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AN AYURVEDIC PROTOCOL FOR THE PREVENTION OF ADENOMYOSIS- A CONCEPTUAL STUDY

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ABSTRACT

Female reproductive health is the most neglected area in medical science. Ayurveda has given more importance to the maintenance of the reproductive health of a female by describing three regimens that are to be followed during the most important reproductive milestones. Rajaswala paricharya to be followed entirely during the reproductive life during the menstruating period, Garbhini paricharya is the term coined for ante-natal care and sootika paricharya is meant for Post-natal care. Women who fail to follow these regimens can be prey for a number of Gynaecological disorders. Adenomyosis is one such disease that is the most neglected disease to be diagnosed in its initial stage, which may be caused by the sthanika vata vrudhi; violation of menstrual regimen can be a cause for the same. So, the proper adoption of Rajaswala paricharya during the menstruating period remains the major preventive factor for most of Gynaecological disorders like Adenomyosis.

KEY WORDS: Rajaswala paricharya, Adenomyosis, Prevention, Vata Vrudhi

INTRODUCTION

Ayurveda is the science that emphasizes the importance of maintenance of health as its prime focus. It comprises of eight speciality branches like Kayachikitsa, Bala chikitsa, Graha chikitsa (Manasaroga) , Urdhwanga chikitsa (Shalakyas) , Shalya chikitsa, Dhamstra chikitsa (Agada tantra), Jara chikitsa (Rasayana) and Vrusha chikitsa (Vajeeekarana).(1) Among this Bala roga is subdivided into two main branches like Kumarabrutya and another one is Prasuti tantra evam stree roga(PTSR). PTSR is a branch that is giving utmost importance to the female health. As per Atharva veda, stri is compared with earth(2) and purusha to akasa. Just as the mother earth receives or collects rainwater, stri receives or collects bija(sperm) following which the seed sown germinates; resulting in the formation of embryo(garbha). Hence stri Arogya plays a major role in the healthy development of the foetus; for that, maintenance of the reproductive health of a female has a prime role. Acharyas has given various regimen throughout the reproductive life of a female like Rajaswala paricharya, Garbhini paricharya and Sootika paricharya for protecting and maintaining the reproductive health of a female in each of her reproductive milestone.(3) Among this Rajaswala paricharya should be followed throughout the reproductive age of a female.

AIMS AND OBJECTIVES

Aim

To analyse the effect of rajaswala paricharya in preventing the Pathophysiology of Adenomyosis.

Objectives

To compile and study the references regarding the anatomy of female reproductive system in ayurveda and contemporary science.
To understand the importance of following the Rajaswala paricharya.



To find out the relationship between violating Rajaswala paricharya and the pathophysiology behind adenomyosis.

MATERIALS AND METHODOLOGY

The literature study was done from the Ayurvedic texts, Contemporary textbooks and all the available e-resources regarding the physiology of menstruation, Rajaswala paricharya and Adenomyosis.

RESULTS

Female Reproductive Anatomy

The female reproductive system is composed of internal and exterior reproductive organs that are involved in the procreation of new life. The female reproductive system in humans is immature at birth and matures during puberty to produce mature gametes that will be fertilized and paves way for the reproduction. The vagina, uterus, Fallopian tubes, and ovaries are the internal sex organs. The cervix connects the vagina to the uterus, vagina is referred to as the birth canal in the context of pregnancy and childbirth which aids in sexual activity. The uterus carries the fertilized throughout the gestation period. Additionally, the uterus secretes substances that aid sperm in reaching the Fallopian tubes, where they fertilize ova (egg cells) produced by the ovary. The uterus is a pear-shaped organ consisting of fundus, body and cervix. The dimensions are 7.5cm á 6cm á 4cm in length, width and thickness. The uterus has 3 layers namely perimetrium (outer layer), myometrium (middle muscle layer), endometrium (inner mucosal layer). Endometrium in turn is divided into 2 layers; the superficial stratum functionalis which sloughs off during menstruation and the deep layer, stratum basalis, which is permanent and gives rise to new functionalis layer after each menstrual cycle. The labia, clitoris, and vaginal opening are together referred to as the exterior sex organs (Vulva). The ovaries release an ovum at predetermined intervals, and it travels via the Fallopian tube and into the uterus. If sperm are encountered during this transit, it can combine with the egg or ovum, fertilizing it to form a zygote. The process of embryogenesis normally starts with fertilization, which takes place in the Fallopian tubes. Once the zygote undergoes cell division and attains the stage of blastocyst it will get implanted in the uterine endometrium. The gestational period starts at this point, and the embryo will continue to grow until it is fully developed. After the period of gestation, the cervix widens and the uterus contracts, allowing the fetus to pass through the birth canal (the vagina).(4)

Adenomyosis

Adenomyosis is a common and rarely diagnosed gynecological disorder in the early stage, which is characterized by the invasion of endometrial glands and stroma deep within the myometrial layers.(5) Previously considered as a variant form of endometriosis and termed as Endometriosis interna, but now considered a different entity. It occurs when there is a disruption in the physiological boundary between the endometrial basal layer and the myometrium. As a result, the endometrial glands invade the myometrium, resulting in ectopic intra-myometrial glands which results in adjacent myometrial hypertrophy and hyperplasia. Islands of adenomyotic lesions may be scattered throughout the uterine musculature, giving origin to the various form of the disease. or they may occur as a localized, focal form, called the adenomyoma. Grades 1, 2, and 3 correspond, respectively, to the involvement of the inner third (superficial adenomyosis), two-thirds, and entire myometrium (deep adenomyosis). The cut section reveals thickening of the uterine wall with a characteristic trabeculated appearance with no capsule as in the case of a fibroid. Microscopic studies reveal glandular tissue surrounded by stromal cells in the myometrium. The range of symptom may vary from menorrhagia or menometrorrhagia and congestive dysmenorrhoea. Uterine cramps may start a few days earlier to the bleeding phase and may continue for a few more days or may persists throughout the cycle. Deep dyspareunia may be present and enlarged bulky uterus on bimanual examination is the significant feature of adenomyosis. USG diagnostic reveals enlarged uterus with asymmetrically enlarged posterior wall associated with multiple small cysts in myometrium with increased vascularity. Junctional zone greater than or equal to 12mm is diagnostic of adenomyosis. MRI is used to differentiate it from fibroid. In contemporary science secondary dysmenorrhoea is managed with NSAIDs or OCPs. If the women has completed her family then hysterectomy can be advised. Laproscopic myometrial electrocoagulation is advised in young women who has completed her family. (6)

Arthavavaha Strotas

Arthavavaha strotas is the classical reference of the female reproductive system in Ayurveda. The strotas are known for their karma of Sravana i.e, the flow of the body fluids from the site of production to the area of requirement.(7) Arthavavaha strotas are the Bahirmukha strotas which are two in number which are directed downwards and are responsible for carrying the menstrual blood. Garbhashaya and Arthava vahini dhamani are considered as the moola of arthavavaha strotas.(8) Garbhashaya (uterus), is triangular in shape with its apex at its mouth. Dalhanacharya describes the garbhashaya is the avayava with a small mouth and a big inner cavity, and its shape is compared with that of the shape of rohita fish. Acharya susrutha and Vagbhata explained Yoni as a conch shell shaped organ having three avartha or layers and Garbhashaya as the third layer of the yoni. Location of the Garbhashaya is between the Pittashaya and Pakvashaya. In the context of ashmari chikitsa it is explained as the garbhashaya is located near Basti. Arthavavaha dhamani when injured may cause Vandhyata (infertility), Maithuna asahishnutaa (Intolerance to sex i.e., difficulty in sex or painful sex -dyspareunia), Aartava naasha (Amenorrhoea or Dysmenorrhoea)(8)

**Rajas**

The blood that which is expelled from the yonimarga for a duration of 3 days once in every month is termed as Rajas. It is the upadhatu of Rasa dhatu.(9) It is Soumya during the time of formation and becomes agneya at the time of excretion by its nature, having the characteristics of Rakta and which is responsible for the formation of Garbha. Arthava pramana is 4 anjali. Suddha arthava should be devoid of picchila(slimy), daha (burning sensation) and arthi(pain) which is neither heavy nor scanty and will have the colour of Gunja fruit, Padma or indrakopa.(10)

Rithu Chakra

The menstrual cycle can be said to have composed of 3 phases ie,

- 1)Raja srava kala (Menstrual phase)
- 2)Rithu kala (Proliferative phase and ovulatory phase)
- 3)Rithuvyatitha kala (Secretory or Post-ovulatory phase)

Bleeding phase according to charaka is 5 days, Vagbhata is 3 days, Haritha is 7 days. Bhavamishra explains further like Excessive bleeding which lasts for 3 days and medium and scanty flow for 5 and 16 days are to be considered as physiological.

Rajaswala Paricharya

Menstrual hygiene in Ayurveda is explained as Rajaswala paricharya in various classics like charaka samhita, sushruta samhita, kashyapa samhita, ashtanga hridayam, ashtang sangraha and bhava prakasha. These are the separate set of regimen which should be followed by a women during her days of menstruation (ie. 3 to 7 days of her menstrual cycle), Bodily composition (Prakruti) forms the basics for all the physiological functions in the human body. The doshic predominance is expressed in all the bodily functions like even in menstruation i.e, vata prakruthi is more prone to have dysmenorrhoea, pitta prakruti have more mood changes and kapha prakruthi will have the menstrual flow associated with clots.

Contraindicated Activities: (11)

1. Dhivaswapna (day sleep) should be avoided and mattresses should be made of Darbha.
2. Application of any kind of Anjana, crying, massaging the body, head bath, too much of laughing, talking and exercise should be avoided.
3. Swedana karma, Vamana and nasya karma are contraindicated.
4. Diet contraindicated: Avoid the eatables which are pungent (tikshna), spicy (katu) and salty in taste.
5. Maithuna (Coitus) is contraindicated.
6. Adoring by wearing any kind of Ornaments, combing and Grooming are contraindicated

Indicated Activities and Diet

1. Positive thoughts should be promoted and always should think about auspicious things.
2. Meal should be Havisyanna (made of Ghee, Sali and milk) and Yavaka (made of barley and milk) and should be consumed directly by taking in hands or in utensils made of clay or leaves.

DISCUSSION

During the reproductive life of a female, the main milestone is the attainment of menarche, which will be achieved physiologically from the age of 8-12 years in the developing countries.(12) Menstruation is the probable indicator of the reproductive capability of women. During the initial days of the commencement of a cycle due to the absence of fertilization the ovum degrades and all the endometrial functionalis start shedding out followed by the imbalance in the hormone levels, especially progesterone (important for the maintenance of pregnancy). After that, a thin layer of endometrial stroma remains. Under the influence of estrogen hormone, the stromal cells and the epithelial cells proliferate and the whole endometrial surface is re-epithelialized within 4 to 7 days.(13) Then within the next few days, the endometrium proliferates and thickens due to the increased number of stromal cells, glands, and new blood vessels aiding in the implantation of the conceptus. During the time of menarche, the uterus undergoes the first time of contraction and endometrial shedding, at that time the whole physic as well as the uterus will be in a weak state. So foods and regimen which promotes strength, as well as rest to the body, should be preferred. The regimen which is opposing these phenomena will cause a decrease in the strength of the uterine musculature during this menstruating phase it may lead to the improper shedding of the endometrial layer or may cause excess invasion of the endometrial layer into the myometrium due to the excess uterine contractions. Menstrual regimen, the Rajaswala paricharya explains that it is a natural shodhana procedure (cleansing), that a women undergoes every month of their reproductive life. So during that period agnimandhya will be observed and so the agni of the menstruating women should be taken care as that of a person undergone a shodhana therapy. The ultimate aim of this regimen is to restore the agni, bala and to avoid the vitiation of vata and kapha doshas by maintaining its equilibrium. Adenomyosis is mainly characterized by the invation of endometrial layers into deeper layers which is mainly due to the sthanika vata kopa occurring during this period. Rajaswala paricharya is the most important Nidhana parivarjana chikitsa for most of the female reproductive tract



disorders. This article mainly emphasis on the role of rajaswala paricharya in preventing Adenomyotic changes, a disease which is mostly left undiagnosed clinically.

REFERENCES

1. Jadhav AN, Bhutani kjjoe. *Ayurveda and gynecological disorders*. 2005;97(1):151-9.
2. Karki aijoa, *Sciences IM. Importance of Mudras in Stree Swasthya*. 2021;6(6):116-9.
3. Gaikwad VRS, Kuwar VRC, Pashte vsijon, *Science H. Rajaswala Paricharya: an Ayurvedic Management to Prevent Menstrual Disorders*. 2017;6(1):61-3.
4. Ramírez-González, Juan Andrés & Vaamonde-Lemos, Ricardo & Cunha Filho, Joao & Varghese, Alex & Swanson, R James. (2016). *Overview of the Female Reproductive System*. 10.1007/978-1-4939-3402-7_2.
5. Ferenczy ajhru. *Pathophysiology of adenomyosis*. 1998;4(4):312-22.
6. Kapoorchand H. *A Comprehensive Treatise on Striroga*. Chaukhambha Bharat Academy: Chaukhambha Vishvabharati; 2018.
7. Shaikh A, Ingle S, Sant S, Ugale K, Bansode R. *Concept of strotas—the duct system of our body*. 2020.
8. Pratibha K, Shrinath V. *A critical review on artavavaha srotas with special reference to female reproductive system*.
9. Tripath DKM, Nikhate DSP, Raole DVV, Kumar DSJTPIJ. *A Conceptual Study of Upadhātu in Ayurveda*. 2019;8(5):596-9.
10. Kapoorchand H. *A Comprehensive Treatise on Striroga*. Chaukhambha Bharat Academy: Chaukhambha Vishvabharati; 2018.
11. Pai P, Bhatuda S, Pandkar pjijod, *Sciences M. Rajaswala paricharya: Effect on menstrual cycle and its associated symptoms*. 2015;14(2):2.
12. Albright DL, Voda AM, Smolensky MH, Hsi BP, Decker mjci. *Seasonal characteristics of and age at menarche*. 1990;7(3):251-8.
13. Ludwig H, Metzger HJAFG. *The re-epithelization of endometrium after menstrual desquamation*. 1976;221(1):51-60.



SOCIAL SECURITY MEASURES AND LIFESTYLE BEHAVIOUR OF ELDERS

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1. ABSTRACT

1.1 Background

Every person – in every country in the world – should have the opportunity to live a long and healthy life. Yet, the environments in which we live can favor health or be harmful to it. Environments are highly influential on our behavior and our exposure to health risks, our access to services like health and social care and the opportunities that ageing brings. Old age has many positive and negative aspects associated with it. Often the realities, perceptions and expectations vary a lot and become a source of distress. It is important to evaluate the concerns and reflect on the possible solutions.

2. Objectives

- *To study the various age-related issues influencing the lifestyles of older people.*
- *To understand the social security measures for elders in urban settings.*

2.1 Method

The qualitative study was taken up to know the social security measures for elder people and to study the lifestyle of the older adults for their well-being.

2.2 Inference: *There are many social concerns raised by the older adults and they are needed to be addressed. Awareness, provision of information on how to approach the concerned authority for utilizing the scheme and ease of administrative procedures should be the important part of providing social security measures for older people. These require multi-level and multidisciplinary levels of checks to deal with and help the elderly to lead a healthy lifestyle with long term social security.*

3. KEY WORDS: *Ageing, Health, Social Security, lifestyle, common health conditions, India.*

4. Preamble: *India, one of the oldest civilizations around the world, is the country with a long history of almost 5000 years and extremely complex social structure. Most of the religious groups around the world like Hinduism, Islam, Buddhism, Christianity, etc., are present here and in addition, there are a variety of cultures and sections with different belief and rituals under the same constitution. Thus, Indian social matrix and cultural pattern is characterized by “Unity in diversity.”*

5. Social Security for Elderly – Introduction

Until recently, family and adult children took on the responsibility of looking after their elderly and were considered to be a reliable source for providing old age security. However, these traditional sources of old age security have come under great strain due to the increased longevity¹ of the elderly, and other widespread

• ¹Author - Sumati Kulkarni, Siva Raju, SmitaBammidi: Increased Awareness, Access and Quality of Elderly Services.



demographic and socio-economic-cultural changes taking place in these transitional societies. The problem is more acute among the poor elderly who, with their deteriorating health conditions, are unable to work for earning and have hardly, if ever, any savings to fall back upon. Marginalization of the poor – an unforeseen consequence of globalization – and increasing feminization of poverty have further underscored the need to adopt suitably targeted measures that provide social security to the elderly.

Like a few other developing countries, the Government of India as well as the State governments have undertaken some initiatives in this direction. Presently, the debate on provision of social security to the elderly revolves around the eligibility, coverage, pension amount, appropriate form of assistance to the elderly (food or physical assistance or monetary help etc.), delivery mechanisms, their suitability, and the economic implications of such measures.

