crown, and face has the loftiest attention of them. Sebaceous glands that are independent of hair follicles cache sebum directly onto the face in locales where one kind of superficial epithelium transitions into another, similar as the lips, eyelids, nipple, labia minora, and glans penis. (1)

Uses

•Certain skin conditions include psoriasis, ichthyosis vulgaris, xerosis, and pruritus in atopic dermatitis are treated with moisturizers. Constantly, they serve as bases or carriers for topical medicines, such those set up in Whitfield's ointment. They're constantly used with humectants like urea and salicylic acid.

• Skin cleaners, sunscreens, antiperspirants, paring creams, aftershaves, and hair mixers are among the products that constantly contain moisturizers.

• To avoid hankie dermatitis and dry skin, throwaway towels include moisturizers. (7)

Advantages of Moisturizers

• Moisturizing reduces the chances of skin problems.
• Moisturizing can reduce the appearance of other mars
• Moisturizing helps your skin stay youthful.
• Moisturizing fights wrinkles.

Disadvantages of Moisturizers

• Over – moisturization • Allergens • Fire threat

Benefits of cucumber on Skin

1) keep pustules and acne off face
2) keeps the skin healthy and toned
3) Helps the combat signs of unseasonable aging
4) A great source of hydration
5) Combats free revolutionaries
6) Relieves fatigue and under eye bags
7) Helps with fluffy eye

Marketed product

1. CUCUMBER MOISTURING CEAM
2. PINK ROOT CUCUMBER CREAM
3. FEEL HIGH CUCUMBER MOISTURING CREAM.
4. GOOD VIBS CUCUMBER MOISTURING FACE GEL
5.DR. RASHEL CUCUMBER GEL
6. LUVYH ADVANCE CUCUMBER FACE PACK.
7. BIO CARE CUCUMBER COOL REJUVENATING MOISTURING CREAM

FORMULATION

Aim : Formulation and Evaluation of herbal moisturizing cream.

Objects

- To reduce acne and skin vexation, reduce skin conditions, dry, skin, wrinkles, etc
- To enhance gleam to the face

Need of work

1. When compared to the other beauty products that are extensively available, natural cosmetics are the most effective and safe to use.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

2. Suitable for any type of skin. Anybody with any kind of skin can use them without ever having to worry about their skin getting worse.
3. No adverse responses.
4. A herbal product is one that's created from botanicals, or shops, and is used to cure ails or save health.
5. The natural constituents in botanicals nourish the body nutrients and other salutary minerals without having any negative impact on mortal health.
6. The maturity of ornamental products suffer original beast testing to guarantee their safety and efficacity before being made available for mortal use. But testing natural cosmetics isn't necessary . These natural phrasings are tested by Ayurvedic Experts in laboratories using state of the art outfit with no creatures involved.
7. Natural cosmetics aren't that precious. In fact, they're fluently available at low cost. (6)

MATERIAL AND METHODS

Cucumber



Kingdom:	Plantae
Clade:	Tracheophytes
Clade:	Angiosperms
Clade:	Eudicots
Clade:	Rosids
Order:	Cucurbitales
Family:	Cucurbitaceae
Genus:	*Cucumis*
Species:	***C. sativus***

Figure 3

The cucumber(Cucumis sativus) is a extensively- cultivated creeping vine factory in the family Cucurbitaceae that bears spherical to globular fruits, which are used as culinary vegetables. Considered an periodic factory, there are three main types of cucumber — slicing, pickling, and seedless — within which several cultivars have been created. (12) (13)

Benefits of Cucumber

1. Keep Pimples and Acne Off your Face According to studies on the benefits of cucumbers for skin, this delicious fruit regulates the quantum of sebum produced in our skin pores. The skin's sebaceous glands cache slithery substances that block skin follicles and beget acne and other skin issues in the long run. Cucumber is a useful remedy for acne that heals mars, congested pores, and slithery skin.

2. Keeps the Skin Healthy and Toned This green tube gives you a naturally radiant gleam and helps you keep your body toned and healthy when consumed withmeals.However, cucumber's antioxidant content helps to keep your skin moisturized and supple for longer, If applied or ingested regularly.

3. Helps Combat Signs of unseasonable Aging Antioxidant factors set up in cucumbers can help wrinkles. Vitamin C and folic acid are also present. Vitamin C promotes the conformation of new skin cells, while folic acid aids in the skin's defense against adulterants from the terrain. These constituents give your skin a firmer, more immature, and healthier appearance.

4. A Great Source of Hydration Antioxidant factors set up in cucumbers aid in wrinkle reduction. It also has vitamin C and folic acid. Vitamin C promotes the creation of new skin cells, while folic acid aids in the skin's defense against outside adulterants. These constituents make your skin look tighter, youngish, and healthier. Birth procedure of cucumber Cucumber excerpt is relatively simple to make and only uses two main constituents cucumber and vegetable glycerin. Voluntarily, you can save the finished excerpt with a natural preservative. (12)

Steps

1) Making the extract is very simple.
2) First, prepare the cucumber by peeling it and slicing it.
3) Once you have sliced the cucumber, you can further cut it into smaller pieces that fit well into the container you plan to use for the extraction process.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal



Figure . 4

4) I used a clean glass jar. (Ideally, use one that is clean from the dishwasher, or rinse it, after cleaning it, with very hot water to help sanitize it.)
5) Add 38.90 gm the cucumber pieces to the jar and cover them with 65 gm vegetable glycerine. It's a good idea to weigh the amount of glycerine added so that you can later determine how much water from the cucumber has been extracted into the glycerine.
6) After adding in the glycerine mix for some second.
7) Seal the jar (airtight) and keep for 15 days in cool area in the lab away from direct sunlight
8) It is important to shake for some few seconds at least once a day .
9) After days strain your cucumber extract through a cheese cloth.
10) extract is ready to used. (14)



After few hours



After 15 days

Requirement

A) Chemical

1 coconut oil	44 g
2. Bees wax	10 g
3. Stearic Acid	5 g
4.vegetable glycerine	4 g
5. Xanthan	0.40 g
6. cucumber extract	8.40 g
7. essential oil	2 g

Table . 1

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

B) Apparatus

:	1. Beaker
	2. Stirrer
	3. Weighing Balance

Table . 2

Procedure

1. 44 gm coconut oil put coconut oil in a beaker or a heat resistant cup.
2. 10 gm emulsifying wax bee's wax.
3. mix above both ingredient and add 5 gm stearic acid to beaker as well keep aside.
4. Take another beaker put 120 gm of distilled water into the beaker.
5. take 4-gram vegetable glycerine and 0.40 gm xanthan gum clear, add the xanthan gum clear to the glycerine and mix well they blend well.
6. Add the xanthan gum mixture to the water and mix till blends well with the water.
7. Heat the water phase respectively to 75 Celsius using the double boil method
8. When they are ready, take out of the beaker
9. pour the water phase into oil phase.
10. first mix with a hand stirrer for about one minute.
11. then mix with stick blender for about 3 minute and mix again with a hand mixer.
12. when the mixture homogenises and the temperature is around 40 Celsius.
13. add active ingredients 8.40 gm cucumber extract and mix well.
14. add 4 gm vitamin E mix and add 2.2 gm neem oil as a preservative and mix well.
15. add in 2 gm perfume oil or one gm essential oil.
16. give it one final mix with electric hand mixer for about 2 minutes.

EVALUATION TESTS OF CREAM

1) Physical evaluation : This is principally used to check colour, odour, texture and stability of cream.

2) Irritancy :This is used to check the quality of accoutrements as well as chemicals and whether it's dangerous to skin/ mucosal or not. First of all, we've to mark area on left hand(rearward face). After that we've to applied expression of cream to that area and time was noted. Also we've to leave expression for many twinkles by this we can checked for irritancy.

3) Washability: This test is also used to check quality of cream. In this first of all we've to add small quantum of cream which was applied on the hand. After that we've to washed with valve water.

4) pH test : This is principally pertaining to acidity situations of substances. The normal value of pH(cream)) is pH 4- 7. This test was measured either by using digital pH cadence or by pH paper.

5) Phase separation : This test is principally checked in 24 hr to 30 hr. For this we've to put cream in a unrestricted vessel at a temperature(30 – 80 °C). Keep this expression down from light.

6) density: This test is principally used to check or prognosticate how accoutrements used in cream will bear in the real world. It's substantially used to check efficacity.

7) Greasiness : This test is principally used to check nature of cream either unctuous or oiled. According to result we can say that all phrasings werenon-greasy.