6. Indian Social Security System

In India, since time when the British introduced the concept of retirement benefits for employees, a multitiered system of social security evolved over the long period. However, until recently, the focus has been on the organized sector. The pension system that was created for government employees in 1881 by the British rulers was retained by the Indian government even after independence. The Adarkar Report of 1944 laid the groundwork for a social security system in India. Pension policies that evolved from 1940s to 1960s cover mainly employees in the organized sector. The elderly, who were working in the organized sector could also avail of the benefits under various acts such as the Employees' Provident Fund Act 1952, Family Pension Scheme 1971, Payment of Gratuity Act 1972, Deposit-linked Insurance Scheme 1976, Group Insurance and General Provident Fund Scheme 1982 and finally, the National Pension Scheme 2004.

7. Concept of Social Security

Social security is defined by the International Labour Organization (ILO)² as 'the protection which society provides for its members, through a series of public measures to prevent the social and economic distress that would otherwise be caused by the stoppage or substantial reduction in earnings resulting from sickness, maternity, employment injury, unemployment, invalidity, old age and death; the provision of medical care and the provision of subsidies for families with children (ILO, 1942).

According to Sir William Beveridge (1943), who is widely accepted as the father of the United Kingdom's social security system, it is 'security of an income to take place of the earnings interrupted by unemployment, sickness or accident, to provide for retirement benefit, to provide against the loss of support by the death of either person and to meet exceptional expenditure such as those connected with birth, death and marriage.'

Social security is a basic human right, which was recognized in the United Nations Declaration of Human Rights in 1948. The Right to life, recognized as a fundamental right by Article 21 of the Constitution of India, implies the Right to live with human dignity. It encompasses not only the security regarding the basic human needs of food, clothing and shelter, but also health security. Social security schemes usually give priority to income security because, generally, the basic needs of the vulnerable sections may be satisfied, if people have an adequate income.

Most of the elderly become vulnerable due to their inability to work and earn. Vulnerability due to advancing age can be anticipated in time, and can be mitigated by making specific provisions if one has an adequate income.

In traditional agricultural societies, families, especially in the joint family system with multi-generational co-residence, usually take care of the economic and emotional security needs of the elderly. When people and families are not able to make arrangements for the care of the elderly, their needs must be provided for by society/state, either in cash or kind (through social insurance and social assistance schemes).

In developed countries, the elderly are covered by an elaborate system of social security. The nature of the issues of the elderly in developing countries is vastly different due to factors such as chronic poverty, unemployment and underemployment as well as the existence of a large informal sector. Many researchers have, therefore, argued for the need to adopt a more extensive notion of social security for LDCs as they felt that the type of social security programmes implemented in developed industrialized countries are generally neither appropriate nor economically feasible in poor countries.

8. Indian concepts of lifestyle: Lifestyle is the perception of a particular society towards life and the way its people live, think and behave. It includes dietary practices, physical-mental activities, cognitive exposure as well as cultural and environmental revelation. The "Vedantic" literature says that life is *sacred and eternal* and according to this belief when the life particles interact with material elements, various events like birth, disease, old age and death result. In Rig Veda, desire for longevity

• ² Author - Sumati Kulkarni, Siva Raju, SmitaBammidi: Increased Awareness, Access and Quality of Elderly Services



and health (mental and eternal physical) is best exemplified in the much-quoted Atharva Veda *sukt*: “*Pashyemsharadahshatam, Jivetsharadahshatam*” (let me see 100 autumns, let me live 100 autumns).

- 9. Concept of Ageing:** At the biological level, ageing³ results from the impact of the accumulation of a wide variety of molecular and cellular damage over time. This leads to a gradual decrease in physical and mental capacity, a growing risk of disease and ultimately death. These changes are neither linear nor consistent, and they are only loosely associated with a person’s age in years. The diversity seen in older age is not random.

Older people are a valuable resource for any society. Ageing is a natural phenomenon with opportunities and challenges. According to Census 2011, India has 104 million older people (60+years), constituting 8.6% of total population. Amongst the elderly (60+), females outnumber males.

Increase in longevity and decline of joint family and breakdown in social fabric pushes seniors into loneliness and neglect. A healthy life, with physical activity, good diet, and other habit-forming substances is recommended.

- 10. The Indian lifestyle and its basics:** The Indian lifestyle is embedded in the principles of “karma” (action) and “dharma” (the righteous way to do the work). In the past and at present, both “karma” and “dharma” are given maximum importance in all Indian activities and deeds. According to the ancient scripture writers (Shastrakars), the dharma is based on four major factors i.e., (i) “Desa” (place, region); (ii) “Kal” (time); (iii) “Karma” (action, efforts, activities); and (iv) “Guna” (natural traits). It was the prevalent belief that a person should perform his “karma” as per the condition, demands, and experience of self as well as in perspective of “desa” and “kal.” In this frame, only the activities carried out as per time, place and condition were considered as “Dharma.” Indeed, “desa” and “kal” were significant factors contributing to dharma.

In Ayurveda, Shushruta advocates for “swasthyavritta” (positive health) recommending “dincharya” (daily routine), “ritucharya” (seasonal routine), diet, exercise and virtuous conduct for positive health. Spiritual dimensions of personality are recommended by “Upnishads.” “Buddhism” favors to lead a well ordered life by opting middle course between self-indulgence and extreme simplicity. “Jainism” emphasized non-violence, vegetarianism, warmth and human sympathy. “Christianity” talked a lot about individual living style, systems and ways of salvation. “Yoggyuru Patanjali” advocated to follow eight-fold path of yoga to get insight and sublime purity of the soul. This could be achieved through adopting a particular lifestyle including 8 steps of “yoga” (1) “Yama” (self control) with five rules, i.e., non-violence, truthfulness, not stealing, chastity and the avoidance of greed; (2) “Niyam” (observance) through purity, contentment, austerity, study of Vedas and devotion of God; (3) “Asana” (posture) (4) “Pranayama” (control of the breath) (5) “Pratyahar” (restraint) (6) “Dharana” (steadying of the mind) (7) “Dhyana” (Meditation) and (8) “Samadhi” (deep meditation). All of these lifestyle concepts are being followed by various communities across the country till date.

11. Indian lifestyle Vs Healthy Ageing – Needs and Activities:

A longer life brings with it opportunities, not only for older people and their families, but also for societies as a whole. Additional years provide the chance to pursue new activities such as further education, a new career or a long-neglected passion. Older people also contribute in many ways to their families and communities. Yet the extent of these opportunities and contributions depends heavily on one factor: health.

Evidence suggests that the proportion of life in good health has remained broadly constant, implying that the additional years are in poor health. If people can experience these extra years of life in good health and if they live in a supportive environment, their ability to do the things they value will be little different from that of a younger person.

Physical and social environments can affect health directly or through barriers or incentives that affect opportunities, decisions and health behaviour. Maintaining healthy behaviours throughout life, particularly eating a balanced diet, engaging in regular physical activity and refraining from tobacco use, all contribute to reducing the risk of non-communicable diseases, improving physical and mental capacity and delaying care dependency. Supportive physical and social environments also enable people to do what is important to them, despite losses in capacity.

The life of an individual was being regulated harmoniously according to the stages of life. It was believed that an individual life is to be lived for 100 years and therefore, has been demarcated into four stages (Ashrams) - “Brahmcharya” (studentship); “Grihstha” (householder); “Vanprasth” (forest dweller); “Sanyas” (ascetic) depending upon physical, psychological, familial, social and spiritual needs. This concept is still practiced by many individuals in India. This system was meant to maintain the discipline, peace and harmony in the family and society. Each of the stages was intended to prepare for the next.

³ Author - Ageing and its implications, P Jayanthi, Elizabeth Joshua, and K Ranganathan



Brahmcharya proposed to achieve all round developments (including formal, informal education) of the child. This stage was to facilitate the individual to stand on his own feet in later stages of life.

The second stage, Grihastha (householder life) was planned to perform all the duties and debts according to dharma (right functioning). In this stage of life, it was suggested that one should acquire the Artha (wealth) by utilizing their wisdom and learned skill as well as satisfy kama (sex desire) in a righteous manner, according to dharma. Proper upkeep, stability, growth and development of human race, enjoying worldly life, earning money, having children, taking care of the family and its welfare, and performing various duties required by family and society were the major activities of this stage of life. Vanprasth was intended to handover the household duties to one's successor, and leave the worldly life, luxuries and enjoyments. Manu Smriti describes this stage in following manner:

- “Grhasthastu yada pasyed vali palitamatmanah; Apatyasyaivacapatyamtadaranyamsamasarayet” (When so ever a householder gets to see wrinkles on his body, white hair on his head, and has his grandchildren, he should resort to the forest).
- Svadhyayenitayuktahsyaddantomaitrahsamahitah; Datta nityam-anadataravbhutanukampakah’ (He should be engaged in regular study, control his senses, keep friendly behavior with everyone, and have a tranquil mind. He must give charity, should not accept gifts from others, and have mercy on all living beings).

The fourth Sanyasa (ascetic) ashram was meant to give up everything and exclusively perform intense “sadhana” (deep meditation). The aim was to reach the final goal of human life: “moksha” or freedom from all the activities of the worldly life and be in a peace-or realization of the God. According to Manu Smriti.

- “Vanesutuvihrtiyavmtrtiyambhagam-ayusah; Caturtham-ayusobjagamtyaktvasangan-parivrajat” (After spending the third portion of one's life in the forest, the fourth portion of life should be spent as a sanyasi, by surrendering all attachments (for the world).
- “Adhyatma-ratir-asinonirapeksonir-amisah; Atmanavasahayenasukharthivicared-ihā” (Delighting in meditation on the Supreme, independence from others, giving up all desires, with only the Self as companion, seeking supreme bliss, shall live like sanyasi).

Among the four Ashrams, “Vanprasth” and “Sanyas” basically relate to old-age lifestyle. Few persons may directly move from “Brahmacharya” to “Vanaprastha” or “Sanyas.” The practice/performance related to “Vanaprastha” is to devote one's heart and soul for intellectual activities and meditation; at the same time, he has to lead a life of self-control, friendliness and altruism with intention to give to charity. “Dharma” and “Moksha” become the main concern of life in the “Vanaprastha.”. In “Sanyas” ashram, the Sanyasi becomes fit to achieve immortality by not possessing any materialistic thing, by restraining his senses, by casting out the love and hatred from him, and by living a life of harmlessness to living beings.

In changing structures of socio-political power and patterns of religious belief, lifestyle of individuals gradually began to change. During the time of Buddhism (around 500 BC) a naive understanding of old age –*continued growth to a more sophisticated* way was brought into existence. The old age was characterized by decline and decay of body and its functions along with illness and death. The early “Buddhism” saw the ageing life as an incessant agony and monotony culminating in death. It was also perceived that elderly irrespective of their geographical limits remain in distress and turmoil. During Buddhist period, it was repeatedly declared “*Dukkhelokopitthito*” (world is created by sufferings). “Buddhism” consider humans to be independent beings possessing free will bestowed to them by nature. However, the true nature of human beings is suffering because of egoistic desires which arise from spiritual ignorance. The Buddhist doctrine of dependent co-origination or “*paticcasamuppada*” contains the basic Buddhist insight into the Nature and the working of reality. The Buddhist approach to problems associated with the old age is to recognize the nature of the human condition, which is common to all people.

During the time of Asoka, hospitals were set up for care and proper upkeep of the society. However, no marked development was observed for the care of elderly. After the advent of Mughals, the conditions in the society remained more or less the same. It was during the British-Raj when the structure of society changed in a noted way. The concept of nuclear families came into existence as individuals became more centralized and concerned towards the well-being of their immediate families. In the long run, this culture became widespread and elderly were ignored to a great extent. They were left to fend for themselves and their needs were overlooked. The trend is still prevalent in large masses, but awareness is now slowly seeping in to motivate individuals in the society to look after the elderly.

The joint family with three to four generations of a single-family living together has always been an accepted and strengthened body of the Indian society. Each of the members of the family supposed to follow the rules and regulations; generally male members were holding head position of the family as traditional values support gender role preferences. Each member of the family has his or her own role and all the members were emotionally bonded with each other. There used to be a very strong support system for the family members. The changing socio-economic, political, technological environment has dramatically influenced the entire current scenario. In search of economic gains and livelihood, population has started moving from their own places to distant places. In the



name of modernization, the changing circumstances are influencing the interpersonal relations, outlook towards life in an adverse manner. The modernization and emergence of nuclear families is gradually eroding these traditional living patterns.

12. Mental Health of Older Adults

Older adults, those aged 60 or above, make important contributions to society as family members, volunteers and as active participants in the workforce. While most have good mental health, many older adults are at risk of developing mental disorders, neurological disorders or substance use problems as well as other health conditions such as diabetes, hearing loss, and osteoarthritis. Furthermore, as people age, they are more likely to experience several conditions at the same time.

There may be multiple risk factors for mental health problems⁴ at any point in life. Older people may experience life stressors common to all people, but also stressors that are more common in later life, like a significant ongoing loss in capacities and a decline in functional ability. For example, older adults may experience reduced mobility, chronic pain, frailty or other health problems, for which they require some form of long-term care. In addition, older people are more likely to experience events such as bereavement, or a drop in socioeconomic status with retirement. All of these stressors can result in isolation, loneliness or psychological distress in older people, for which they may require long-term care.

Mental health has an impact on physical health and vice versa. For example, older adults with physical health conditions such as heart disease have higher rates of depression than those who are healthy. Additionally, untreated depression in an older person with heart disease can negatively affect its outcome.

13. Indian Lifestyle Vs Mental Health:

India is a country which has bred a number of religious sects at different stages of its civilization and also adopted some alien religion and culture. Aryan, Hindu, Sikhism, Jainism, Buddhist and some not very popular religions and culture took its birth on Indian soil. Religions and culture like Christianity, Islam, Bahai, Yahudi, Parsians, etc., were adopted in the country from alien nations. As a result, the lifestyle in India got colored under the shadows of cults and cultures. Added to that, India also witnessed development of sects based on the thoughts of Yogguru Patanjali, AadiguruShankeracharya, Swami RamkrishnaParamhans, Swami Vivekanand, Swami Dayanand, Sai Baba, Jaigurudev, etc., Consequently, the contemporary Indian lifestyle is the conglomeration of a number of lifestyles.

Every lifestyle has its positives and negatives. Following a particular lifestyle may be smooth as well as stressed. In ancient Indian situations people knew their specific roles to be performed during different stages of life and that left little room for development of psychogenic (exogenous) mental-health problems. Although biological (endogenous) mental-health problems were almost equally prevalent as “unmad” (mania); “avsaad” (depression); “sannipat” (delirium); “smritibhransh” (dementias); etc., as are today. A number of religions, sects, cults and the influences of the western world (like industrialization, urbanization, demographic movements) without any set patterns of lifestyle have become prevalent in the country. And, these factors are leading to conflicts and confusions and providing more opportunities to conflicts between soma, psyche and environment, which are leading to a variety of mental illnesses.

The lifestyle affects the longevity and health in old age. The “Atharva-Veda,” believed that mental illness might result from divine curses and it also provides the description for mental illness like schizophrenia. In Vedic period, mental health was described in two well-known Ayurvedic scriptures, the “Charaka Samhita” by Charaka, and the “Sushruta Samhita” by Sushruta. Both of these scriptures have established the roots in modern Indian medicine.

It is also described that health related problems take place due to imbalance in nutritional intake. Ayurveda advocates consumption of whole grain foods, fruits and vegetables for better mental health. Studies show that food with low amounts of life energy (prana) like over-ripened, overcooked, highly processed, frozen and refined food products should be avoided. Lifestyle (dietary habits, mental exercise, social networking, etc) also have role in preventing/developing cognitive disorders. Alzheimer's is more common in the community where elderly are socially isolated. The fear of death or the despair of the absurd, ignorance of life's meaning (apivarga in ayurveda) and the sadness secondary to loneliness were believed to be three common sufferings of old age.

In ancient systems, diagnoses (nidana) of illnesses were based on cause, premonitory indications (purvarupa), symptoms (rupa), therapeutic tests (upashya) and natural history of the disease (samprapti). Keeping the body in good health and free from diseases were very much persuaded in ancient Indian thinking. Ayurveda believed “old age is the foundation of all wisdom, virtues, enjoyments (bhoga) and the source of all ‘purusharth’ (dharma, arth, kam and moksha).” Disease due to senile degeneration causing decline in memory and intelligence (smritikhasay and medhakhasay) are referred in modern time as AD and other dementias. The health related problems were thought to be the result of divine curse, seasonal factors or bad deeds (*dosh bal, daivabal* or

⁴ World health organization, fact sheets, mental health of older adults



kalbalpravritti). To maintain health, healthy ways of life (dincharya, ritucharya) were advocated by “Ayurveda.” Different mental-health conditions occurring in the old age are also featured in Indian epics.