RESULTS

1) Physical evaluation	GOOD
2) Irritancy	**NO**
3) Washability	**GOOD**
4) pH test	**SUITABLE (5.6 PH)**
5) Phase separation	**NO**
6) Viscosity	**GOOD**
7) Greasiness:	**GOOD**

Table. 3

DISCUSSION AND CONCLUSION

The Advantage of herbal cosmetics is their non-poisonous nature . herbal cream are provide several benefits .the use of cucumber extract as the active ingredient in moisturing cream make skin hydrated and antiwrinkle . there is no side effect that occur herbal cream . different type of skin disease can be treated by using moisturing cream. The herbal Cucumber moisturing cream containing natural ingredients to make it natural product or healthy product for skin .we have in this manner found great properties for the Cucumber cream in the current procedure and enjoyed to make an herbal moisturising cream and found the gainful benefits of cucumber moisturing cream.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

REFERENCES

1. *Ross and Wilson. Anatomy and Physiology in Health and Illness, 11e.*
2. *Aswal A, Kalra M, Rout A. Preparation and evaluation of polyherbal cosmetic cream. Der Pharmacia Lettre. 2013;5(1):83–88.*
3. *Ubaid M, Ilyas S, Mir S, et al. Formulation and in vitro evaluation of carbopol 934-based modified clotrimazole gel for topical application. An Acad Bras Ciênc. 2016;88(4):2303–2317*
4. *H, K. M. (2006). Proper choice of base of topical medicaments. Medical Bulletin, 11(9), 7-8*
5. *FORMULATION AND EVALUATION OF HERBAL MOISTURIZING CREAM AUTHOR NAME: Kajal Nivrutti Tangadkar, Talekar Sakshi Karbhari,Shinde Ashok Lahu, Prof.Akshada Dilip Suryawanshi*
6. *Formulation and Evaluation of Herbal Moisturizing Cream Arun Kumar, Divyansh*, Neha Ansari, Rahul Shukla, Gangeshwar Pratap Singh*
7. *Loden M. The clinical benefit of moisturizers. J Eur Acad Dermatol Venereol. 2005;19(6):672–688, quiz 686–687. [PubMed] [Google Scholar]*
8. *Lodén M. Role of topical emollients and moisturizers in the treatment of dry skin barrier disorders. Am J Clin Dermatol. 2003;4(11):771–788. [PubMed] [Google Scholar]*
9. *Ginsburg IH. The psychosocial impact of skin disease. An overview. Dermatol Clin. 1996;14(3):473–484. [PubMed] [Google Scholar]*
10. *Baumann L. Moisturizing Agents. In: Baumann L, editor. Cosmetic Dermatology- Principles and Practices. 1st ed. New York: Tata McGraw Hill; 2002;93–99. [Google Scholar]*
11. *Diana Darel's Z. Therapeutic moisturizers. Dermatol Clin. 2000;18(4):597–607. [PubMed] [Google Scholar]*
12. *"Cucumber." Encyclopædia Britannica. [1998] 2019.*
13. *Silvertown, Jonathan (1985). "Survival, Fecundity and Growth of Wild Cucumber, Echinocystis Lobata". Journal of Ecology. 73 (3): 841–849.* doi:10.2307/2260151. JSTOR 2260151.
14. *Review on Cucumber Lotion as Skin Care Product Kartiki U. Jadhav, Manisha Kale Mam Department of Pharmacutics, Dr Naikwadi College of Pharmacy Jamgaon Sinnar. Dr. Naikwadi College of Pharmacy Jamgaon Sinnar. Contact no 7391803804, Email id:- kartikijadhav2002@gamil.com*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

HEALTH CONSEQUENCES OF FLOODS: A CASE STUDY

[1]Prashant H, [2]Dr.Anjanappa B.H

[1]Research Scholar (Asst. Professor, GFGC Hulkoti), Dept. of Sociology, Kuvempu University, Shimoga, 577451, India

[2]Professor, Dept. of Sociology, Kuvempu University, Shimoga, 577451, India

ABSTRACT

A flood is a natural disaster and may happen abruptly or gradually, causing major disruptions to social, cultural, and economic systems and significantly impacting human life. As per the United Nations, Natural disaster is described as a sudden or significant calamity that interrupts the fundamental operation of a society or community. Currently, the term 'Disaster' is frequently utilized to denote any drastic occurrence, whether caused by nature or humans, that leads to casualties, damage to property, infrastructure, basic services, and sources of income to a degree that is too much for the impacted communities to manage independently. It can be said that most immediate threat of climate-related deaths is floods. It has been observed that individuals impacted by flooding are more vulnerable to health issues like colds, fevers, wounds, pains, anxiety, depression and skin infections. Floods are known to have a negative impact on people's health at every age.

KEY WORDS: *Disaster,Community, Flood,Infrastructure, Health, Casualty*

1. INTRODUCTION

Disruption to health is one of the severe consequence of the Floods. Flood is a disaster as well as a hazard and it interacts with a community's vulnerability to amplify its effects. In particular, a hazard can be viewed as a situation before a disaster occurs in which the possibility of a disaster is present. Dangers can arise from natural occurrences or human activities. In the same way, disasters can be natural or man-made. The level of a disaster's seriousness is based on how much it disrupts daily routines, like loss of life and property, injury, hardship, negative health effects, community needs such as shelter, food, clothing, medical assistance, and social support, damage to infrastructure and buildings, communication issues, and the need for recovery.The primary reason for the floods in Karnataka is the high amount of rain that falls during the monsoon season (June to September). Floods become devastating when additional factors such as changes in river courses and the alignment of multiple river flows add to the situation. An increase in the number of people living in floodplains has also become a key factor in exacerbating the severity of floods.In every disaster, it is the community that responds first, and the way things unfold post-disaster depends greatly on the initial response of those affected. It is very important to ascertain the health casualties due to Flood.

2. REVIEW OF LITERATURE

*Shannon Doocy and Thomas D. Kirsch*in "The Human Impact of Floods" - Floods are the most prevalent natural catastrophe and the primary reason for natural disaster deaths globally. The risk of severe losses from flooding is high because of deforestation and the growing number of people living near coastal areas, river basins, and lakeshores. The aim of this review was to outline the consequences of flood events on human populations such as death, harm, and relocation, and to pinpoint any potential factors that contribute to these results. Floods were the primary reason for natural disaster fatalities worldwide and caused 6.8 million deaths in the 20th century. Asia experienced the highest number of flood-related deaths in the last quarter of the 20th century, with almost half of all fatalities occurring in this region. According to the Center for Research on the Epidemiology of Disasters (CRED), a flood is described as a substantial increase in water level in a stream, lake, reservoir, or coastal area. Recent increases in population growth and shifts in land use have heightened human susceptibility to floods. Negative effects of floods can result in direct deaths and illnesses, as well as indirect consequences such as displacement and extensive destruction of crops, buildings, and assets. Drowning and trauma or injury are the primary reasons for death in floods.

*Olivia Lai*in "Floods Around the World?" - Floods are one of the most destructive natural disasters globally, impacting millions of individuals and causing extensive harm to human communities and the environment. As climate change affects our planet and human actions change landscapes, it is more important than ever to understand the main reasons and consequences of floods. This article examines the reasons for flooding and investigates the extensive impacts it has on both our ecosystems and communities. Floods can be triggered by various factors, sometimes occurring at the same time. Nevertheless, a major factor behind floods, particularly in instances of flash floods, is an abundance of intense rainfall. Floods occur when precipitation in flat regions and cities exceeds the ground's capacity to soak it up, causing water levels to quickly increase. Intense precipitation in rivers causes flooding when water flows downhill and spills over riverbanks onto adjacent areas.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

3.1 STATEMENT OF THE PROBLEM: Karnataka Floods 2019 caused the destruction of property, loss of several crores and affected health conditions of many people in Gadag. Floods in the Gadag district were caused by flooding by the *Tungabhadra* and *Malaprabha* rivers and *Bennihalla* stream along with continuous rainfall. The present study proposes to analyse the minor health consequences due to Karnataka Floods 2019 with regard to the residents of Hole alur village which is on the banks of *Malaprabha* river stream.

3.2 OBJECTIVES OF THE STUDY: A flood is a type of natural calamity that can occur suddenly or gradually, severely disrupting social, cultural, and economic institutions and having a profound effect on human life. Floods have a strong influence on Health of the people. The present study has the following objectives.

1. The study aimed to record and evaluate the effects of floods on people.
2. Evaluate the effects of floods on health casualties of a Flood.
3. To examine the health implications of flood on women.

3.3 STUDY AREA: Gadagdistrict is a region located in the Indian state of Karnataka. Established in 1997, it separated from Dharwad district. In 2011, the population was 1064570, with 35.21 percent living in urban areas. There are seven talukas in the region: Gadag, Gajendragad, Ron, Shirhatti, Nargund, Lakshmeshwar, and Mundargi.Gadag district shares boundaries with Bagalkot district to the north, Koppal district to the east, Vijayanagara district to the southeast, Haveri district to the southwest, Dharwad district to the west, and Belgaum District to the northwest. Known for the abundance of monuments, especially Jain and Hindu temples. Holealur, also known as Holealooru, is a historically significant village located in the Ron taluk of Gadag district in the Indian state of Karnataka. According to the 2011 India census, Holealur had a population of 8095, consisting of 4045 males and 4050 females. The population of children aged 0-6 in the village was 1016, accounting for 12.55% of the total population. The average sex ratio in Holealur village is 1001, surpassing the average sex ratio of 973 in the state of Karnataka. The Child Sex Ratio for Holealur in the census is 932, which is below the average of 948 in Karnataka.

3.4 RESEARCH METHODOLOGY: Both quantitative and qualitative methods were utilized in the approach. The study involved gathering information from district collector office, conducting interviews with civil administration, health officials, and personnel involved in rescue operations, communication and transport restoration, mass casualty management and having informal conversations with local residents. The study involves collecting primary data from 25 respondents using simple random sampling. The questionnaire was created using information from media and news reports on the damages and constraints that had occurred. The goal was to analyse the obstacles that might have hindered the high-quality healthcare following the flood.