Decline in the old age mental-health, however, is often the results of faulty lifestyle like smoking, alcohol intake, improper diet and lack of exercise as well as environmental and other external factors. Hence, this decline can be slowed down or even reversed at any age through the appropriate interventions to modify individual lifestyle or adverse environmental factors

14. Need for Social Security in Older people

As per 2011 Census, there were 104 million elderly⁵ (60+) in India, as compared to 70.6 million in 2001 and they are expected to cross 173 million by 2026. Out of 104 million elderly in 2011, 64 million are young-old i.e. in the age group 60-69, 28.4 million in the old-old age group 70-80 while 11.4 million are oldest-old i.e. above 80, of which 0.6 million are 100+.

Between 2000 and 2050, the total population of India is estimated to increase by 60% while that of the elderly is expected to shoot up by 360%. Rapid ageing is the result of expected increase in the life expectancy from 1996 to 2021-25. About two-fifths of the elderly have no personal income.

15. Major themes raised by the older adults – Health Related:

- Anxiety
- Insomnia
- Dementia
- Diabetes
- Obesity
- Prostate problems
- Dental problems
- Cancer
- Depression
- Neurological disorders
- Heart diseases
- Lack of interaction/ Isolation
- Lack of respect / Elderly Abuse
- Social Anxiety
- Stress

16. Major themes raised by older adults – Social Security Related:

- Increase in population
- Changing socio- economic scenario
- Illiterate
- Totally or partially dependent on their children or others
- Lack of awareness on the schemes
- Lack of care givers
- No other source of economic support
- Not owning any assets
- Poor administrative procedures

17. Solutions for concerns of elderly – Health Related:

- Adherence to medical advice
- Good Nutrition
- Balanced Diet
- Healthy Habits/ Healthy lifestyle
- Early diagnosis, in order to promote early and optimal management;
- Optimizing physical and mental health⁶, functional ability and well-being;

⁵Author - Sumati Kulkarni, Siva Raju, SmitaBammidi: Increased Awareness, Access and Quality of Elderly Services.



- Identifying and treating accompanying physical illness;
- Detecting and managing challenging behavior; and
- Providing information and long-term support to carers.
- Provide comprehensive, integrated and responsive mental health and social care services in community-based settings;
- Implement strategies for promotion and prevention in mental health

18. Solutions for Concerns of Elderly – Security Related:

- Family and friends should provide proper information to the elderly
- More steps should be taken to raise awareness on social security measures.
- Provide recreation centers where elderly can gather and share information
- Use innovative technology to make the procedures easier.

19. Results: Discussion and feedback from the older adults suggested that while specific information and support were available for the health-related issues, there were some concerns; it was the social issues and security which were highlighted as a major cause of concern for the older adults. Lack of respect, unacceptable behavior of younger generation in the public places towards the elderly, inadequate or lack of infrastructure supporting elderly in various public areas, offices, conveniences or support systems were given as examples. There was no visible implementation of laws on the ground, although many were available to support or protect the elderly. Suggestions for possible solutions were offered which included: more involvement of multiple agencies along with the government, nongovernment organizations working in the field of old age, authorities for law and order and legal systems, all working in tandem keeping focus at the needs of the elderly. While the elderly resupported it was considered vitally important to take care of their dignity and self-respect. It was felt that awareness needs to be raised in all quarters, from educational set ups to even political establishments to support the cause of the elderly and safeguard their dignity

20. Conclusion: The Indian model of the society has excellent concepts regarding the all-round development of an individual with proper stress on the importance of caring for ageing. Traditional values and beliefs are transferred from one generation to other through the elderly.

Social security and welfare aspect is an integral part of overall national development. A modern welfare nation needs to bear duty and responsibility of social security in order to develop the socio- economic and other sectors of its elder citizens. It should design appropriate structure and programmes of social security with limited limitations. It is the elderly's social right to deserve security measures. The multilevel and multi-disciplinary checks should be done to deal with and help the elderly to lead a happy and healthy and a socially secured lifestyle as they deserve the respect and attention they have been ignored of.

21. BIBLIOGRAPHY

1. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5483713/>
2. <https://www.markedbyteachers.com/gcse/sociology/old-age-and-social-security-measures.html>
3. https://india.unfpa.org/sites/default/files/pub-pdf/ThematicPaper1_2.pdf
4. *Building Knowledge Base on Ageing in India: Increased Awareness, Access and Quality of Elderly Services*, by Sumati Kulkarni, Siva Raju, SmitaBammidi.
5. *Encyclopedia of Social Work*, publication by Govt. of India. G.R. Madan, *Indian Social Problems*,
6. Alam, Rafique and Husain, M.G. (1997). "Psycho-Social Problems of Ageing: Indian Perspective in M.G. Husain (ed.)"; *Changing Indian*
7. *Society and Status of Aged*. New Delhi; Manak Publication Pvt. Ltd
8. Anantharaman, R.N. (1981). "Physical Health and Adjustment in Old Age." *Journal of Psychological Researches*.
9. Husain, M.G. (ed.) (1997). *Changing Indian Society and Status of Aged*. New Delhi; Manak Publications Pvt. Ltd.
10. *Social Security Measures for Elderly Population in Delhi, India: Awareness, Utilization and Barriers*, Charu Kohli, Kalika Gupta, Bratati Banerjee, and Gopal Krishna Ingle

⁶World health organization, fact sheets, mental health of older adults.



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11. Author - Sumati Kulkarni, Siva Raju, SmitaBammidi: *Increased Awareness, Access and Quality of Elderly Services*
 12. Author - G.R. Madan, *Indian Social Problems Encyclopedia of Social Work, publication by Govt. of India.*
 13. *Old age and social security measures*
 14. *Social Security Measures for Elderly Population in Delhi, India: Awareness, Utilization and Barriers, Charu Kohli, Kalika Gupta, BratatiBanerjee, and Gopal Krishna Ingle*
 15. *Ageing and its implications P Jayanthi, Elizabeth Joshua, and K Ranganathan*
 16. *World health organization, fact sheets, mental health of older adults*



CONTENT, MEANS AND METHODS OF FORMATION OF COMMUNICATION CULTURE IN FUTURE FOREIGN LANGUAGE TEACHERS

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ANNOTATION

This article is devoted to content, means and methods of formation of communication culture in future foreign language teachers. In it, one of the main requirements for future foreign language teachers is the development of communication culture, its quality, the correctness, accuracy, clarity, expressiveness of communication culture behaviors, as well as the ability to listen to one's partner, politeness and care. The importance of the ability to build different behavioral strategies that occur in the communication process is taken into account. The article highlights the importance of using interactive educational technologies, one of the modern technologies, for successful teaching of communicative culture in English. In addition, in addition to the above-mentioned interactive educational technologies aimed at developing communication culture in future foreign language teachers, it is possible to highlight the importance of "cooperative learning" technology.

KEY WORDS: *communication, culture, teacher features, student features, collaborative work, Students' team-achievement Divisions-STAD, Group-investigation method, The Learning Together Method, Dialogue and discussion method*

Содержание, средства и методы формирования культуры общения у будущих учителей иностранного языка

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Данная статья посвящена содержанию, средствам и методам формирования культуры общения у будущих учителей иностранного языка. В нем одним из основных требований к будущим учителям иностранного языка является развитие культуры общения, ее качества, правильности, точности, ясности, выразительности поведения, культуры общения, а также умения слушать собеседника, вежливости и внимательности. Учитывается важность умения строить разные поведенческие стратегии, возникающие в процессе общения. В статье подчеркивается важность использования интерактивных образовательных технологий, одной из современных технологий, для успешного обучения коммуникативной культуре на английском языке. Кроме того, помимо вышеперечисленных интерактивных образовательных технологий, направленных на развитие культуры общения у будущих учителей иностранного языка, можно выделить важность технологии «обучения в сотрудничестве».

Ключевые слова: *коммуникация, культура, особенности учителя, особенности ученика, совместная работа, Студенческие коллективы-достижения Отдель-ШТАД, Метод группового исследования, Метод совместного обучения, Метод диалога и обсуждения.*

INTRODUCTION

Studying the experience of higher education institutions in recent years shows that many methodological approaches to teaching a foreign language are widespread. The main methodological approach called "Communication" is understood as an educational system that shifts the main focus from the goal of "teaching verbal activity" to "teaching communication" [1,136]. Thus, communication is considered a one-way process of transfer from subject to object. The main goal of communication is to develop language and speech skills in reading, listening, speaking, writing, as a result of which communication is carried out in



the context of knowing and learning a foreign language (educational, professional, everyday, socio-cultural). Communication culture of a student of a foreign language is a general process that is difficult to implement in a short time. It compares speaking in a foreign language according to the linguistic parameters of the mother tongue. Oral and written forms of teaching a foreign language should be distinguished by their correctness, accuracy, methodological adequacy, appropriateness to the communication situation. Therefore, the communicative culture of a foreign language can be interpreted as the goal and result of language teaching.

LITERATURE ANALYSIS

A number of research works have been carried out on the development of communication culture in future foreign language teachers. In particular, William Littlewood (1992) summarized earlier theories in terms of the personal experience and level of autonomy of language learners [2,112]. The author describes communication culture in three stages of skill development. D. A. Starkova's dissertation research (2009) devoted to the use of interactive methods of teaching a foreign language aroused the interest of scientific researchers. In addition, a meaningful component of professional teaching of English language teachers (2013) N.D. This method was proposed by D.W.Johnson and R.T.Johnson (2019), in which students of different knowledge levels interact with each other. means to help and develops in them skills such as respect, making the right decision, getting out of problematic situations [3, 6].

RESEARCH METHODOLOGY

The article discusses the integration of our country into the world education and information space, the need for new methods of forming and developing the linguistic identity of university graduates who can freely communicate there is becoming urgent. In this regard, especially in the process of interaction of future foreign language teachers with students, the way to acquire communication culture skills in English necessary for the development of communication culture based on the expansion of the scope of communication culture and the development of basic (basic) competencies. One of the most important tasks is the application of new and advanced methodological methods and technologies and their effectiveness.

ANALYSIS AND RESULTS

Today, in the period of improvement of the continuous education system, the training of highly qualified personnel remains one of the most important tasks of the modern society. To solve this problem, it is necessary to evaluate the knowledge and skills of future foreign language teachers, to reorient them, and to modernize the higher education system. The goal of education in higher education institutions, which is reflected in the state educational standard, is to achieve world-class general and professional culture. This approach to the professional training of students makes the problem of forming the culture of oral communication as a component of the professional competence of future English language specialists relevant. In our country, due to the integration of world cultural and economic spheres, the development of international relations, the expansion of production, the training of qualified specialists, knowledge of a foreign language at an appropriate level has become a necessary feature [4; 224-229].

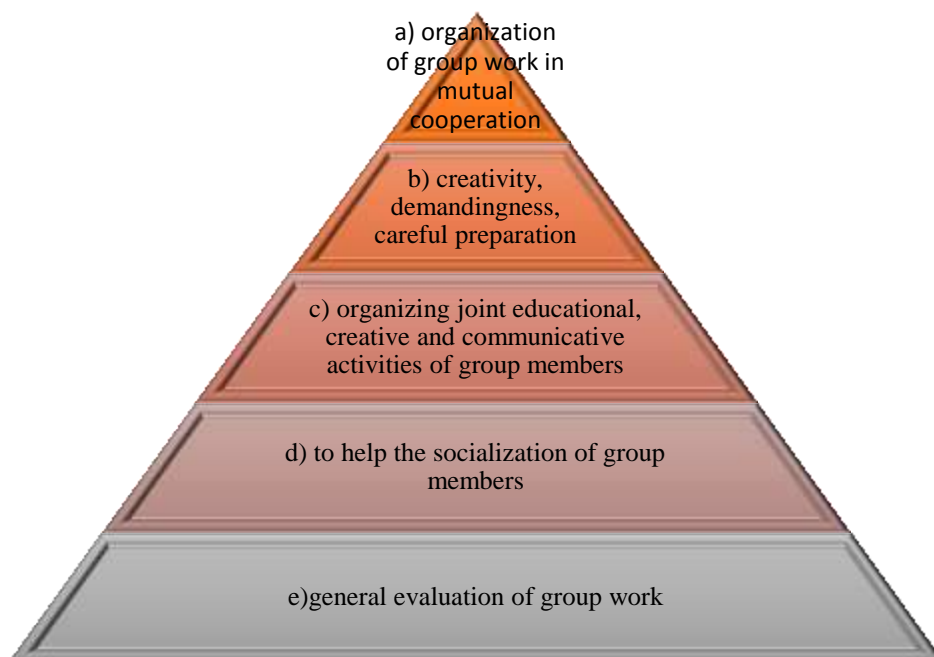
One of the main requirements for future foreign language teachers is the development of communication culture, its quality, correctness, accuracy, clarity, expressiveness of communication culture behavior, richness of language, logic, argumentation, correctness of given evidence. , the ability to defend one's opinion in a debate; the ability to listen to one's partner, politeness, care; It is important to have the ability to build strategies for different behaviors that occur in the process of communication. Also, the whole complex of forms and methods of developing students' communicative competence aimed at acquiring communication culture skills in English should allow them to effectively carry out professional (ie teaching) tasks.

In addition to the above-mentioned interactive educational technologies aimed at developing the culture of communication in future foreign language teachers, it is possible to highlight the importance of the "cooperative learning" technology. Through "cooperative learning" it is possible to model the organization of the activities of the listeners in small groups. One of the options is "studying the student body". This method emphasizes "team goals" and the success of the whole group (team success), which can only be achieved as a result of the independent work of each member of the group (team) in constant interaction with other members. We think that one of the main goals of our research is to use the methods of "collaboration" in order to develop communication culture among students.

We propose to categorize the main principles of the educational technology of cooperation, the primary aspects that the teacher should follow, and the two main groups that are considered by the students (from the most important parameters to the second levels). This can be seen in the following graphic we can consider (see Figure 1.1):



1. Teacher features



2. Student features

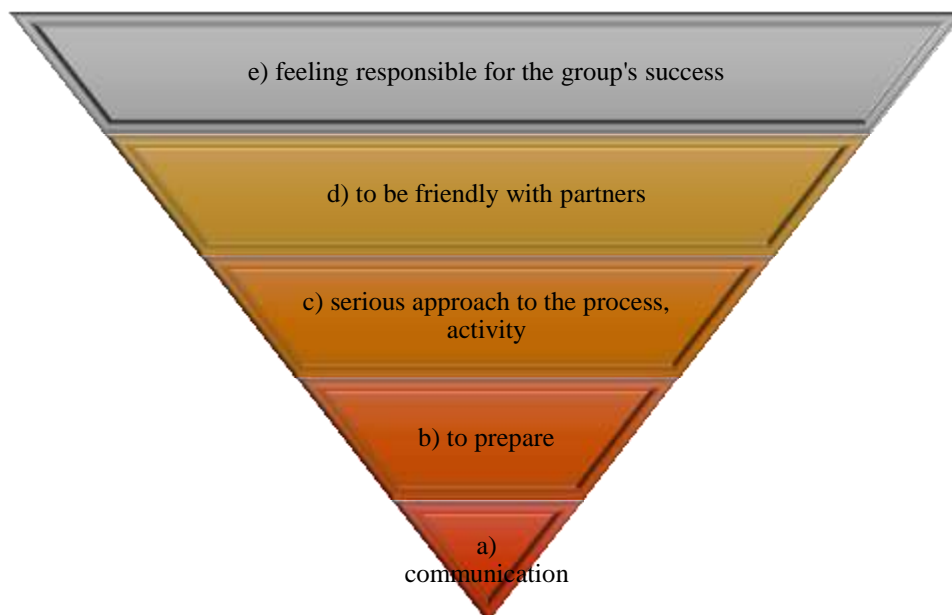


Figure 1.1 The main principles of using the educational technology of “collaborative work” in the development of communication culture in English among future foreign language teachers

It is worth noting that the English language teacher should strongly prepare for classes based on certain psychological-linguistic characteristics of students in the development of communication culture, and a number of problems and difficulties that may arise in the correct distribution of independent work. can prevent. In setting up a successful cooperative work, sometimes there are conflicting situations between group members that can hinder the learning process. Therefore, it is necessary to analyze the problems and difficulties that may arise along with the existing advantages of the "collaboration" technology. The following table contains the same aspects and the recommendations and conclusions that can be overcome (see Figure 1.2):

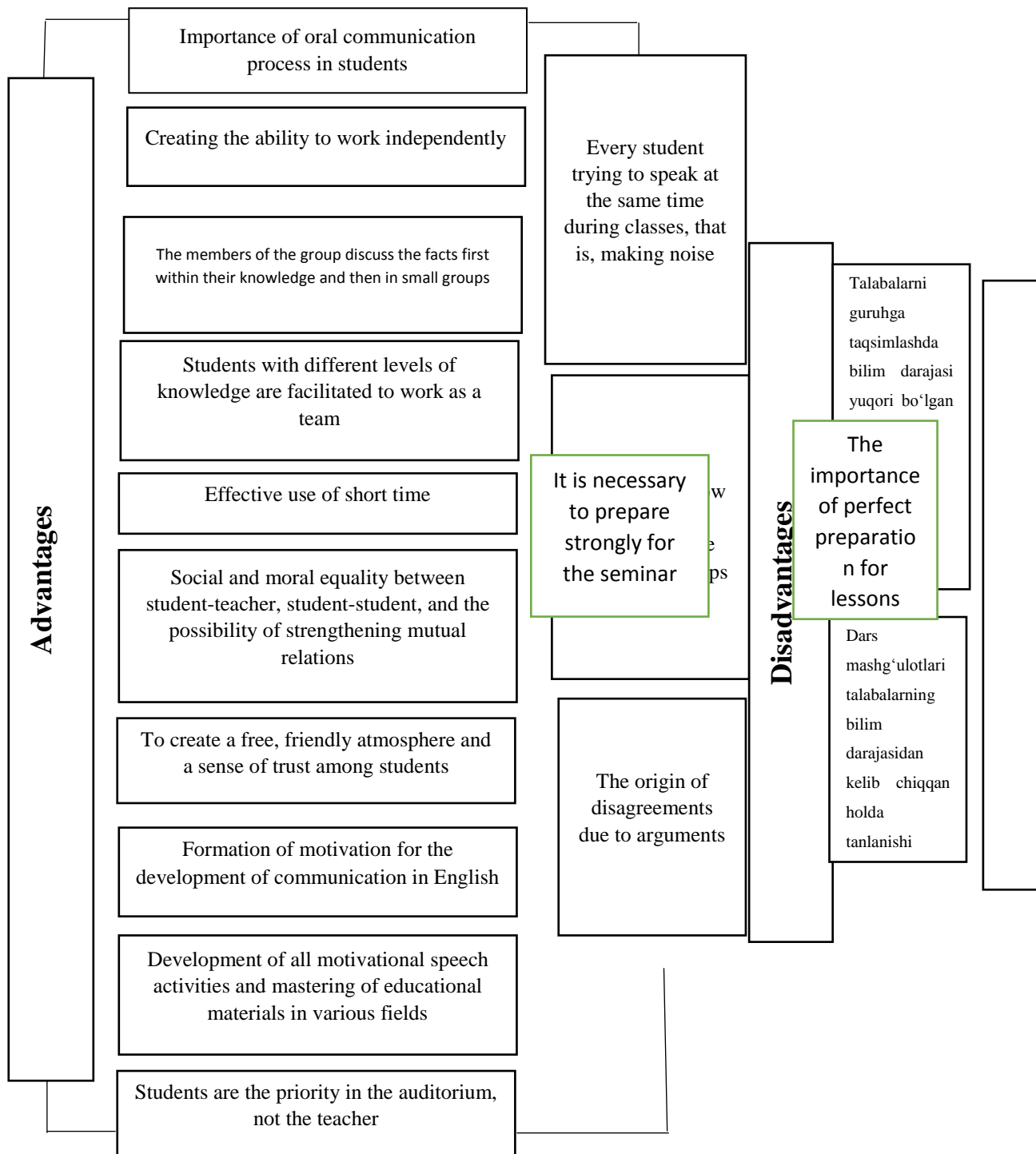


Figure 1.2 Advantages of using “Collaboration” technology, possible problems and disadvantages and suggestions for their elimination

From the table above, it is clear that the advantages of "collaborative" educational technology can “compensate” for its above-mentioned disadvantages. In this regard, one of the tasks of foreign language pedagogues is to achieve maximum success in this process, taking into account the methods of learning English, educational needs and possible difficulties of future foreign language teachers. It is important to take appropriate measures. For this purpose, it is necessary to use certain “working in



cooperation” methods. In particular, we found it permissible to apply the following special methods of this educational technology in the development of communication culture among future foreign language teachers (see Figure 1.3):

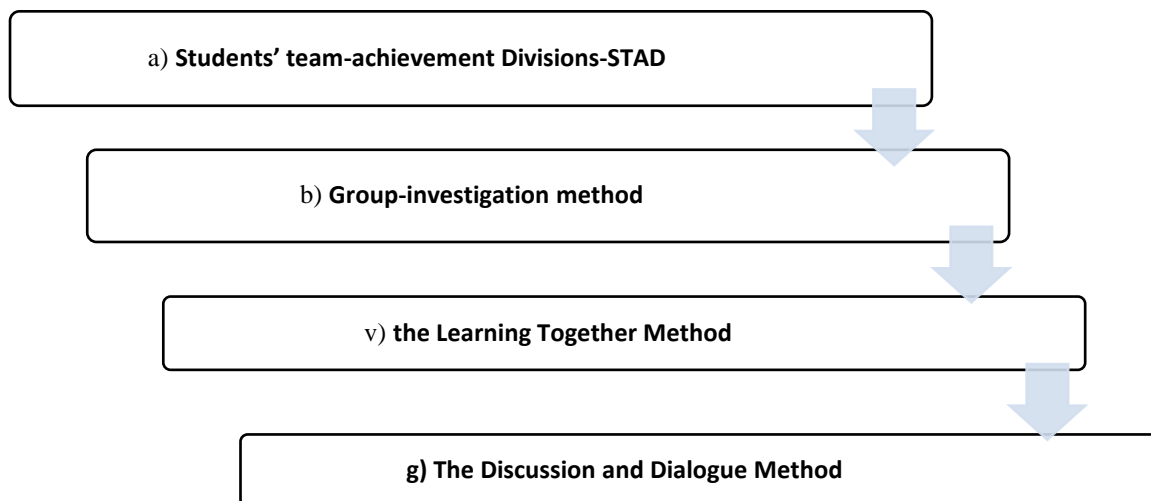


Figure 1.3. Special methods of "collaborative work" educational technology in the development of communication culture in future foreign language teachers.

a) The method of “combination towards team success” of students. (Students’ team-achievement divisions-STAD) This method was proposed by S. Sharan, and the main goal of this method is to perform the task orally by working in pairs - to discuss the task, exchange ideas, and share knowledge. implies. [5; 105-p]. In this case, students are divided into small groups with different levels of knowledge, and the teacher monitors the complete mastery of the given assignment or task by each team member. Then individual tasks are carried out: at this stage they work together, but cannot help each other. The main goal is to ensure that students create opportunities for each other and use it to achieve the assigned task, and to conduct individual control over mastering and acquired knowledge within the specified period. In this way, group members will be motivated to use the opportunity effectively.

b) “Group-investigation method” is a method proposed by D. Zingaro [6; p. 42] a specific topic is selected based on the common opinion of the members of a small group, and this a small research work is carried out. Through this method, the student performs oral communication in English on the basis of his/her own desire, on the basis of discussion, discussion, conversation, social research, and statistical analysis. That is, a topic covering multifaceted, problematic aspects is chosen and research is conducted in this direction in small groups. It is important for the teacher to create conditions for the students to conduct this process independently, to develop it, to define goals and tasks, and it is not allowed to reject their opinions and make their own suggestions. At the end of the "Group Presentation", the results are analyzed and collectively evaluated.

c) “The Learning Together Method”. This method was proposed by D.W.Johnson and R.T.Johnson. develops skills such as making the right decision, getting out of problematic situations [7; 6]. In the Collaborative Learning Method, small groups are given a common task and students can complete it individually and make their own suggestions. In this case, improving communication in English is the main condition. In this method, the main attention is paid to the two main criteria: the quality of the work performed and the active participation of each student in the observation process.

g) “Dialogue and discussion” method (The Discussion and Dialogue Method). Yoshio Asano was the first to use this method, in which small groups exchange information with each other in the form of a dialogue or mutual discussion, decide on the negative or positive side, and discuss their knowledge through questions and answers [8; 89]. Also, the conversation is analytically strengthened with the participation of student-student, student-teacher. As a result, the main focus is not on the grade, but on the development of learned skills.

CONCLUSION

In conclusion, the integration of our country into the world education and information space, the need for new methods of forming and developing the linguistic identity of university graduates who can freely communicate there is becoming urgent. In this regard, especially in the process of interaction of future foreign language teachers with students, the way to acquire communication culture skills in English necessary for the development of communication culture based on the expansion of the scope of communication culture and the development of basic (basic) competencies. One of the most important tasks is the application of new and advanced methodological methods and technologies and their effectiveness. Moreover, “working in cooperation” is based on the students’ joint performance of a given task, acquiring new knowledge and skills, information, working as a team, respecting the opinion and personality of others, develops skills and competencies such as defending one’s



position. These technologies do not mean theory, but practice, they support the development of communication and work on oral speech, the practical use of language in the course of the lesson.

REFERENCES

1. Fedotova, N. N. (1999). *Professional potential graduates. Human resources*, 1(2),14-16.
2. Гальскова Н.Д. Современная цель обучения иностранным языкам: от комплексного подхода к интеграции//Сборник статей международной научно-практической конференции памяти академика РАО Инессы Львовны Бим.-М.:” Просвещение”, 2013.25-34 Б.
3. Popova, T. P. (1999). *Formation of foreign language communicative competence of students of the 1st year correspondence department of language high school (English: Applications) (Unpublished candidate dissertation)*. Nizhny Novgorod State Linguistic University, Nizhny Novgorod, Russian Federation.-B. 54-57
4. Sodiqov Kh. *Developing Communicative and Speech Culture and Communicative Competence of Future Teachers. // Eastern European Scientific Journal. Germany. 2018. Issue 3. -B. 224-229*
5. Sharan, S. *Cooperative Learning in the Classroom. Research in Disegregated Social Subjects .-Lawrence :Erlbaum, 1984.-235-236 p.*
6. Zingaro, D. *Group Investigation: Theory and Practise.-Ontario institute for studies in Education, Toronto, Canada, 2008-P.12.*
7. ohnson , D.W., Johnson, R.T. *Cooperative Learning methods: A Meta-Analysis. University of Pennsylvania, Philadelphia, USA., 2004.http://www.co-operation.org/. (Access date:20.03.2019)*
8. Anna-Maria, STOICA. *Methods for the assessment of ESP.-New York:UTT, 2006.-326-329 p.*



RECENT DEVELOPMENT OF POLYSACCHARIDE BASED GEL: POROSITY BASED CLASSIFICATION AND A FUTURE PERSPECTIVE

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ABSTRACT

Polysaccharide is one of the most ancient and vast research field among natural sustainable biopolymers and they are readily available in nature as an essential component of our daily food. Hence, distribution of the entire field into some important factor-based classification like physical structure, stability, solubility become mandatory for clear understanding of whole polysaccharide chemistry. In some past decades, scientists mainly focused on general laboratory synthesis of this biopolymers with potential applications. Then, they broadened their vision to classify polysaccharide based composite materials and hydrogels based on majorly available polysaccharides in nature. Those gels are separated from entire polysaccharide based soluble biopolymers due to their three-dimensional physical or chemical crosslinked structure and hydrophilic, polymeric frameworks. But, a more compile classification was needed for better understanding of synthetic approach for those biodegradable hydrogels and their applications. Introducing gel porosity-based classification is a novel approach facilitating to understand the gel structure. The review mainly focused the recent advancement of polysaccharide-based gels with targeted porosity.

KEYWORDS: *Hydrogels, biopolymers, polysaccharides, porosity*

1. INTRODUCTION

Polysaccharide is one of the most common biopolymers, naturally available in nature.¹ Recent development of polysaccharide-based materials has added in novel dimension in every industrial as well as bio applications such as environmental² and food packaging industry,³ drug or gene delivery⁴ and tissue engineering⁵ and so on. Modern progression of science has categorized the polysaccharide-based materials into water soluble biopolymers; polymeric nano composite⁶ and gels⁷. Among them, gels have attracted major attention due to their diverse ability to important properties inclusion and regulations as well as variable applicative side from the same polysaccharide-based gel.⁸

Hence, now a days, a major attention has been paid on synthesis of polysaccharide based three-dimensional network, called gels, because they are widely investigated self-organized materials with wide applications in toothpaste, shampoo, hair-gel and many more day-to-day usable products of human life.⁹ Major polysaccharide-based gels are hydrogels due to their extensive water adsorption capability with incredible properties like biodegradability, biocompatibility, high cost-effectiveness, non-toxicity, reproducibility, and ready availability. Most of them exhibited low stiffness with high-water absorption capacity, which preferably introduced self-healing properties approximating natural tissues specifically in case of bulk gel. These properties facilitated several biomedical applications like drug delivery, tissue engineering, wound healing. Porosity is one of the most important properties of hydrogel to dictate their structural stiffness feature and water adsorption and retention in this regard.¹⁰ It not only dictates the leachability of incorporated drugs or genes, but actually decide the industrial and biomedical application capability of the same polysaccharide-based gel also in diverse perspectives as the same polysaccharide can form bulk, nano, micro and supramolecular gel based of different porous distribution and result in diverse properties. Numerous bioapplications of gel like drug delivery, tissue engineering, cell immobilization, wound healing abilities can be restricted due to irregular pore size. Hence, the gel porosity-based classification of synthetic approaches for polysaccharide-based gels are very urgent to explore future gel with higher efficiency.

Polysaccharide chemistry is a vast field; hence focusing on a particular aspect is very important to understand the whole science. In that respect, many reviews captured several perspectives like general synthetic approaches of individual polysaccharide materials; general or specific applications; the perspective of different porosity while classifying polysaccharide-



based gels remain untouched. In recent days, numerous review articles discussed specific applications of different common polysaccharide composite,¹¹ bioapplications of their synthesized gels;¹² general synthetic approaches such as extraction and purification or characterization.¹³ But, overall idea of porosity-based classification of polysaccharide-based gel and their specific synthetic approaches has not been explored yet in terms of an overview. This review mainly focused on porosity-based classification of common polysaccharide gels and their specific synthetic approach and an overall future perspective in terms of broad range of applications.

2. POROSITY BASED CLASSIFICATION

In several polysaccharide-based gels porosity can be incorporated by particle leaching technique through controlled sized particle called porogen dispersion into prepolymer solution. Goh *et al* reported a porous heparin-based hydrogel with fast gelling injectable property and an incredible pour interconnectivity utilizing gelatin microparticles as a porogen.¹⁴ Another mixed polysaccharide based porous hydrogel matrix was synthesized by utilizing a gelatin-hydroxyphenyl propionic acid/carboxymethyl cellulose tyramine (Gtn-HPA/CMC-Tyr) through horseradish peroxidase (HRP)-catalyzed oxidation. Based on the porosity, all the polysaccharide-based gels have been classified as follows (Figure 1).

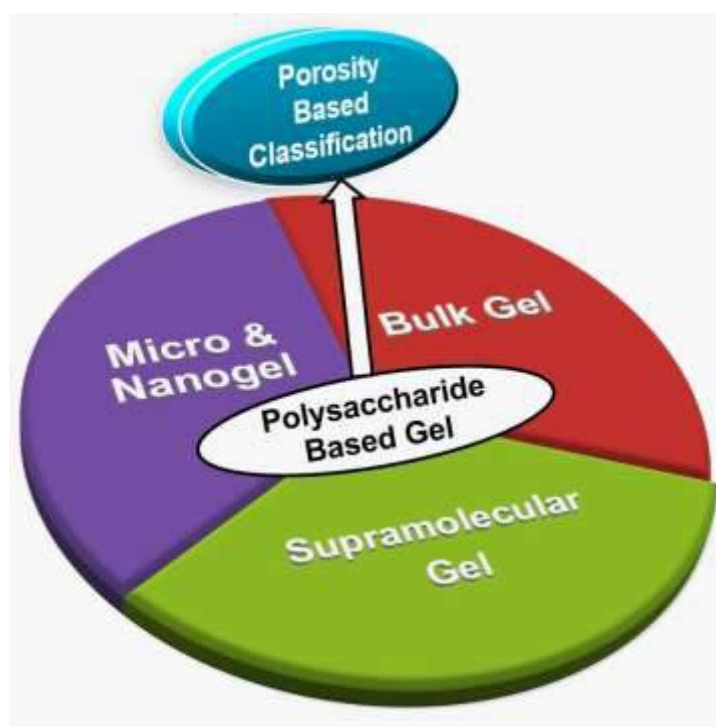


Figure 1. Porosity based classification of polysaccharide-based gel.

2.1. Bulk Gel

These categories majorly focused on three-dimensional heterogeneous network. Uniform texture is absent in most cases.