3.5 IMPORTANCE OF THE STUDY: Preventing catastrophes in life is not always completely achievable. Risks can always escalate into disasters, and businesses are susceptible to these disruptions. Floods, whether small disruptions in one area or large global events, can cause disruptions in operations and have lasting negative effects on profitability, reputation, and safety. There is a high chance of extreme weather patterns as well. These weather occurrences will put lives at risk, cause chaos in communities and damage property. It is difficult to determine the exact degree, but through strategic planning, experts can assist communities in implementing strategies to reduce the impact of Floods. Government agencies, state and city emergency management departments, and local authorities require experts in Flood management. Getting ready for emergencies saves many lives, quickens recovery for individuals, and reduces costs. The topic of disaster mitigation in India has been widely debated due to the regular occurrence of natural disasters like earthquakes, floods, and droughts. The readiness for disasters is crucial in strengthening community resilience. The study aims to mitigate and prevent the harm and distress floods can bring about.

4.1 ANALYSIS: Typical symptoms consist of high body temperature, perspiration, chills, head pain, body or joint pain, general discomfort, decreased hunger, queasiness. The research includes gathering firsthand information from 25 participants through the method of simple random sampling. The study was developed based on data from media and news coverage detailing the damages and limitations that had taken place. The aim was to examine health casualtiesof the flood.

Table 1. Age & Gender Distribution of respondents

Age (Years)	Gender				Total	
	Male		Female		No.	Percentage
	No.	Percentage	No.	Percentage		
<10	1	9.1	1	7.15	2	8
11-18	2	18.19	4	28.58	6	24
19-25	2	18.19	3	21.43	5	20
26-40	4	36.37	4	28.58	8	32
41-60	1	9.1	1	7.15	2	8
>60	1	9.1	1	7.15	2	8
Total	11	100	14	100	25	100

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

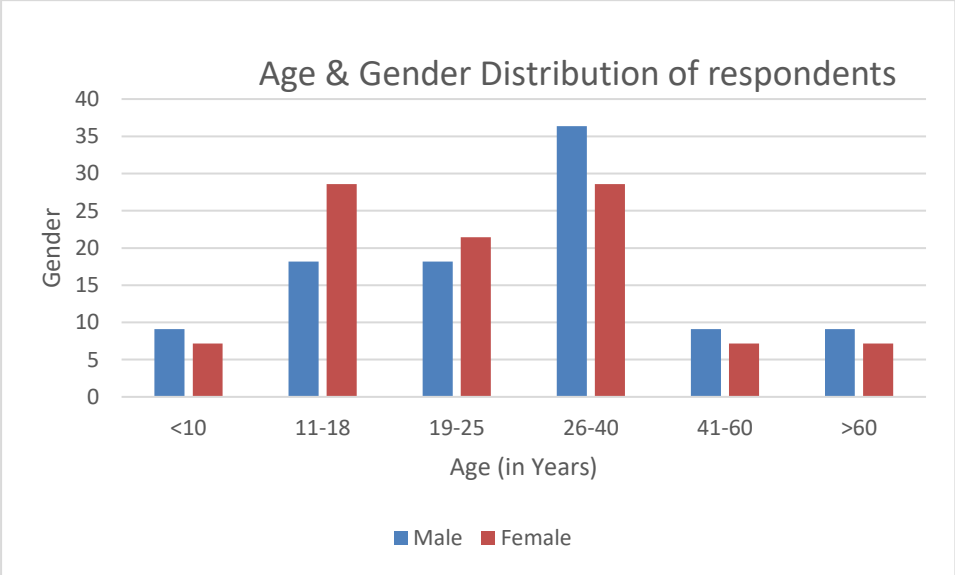


Fig 1. Age & Gender Distribution of respondents

Table 1 shows the age and gender distribution of respondents. It can be seen that from among the interviewed 25 participants, 10 people are below the age of 10 years of which 1 male and 1 female. People of age 11 to 18 years are 6 in total of which 2 are male and 4 are female. 5 people are in the age group of 19-25 years involving 2 males and 3 females. The age group of 26-40 years consists of 4 male and 4 female members totalling 8. There are 2 members in the age group of 41-60 with 1 being male and 1 being female. 2 respondents are above the age group of 60 years with 1 male and 1 female.

Table 2. Casualties reported

Nature of Consequence	No.	Percentage	Male	Female
Cold	6	24	2	4
Fever	4	16	3	1
Muscle Ache	3	12	1	2
Diarrhoea	2	8	1	1
Skin Infections	3	12	1	2
Anxiety	1	4	0	1
Mental disturbance	2	8	1	1
Wounds	4	16	2	2
Multiple Health Issues*	13	52	5	7
Total	25	100	11	14

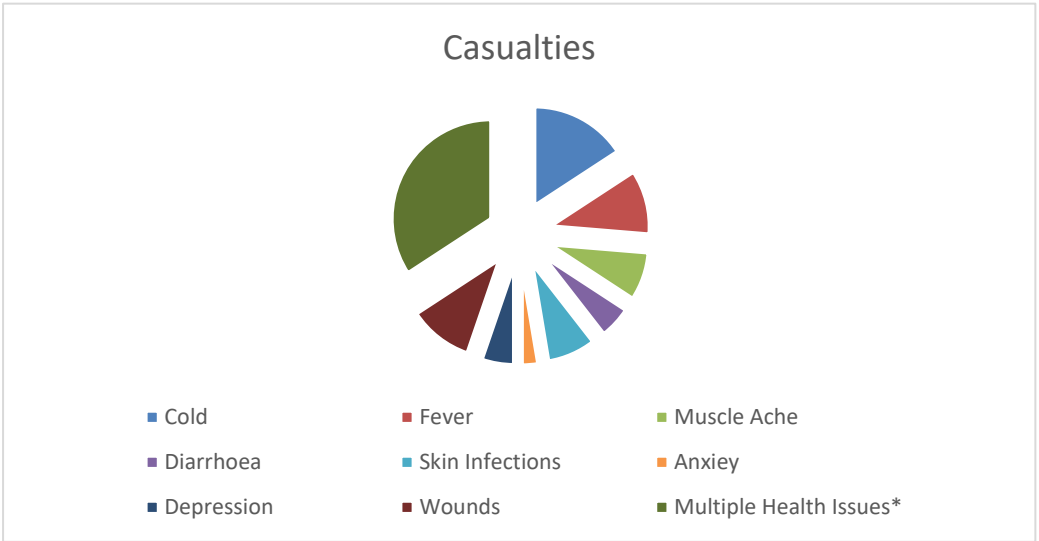


Fig 2. Casualties Reported

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Table 2 shows the casualties reported of the respondents due to Floods. 6 people suffered from cold making it 24% of the total casualties. 4 respondents reported that they suffered from fever and 3 said they had muscle aches. Diarrhoea amounts for 8 % and skin infections make it to 12% with 2 and 3 respondents respectively. A case of Anxiety has been reported. Anxiety and mental disturbance were reported by 2 respondents. 4 respondents said to have wounds making it to 16% of the total. There are also 13 people who suffered from multiple health issues i.e combination of one or more issues like fever with cold and diarrhoea, Wounds with Anxiety/Depression.

4.2 DISCUSSION & FINDINGS: As it is evident from the Table 1 &2, majority of the respondents are females being 14 in number among 25 respondents. Majority of the cold issues were found in females. 32& of the respondents are in the age group of 26-40 and aged people (>60) constitute 8 % of the respondents. Fever had been more predominant in males than females with 3 cases in males and a single case in female. Anxiety was reported in female respondent and mental disturbance and wounds equally affected both males and females. Skin infections are found more in females than males. Again females suffered more with multiple health issues with the presence of 'Multiple health issues' in 7 females and 5 male respondents.

4.3 SUGGESTIONS: Injuries are the primary effects that need to be dealt with right after a Floods occurs. As it is very clear Floods affected both male and female respondents equally in most of the health casualties. An urgent requirement exists for developing a comprehensive flood management strategy that prioritizes readiness from citizens, NGOs, and the government. Only when we take action can we lessen the harm from floods and protect people's lives, belongings and livelihoods. It is now understood that floods should not simply be seen as the result of rushing water, but they are a common danger that can become a health catastrophe when natural river flow or drainage systems cause Flood situations.

5. CONCLUSION: Floods were found to pose the highest acute risk of climate-induced casualties. Flood affected people are found to be more prone to Cold, Fever, wounds, aches, anxiety and depression, skin infections and diarrhoea. People of all age group are found to be affected with the health issues due to Floods. Karnataka Floods of 2019, highlighted the resilience and collaborative attitude of its inhabitants. Events of this scale affected all members of society, regardless of wealth, gender, or age, by bringing suffering to everyone. The need for health emergencies and the preparedness for the same had also been understood. Police, Fire Services, the Municipal cooperation, and the State Government worked round the clock to fully understand the seriousness of the situation before taking action to address the emergency.