2.1.1. Cellulose Based Gel

Cellulose is attractive and inexpensive natural hydrophilic polysaccharide, which is most abundant on Earth and possesses high biocompatibility with low density.^{15,16} Simple methyl derivative of cellulose was originated by partial substitution of hydroxyl groups (-OH) with methoxy groups (-CH₃O) with enhanced viscosity with temperature induced sol-gel transition property as a result of hydrophobic interaction. The gelation behavior has been organized by degree of substitution, molecular weight and its concentration.¹⁷ Great functional alteration leads to gel networking structure. A well-known cellulose derivative, carboxymethyl cellulose (CMC), has been extensively utilized to prepare hydrogels due to its water-solubility through numerous chemical modifications.¹⁸ For example, hydrogels from thiol-modified CMC and polyethylene glycol (PEG)-tetra-norbornene through photopolymerization was reported by Lee *et al.*¹⁹ However, applications of injectable hydrogels were restricted by ultra violet (UV)-triggered reaction mechanism. *In situ* Schiff base reaction could be more feasible in this regard. Shen *et al.* engineered a CMC-based injectable hydrogel *via* this reaction, where 3,3'-dithiobis(propionohydrazide) is crosslinked to oxidized CMC.²⁰



2.1.2. Chitin Based Gel

Chitin is a basic aminopolysaccharide obtained from crustaceans (shrimps and crabs). It is basically poly ($\beta(1\rightarrow4)$ *N*-acetyl-*D*-glucosamine) unit.²¹ Being second most abundant after cellulose and common natural polymer with high viscosity, metal chelation capacity, polyelectrolyte tendency; chitin based hydrogels are very attractive materials in terms of applications.²² Double crosslinked chitin hydrogels was reported recently by dissolving chitin in potassium hydroxide (KOH)/urea aqueous solution with freezing-thawing process through cross linking followed by coagulating in ethanol solution at low temperature.²³

Chitosan was basically synthesized by *N*-deacetylation of chitin. They generally found in fungi and cell walls of algae, the exoskeletons of insects, mollusks and crustacean.^{24,25} Easy physical and chemical modification of chitosan through reactive hydroxyl and amino groups resulted gelation. In contact with alkali, the amino functionality transformed to physically cross-linked hydrogel. Hydrogen-bonding played an important role to entangle macromolecular chains. Synthesis of chitosan hydrogels was triggered by numerous chemical networking agents, including glutaraldehyde (GLA),²⁶ formaldehyde,²⁷ *N*, *N*'-methylenebisacrylamide (MBA),²⁸ genipin,²⁹ ethylene glycol diglycidyl ether (EGDGE) and epichlorohydrin (ECH).³⁰ Report showed that modification of chitosan with 1, 2-butene oxide and succinic anhydride (NSHBC) resulted gel as function of temperature ranging from 17 °C to 32 °C. Chemical modifications in acrylamide³¹ or glycol chitosan obtaining *N*-hexanoyl glycol chitosan using hexanoic anhydride were able to form chitosan based gel.³² Physical networking technique has been also taken to consideration in case of chitosan based gel formation. Ionic crosslinking was reported as a great approach in this regard. Anionic crosslinkers such as sodium tripolyphosphate,³³ sodium citrate, sulfosuccinic acid, and oxalic acid were used to prepare chitosan hydrogels.³⁴ Another method was freeze-thawing approach which led to combination of several polymers like starch, poly (vinyl alcohol) (PVA), poly (acrylic acid) (PAA) or alginate and capable of hydrogen bonding.³⁵ For example, synthesis of artificial bones composed of chitosan/PAA network using PVA and PAA by repeated freezing and thawing was reported. Another recent study exhibited that; a novel chitosan hydrogel was prepared through dissolution in alkaline-urea aqueous solvent. The entire gelation process was observed through aggregation induced emission fluorescence.³⁶ A composite hydrogel of chitosan, heparin and poly (gamma-glutamic acid) for wound healing was reported by Zhang and co-workers *via* crosslinking by addition of acetic acid.³⁷

2.1.3. Starch Based Gel

Starch, one of the largest biomasses on earth, is a natural, abundant, cheap, available, renewable, and biodegradable polymer. But native starch extracted from plants cannot tolerate the extreme processing conditions like temperature or acid base treatment leads to limited applications.³⁸ Hence to enhance or inhibit particular properties according different industrial requirements as well as bioapplications, several modifications regarding physical, chemical or enzymatic modifications by debranching enzymes (isoamylase or pullulanase) have been performed.³⁹ Smaller blocks were generated from linear short chains through highly debranching of starch (H-DBS) with less water holding capacity, which leads to stronger smooth, non-sticky and glossy hydrogel.⁴⁰ These gels have potentially used in the food and pharmaceutical industries⁴¹

2.1.4. Hyaluronic Acid Based Gel

Hyaluronic acid (HA) is another well-known polysaccharide with large number of hydroxyl group, a non-sulfated glycosaminoglycan (GAG) and major constituent of skin extracellular matrix (ECM). In a work performed by Laurent, Gelotte, and Hellsing (1964), stability in aqueous solutions of HA was enhanced through crosslinking with 1, 2, 3, 4-diepoxybutane.⁴² Similarly a stable and homogeneous hydrogel has been reported *via* mixing with butanediol-diglycidylether in sodium hydroxide solution followed by HA powder addition.⁴³ Hylase wound gel composed of emollients and sodium hyaluronate (2.5 %) was synthesized.⁴⁴ Fiorica *et al.* (2018) fabricated a hydrogel by crosslinking of a copolymer of HA (MW = 1.5×10^6 Da), (hyaluronic-(2-aminoethyl)-carbamate acid (HA-EDA)) with α -elastin.⁴⁵ Wu *et al.* (2017) utilized 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide (EDC) to provide crosslinking of HA with gelatin to synthesize hydrogel.⁴⁶ Initially, gelatin (GEL) and HA at different ratio (8:2, 5:5 and 2:8) were prepared followed by crosslinking with 0.1 % EDC. The crosslinking agent did not damage the porous structure of the hydrogel, essential for several biomedical applications. A hydrogel with improved mechanical properties by mixing HA -tyramine (HA-Tyr) with collagen I-hydroxybenzoic acid derivative (COL-P) has been prepared, followed by crosslinking through blending with HRP and H₂O₂. Shi *et al.* (2018) reported HA (MW = 1.5×10^5 Da) modification through functionalization with pendant bisphosphonate (BP) groups.⁴⁷ HA based *in situ* injectable hydrogel could be formed through dynamic covalent bond between phenylboronic acid modified HA (HA-PBA) and PVA.⁴⁸ Another novel injectable DMEM (Dulbecco's Modified Eagle's Medium)-induced phenylboronic acid-modified HA self-crosslinking hydrogel was reported. Combination of the phenylboronic acid and a diol on HA resulted good self-healing properties and tissue adhesion properties to the hydrogels through dynamically reversible phenylboronic acid esters.⁴⁹

2.1.5. Dextran Based Gel

Dextran primarily composed of repeating $\alpha(1\rightarrow6)$ linked *D*-glucopyranose residues with less percent of $\alpha(1\rightarrow2)$, $\alpha(1\rightarrow3)$, or $\alpha(1\rightarrow4)$ linked side chains and major components of many bacteria.⁵⁰ Main groups, which can be modified through physical and chemical cross-linking leading to gelation, are hydroxyl groups per glucose unit. Physically crosslinked dextran gel could be prepared through derivatization with lactic acid oligomers while functionalized with bifunctional glutaraldehyde, isocyanates or



by partial oxidation of hydroxyl groups to aldehydes followed by crosslinking with gelation, results chemically crosslinked gels.⁵¹ Another interesting example of injectable biomimetic hydrogel was dextran-tyramine conjugated HA with high moduli, enhanced bovine chondrocyte viability, proliferation and matrix secretion.

2.1.6. Agar Based Gel

Agar is a complex polysaccharide mixture of linear agarose and branched agaropectin, extracted from marine red seaweeds.⁵² The linear polymer composes of 1→3-linked-β-D-galactose (G) and 1→4-linked 3, 6-anhydro-α-L-galactose; whereas branched agaropectin linked with several substituent groups for example sulfate esters, methyl esters, pyruvate acid ketals.⁵³ Hydrogen bonding played vital role for linear agarose hydrogels which could be used for three-dimensional chondrocytes encapsulation.

2.1.7. Alginate Based Gel

Alginate is an unbranched anionic heteropolysaccharide derived from brown seaweeds and some bacteria, also found in outer wall of some brown algae such as kelps, composed of 1–4 glycosidically linked β-D-mannuronic (M) and α-L-guluronic (G) acids in varying composition and sequences.⁵⁴ Effective quantification of alginate hydrogel formation along with its mechanical strength could be dictated by external gelation process using calcium chloride (CaCl₂).⁵⁵ Hence divalent cations, such as Ca²⁺ and Ba²⁺, played the mastered role as crosslinking agents to transform aqueous solutions of sodium alginate to gels. The predicted interaction strength order was reported as Pb²⁺ > Cu²⁺ > Cd²⁺ > Ba²⁺ > Sr²⁺ > Ca²⁺.⁵⁶ Mechanistic elucidation revealed the gelation through ionic cross-linking of negatively charged carboxyl groups of the alginate chain and positively charged divalent metal ions.⁵⁷ It is important to note that, in order to obtain authentic information about molecular interactions, the knowledge of the initial values of the storage modulus in rheology was very important unlike the case of Alginate-Ca²⁺ gelation studies. A new custom-made rheometric setup was able to record the fast response from the very beginning, thus both the concentration and volume of the crosslinker could be controlled.⁵⁸ Again, injectable self-crosslinking property was introduced through reaction between alginated dialdehyde and gelatin.⁵⁹

2.1.8. Gums Based Gel

Gums are another class of naturally available polysaccharide derived from renewable sources. Capacity to hydration of these materials leads to form gel.⁶⁰ Common gums are generally classified as Gellan gum and Xanthan gum. Gellan gum is anionic exopolysaccharide, more precisely a linear tetramer composed of (1→4)-L-rhamnose-α(1→3)-D-glucose-1 β(1→4)-D-glucuronic acid-β(1→4)-D-glucose as repeating unit with one carboxylic side group; with high molecular weight, secreted by the bacteria *Sphingomonas paucimobilis*.⁶¹ This polysaccharide resulted non-toxic, ionic and thermo responsive gels close to body temperature.⁶² Gellan gum gel network was truly formed upon aggregation and ionic crosslinking through monovalent cations in spite of adopting ordered double helical architecture upon cooling. These monovalent cations broadcasted electrostatic repulsion amongst the carboxylate groups to induce gelation, but connection of two carboxylate groups was established by the divalent cations in addition to the screening effect. Thus, divalent cations formed stronger gels with higher viscosity than monovalent cations. Additionally, this gellan gum based photocrosslinkable hydrogels *via* methacrylation and blending was also reported.⁶³

Xanthan gum composed of five monosaccharides comprising two D-glucose, two D-mannose and one D-glucuronic acid units.⁶⁴ It is basically an extracellular heteropolysaccharide produced by the bacterium *Xanthomonas campestris*. Trisaccharide units of glucuronic acid replaced the alternating glucose units flanked by mannose entities. The backbone was protected from the external environment through covering with the side chains in helical secondary structure *via* hydrogen bonding. This structural complication leads to highly viscous gel even at lower concentration. Stability at various stimuli like pH, temperature, ion concentrations are some basic natures of the gel resulting pseudo-plastic property. Various medical applicative sides such as wound healing, drug carriers could be shown by gum-based gel. Carboxymethyl derivatization at the glucose residues of xanthan resulted microcapsule entrapment.⁶⁵ Thus, the injectable property or encapsulation could trigger this method. Running of intra-articular xanthan injection has the ability to protect the articular cartilage in osteoarthritic rabbit models.

2.1.9. Pectin Based Gel

Extraction from plant cell walls results pectin, a water-soluble polysaccharide, composed of α-D-galacturonate residues linked by (1→4) glycosidic bond, and Rhamnogalacturonan I (RGeI) and Rhamnogalacturonan II (RGeII). Monosaccharides such as D-xylose, D-glucose, L-rhamnose, L-arabinose or D-galactose are the major constituents⁶⁶ with partly methoxylated or amidated galacturonic acid (GalA) as a main building block. Classic egg-box model explained the gelation process which was regulated by several intrinsic and extrinsic factors such as pH, temperature, ion strength, molecular weight, Ca-binding blocks distribution, the degree of methoxylation. Egg-box dimers could be constructed from two antiparallel polyuronate chains with Ca²⁺ and further aggregated laterally to form multimers.⁶⁷

2.1.10. Heparin Based Gel

Heparin is a highly sulfated linear glycosaminoglycan with alternating units of β-(1→4) linked uronic acids (mainly D-glucuronic, L-iduronic or L-2-sulfated iduronic) and glucosamine residues (mainly D-N-acetyl glucosamine and O- and N-sulfated glucosamine).⁶⁸ Presence of carboxyl and sulfate reactive groups result high negative charge leads to the electrostatic interaction



with proteins and chemical modifications. Numerous capacity of cellular signaling and growth could be regulated *via* enzymes like proteases and chemokines. An enzymatically crosslinked injectable heparin and dextran-based hydrogel exhibited higher storage modulus (~48 kPa), chondro compatibility and cartilage matrix secretion.⁶⁹

2.1.11. Chondroitin Sulfate Based Gel

Polyelectrolyte chondroitin sulfate, renowned anionic polysaccharides composed of disaccharide units consisting β -(1→4) D-glucuronic acid and β -(1→3) N-acetyl galactosamine with sulfate group glycosaminoglycan. Being major matrix components of cartilage, the presence of chondroitin sulfate empowered constricted strength of the scaffold through proteoglycan secretion. Combination of chondroitin sulfate with other synthetic or natural polymers like PEG through its reactive hydroxyl and carboxyl functional groups lead to gel formation.⁷⁰ For example, injectable biomimetic hydrogels was generated from collagen type II (Col II) and activated chondroitin sulfate under physiological conditions without addition of any catalysts or crosslinker.⁷¹

2.1.12. Carrageenan Based Gel

Carrageenan is a linear hydrophilic polysaccharide composed of sulfated disaccharides with (1→3)-linked β -D-galactose and (1→4)-linked α -D-galactose units, which could be altered into the 3, 6-anhydro derivative depending on the extraction situation and starting materials. Due to structural resemblance to glycosaminoglycans, a large scientific attention has been paid to carrageenans based gel. κ -Carrageenan (kappa) extracted from *Kappaphycus cottonii* results strong rigid gels. On the contrary, elastic, dry, soft gels were prepared by the iota (*i*-type) in the presence of calcium ions. Rigidity of this hydrogels can be monitored by changing potassium concentration. Another interesting property possessed by this polysaccharide-based gel is temperature triggered sol-gel transformation along with ionic gelation, since carrageenan can show upper critical solution temperature.⁷²

2.1.13. Pullulan Based Gel

Pullulan, a component of the cell wall in the yeast-like fungus *Aureobasidium pullulans*, composed of linear maltotriose oligosaccharide connected through α (1→4) and α (1→6) glycosidic bonds. Chemical functionalization or mixing with other organic or inorganic materials could transform highly water-soluble pullulan to gel with enhanced stability. Carboxymethylated pullulan conjugated with heparin and hydroxyapatite/pullulan/dextran composite has been developed with tissue regenerative ability.⁷³

2.1.14. Xylan Based Gel

Xylan is a natural, biodegradable polysaccharide composed of arabinose, 4-O-methyl-glucuronic acid and xylose in a ratio of 1:2:11 respectively.⁷⁴ Low molecular weight and high degree of side chain substitution could not lower water solubility of xylan. Hence, hydrogel network was formed through crosslinking from hydrophilic xylan polymer.⁷⁵ Modification of carboxylic groups present in glucuronic acid residues could be used for transforming gel. *In situ* injectable xylan-tyramine gel through enzymatic crosslinking using HRP and H₂O₂ has been synthesized.⁷⁶

2.1.15. Curdlan Based Gel

Curdlan, composed of (1 → 3)-linked β -D-glucose, is a crystalline polysaccharide with high molecular weight over 1,000,000. Its unique gelation ability caused by heating or neutralization of its alkaline solution is well known. A novel curdlan hydrogel was recently reported through chemical cross-linking. This gel exhibited high compression ability and exceptional shape recovery capacity. Variable cross-linker such as ethylene glycol diglycidyl ether (EGDGE, C2), 1, 4-butane diol diglycidyl ether (BDDGE, C4), and 1, 6-hexane diol diglycidyl ether (HDDGE, C6) were recently utilized for this type of gel synthesis.⁷⁷