REFERENCES

1. *Gupta H. "Disaster management". University Press. 2003*
2. *Kotlyakov V M. "Natural disasters – Volume II". EOLSS Publications.2010*
3. *Alexander D. "natural Disasters".Taylor & Francis Publishers. 2018*
4. *Singh R B. "Vladimir M. Natural Hazards and Disaster Management, Rawat Publications.2009*
5. *Steinberg T. "Theodore Acts of God, The Unnatural History of Natural Disaster in America". Oxford University Press.2006*
6. *Giddens A. "Sociology: Introductory Readings". Polity Press. 2022*
7. *Scott J. "Sociology: The Key Concepts". Taylor & Francis Publishers. 2006*
8. *FEMA, "Emergency Management in the United States" https://training.fema.gov/emiweb/downloads/is111_unit%204.pdf [Nov. 13, 2023].*
9. *FEMA Department of Homeland Security, "Natural Hazards", https://hazards.fema.gov/nri/natural-hazards#:~:text=Natural%20hazards%20are%20defined%20as,hazards%2C%20such%20as%20manmade%20hazards.[Nov. 13, 2023].*
10. *The Pennsylvania State University "What is a Natural Hazard?"*
11. *https://www.eeducation.psu.edu/geog30/node/378#:~:text=Geological%20hazards%20are%20hazards%20driven,the%20impacts%20of%20the%20events. [Nov. 13, 2023].*
12. *Alexander D. "natural Disasters".Taylor& Francis Publishers. 2018*
13. *Giddens A. "Sociology: Introductory Readings". Polity Press. 2022*
14. *FEMA, "Emergency Management in the United States" https://training.fema.gov/emiweb/downloads/is111_unit%204.pdf [Nov. 13, 2023].*
15. *FEMA Department of Homeland Security, "Natural Hazards",*
16. *https://hazards.fema.gov/nri/naturalhazards:text=Natural%20hazards%20are%20defined%20ashazards%2C%20such%20as%20manmade%20hazards. [Nov. 13, 2023].*
17. *Kotlyakov V M. "Natural disasters – Volume II". EOLSS Publications.2010*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

IMPLICATIONS OF SAVANT SYNDROME FOR COGNITIVE NEUROSCIENCE AND EDUCATION: BRIDGING INSIGHTS FROM EXTRAORDINARY ABILITIES TO LEARNING ENHANCEMENT

Eunice Meng Yin Tan (PhD)
Singapore

Savant Syndrome

The next few sections will describe some of the more common facts regarding savant syndrome.

Savant skills do not diminish or dissolve. A pattern of replication to improvisation to creation is often seen.

Savant skills usually do not fade or diminish over time. Savant skills may evolve, and the individual may learn to be creative with their savant skill. An exception is the earlier highlighted case of Nadia, an individual with savant skills whose artistic ability diminished when she was taught more self-help and independence skills (Selfe, 2012; Treffert, 2014). This raises the question of whether savant skills may get substituted for something else resulting from having been taught social skills, such as the attainment of better language abilities, communication capabilities and daily living skills (Selfe, 2012; Tan & Poon, 2022; Treffert, 2014). However, it has been documented that these substitutions do not occur regularly. Alternatively, with continued and sustained practice, the special abilities can persist at the same level or further intensify.

Treffert has witnessed a progression in savant skills, especially in prodigious savants whose abilities improve over time and may evolve to that of creativity (Bennett & Heaton, 2017; Tan & Poon, 2023; Treffert, 2014; Treffert & Rebedew, 2015). Based on these observations, Treffert revised his notion that individuals with ASD who have savant skills are not able to be creative or to improvise. He noted that individuals with savant skills can display extraordinary talents and stunning replication abilities, as well as be creative with their savant skill (Treffert, 2014).

The pattern of talent development as observed by Treffert begins with the accurate replication of audio or visual subjects. Leslie Lemke, for example, was able to perform Tchaikovsky's first piano concerto perfectly at the age of 14, after hearing the musical piece as a theme song in a televised movie (Strauss, 2014; Treffert, 2014; Wilson, 2016). Leslie's musical talent progressed from the literal replication (which he can still do today) to improvisation and creativity. This occurrence may have developed due to his apparent boredom with just reproducing what he had heard (Strauss, 2014; Tan & Poon, 2023; Treffert, 2014).

That same transition can be seen in individuals with ASD who display artistic talents. Take for example, the famous artist Stephen Wiltshire who has also been diagnosed with ASD and has experienced many of the challenges associated with ASD. Stephen Wiltshire is able to reproduce in detail what he sees. This was demonstrated in a recent documentary film whereby, after a 45 minutes helicopter ride over Rome, Stephen Wiltshire was able to complete, in three days, an accurate and detailed drawing of the city. A blueprint of the coliseum that was superimposed on his drawing, showed an accurate reproduction of the structure. The clip of the drawing marathon can be seen at www.savantsyndrome.com (Strauss, 2014; Wilson, 2016).

Stephen is able to improvise in his drawings, and also construct and create beautiful scenes of his choice. Stephen has published numerous art books and runs his own art gallery in London where he exhibits his drawings (Rieznik & Sigman, 2017; Strauss, 2014; Wilson, 2016).

Savant syndrome is not always associated and accompanied with low IQ

People are of the impression that individuals who display savant skills must have a low IQ. Although most individuals who display savant skills have IQs of between 50 and 70, there are accounts of some with IQs of 125 or higher (Bennet & Heaton, 2017; Jeon, 2016; Simard-Meilleur et al., 2014; Treffert, 2014).

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

A possible explanation of the low IQ score among individuals with ASD who have savant skills is that some of the test items are verbal. Many individuals with ASD, including those who display savant skills have deficits in their language abilities, especially in the area of verbal skill. This discrepancy in their language ability is an inherent part of ASD (Nader, Courchesne, Dawson, & Soulières, 2016; Simard-Meilleur et al., 2014; Tan, 2024; Treffert, 2014).

Another possible reason for the lower IQ score amongst individuals with ASD is the fact that IQ tests measure only one aspect of intelligence. Savants tend to perform below par on that particular measure of intelligence. Researchers have indicated that there are various ways to measure intelligence and that the IQ test is just one such method. IQ tests measure some aspects of intelligence but may fail to recognize other forms of intelligence that individuals with ASD who display savant skills may possess. Some of the individuals with ASD who display savant skills may appear severely disabled in the abilities measured by IQ. Nonetheless, they are intelligent and gifted within their own right (Nader et al., 2016; Treffert, 2014).

The areas of geniuses that individuals with ASD exhibit have led researchers to conclude that there are a series of intelligences, rather than a single intelligence. Others also have suggested the existence of multiple intelligences, which has led to a continued debate among researchers, with regards to the topic on general intelligence versus multiple intelligence theories (Ruthsatz, Ruthsatz, & Stephens, 2014; Treffert, 2014; Tan & Poon, 2023; Treffert & Rebedew, 2015).

In all developmental disabilities and savant syndrome, it is important to make a distinction between intellectual disability and functional ability. For example, intellectual disability is categorised by IQ scores, while functional ability refers to instances in which individuals with a regular or high IQ (if accurately measured) function at levels more reliable than individuals with lower IQ scores. IQ tests measure language, verbal discrepancies, social skills and other aspects of intelligence. However, assessments in these areas of intelligence for individuals with ASD may result in scores suggesting a degree of intellectual disability when in fact certain areas of their overall functioning abilities exceed that of a typically developing individual.

Leslie Lemke is an example of how IQ scores can be misleading, if used as a single measure of intelligence. Leslie has a measured IQ of 58 points on the Wechsler Adult Intelligence Scale – R (WAIS-R) test. It was based exclusively on verbal scores. Performance tests were not conducted on Leslie because such testing is highly dependent on sight and Leslie is blind. Other tests that were carried out on Leslie included the fourth edition of the Stanford-Binet, the Tactual Performance Test, the American Association for Mental Deficiency Adaptive Behavioral Scale, and the Animal List Selective Reminding Test (Strauss, 2014; Treffert, 2014; Wilson, 2016). From the scores of all the various tests, it was concluded that Leslie has severe intellectual disability. His IQ was measured at between 35 and 55 (Strauss, 2014; Tan & Poon, 2023; Treffert, 2014; Wilson, 2016). However, by listening and watching Leslie perform, one would realize that he has abilities that surpass that of any typically developing individual.

Therefore, in summary, the IQ level in individuals with ASD who display savant skills varies widely from low to high. Having a low IQ is not a prerequisite or requirement for being classified as a savant. While many savants have measured IQ levels of below 70, there are other savants who have measured IQs that are above normal, as high as 125 or above (Bennet & Heaton, 2017; Treffert, 2014; Strauss, 2014).

Not all savants have ASD or Asperger syndrome.

There are prodigies and geniuses who do not display any traits of ASD and/or intellectual disabilities. Some of these individuals are intelligent and they do not have ASD (Ruthsatz et al., 2014; Ruthsatz, 2014). They have composed multiple symphonies by the age seven or have become proficient at mastering various musical instruments, sometimes at a young age. Other individuals present extraordinary artistic, mathematical, prose or poetry skills well beyond their years. Children who show these extraordinary types of savant skills and who do not have ASD are categorized as prodigies (Ruthsatz et al., 2014; Ruthsatz, 2014). An adult who displays savant skills and who is not diagnosed as ASD is classified as a genius.

Prodigies and geniuses have outstanding abilities in the absence of any underlying disability. Whereby an individual with ASD who displays savant skills usually has one area at a genius level, a regular prodigy or genius has a high measured IQ in all areas of their functioning skill levels (Tan & Poon, 2023; Ruthsatz et al., 2014).

Just as not every savant has ASD, not every gifted individual has ASD. Instead, the terms prodigy and genius exist as independent settings that are distinct from any fundamental or primary disability or disorder.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

There are more males than females in ASD and in the savant syndrome

There appear to be more males than females amongst individuals with ASD who exhibit savant skills. There have been reports that males outnumber females by an approximate six to one ratio in savant syndrome (Treffert, 2009). By comparison, the estimated male to female ratio for individuals with ASD is four to one. Geschwind and Galaburda (1987) provide a possible explanation for the difference in incidence rates between males and females. Their work on cerebral lateralization indicated that the left hemisphere of the brain usually completes its development and growth at a later stage than the right hemisphere. Thus, the brain is subjected and endangered to prenatal effects. Some of these effects can be harmful if the brain is exposed for a longer period. In the male foetus, the circulating testosterone may stretch to great levels. This may slow down growth and weaken or damage neuronal function in the more vulnerably exposed left hemisphere (Corrigan, Richards, Treffert, & Dager, 2012; Meilleur et al., 2015; Simard-Meilleur et al., 2014; Treffert, 2014). A pathology of superiority was hypothesised in which compensatory development in the right brain was caused as a consequence of damaged development to the left brain (Corrigan et al., 2012; Simard-Meilleur et al., 2014).The research findings of Geschwind and Galaburda (1987) also explain the higher occurrence of other mental and intellectual disorders among males (Floris et al., 2013; Peterson, Mahajan, Crocetti, Mejia, & Mostofsky, 2015; Treffert, 2014). Other learning disabilities, such as dyslexia, delayed speech and stuttering also have a higher incidence among males (Simard-Meilleur et al., 2014; Treffert, 2014).

All savant skills are accompanied by strong memory

Individuals with ASD who have savant skills exhibit strong memory, regardless of their special abilities or talents (Hoffmann, 2016; Hughes et al., 2017; Rieznik & Sigman, 2017). Down (1887) used the term “verbal adhesion” and Critchley (1979) used the term “exultation of memory” or “memory without reckoning” to describe the strong memory exhibited by individuals with ASD. Savant memory is characteristically profound but narrow within the scope of the accompanying special ability (Hughes et al., 2017; Rieznik & Sigman, 2017; Strauss, 2014).

Conclusion

Since Down's first account, there have been numerous studies on the cause of savant syndrome. Researchers, including Treffert, have hypothesized that injury to the left brain results in the development of a savant skill (Treffert, 2014; Wilson, 2016). Other researchers have commented that when an individual experiences frontal-temporal dementia (FTD), savant skills may surface (Treffert, 2014; Wilson, 2016). The loss of function in the left anterior lobe of the brain may lead to artistic and music savant skills. For a savant skill to occur, there may be some loss to the left temporal lobe of the brain with enhanced function of the posterior neocortex (Al-Onizat, 2016; Hoffman, 2016; Kastrup, 2017; Wilson, 2016).

Currently, the reason why some individuals with ASD and individuals with intellectual disabilities have savant abilities and talents has not been fully understood. However, there is a strong association between savant skills and ASD as indicated in some scientific research journals. There have been theories put forward, none of which are able to explain the link between savant skills and ASD. Some of the theories include: (1) Biological-Developmental - such as genetic, neurochemical, left hemisphere dysfunction, frontal and temporal lobe damage (Al-Onizat, 2016; Hoffman, 2016; Kastrup, 2017; Wilson, 2016) and the DSM IV diagnostic category in Pervasive Developmental Disorder (PDD), (2) Cognitive - such as deficits in executive function and abstract thinking, weak coherence theory, highly developed procedural memory and eidetic imagery (Hiniker et al., 2016; Geurts & Lever, 2017). Other explanations include (3) theory of mind, the ability to think, rationalise, judge and make inferences about the thoughts, feeling and perceptions of other people (Frith, 1989; Hutchins et al., 2016; San José Cáceres, Keren, Booth, & Happé, 2014), (4) compensation for sensory disabilities whereby savant skills are developed in response to the absence of sensory capabilities (especially blindness), (5) social seclusion which offers an environment that allows the individual to maintain focus and develop his or her savant skill, and (6) the modularity of mind hypothesis which suggests that when executive cognitive functions are disturbed, the mind will exhibit a conspicuous modular and segmental organization (Kumar, 2017).

REFERENCES

1. *Al-Onizat, S. H. (2016). Measurement of multiple intelligences among sample of students with autism and intellectual disability using teacher estimation and its relationship with the variables: The type and severity of disability, gender, age, type of center. International Journal of Education, 8(1), 107-128.*
2. *Bennett, E., & Heaton, P. (2017). Defining the clinical and cognitive phenotype of child savants with autism spectrum disorder. Current Paediatric Research, 21(1), 140-147.*
3. *Corrigan, N.M., Richard, T.L., Treffert, D.A., & Dager, J.R. (2012). Towards a better understanding of the savant brain. Comprehensive Psychiatry 53(6), 706-717.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

4. *Floris, D. L., Chura, L. R., Holt, R. J., Suckling, J., Bullmore, E. T., Baron-Cohen, S., & Spencer, M. D. (2013). Psychological correlates of handedness and corpus callosum asymmetry in autism: The left hemisphere dysfunction theory revisited. Journal of Autism and Developmental Disorders, 43(8), 1758-1772.*
5. *Frith, U. (1989). Autism: Explaining the enigma. Oxford: Blackwell Publishers Inc.*
6. *Geurts, H. M., & Lever, A. G. (2017). The clinical neuropsychology of ASD. In autism spectrum disorders in adults (pp. 95-110). London: Springer International Publishing*
7. *Hiniker, A., Rosenberg-Lee, M., & Menon, V. (2016). Distinctive role of symbolic number sense in mediating the mathematical abilities of children with autism. Journal of Autism and Developmental Disorders, 46(4), 1268-1281.*
8. *Hoffman, E. (1971). The idiot savant: A case report of review of explanations. Mental*
9. *Hoffmann, M. (2016). Memory syndromes. In Cognitive, Conative and Behavioral Neurology (pp. 99-130). United States: Springer International Publishing.*
10. *Hughes, J. R. (2012). The savant syndrome and its possible relationship to epilepsy. Advances in Experimental Medicine and Biology, 724, 332-343.*
11. *Hutchins, T. L., Prelock, P. A., Morris, H., Benner, J., LaVigne, T., & Hoza, B. (2016). Explicit vs. applied theory of mind competence: A comparison of typically developing males, males with ASD, and males with ADHD. Research in Autism Spectrum Disorders, 21, 94-108.*
12. *Jeon, Y. (2016). Savant syndrome: A review of research findings. Retrieved from epository.stcloudstate.edu/sped_etds/25/*
13. *Kastrup, B. (2017). Self-transcendence correlates with brain function impairment. Neuroethics, 4, 33-42.*
14. *Kumar, B. A., Malhotra, S., Bhattacharya, A., Grover, S., & Batra, Y. K. (2017). Regional cerebral glucose metabolism and its association with phenotype and cognitive functioning in patients with autism. Indian Journal of Psychological Medicine, 39(3), 262-270.*
15. *Meilleur, A., Jelenic, P., & Mottron, L. (2015). Prevalence of clinically and empirically defined talents and strengths in autism. Journal of Autism & Developmental Disorders, 45(5), 1354-1367. doi: 10.1007/s10803-014-2296-2*
16. *Nader, A. M., Courchesne, V., Dawson, M., & Soulières, I. (2016). Does WISC-IV underestimate the intelligence of autistic children? Journal of Autism and Developmental Disorders, 46(5), 1582-1589.*
17. *Peterson, D., Mahajan, R., Crocetti, D., Mejia, A., & Mostofsky, S. (2015). Left-hemispheric microstructural abnormalities in children with high-functioning autism spectrum disorder. Autism Research, 8(1), 61-72.*
18. *Petrina, N., Carter, M., Stephenson, J., & Sweller, N. (2016). Perceived friendship*
19. *Rieznik, A., & Sigman, M. (2017). Dazzled by the mystery of mentalism: The cognitive neuroscience of mental athletes. Retrieved from https://www.frontiersin.org/articles/10.3389/fnhum.2017.00287*
20. *Ruthsatz, J. (2014). The summation theory as a multivariate approach to exceptional performers. Intelligence, 45, 118-119.*
21. *Ruthsatz, J., Ruthsatz, K., Stephens, K.R. (2014). Putting practice into perspective: Child prodigies as evidence of innate talent. Intelligence 45, 60-65. Rutter, M.L. (2011). Progress in understanding autism: 2007–2010. Journal of Autism*
22. *San José Cáceres, A., Keren, N., Booth, R., & Happé, F. (2014). Assessing theory of mind nonverbally in those with intellectual disability and ASD: The penny hiding game. Autism Research, 7(5), 608-616.*
23. *Selfe, L. (2012). Nadia revisited: A longitudinal study of an autistic savant.London: Psychology Press.*
24. *Simard-Meilleur, A. A., Jelenic, P., & Mottron, L. (2014). Article 2: Prevalence of Clinically and Empirically Defined Talents and Strengths in Autism. Journal of Autism and Developmental Disorders, (5), 1354–1367.*
25. *Strauss, J. (2014). Idiot savants, retarded savants, talented aments, mono-savants, autistic Savants, just plain savants, people with savant syndrome and Autistic people who are good at things: A view from disability studies. Disability Studies Quarterly, 34(3), 4.*
26. *Tan, E., & Poon, K. (2022). Aptitudes, Capabilities, and Interests of Children with Autism Spectrum Disorder. European Journal of Teaching and Education, 4(4), 32–43. https://doi.org/10.33422/ejte.v4i4.863*
27. *Tan, E.M.Y. ,& Poon, K.K. (2023). Exceptional Abilities and Individuals with Autism. A Historical Account. International Journal for Multidisciplinary Research, 9(1), 17-21. doi: 10.36713/epra2013*
28. *Tan, E.M.Y. & Poon, K.K. (2023). Parental Involvement and Influence in the Development of Talents for Individuals with Autism Spectrum Disorder. Three Modern Case Studies. International Journal of Research and Development, 8(1), 40-44.*
29. *Tan, E.M.Y, & Poon, K.K (2023). A Literature Overview on the Relationship between Autism Spectrum Disorder and Savant Skills. International Journal of Innovation Scientific Research and Review, 5(1), 3870-3874.*
30. *Tan, E.M.Y., & Poon, K. K.L. (2023). A Literature Summary on the Typology of Giftedness Among Savants . International Journal of Multidisciplinary Research and Development. 10(4), 19-22.*
31. *Tan, E.M.Y. (2024). Psychological Accounts For The Difficulties Experienced By Individuals With Autism Spectrum Disorder. International Journal of Research and Development, 9(1), 238-241. https://doi.org/10.36713/epra15658*
32. *Treffert, D.A. (2009). The savant syndrome: An extraordinary condition. A synopsis: Past, present, future. Philosophical Transactions of the Royal Society 364, 1351-1357. doi: 10.1098/rstb. 2008.0326*
33. *Treffert, D.A. (2014). Accidental Genius. Scientific American, 311(2), 52-57.*
34. *Treffert, D.A. (2014). Savant Syndrome: Realities, myths and misconceptions. Journal of Autism and Developmental Disorders 44(3), 564-571. doi:101.1007/s10803-013-1906-8*
35. *Treffert, D.A. & Rebedew, D. L. (2015). The savant syndrome registry: A preliminary report. Wisconsin Medical Society, 114(4), 158-62.*
36. *Wilson, C. (2016). There's a savant in you. New Scientist, 229 (3056), 28-30.*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