2.2. Supramolecular Gel

Supramolecular hydrogels are generally formed through noncovalent interactions. Though it is similar as polymer hydrogel, different physical and chemical properties have to be taken in consideration in terms of three-dimensional entanglement, thermal stability and reversibility. Unlike to the typical molecular gels, thermal stability at lower temperature is an essential characteristic for supramolecular gel.⁷⁸ They are mostly homogeneous such as uniform pore size, sometimes heterogeneous network like the bulk gel.⁷⁹ Again, completely reversible sol-gel transition of these gels facile desired biomedical applications harmonizing to existing polymer driven soft materials.⁸⁰ Generally polysaccharide based supramolecular gel can be prepared through host-guest interaction by accommodating organic/inorganic guest molecules, where cyclodextrins (CDs), cyclic oligosaccharides extracted through enzymatic hydrolysis of starch and was reported to act as a potential host. The polar hydrophilic external surface and hydrophobic internal cavity are the major characteristics of CDs. Again, it contains numerous hydroxyl groups with variable reactivity. CDs can be classified into three categories namely α -cyclodextrin (α -CD), β -cyclodextrin (β -CD), and γ -cyclodextrin (γ -CD). They can be differentiated by the number of glucose subunits. Some reports regarding supramolecular polysaccharide gels are demonstrated here. A supramolecular polymer coassembly, composed of Fmoc-tetrapeptide and light-responsive arylazopyrazole (AAP), was mixed with β -CD vesicles (CDVs) to result supramolecular gel by using host-guest chemistry.⁸¹ Several inclusion complex based supramolecular polysaccharide gels were reported. For example, development of inclusion



complex between PEG grafted dextran and α -CDs could originate a supramolecular hydrogel.⁸² Another report showed star-shaped poly-*N*-isopropylacrylamide (PNIPAM) polymer with a β -CD molecule forming supramolecular self-assembled architectures through mixing with adamantly terminated eight-arm PEG polymer. Inclusion complexation between the β -CD molecules and the adamantyl groups played the major role here.⁸³ Hence inclusion triggered supramolecular architecture resulted from α -CD conjugated curdlan with photoirradiated gel-sol transition at 365 nm. Mixing of α -CD and PEG-terminated poly(amino amine) dendrimer bearing NIR-active platinum (Pt) nanoparticles in the core resulted self healing supramolecular network.⁸⁴ Poly(acrylic acid) functionalized cyclodextrins (pAA-CDs) (host) and pAA modified with ferrocene (pAA-Fc) (known for its redox-responsive properties) (guest) fabricated an interesting system upon addition of oxidant sodium hypochlorite (NaClO).⁸⁵ Again mono-carboxylated PEG modified chitosan was combined with α -CD resulting thermo-responsive supramolecular hydrogel leading to supramolecular gel.⁸⁶ Hence it is already established that supramolecular gels could respond to various chemical (pH change, ionic, etc.) and physical (light, sonication, mechanical force, etc.) stimuli along with reversible phase transitions resulting advantageous bioapplications. For example, hydroxypropyl methyl cellulose (HPMC)-based pH-triggered *in situ* gel containing HP- β -CD-drug inclusion complex exhibited a novel nasal delivery of Paliperidone (PLPD).⁸⁷ Simply mixing of β -cyclodextrin-modified chitosan (CS-CD) with AgNO₃ under basic condition leads to a stable supramolecular hydrogel resulting high antibacterial and wound healing capacity (Figure 2).⁸⁸

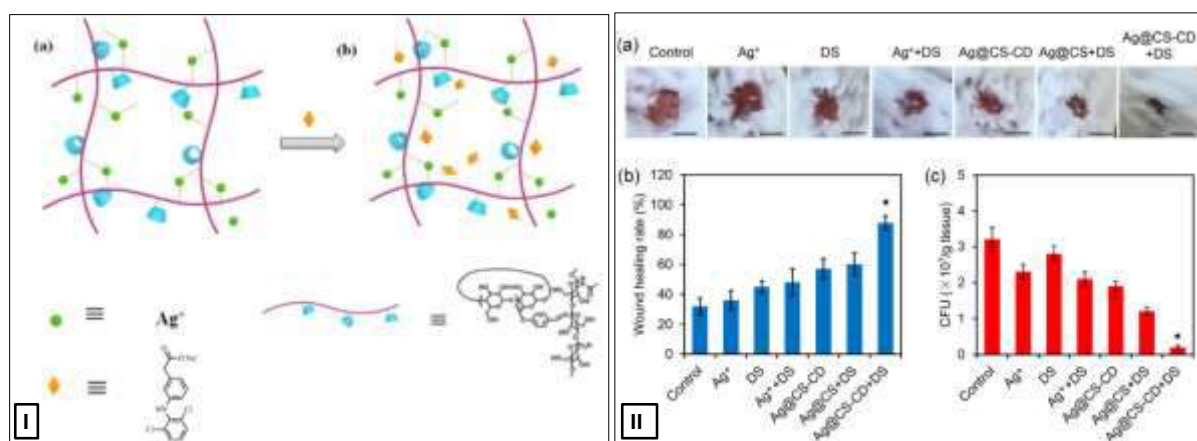


Figure 2. (I) (a) Illustration of the Prepared Hydrogels through Supramolecular Complexation (b) Illustration of the Supramolecular Hydrogels Loading Anionic Drugs. (II) In vivo antibacterial and wound healing capacity of the hydrogels in the mouse wound-infection model. (a) Images of wounds on mouse back in different treatments after 6 days of treatment. Scale bar = 0.5 cm. The calculated areas of each wound were 0.56, 0.5, 0.33, 0.25, 0.17, and 0.08 cm² from light to right. (b) Wound healing rate of different groups. (c) Bacterial numbers of different groups in wound tissues evaluated by colony forming unit (cfu) assays. Reproduced with permission from ref 88. Copyright 2021 American Chemical Society.

High attention has been paid in low molecular weight gelators (LMWGs) over recent dates in this regard, due to multi-stimuli responsive properties, which can lead to higher flexibility for the creation of smart materials.⁸⁹ The unique properties of LMWGs like reversible gel formation in different solvents arise from its lower molecular weight less than 2000 D. The resulting gels processed through non-covalent driving force including hydrogen bonding, hydrophobic interactions, π - π stacking, and van der Waals interactions, hence termed as physical gels or supramolecular gels. Several common monosaccharides and oligosaccharide units like D-glucose, D-glucosamine, *N*-acetyl-D-glucosamine, D-lactose, D-maltose based LMWGs are exceptionally good in this regard due to high biocompatibility, biodegradability (Figure 3). For example, several sugar building blocks starting from D-glucose has been synthesized through functionalization with triazole, alditol. Similarly, derivatization of glyconamide at anomeric position or C-2/3 position from methyl glycosides leads to glycocluster formation and results LMWGs which leads to supramolecular assembly. Enzyme-responsive supramolecular hydrogel has also been reported using LMWGs.⁹⁰ Glucoside-introduced supramolecular hydrogel in response to a protein is wellknown. Lactose containing amphiphatic ureas forms LMWHGs, aimed at site-specific drug release in the small intestine.^{91,92}

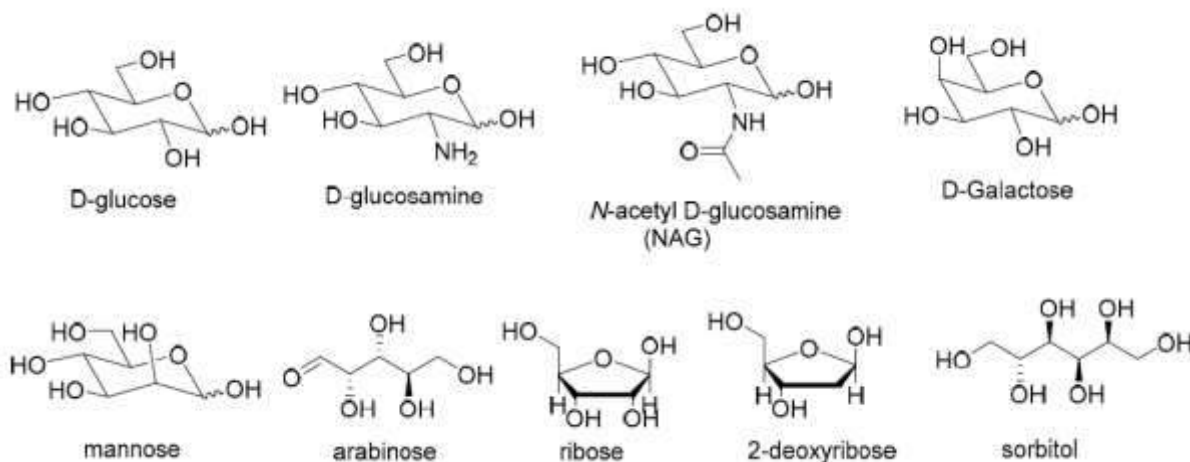


Figure 3. Structures of the sugar starting materials used often for designing low molecular weight gelators (LMWGs). Reproduced with permission from ref 80. Copyright 2021 MDPI.

2.3. Microgel and Nanogel

Depending on the gel particle dimension, the classification of micro and nanogel was made and today's biomedical field is basically ruled by those materials. Microgels are the hydrogels on a microscopic scale and nanogels are on a submicron scale. Now the basic question arises what are the properties which make them so evolutionary to modernize medical procedures. Basically, those materials are more interesting compared to their bulk analogue due to smaller particle size,⁹³ superior encapsulation efficacy of many therapeutics, such as proteins, genes, drugs and contrast agents, enhanced colloidal stability,⁹⁴ inertness which facilitates drug delivery and gene therapy. Again, they respond faster to their surroundings and effectively circulate in the blood to arrive at target sites after injection. Their high interfacial area per unit mass leads to higher exchange rate.⁹⁵ These exceptional characteristics add a new dimension to polysaccharide-based gel research field. A detail consideration about polysaccharide micro and nanogels are discussed in this regard.

Polysaccharide based microgels are physically cross-linked polymer of colloidal size between 1 and 1000 nm and leads to soft and porous architecture. This physical entrapment by cross-linking into a polysaccharide-based hydrogel network might happen *via* hydrazone aldehyde interaction; afterward, this hydrazone-functionalized microgel transformed to covalently crosslinked bulk hydrogel.⁹⁶ Generally they are distinct particles with colloidal dispersions ability and good swelling capacity depending on cross-linking density, synthetic process, initial monomer concentration, composition and solvents. General synthetic methods used generally are anionic copolymerization, emulsion polymerization in presence or absence of surfactant, precipitation method, inverse microemulsion polymerization, cross-linking of neighboring polymer chains (Figure 4).

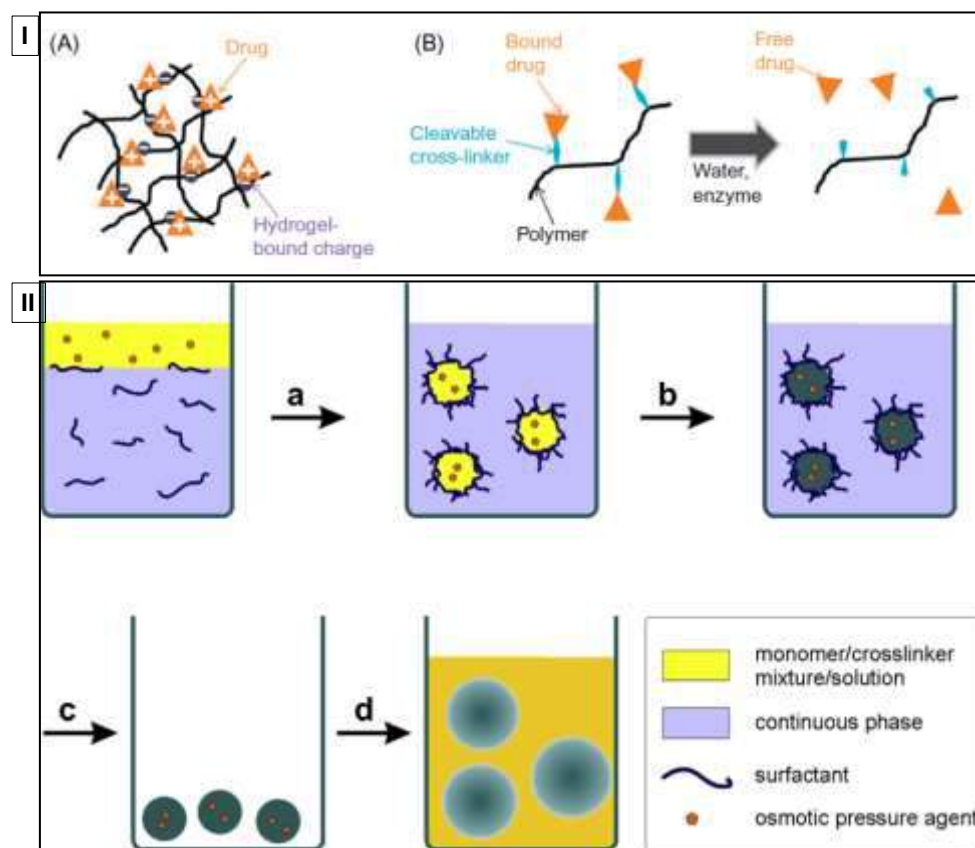


Figure 4. (I) Physical (A) and chemical (B) strategies for enhancing the interaction between a loaded drug and a polymeric gel to slow drug release. Reproduced with permission from ref 121. Copyright 2019 Elsevier. (II) Schematic representation of microgel preparation by radical crosslinking polymerization in (inverse) miniemulsion: (a) emulsification and homogenization, (b) polymerization, (c) removal of excess surfactant by washing/dialysis and subsequent freeze-drying and (d) redispersion of microgels in a good solvent for the network-forming polymer by swelling. Reproduced with permission from ref 97. Copyright 2012 Elsevier.

Thus, several well-known polysaccharides like dextran, gelatin or chitosan formed microgel materials by using those methods.⁹⁷ Chitosan can form microgel through self-assembly or derivatization. Dual stimuli (temperature and pH) responsive microgel was reported through copolymerization of ionizable chitosan with poly(*N*-isopropylacrylamide).⁹⁸ UV-crosslinkable and injectable chitosan based microgel has been synthesized by Wang *et al.*⁹⁹ Reversible binding of lectin metalloprotein, conA to glucose and mannose with high affinity resulted microgel.¹⁰⁰

On the other hand, polysaccharide based nanogels are basically physically or chemically crosslinked nanosized polymer particles and can be prepared through nanoemulsions and nanosuspensions. Synthetic approach of several polysaccharide nanogels are as follows. Monodisperse dextran nanogels were synthesized through the self-assembly of amphiphilic poly (*D*-/*L*-lactide)-grafted dextran.¹⁰¹ Combination of azobenzene and dextran was reported by Patnaik *et al.* and lead to azodextran-based nanogels by a self-assembly physical technique.¹⁰² Aguirre *et al.* demonstrated emulsion polymerization process followed by electrostatic interaction to produce cationic and biodegradable polyvinyl chloride (PVCL) & polydiethylaminoethyl methacrylate (PDEAEMA) based core-shell nanogels utilising dextran-based macro-cross-linkers. Positively charged core-shell nanogels could interact with the negatively charged siRNA after loading and exhibited a charge reversal in zeta potential values. Another dextran based cationic nanogels combination with (2-(methacryloyloxy)-ethyl) trimethylammonium chloride are also reported. Thus, stimuli responsiveness can be introduced including thermo-responsive PVCL and pH-responsive PDEAEMA, and dually thermo- and pH-responsive PDEAEMA/PVCL-based core-shell nanogels. These syntheses are basically driven by utilizing different biocompatible and biodegradable dextran-methacrylates as macro-cross-linkers. Modern studies show that bio-orthogonal and reversible reaction play important role to synthesize multistimuli-responsive dextran based nanogels. These reactions mainly facilitated the nanogel preparation through formation of a polyhydrazone network by the cross-linking of nanodroplets obtained from functionalized dextran with *N*-reactive carbonyls. These systems would be oxido reductive stress and pH sensitive, as disulfide groups are exhibits reducing environment responsiveness.¹⁰³ Nanogels possessing dextran and oligolactide (OLA) chains connected through disulfide bonds (Dex-g-SS-OLA) were reported as an efficient drug delivery system. Galactose (Gal) based nanogel was reported leading to receptor-mediated endocytosis. Another report shows, colloidal chitin nanogels has been prepared



in calcium chloride solution with saturated methanol.¹⁰⁴ Nanofibrous microsphere with high cellular affinity resulted from chitin in NaOH/urea.¹⁰⁵ Chondroitin sulfate-nisin nanogel with variable morphology and different loading capacity was reported with electrostatic complexation.¹⁰⁶ Chondroitin sulfate based nanogels with enhanced solubility was prepared through direct crosslinking.¹⁰⁷ The major component for synthesizing these nanogels was *N*-diethylamino-4-hydroxymethylcoumarin (CM) and functional modification HA could enhance the selectivity towards cancer cells.¹⁰⁸ According to several reports, HA is an extensively used polysaccharide for nanogel preparation with biomedical applications. HA based nanogels with good immunocompatibility and hemocompatibility could be prepared *via* radical copolymerization, emulsion and precipitation polymerization through functionalization with thiolated hydrophobic molecules.¹⁰⁹ Fluorescent HA-iodixanol nanogels (HAINGs) were synthesized by Zhu *et al.* and used for targeted X-ray computed tomography (CT) imaging and chemotherapy.¹¹⁰ Synthesis of injectable nanocomposite temperature responsive gel from hydroxypropyl methylcellulose (HPMC) as a matrix with nano-sized inorganic filler and biphasic calcium phosphate (BCP) has been reported.¹¹¹ Wu *et al.* demonstrated injectable nanogels with poly(NIPAM), poly(3-acrylamidophenylboronic acid) using maleic acid-dextran as a crosslinker with monodisperse property.¹¹² Another NIPAM and polysaccharide based hybrid nanogel was reported through chemically crosslinking with alginate used for as efficient anticancer drug delivery. Doxorubicin loaded DNA aptamer linked myristylated chitosan nanogel, Chitosan/albumin hybrid nanomaterials have also been explored by renowned research groups with anticancer drug delivery applications.¹¹³ Some reports include formation of nanocomposite gel from analogous bulk structure. For example a novel chitosan-based thermosensitive hydrogel using a sol-gel method has been synthesized and by adding silica/calcium phosphate (SiCaP) nanoparticles it was transformed to nanocomposite hydrogels including chitosan and β -glycerophosphate (Ch- β) as a matrix.¹¹⁴ Modification of an injectable thermoresponsive hydroxypropyl guar-graft-poly(*N*-vinylcaprolactam) (HPG-g-PNVCL) copolymer with nano-hydroxyapatite covalently crosslinked *via* divinyl sulfone (DVS) lead to HPG-g-PNVCL/n-HA/DVS as an efficient nanocomposite thermogel acting as a biocompatible scaffold for osteoblastic cell growth.¹¹⁵ Glucose responsive nanogel based on electrostatic interaction between chitosan and alginate was reported with potential bioutilizations.¹¹⁶ Modern research indicates the development of a new concept for brachytherapy based on intrinsically radiolabeled gold-palladium (AuPd) alloy nanoparticles, followed by functionalization with carbohydrate-ester based liquid. Thus, the system was transformed to biodegradable injectable nanogel allowing lower administration through small-gauge needles. Dispersion of nanoparticles in ethanol along with water insoluble carbohydrate esters resulted “nanogels” (Figure 5).¹¹⁷