REVIEW ON HPLC-UV METHOD TO DETERMINE CIMETIDINE, RANITIDINE, FAMOTIDINE AND NIZATIDINE IN URINE

Alfisha A. Maniyar*[1] , Dr. Sunil Jaybhaye [2], Khambayatkar Shruti M[3]
Department Of Pharmaceutical Analysis, Institute of Pharmacy Badnapur Jalna -431203 (MH) India
Corresponding Author

ABSTRACT
A validated, uncomplicated, and widely applicable HPLC-UV technique for quantifying cimetidine, famotidine, nizatidine, and ranitidine in human urine is elucidated. This represents the inaugural singular HPLC method documented for scrutinizing all four H2 antagonists in human biological specimens. Furthermore, this technique was employed for assessing ranitidine and its byproducts in human urine. All calibration plots exhibited strong linear correlation (r 2 > 0.9960) across the experimental ranges. The methodology demonstrated commendable precision and accuracy, manifesting overall intra- and inter-day fluctuations of 0.2–13.6% and 0.2–12.1%, respectively. The separation of ranitidine and its metabolites through this analysis notably enhanced resolution, precision, and accuracy in comparison to prior methodologies. Subsequently, the analysis was effectively implemented in a human volunteer investigation utilizing ranitidine as the prototype compound.

KEY WORD - *such as H2 antagonists, High performance liquid chromatography, Bioavailability, Metabolism, Ranitidine, Famotidine, Cimetidine, and Nizatidine are commonly utilized in research studies within the field of pharmacology.*

INTRODUCTION

Histamine (H2) antagonists, including ranitidine, cimetidine, nizatidine, and famotidine, represent established pharmacological agents utilized in the management of gastro-esophageal reflux disease as well as gastric and duodenal ulceration. (1)

All four aforementioned H2 antagonists fall under the category of class III drugs, which are characterized by high solubility and low permeability as per the Biopharmaceutics Classification System (BCS) (2-4). The BCS classification system, established by Amidon et al. in 1995, serves as a tool for exempting the necessity of in vivo bioequivalence evaluations for new or reformulated generic immediate-release pharmaceutical products. At present, the BCS is exclusively applicable to class I oral immediate-release formulations, demonstrating high solubility and high permeability, that exhibit prompt in vitro dissolution following recommended testing protocols. (6-9) However, for class III compounds like the H2 antagonists, such exemption is not feasible, and in vivo bioavailability investigations become obligatory.

It is, therefore, essential that straightforward and dependable techniques are accessible for the examination of these compounds in biological fluids. Several HPLC-UV methodologies have been devised for the evaluation of the individual H2 antagonists in biological specimens such as urine or urine and plasma; cimetidine [9–11], famotidine [12–15], ranitidine [16], nizatidine [17,18]. More intricate or advanced liquid chromatography approaches have also been documented for the specific assessment of H2 antagonists in urine, including HPLC–MS [19–21], paired-ion HPLC-UV [22–23] post-column fluorescence derivatization [24], HPLC-TLC [25] and supercritical chromatography [26]. The majority of these techniques necessitate either solid-phase or liquid-phase extraction procedures which are time-intensive. Furthermore, these methodologies are solely capable of scrutinizing one of the four H2 antagonists. Two research groups have outlined procedures for the quantification of all four H2 antagonists in tablet formulations [27,28]. Nevertheless, there has been no documentation of a singular universal assay competent in scrutinizing all four H2 antagonists in biological samples such as human urine. Analysis from urine serves as a highly valuable approach in ascertaining the bioavailability of these medications in human subjects. Urine presents itself as a more conveniently obtainable biological matrix in comparison to plasma, is simpler to acquire, and is less invasive.

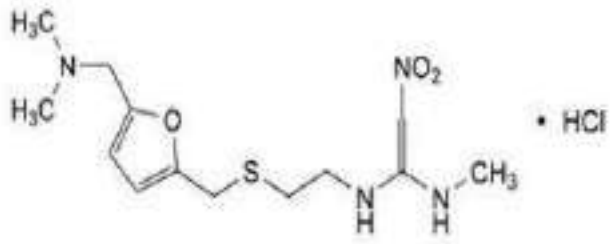
3. Drugs

3.1 Ranitidine

Ranitidine is a medication used to decrease stomach acid production. It was commonly used to treat conditions like peptic ulcer disease, gastroesophageal reflux disease, and Zollinger-Ellison syndrome

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Ranitidine works by blocking histamine, which reduces the amount of acid released by the stomach.
- It can be taken orally or administered intravenously
- . Common side effects include headaches and pain/burning at the injection site, while serious side effects may include cancer, liver problems, slow heart rate, pneumonia, and an increased risk of Clostridium difficile colitis



Structure 3.1 : Ranitidine Hydrochloride

- Ranitidine is a small molecule drug with the chemical formula C13H22N4O3S

Mechanism of action

The mechanism of action involves the hormone gastrin, secreted by stomach lining cells post-meal, stimulating histamine release. Subsequently, histamine binds to histamine H2 receptors, inducing gastric acid secretion. Ranitidine operates by reversible binding to these receptors on gastric parietal cells, reducing gastric acid secretion. This action inhibits histamine binding to the receptor, thereby decreasing gastric acid production. Relief from gastric-acid symptoms may manifest within 60 minutes post a single dose, with effects lasting between 4 to 10 hours, offering rapid and efficient symptomatic alleviation.
Structure of ranitidine (19)

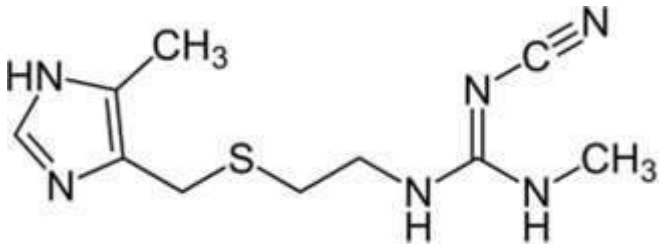
Uses

Ranitidine is a pharmaceutical agent that functions to diminish the production of gastric acid within the stomach. Its historical application encompassed the management of dyspepsia, pyrosis, and gastroesophageal reflux, including gastro-oesophageal reflux disease (GORD), a condition characterized by recurrent episodes of acid reflux. Additionally, it was employed in the prophylaxis and treatment of peptic ulcers. (18)

3.2 Cimetidine

Histamine H2-receptor antagonist

- Use – Treatment of heartburn and peptic ulcer
- Branded name – Tegamet



Structure 3.2 : cimetidine

- Cimetidine, with the chemical formula C10H16N6S

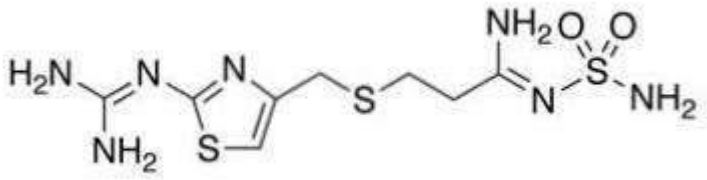
SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Mechanism of action
The H2-receptor antagonist cimetidine functions by competitively inhibiting histamine's ability to activate the H2-receptors situated on the gastric parietal cells, which play a pivotal role in the secretion of hydrochloric acid and the intrinsic factor. This action leads to a decrease in the amount of gastric acid produced in response to various stimuli such as histamine, food, caffeine, and insulin. (16)

Uses
Cimetidine is employed for the treatment of gastric and intestinal ulcers, as well as for the prevention of their recurrence post-healing. Furthermore, this pharmaceutical agent is utilized in the management of specific gastrointestinal issues in the stomach and esophagus, including conditions induced by excessive gastric acid secretion such as Zollinger-Ellison syndrome and erosive esophagitis, or the retrograde movement of stomach acid into the esophagus (acid reflux disease/GERD). Alleviating the surplus stomach acid production can ameliorate symptoms like abdominal discomfort, heartburn, dysphagia, cough, and insomnia. (17)

3.3 Famotidine
Histamine H2 receptor antagonist medication that decreases stomach acid production.

- Brand name - Pepcid
- Used - to treat peptic ulcer disease, gastroesophageal reflux disease, and Zollinger-Ellison syndrome.
- Route of administration - Taken by mouth or by injection into a vein.



Structure 3.3 : **Famotidine**

- Molecular formula is C8H15N7O2S3, with a molecular weight of 337.445 Da

Mechanism of action
The mechanism of action involves histamine functioning as a local hormone to stimulate acid output by parietal cells through a paracrine pathway. Adjacent to the parietal cells are neuroendocrine cells known as enterochromaffin-like (ECL) cells, which control the basal secretion of histamine. Additionally, histamine release is induced by acetylcholine and gastrin, a peptide hormone. Gastrin (G) cells secrete gastrin, which acts on CCK2 receptors located on ECL cells, triggering the release of histamine from these cells. Subsequently, histamine interacts with H2 receptors present on the basolateral membrane of parietal cells, resulting in elevated intracellular cAMP levels and activation of proton pumps on parietal cells. The proton pumps then release more protons into the stomach, consequently increasing acid secretion. In conditions characterized by acid hypersecretion like ulcers, the regulation of acid secretion is impaired. Famotidine operates on H2 receptors and inhibits the effects of histamine.

Uses
a. Famotidine is employed for the treatment of gastric and intestinal ulcers, as well as for the prevention of ulcer recurrence in the intestines following healing.
b. It relieves symptoms such as cough that doesn't go away, stomach pain, heartburn, and difficulty swallowing. (8)

4. High performance liquid chromatography
High-performance liquid chromatography, also known as High pressure liquid chromatography (HPLC), represents a distinct variant of column chromatography commonly applied in the fields of biochemistry and analysis for the purpose of segregating, characterizing, and quantifying bioactive compounds. HPLC predominantly relies on a column containing packing material (referred to as the stationary phase), a pump responsible for propelling the mobile phase(s) through the column, and a detector that indicates the retention times of

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

the various molecules. The duration of retention is subject to fluctuations based on the interactions among the stationary phase, the molecules under examination, and the solvent(s) that are employed. The introduction of the specimen slated for analysis occurs in minute quantities into the flow of the mobile phase and is impeded by specific chemical or physical interactions with the stationary phase. The extent of hindrance is contingent upon the characteristics of the substance being analyzed as well as the composition of both the stationary and mobile phases.

The amount of retardation depends on the nature of the analyte and composition of both stationary and mobile phase. The degree of retardation is contingent upon the characteristics of the substance being analyzed and the makeup of both the stationary and mobile phases. The moment at which a particular substance emerges (exits the column) is termed the retention time. Typical solvents employed encompass any miscible blends of water or organic fluids (with methanol and acetonitrile being the most prevalent). Separation is achieved by altering the composition of the mobile phase throughout the analysis, a process referred to as gradient elution. This gradient segregates the mixtures of substances based on their interaction with the current mobile phase. The selection of solvents, additives, and gradient is influenced by the properties of the stationary phase and the substance being analyzed.

HPLC

4.1 Types of HPLC

1. Normal phase column
2. Reverse phase column
3. Ion exchange column
4. Size Exclusion column (4)



4.2 Instrumentation

A. The pump

- The pump is located at the upstream end of the liquid chromatography system, where it initiates the movement of eluent from the reservoir of solvent into the system.
- The generation of high pressure is a fundamental necessity for pumps, in addition to the requirement of maintaining a consistent pressure under all conditions and controlling a reproducible flow rate.

Types : reciprocating piston pump
Syringe pump
Constant pressure pump

B. Injector

- An injector is placed next to the pump.
- One of the most straightforward approaches involves utilizing a syringe for the introduction of the sample into the eluent flow.
- A prevalent injection technique relies on the utilization of sampling loops.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

- Moreover, a commonly employed strategy involves the application of an auto sampler (auto-injector) system, enabling multiple injections at predetermined intervals.

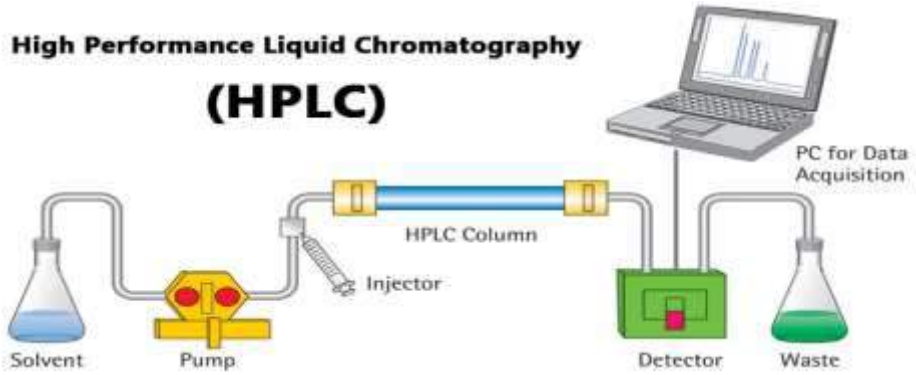
C. Column

- The separation is performed inside the column.
- The contemporary columns are frequently fabricated within a stainless steel enclosure, as opposed to glass columns.
- Silica or polymer gels are commonly utilized as the packing material in contrast to calcium carbonate.
- The mobile phase employed in liquid chromatography ranges from acidic to alkaline solvents.
- The majority of column enclosures are constructed from stainless steel due to its resilience towards a wide array of solvents

Types: Guard column
Analytical column

D. Detector

- Separation of analytes is performed inside the column, whereas a detector is used to observe the obtained separation.
- The composition of the eluent is consistent when no analyte is present. While the presence of analyte changes the composition of the eluent. What detector does is to measure these differences.
- This difference is monitored as a form of an electronic signal. There are different types of detectors available.



E. Recorder

- The alteration in the eluent identified by a sensor manifest as an electronic indication, hence remaining imperceptible to the naked eye.
- In ancient times, the pen (paper)-chart recorder enjoyed widespread usage. In the contemporary era, a computer-based data processor (integrator) has become increasingly prevalent.
- There are various types of data processors; from a simple system consisting of the in-built printer and word processor while those with software that are specifically designed for an LC system which not only data acquisition but features like peak-fitting, baseline correction, automatic concentration calculation, molecular weight determination, etc.

F. Degasser

- When gas is detected within the eluent, it is identified as interference resulting in an erratic baseline.
- The degasser employs a specific polymer membrane tubing for the elimination of gases.
- The polymer tube's surface features numerous minute pores that facilitate the passage of air while obstructing the flow of liquid through said pores. (5)

4.3 Application of HPLC

HPLC has become a staple technique for separating, identifying and quantifying different components in a mixture. Those three tasks lend themselves to a number of applications…

1.Pharmaceutical development

One of the primary applications of High-Performance Liquid Chromatography (HPLC) lies in the production stages of pharmaceutical goods. The utilization of HPLC serves as a dependable and accurate means to evaluate the level of purity in the end product.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

Consequently, it plays a crucial role in assisting pharmaceutical manufacturers in the formulation of exceptionally pure products. Nonetheless, its extensive cost implications often render it as a secondary option in the large-scale manufacturing of drugs.

2. Medical Diagnosis

High-Performance Liquid Chromatography (HPLC) is utilized for the purpose of isolating components from mixtures, making it suitable for the examination of nutrients in blood and various medical samples. Despite its higher cost in comparison to other methods, HPLC is capable of providing significantly more accurate outcomes when assessing factors such as vitamin D insufficiency. Instead of directly measuring the levels of vitamin D, HPLC can be applied to determine the concentration of 5-hydroxyvitamin D [25(OH)D] – a metabolite linked to the synthesis of vitamin D.

3. Medical Research

In addition to determining the levels of nutrients for diagnostic purposes, High Performance Liquid Chromatography (HPLC) is frequently employed in the examination of biological specimens obtained from individuals already diagnosed with certain conditions. For instance, by pinpointing particular metabolites in individuals afflicted with conditions such as Parkinson's disease or cardiovascular ailments, researchers can leverage them as biomarkers to facilitate early detection in prospective patients.

4. Food production

Over the past few decades, use of chemicals in agriculture and food production has become far more common. In many cases, this can be problematic, with chemical residues remaining on products and posing health risks to consumers. Thankfully, HPLC can also be used to identify and quantify pesticides along with preservatives and artificial flavorings and colourants.