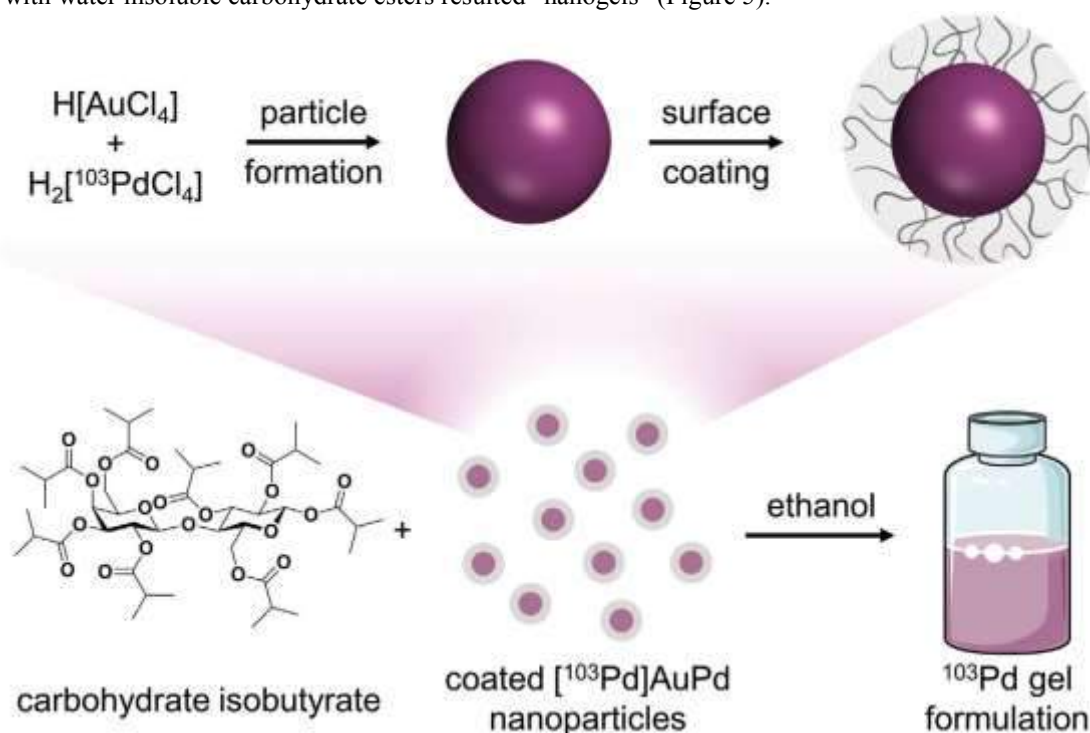


Figure 5. Preparation of the ¹⁰³Pd-nanogel formulation for immobilization of ¹⁰³Pd-containing AuPdNPs. [¹⁰³Pd] AuPdNPs were prepared from their chloride salts using trisodium citrate. Surface coating of the particles was carried out with thiol-terminated PNIPAAm. The liquid ¹⁰³Pd-nanogel formulation was prepared by adding the [¹⁰³Pd] AuPdNPs directly to a premixed solution of LOIB or SAIB in ethanol. Reproduced with permission from ref 117. Copyright 2021 Wiley.

As per the last section, these materials have been used in several biomedical applications. Hence sterilization is very important in this regard. A novel approach to get purified nanogel is autoclave method at high temperature and pressure. Montanari *et al.* reported the synthesis of gellan- and HA-cholesterol derivatives followed by dispersion in aqueous solutions, and



then, sterilization through autoclave leads to pure polymeric nanogels.¹¹⁸ An interaction between hydrophobic cholesterol moieties and hydrophilic polysaccharide chains under autoclave condition (temperature (121 °C) and pressure (1.1 bar for 20 min) was explored.

3. CONCLUSIONS AND FUTURE PERSPECTIVE

The above discussion has given an overview on porosity-based classification of recently developed polysaccharide-based gel. I have discussed every case as an applicative viewpoint. Numerous common polysaccharide based highly porous hydrogel network composed of cellulose, alginate, chitin, chitosan and hyaluronic acid can provide a biomimetic and moist cellular outgrowing environment, where the porous structure not only accommodates the living cells, but diffuse gases, nutrients and waste products.¹¹⁹

Though scientists are making progress in this field, more development is required in this aspect. The clarity of understanding about the porosity will not only define the structural pattern of the gel, classify them as bulk, nano or microgel, but several properties like in situ injectability and self-healing properties can be incorporated. These are essential requirements for wide biomedical applications and industrial uses. Hence, better understanding should be built on porosity specific synthetic approaches through functional group modification via a cost-effective process. Moreover, industrial method with higher economical feasibility to introduce porosity for a broad range of therapeutic applications should also be explored further. Hence, this review climaxes that more analytical research, which should get a good appreciation in polysaccharide-based gel synthetic field in future.

Conflict of Interest

The authors declare no conflict of interest

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REFERENCES

1. F. G. Torres, O. P. Troncoso, A. Pisani, F. Gatto and G. Bardi, *Int. J. Mol. Sci.* **20**, 5092 (2019). <https://doi.org/10.3390/ijms20205092>
2. Z. A. Raza, S.A. Munim and A. Ayub, *Carbohydrate Research* **510**, 108443 (2021).
3. A. Nešić, G. Cabrera-Barjas, S. Dimitrijević-Branković, S. Davidović, N. Radovanović and C. Delattre, *Molecules* **25**, 135 (2020). <https://doi.org/10.3390/molecules25010135>
4. P. Manivasagan and J. Oh, *International Journal of Biological Macromolecules* **82**, 315 (2016).
5. A. Tchobanian, H. V. Oosterwyck and P. Fardim, *Carbohydrate Polymers* **205**, 601 (2019).
6. Y. Zheng, J. Monty and R. J. Linhardt, *Carbohydrate Research* **405**, 23 (2015).
7. M. Zhu, H. Jin, T. Shao, Y. Li, J. Liu, L. Gan and M. Long, *Materials & Design* **192**, 108723 (2020).
8. H. Hu and F-J. Xu, *Biomater. Sci.* **8**, 2084 (2020).
9. N. Basu, A. Chakraborty and R. Ghosh, *Gels* **4**, 52 (2018).
10. K. Farzarian and A. Ghahremaninezhad, *Gels* **4**, 70 (2018). <https://doi.org/10.3390/gels4030070>
11. M. Nasrollahzadeh, M. Sajjadi, S. Irvani and R. S. Varma, *Carbohydrate Polymers* **251**, 116986 (2021).
12. Md. I. H. Mondal, *Synthesis and Applications of Carbohydrate-Based Hydrogels*. Springer International Publishing AG, part of Springer Nature. *Cellulose-based superabsorbent hydrogels, polymers and polymeric composites: a reference series*. (2018). https://doi.org/10.1007/978-3-319-76573-0_49-1
13. K. Mohana, T. Muralisankar, V. Uthayakumara, R. Chandirasekara, N. Revathia, A. R. Ganesan, K. Velmurugand, P. Sathishkumare, R. Jayakumar and P. Seedeveg, *Carbohydrate Polymers* **238**, 116185 (2020).
14. M. Goh, Y. Kim, K. Gwon, K. Min, Y. Hwang, G. Tae, *Carbohydrate Polymer* **174**, 990 (2017).
15. D. Klemm, B. Heublein, H. P. Fink and A. Bohn, *Angewandte Chemie International Edition* **44**, 3358 (2005).
16. R. J. Moon, A. Martini, J. Nairn, J. Simonsen and J. Youngblood, *Chemical Society Reviews* **40**, 3941 (2011).
17. H. Park, M. H. Kim, Y. Yoon and W. H. Won Ho Park, *Carbohydrate Polymers* **157**, 775 (2017).
18. X. Shen, J. L. Shamshina, P. Berton, G. Gurau and R. D. Rogers, *Green Chemistry* **18**, 53 (2016).
19. S. Lee, Y. H. Park and C. S. Ki, *International Journal of Biological Macromolecules* **83**, 1–8 (2016).
20. Y. Shen, X. Li, Y. Huang, G. Chang, K. Cao and J. Yang, et al., *Macromolecular Research* **24**, 602 (2016).
21. J. Radhakrishnan, A. Subramanian, U. M. Krishnan and S. Sethuraman, *Biomacromolecules* **18**, 1 (2017).
22. H. Imen, Fatih Özogul and Joe M. Regenstein, *Trends in Food Science & Technology* **48**, 40 (2016).
23. B. Chen, S. Wu and Q. Ye, *Carbohydrate Polymers* **259**, 117707 (2021).
24. H. P. S. Abdul Khalil, C. K. Saurabhm, A. S. A. Adnan, M. R. Nurul Fazita, M. I. Syakir, Y. Davoudpour and R. Dungani, *Carbohydrate Polymers* **150**, 216-226 (2016).
25. Z. Shi, X. gao, M. W. Ullah, S. Li, Q. Wang and G. Yang, *Biomaterials* **111**, 40 (2016).
26. J. O. Gonçalves, J. P. Santos, E. C. Rios, M. M. Crispim, G. L. Dotto and L. A. A. Pinto, *Journal of Molecular Liquids* **225**, 265 (2017).
27. M. Sadeghi, F. Hanifpour, R. Taheri, H. Javadian and M. Ghasemi, *Process Safety and Environmental Protection* **102**, 119 (2016).



28. N. B. Milosavljević, M. D. Ristić, A. A. Perić-Grujić, J. M. Filipović, S. B. Štrbac, Z. L. Rakočević and M. T. Kalagasidis Krušić, *Journal of Hazardous Materials* **192**, 846 (2011).
29. K. Delmar and H. Bianco-Peled, *Carbohydrate Polymers* **136**, 570 (2016).
30. T. Józwiak, U. Filipkowska, P. Szymczyk, J. Rodziejewicz and A. Mielcarek, *Reactive and Functional Polymers* **114**, 58 (2017).
31. X. Bai, Z. Bao, S. Bi, Y. Li, X. Yu, S. Hu, ... and X. Chen, *Macromolecular Bioscience* **18(3)**, 1700305 (2018).
32. Z. Li, H. Shim, M. O. Cho, I. S. Cho, J. H. Lee, S.-W. Kang and K. M. Huh, *Carbohydrate Polymers* **184**, 342 (2018)
33. M. Yadollahi, S. Farhoudian, S. Barkhordari, I. Gholamali, H. Farhadnejad and H. Motasadizadeh, *International Journal of Biological Macromolecules* **82**, 273 (2016).
34. P. M. Pakdel and S. J. Peighambaroust, *Carbohydrate Polymers* **201**, 264 (2018).
35. S. Baghaie, M. T. Khorasani, A. Zarrabi and J. Moshtaghian, *Journal of Biomaterials Science. Polymer Edition* **28**, 2220 (2017).
36. Z. Wang, J. Nie and W. Qin, et al. *Nat Commun.* **7**, 12033 (2016).
37. L. Zhang, Y. Ma, X. Pan, S. Chen, H. Zhuang and S. Wang, *Carbohydrate Polymers* **180**, 168 (2018).
38. S. Wang and L. Copeland, *Effect of Acid Hydrolysis on Starch Structure and Functionality: A Review. Critical Reviews in Food Science and Nutrition* **55**, 1081 (2015).
39. G. Liu, Z. Gu, Y. Hong, L. Cheng and G. Li, *Trends in Food Science & Technology* **63**, 70 (2017).
40. N. Klaochanpong, C. Puttanlek, V. Rungsardthong, S. Pancha-arnon and D. Uttapap, *Food Hydrocolloids* **45**, 218 (2015).
41. G. Liu, Y. Hong, Z. Gu, Z. Li and L. Cheng, *Food Hydrocolloids* **45**, 351 (2015).
42. M. F. P. Graca, S. P. Miguel, C. S. D. Cabral and I. J. Correia, *Carbohydrate Polymers* **24**, 116364 (2020)
43. E. Piron and R. Tholin, *Polysaccharide Crosslinking, Hydrogel Preparation, Resulting Polysaccharide (S) and Hydrogel (s), uses thereof. Google Patents.* (2005)
44. A. Khelfi, *Therapeutic Enzymes Used for the treatment of Non-Deficiency Diseases. Research Advancements in Pharmaceutical, Nutritional, And Industrial Enzymology. IGI Global* **46** (2018).
45. C. Fiorica, F. S. Palumbo, G. Pitarresi, M. Allegra, R. Puleio and G. Giammona, *Journal of Drug Delivery Science and Technology* **46**, 28 (2018).
46. S. Wu, L. Deng, H. Hsia, K. Xu, Y. He and Q. Huang, et al., *Journal of Biomaterials Applications* **31**, 1380 (2017).
47. L. Shi, Y. Zhao, Q. Xie, C. Fan, J. Hilborn and J. Dai, et al. *Advanced Healthcare Materials* **7**, 1700973 (2018).
48. W. Shia, B. Hass, M. A. Kussa, H. Zhang, S. Ryud, D. Z. T. Lig and Bin Duana Yu-long Lif, *Carbohydrate Polymers* **241**, 116364 (2020).
49. H. Gao, C. Yu, Q. Li and X. Cao, *Carbohydrate Polymers* **258**, 117663 (2021).
50. D. Q. Wu, F. Qiu, T. Wang, X. J. Jiang, X. Z. Zhang and R. X. Zhuo, *ACS Appl. Mater. Interfaces* **1**, 319 (2009).
51. C. Hiemstra, L. J. Aa, Z. Zhong, P. J. Dijkstra and J. Feijen, *Macromolecules* **40**, 1165 (2007).
52. A. M. M. Sousa, H. K. S. Souza, J. Uknalis, S.-C. Liu, M. P. Goncalves, L. Liu, *Carbohydr. Polym.* **115**, 348 (2015).
53. A. A. Amini and L. S. Nair, *Biomed. Mater.* **7**, 24105 (2012).
54. L. Cao, W. Lua., A. Mataa, K. Nishinarib and Y. Fang, *Carbohydrate Polymers* **2020**, **242**, 116389 (2020).
55. S. St'öflein, I. Grunwald, J. Stelten and A. Hartwig, *Carbohydrate Polymers* **205**, 287 (2019).
56. Y. A. Mørch, I. Donati, B. L. Strand and G. Skjåk-Bræk, *Biomacromolecules* **7**, 1471 (2006).
57. G. Simó, E. Fernández, J. Vila-Crespob, V. Rui Pérezb and J. M. Rodríguez-Nogales, *Carbohydrate Polymers* **170**, 1 (2017).
58. I. N. Besiri, T. B. Goudoulas and N. Germann, *Carbohydrate Polymers.* **246**, 116615 (2020).
59. R. Resmia, J. Parvathya, A. Johnb and R. Joseph, *Carbohydrate Polymers* **234**, 115902 (2020).
60. A. J. Ribeiro, F. R. L. de Souza, J. M. N. A. Bezerra, C. Oliveira, D. Nadvorny, R. de La, M. F. Soares,...and J. L. Soares Sobrinho, *Carbohydrate Polymers* **147**, 188 (2016).
61. D. D. Nguyen and J.-Y. Lai, *Polym. chem.* **11**, 6988 (2020).
62. H. E. Tahira, Z. Xiaobao, G. K. Mahunub, M. Arslana, M. Abdalhaia and L. Zhuhua, *Carbohydrate Polymers* **224**, 115141 (2019).
63. K. M. Zia, S. Tabasum, M. F. Khan, N. Akram, N. Akhter, A. Noreen, ... and M. Zuber, *Macromolecules* **109**, 1068 (2018).
64. G. Han, H. Shao, X. Zhu, G. Wang, F. Liu, F. Wang, P. Ling and T. Zhang, *Carbohydr. Polym.* **89**, 870 (2012).
65. A. C. Mendes, E. T. Baran, R. C. Pereira, H. S. Azevedo and R. L. Reis, *Macromol. Biosci.* **12**, 350 (2012).
66. S. Y. Chan, W. S. Choo, D. J. Young and X. J. Loh, *Carbohydrate Polymers* **161**, 118 (2017).
67. J. Kongsin, C. Gamonpilas, P. Methacanon, A. Panya and S. M. Goh, *Food Hydrocolloids* **50**, 128 (2015).
68. R. Jin, L. S. Teixeira, P. J. Dijkstra, C. A. Van Blitterswijk, M. Karperien and J. Feijen, *J. Control. Release* **152**, 186 (2011).
69. J. H. Choi, Y. K. Joung, J. W. Bae, J. W. Choi, T. N. Quyen, and K. D. Park, *Macromol. Res.* **19**, 180 (2011).
70. D.-A. Wang, S. Varghese, B. Sharma, I. Strehin, S. Fermanian, J. Gorham, D. H. Fairbrother, B. Cascio and J. H. Elisseeff, *Nat. Mater.* **6**, 385 (2007).
71. Y. Gao, B. Li, W. Kong, L. Yuan, L. Guo, C. Li, H. Fan, Y. Fan and X. Zhang, *International Journal of Biological Macromolecules* **118**, 2014 (2018).
72. E. G. Popa, M. E. Gomes and R. L. Reis, *Biomacromolecules* **12**, 3952 (2011).
73. J. C. Fricain, S. Schlaubitz, C. Le Visage, I. Arnault, S. M. Derkaoui, S. R. Catros, C. Lalande, R. Bareille, M. Renard, T. Fabre, S. Cornet, ...and J. Amedee, *Biomaterials* **34**, 2947 (2013).
74. V. Kuzmenkoa, D. Högge, G. Toriza and P. Gatenholm, *Carbohydrate Polymers* **102**, 862 (2014).
75. A. F. A. Chimphango, W. H. van Zyl and J. F. Görgens, *Carbohydrate Polymers* **88**, 1109 (2012).
76. Y. Feng, Q. Li, D. Wu, Y. Niu, C. Yang, L. Dong and C. Wang, *Biomaterials* **134**, 128 (2017).
77. Y. Matsumoto, Y. Enomoto, S. Kimura and I. Tadahisa, *Carbohydrate Polymers* **269**, 118312 (2021).
78. B. Tiana, S. Huab and J. Liu, *Carbohydrate Polymers* **232**, 115805 (2020).
79. Y. Matsumoto, A. Shundo, M. Ohno, N. Tsuruzoe, M. Goto and K. Tanaka, *Langmuir* **34**, 7503 (2018).