5. Legal

Similar to the above, HPLC is also used for the detection of drug traces in urine. Usually used in tandem with mass spectrometry, the technique can be applied to detect everything from doping agents, metabolites and conjugates to opioids, cocaine, LSD, cannabis and ketamine. When drug traces are detected, the HPLC findings can be used as evidence in police charges as well as sporting disqualifications. Because it can be used to check for metabolites – produced by a reaction to the substance – the method is useful for modern drugs which are designed specifically to disappear within the body. (6)

5.Experimental

5.1 Chemical and reagents

Ranitidine hydrochloride was acquired from Zhongnuo Pharmaceutical Co., Ltd. Based in Shijiahzuang, China. The metabolites of ranitidine, namely ranitidine N-oxide, desmethyl ranitidine, and ranitidine S-oxide, were procured from GlaxoSmithKline located in Harlow, UK. Cimetidine, nizatidine, and famotidine were obtained from Sigma-Aldrich in the UK.

High-Performance Liquid Chromatography (HPLC) grade acetonitrile and water were sourced from Fisher Scientific in Loughborough, UK. Water utilized for the preparation of samples was obtained from an Elga Purelab option purification system. Sodium acetate from Sigma-Aldrich and glacial acetic acid from VWR International in Poole, UK were of analytical-reagent grade. Blank urine samples were provided by laboratory personnel.

5.2 Preparation and chromatographic condition

The configuration of the HPLC system included a high-performance LC (HPLC) system from Hewlett–Packard 1050 Series, which was furnished with a UV detector set at 230 nm to determine the four parent H2 antagonists. Ranitidine and its metabolites were separately analyzed at a wavelength of 320 nm. The collection of chromatographic data was executed through PC/Chrom software (H&A Scientific Co., UK). Utilizing a Phenomenex Luna SCX column (250 mm × 4.6 mm I.D.) filled with 5 m strong cation-exchange resin (VWR International) at 50 ◦C facilitated the successful separation of all molecules. The analysis was conducted with a mobile phase comprising acetonitrile:0.1 M sodium acetate buffer acidified with glacial acetic acid (pH 5.0; 0.1 M) in a ratio of 20:80, v/v. The entire analysis procedure was completed within 15 minutes at a flow rate of 2.0 ml/min.

5.3 Preparation of standard solutions, quality control Samples and volunteer samples

i. H2 antagonists—cimetidine, famotidine, And ranitidine

A solution of standard for each drug was individually concocted within the mobile phase and urine, after which it was introduced into the HPLC column to ascertain the distinct retention times of the molecules. Subsequently, a concentrated solution containing 500 g/ml

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

of each standard as a free base was formulated in diluted blank urine (human urine diluted in a 50:50 proportion with a solution of 20:80 acetonitrile:water). Working standard solutions were then created through gradual dilutions of the concentrated solution with urine across the spectrum of 0–500 g/ml. Finally, a 10 µl volume from each solution was injected into the chromatographic system.

ii. Ranitidine and its Metabolites

A solution of stock comprising 500 g/ml of ranitidine and 50 g/ml of each metabolite of ranitidine (ranitidine N-oxide, ranitidine S-oxide, and desmethyl ranitidine) was formulated utilizing undiluted human urine mixed in a 50:50 proportion with a solution composed of 20:80 acetonitrile:water (referred to as control urine). Various standards covering the range of 0–500 g/ml for ranitidine and 0–50 g/ml for each metabolite were generated through successive dilution utilizing the control urine. In the context of the human trial, each sample provided by the volunteers was similarly diluted in a 50:50 ratio with a solution of 20:80 acetonitrile:water. A 10 µl aliquot from each solution was introduced into the chromatographic system under specified conditions.

iii. Method validation

Quality control standards ranging from low to high concentrations of the molecules were meticulously formulated in control urine for the purpose of assessing the precision and accuracy of the methodology. Distinct standards pertaining to low concentrations were specifically concocted to explore the thresholds of detection and quantification

iv. Linearity

The method's linearity was assessed across a range of concentrations, specifically from 0.5 to 500 g/ml for cimetidine, famotidine, nizatidine, and ranitidine, and from 0.1 to 50 g/ml for the metabolites of ranitidine.

v. Accuracy, precision and reproducibility

The evaluation of accuracy, precision, and reproducibility is crucial in scientific assays. This evaluation was conducted by assessing the intra- and inter-day coefficient of variation. Furthermore, the quality control samples underwent scrutiny for accuracy and precision through the analysis of five determinations for each quality control concentration at three distinct time points. Additionally, the inter-day variation was examined across three different concentrations on four separate non-consecutive days.

vi. Sensitivity

The determination of sensitivity Involved establishing the limit of detection (LOD) as the minimum analyte concentration yielding a signal at least double the baseline noise level. Furthermore, the determination of the limit of quantification (LOQ) was based on identifying the lowest analyte concentration that could be accurately measured with a precision of 20% and an accuracy falling within the range of 80-120%.

6.Voluntary study

6.1 Sample collection

Blank urine was obtained from healthy donors who did not have ranitidine in their system and was stored at -20°C. Control human urine samples were created by combining blank samples from donors in a 50:50 ratio with a solution of 20:80 acetonitrile: water.

Six individuals volunteered to take part in the research, having provided written consent after being informed. These participants were non-smokers, self-reported as healthy, and had no prior history of gastrointestinal illnesses. The research procedure was authorized by The Joint UCL/UCLH Committees on the Ethics of Human Research. The study was carried out following the Helsinki guidelines on research ethics (1965) and its subsequent amendments

The volunteers reported to the study centre after an overnight Fast and each received a single dose of 168 mg ranitidineHydrochloride (equivalent to 150 mg ranitidine) in 150 ml water.

A standardised sandwich lunch was provided 4 h post-dose. Cumulative urine samples were collected from each volunteer And involved the collection and measurement of bladder output Over the following time periods: 0 (pre-dose), 0–2, 2–4, 4–6, 6–12 and 12–24 h. For each collection period, 20 ml aliquot was Retained and stored at −20 ◦C.

6.2 Analysis of Urine Sample

Prior to the examination of volunteer specimens, an investigation was carried out on the stability of ranitidine and its metabolites in urine under various storage conditions. Duplicate spiked samples containing two different concentrations of ranitidine (267 and 80 µg/ml) were prepared. These spiked samples underwent analysis following diverse storage conditions: immediately upon placement on the auto sampler, after intervals of 4, 9, and 24 hours, following one, two, and three freeze/thaw cycles, as well as after 3 months of storage at -20 °C. Moreover, the stability of the metabolites of ranitidine was assessed after three freeze/thaw cycles and 48 hours of room temperature exposure at concentrations of 9 and 30 µg/ml.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 6 | June 2024 - Peer Reviewed Journal

The urine aliquots obtained from v"lunt'ers were thawed at room temperature, and a mixture of 0.65 ml containing 20:80 acetonitrile:water was added to each sample in duplicates. Subsequently, after brief vortex-mixing, a 10 µl aliquot of each solution was injected into the HPLC column. (7)

7. conclusion

The method described in the HPLC-UV study is a straightforward, versatile, convenient, and replicable technique that can be utilized for the determination and quantification of any of the four H2 receptor antagonists. The study effectively examined ranitidine and its metabolites in the urine of healthy human volunteers post-administration of ranitidine. This technique proves valuable for bioavailability investigations and holds promise for exploring drug interactions in clinical pharmacology trials.

8. REFERENCE

1. *A.H. Mohamed, R.H. Hunt, Aliment. Pharmacol. Ther. 8 (1994) 3.*
2. *E. Jantratid, S. Prakongpan, J.B. Dressman, G.L. Amidon, H.E. Junginger,K.K. Midha, D.M. Barends, J. Pharm. Sci. 95 (2006) 974.*
3. *C.Y. Wu, L.Z. Benet, Pharm. Res. 22 (2005) 11.*
4. *https://www.pharmaguideline.com/2016/01/different-types-of-columns-used-in-hplc.html?m=1*
5. *https://microbenotes.com/high-performance-liquid-chromatography-hplc/#instrumentation-of-hplc*
6. *https://www.researchgate.net/publication/235987484_High_performance_liquid_chromatography_A_short_review*
7. *M.S. Smith, J. Oxford, M.B. Evans, J. Chromatogr. A 683 (1994) 402*
8. *https://en.m.wikipedia.org/wiki/Famotidine*
9. *EMEA/CPMP, The European Medicines Agency, Committee for Proprietary Medicinal Products, 2001.*
10. *Shamburek RD, Schubert ML. Control of gastric acid secretion. Histamine H2-receptor antagonists and H+K(+)-ATPase inhibitors. Gastroenterol Clin North Am. 1992 Sep;21(3):527-50. [PubMed]*
11. *Delpre G, Kadish U, Livni E. Hepatitis following cimetidine administration. Am J Med Sci. 1982 May-Jun;283(3):153-6. [PubMed]*
12. *Gyeresi, M. Gergely, J. Vamos, JPC – J. Planar Chromatogr.-Modern Tlc 13 (2000) 296.*
13. *Gibaldi M. Drug interactions: Part I. Ann Pharmacother. 1992 May;26(5):709-13. [PubMed]*
14. *T.C. Dowling, R.F. Frye, J. Chromatogr. B 732 (1999) 239*
15. *Yusuf, S. Al Dgither, M.M. Hammami, Ther. Drug Monit. 28 (2006)*
16. *https://go.drugbank.com/drugs/DB00501*
17. *https://my.clevelandclinic.org/health/drugs/18309-cimetidine-tablets*
18. *https://www.nhs.uk/medicines/ranitidine/#:~:text=Ranitidine%20is%20a%20medicine%20that,prevent%20and%20treat%20stomach%20ulcers*
19. *Medically reviewed by Melisa Puckey, BPharm. Last updated on Feb 29, 2024.*