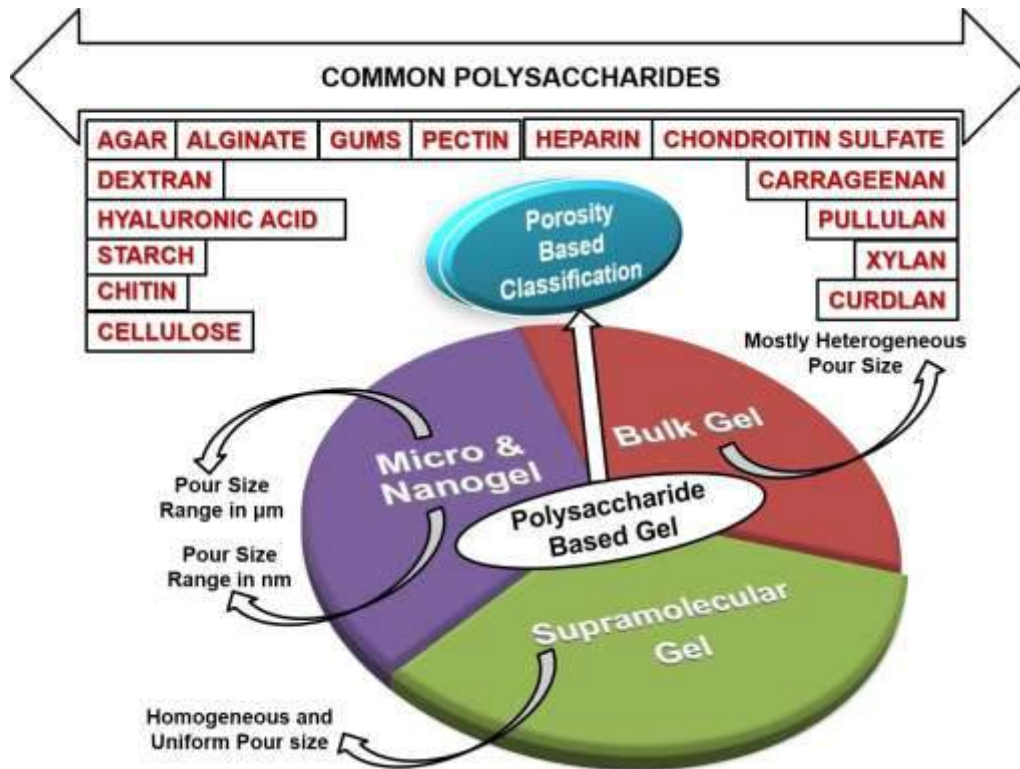


80. J. Morris, J. Bietsch, K. Bashaw and G. Wang, *Gels* **7**, 24 (2021).
81. C. W. Chu and C. A. Schalley, *Organic Materials* **3**, 25 (2021)
82. S. Gim, Y. Zhu, P. H. Seeberger and M. Delbianco, *Nanomed Nanobiotechnol.* **1558**, 1 (2019).
83. Z. X. Zhang, K. L. Liu and J. Li, *Angew. Chem. Int. Ed.* **52**, 6180 (2013).
84. J. Hoque, N. Sangaj and S. Varghese, *Macromol. Biosci.* **1800259** (2018).
85. M. Nakahata, Y. Takashima, H. Yamaguchi and A. Harada, *Nat. Commun.* **2**, 511 (2011).
86. M. C. G. Pelláa, M. K. Lima-Tenório, E. T. Tenório-Neto, M. R. Guilherme, E. C. Muniza and A. F. Rubira, *Carbohydrate Polymers* **196**, 233 (2018).
87. A. P. Sherje and V. Londhe, *Carbohydrate Polymers* **196**, 233 (2018).
88. J. Wang, L. Feng, Q. Yu, Y. Chen and Y. Liu, **22**, 534 (2021)
89. X. Guan, K. Fan, T. Gao, A. Ma, B. Zhang, J. Song, *Chem. Commun.* **52**, 962 (2016).
90. S. Kimura, M. Yokoya and M. Yamanaka, *Chem. Lett.* **50**, 459 (2021).
91. S. Akama, T. Maki and M. Yamanaka, *Chem. Commun.* **54**, 8814 (2018).
92. T. Maki, R. Yoshisaki, S. Akama and M. Yamanaka, *Polym. J.* **52**, 931 (2020).
93. G. T. Franzesi, B. Ni, Y. Ling and A. Khademhosseini, *J. Am. Chem. Soc.* **128**, 15064 (2006).
94. G. Soni and K. S. Yadav, *Saudi Pharm. J.* **24**, 133 (2016).
95. N. Sahiner, W. Godbey, G. L. McPherson and V.T. John, *Colloid. Polym. Sci.* **284**, 1121 (2006).
96. M. Bayat and S. Nasri, *Nanomaterials for Drug Delivery and Therapy* **12**, 343 (2019).
97. D. Klínger and K. Landfester, *Polymer* **53**, 5209 (2012).
98. A. Kulkarnia, A. Tourretteb, M.C.G. Warmoeskerken and D. Jocić, *Carbohydrate Polymers* **82**, 1306 (2010).
99. L. Wang, F. Xu, X. Gang, U. Demirci, D. Wei and Y. Zhou, *Acta Biomaterialia* **22**, 59 (2015)
100. S. Fuchs, K. Shariati and M. Ma, *Pharm Res.* **37**, 202 (2020).
101. K. Nagahama, Y. Mori, Y. Ohya and T. Ouchi, *Biomacromolecules* **8**, 2135 (2007).
102. S. Patnaik, K. S. Ashwani, G. R. Gandhi and C. K. Gupta, *Int. J. Pharm.* **342**, 184 (2007).
103. M. S. Alkanawati, M. Machtakova, K. Landfester and H. Thérien-Aubin, *Biomacromolecules* **22**, 2976 (2021).
104. M. V. Priya, M. Sabitha and R. Jayakumar, *Carbohydrate Polymers* **136**, 609 (2016).
105. B. Duan, X. Zheng, Z. Xia, X. Fan, L. Guo, J. Liu, ... and L. Zhang, *Angewandte Chemie International Edition* **54**, 5152 (2015).
106. S. Mohtashamian, S. Boddohi and S. Hosseinkhani, *International Journal of Biological Macromolecules* **107**, 2730 (2018).
107. J. Wang, W. Zhao, H. Chen, A. Qin and P. Zhu, *Nanoscale Research Letters* **12**, 572 (2017).
108. M. Ashrafizadeh, S. Mirzaei and M. H. Gholami et al., *Carbohydrate Polymers* **272**, 118491 (2021).
109. S. S. Pedrosa, P. Pereira, A. Correia, S. Moreira, H. Rocha and F. M. Gama, *Macromolecular Bioscience* **16**, 1610 (2016).
110. Y. Zhu, X. Wang, J. Chen, J. Zhang, F. Meng, C. Deng, ...and Z. Zhong, *Journal of Controlled Release* **244**, 229 (2016).
111. R. M. Seydlar, A. Nodehi, M. Atai and M. Imani, *Carbohydrate Polymers* **99**, 257 (2014).
112. Z. Wu, X. Zhang and H. Guo et al., *J Mater Chem.* **22**, 22788 (2012).
113. R. Ahmad, Y. Deng, R. Singh, M. Hussain and M. Ali, et al. *Journal of Biomedical Nanotechnology* **14**, 20 (2018).
114. S. M. Latifil, C. Tang and H. J. Donahue, *Journal of Biomaterials and Nanobiotechnology* **12**, 34 (2021).
115. A. Parameswaran-Thankam, C. M. Parnell, F. Watanabe and B. Ambar et al., *ACS Omega* **3**, 15158 (2018).
116. M. Vicario-de-la-Torre and J. Forcada, *Gels* **3**, 16 (2017).
117. M. Fach, F. P. Flíedner, P. J. Kempen, F. Melander, A. E. Hansen, L. M. Bruun, U. Köster, E. Sporer, A. Kjør, T. L. Andresen, A. I. Jensen and J. R. Henriksen, *Adv. Healthcare Mater.* **10**, 2002 (2021).
118. E. Montanari, M. De Rugeriis, C. Di Meo, R. Censi, T. Coviello, F. Alhaique and P. Matricardi, *J. Mater. Sci. Mater. Med.* **26**, 1 (2015).
119. D. D. Nguyen and J-Y. Lai, *Polym. chem.* **11**, 6988 (2020).

Recent development of Polysaccharide Based gel: Porosity Based Classification and A Future Perspective

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A modern and compile classification was needed for better understanding of synthetic approach for biodegradable common polysaccharide-based hydrogels and their applications. Introducing gel porosity-based classification is a novel approach facilitating to understand the gel structure. The review mainly focused the recent advancement of polysaccharide-based gels with targeted porosity.





THE FEMINIST RESPONSES TO MARY WOLLSTONECRAFT: A READING

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ABSTRACT

According to the well-known study on Wollstonecraft's reception in the early 20th century, some feminists embraced her unusual life experience as a personal model for their own experiments with, and literary reflections on, love, sex, and marriage. She frequently used the first-person plural to refer to herself as a part of the greater community of women who endure patriarchal oppression in *A Vindication of the Rights of Woman*. There is evidence that many intellectuals regarded Wollstonecraft's contributions to modern women largely from a biographical and literary standpoint. Examples include Virginia Woolf, Ruth Benedict, and Emma Goldman. Numerous important biographical studies of Wollstonecraft's life and literary critiques of her writing have been produced since the 1970s. The second wave of feminist researchers, however, were undoubtedly most influenced by this symbolic interpretation of Wollstonecraft as a personal figure. In this research paper, we aim to investigate the feminist theories of Wollstonecraft as well as her experiments with gender, life, marriage, literature, and society.

KEYWORDS: A Vindication of the Rights of Woman, Mary Wollstonecraft, Feminism, Radical Feminist, Modern Feminism

INTRODUCTION

What can be said about something that we presently consider to be feminist philosophy if, properly speaking, feminism did not exist in the eighteenth century? The question can be posed because feminist thought has a long history, as Janes herself acknowledges in her analysis of Mary Astell's seventeenth-century essay, *A Serious Proposal to the Ladies* (Part I, 1694). Astell was putting feminist theory into practise when she suggested creating a 'Retirement' where 'women' may serve God and advance their minds (the two goals having a radical interchangeability). She foreshadows Mary Wollstonecraft's parallel appeal to God in her case by stating that her religious views form the core of her wish to acknowledge women as sensible human beings in *A Vindication of the Rights of Woman* are supported by the fact that they are human beings, just like men, and that they were put here to develop their faculties.

When Mary Wollstonecraft's *A Vindication of the Rights of Woman* was published at the beginning of 1792, it is generally believed that it was met with shock, horror, and mockery. The forces of reaction allegedly gathered to oppose this audacious attempt to assert women's equality and spattered the Amazon with their pens. Her biographers have argued time and time again that the work's first evaluations and recorded responses were overwhelmingly positive, but this has had no effect on the widespread misperception. The causes of the academic ineffectiveness are plain to see. Later in the decade, Wollstonecraft came under fire from the media, and for most of the nineteenth century, feminists used her name as proof of the terrible effects of female liberation. The quiet approval of 1792 was completely outnumbered by the clamorous of 1798 in terms of both intensity and duration. Since the majority of authors who have written about Wollstonecraft and *A Vindication of the Rights of Woman* are primarily focused on the slow progress of female emancipation, they anticipate a negative reaction to her and her work and show little to no interest in the oddities of late eighteenth-century social thought.



THOUGHTS ON WOLLSTONECRAFT'S FEMINISM

The emphasis on a person's potential for logical self-improvement and spiritual contemplation, however, was replaced by Wollstonecraft, ushering in a new era of feminist ideology that was founded on Enlightenment rights and called for a larger social shift in the status of women. The feminist theory did, however, enter a new phase with the work of Wollstonecraft, shifting from a focus on the ability of the individual for logical self-improvement and spiritual contemplation to an Enlightenment rights-based argument for a larger social transformation in the status of women.

The possession of the political clout to further the egalitarian change of the home, community, and state, Wollstonecraft targeted many of her assertions in *A Vindication of the Rights of Woman* at enfranchised males. She has been accused of misogyny and male identification by some academics due to her harsh criticisms of the degraded social status of women in her era, her general demonstration of herself as a unique exception to this rule, and her advocacy for women's equality in the pursuit of the same moral standards as men. In the *A Vindication of the Rights of Woman*, Poovey even went so far as to say that she “*rejected a female speaking voice*” (1984).

However, as we have seen, Wollstonecraft frequently addressed other women in the first person, empathising with their concerns and interests. In the *A Vindication of the Rights of Woman*, she regularly utilised the first-person plural to identify herself as a member of the larger community of women who experience patriarchal injustice: “*we might as well never have been born, unless it were necessary that we should be created to enable man to acquire the noble privilege of reason,*” she pointed out with dark humor (89). This first-person plural formulation foreshadows Wollstonecraft's final novel's ‘*radical feminist*’ shift, in which the middle-class Maria comes to understand the anguish of the working-class Jemima by hearing her personal account of experiencing patriarchal oppression all of her life: “*thinking of Jemima's peculiar fate and her own, she was led to consider the oppressed state of women, and to lament that she had given birth to a daughter*” (Wollstonecraft [1798] 1994; Lorch 1990). Taylor has stressed the psychological necessity of this sense of solidarity—more especially, the identification of the individual with group oppression—for the emergence of any social movement to address collective injustice (2003, 238–239).

The 1846 state-level legislative petition and the 1848 Seneca Falls public conference for women's rights in upstate New York marked the beginning of organised (formal, public, and collective) feminism in the nineteenth century (Ginzberg 2005). The women's political clubs of the liberal stage of the French Revolution marked the unofficial beginning of modern feminist action, but Robespierre put an end to it (Landes 1988). In early to mid-nineteenth-century American culture, abolitionist, prohibition, and benevolent societies also served as a platform for women's innovative engagement in social change and informal politics. In France, Britain, Germany, and the United States, feminist factions emerged within the socialist and anarchist movements. Women's rights movements from Britain to Russia to Chile were frequently centred around these educational causes, and there were founding of female academies, colleges, and universities as well as a push for coeducational access to men's institutions of higher learning (Stites [1978] 1991; Tagle 2005). Feminist ideas quickly spread through intricate global organisations of like-minded women and men from the 1830s through the 1860s (Anderson 2000). By the 1870s and 1880s, a number of feminist organisations were thriving, including the National Woman Suffrage Association in the United States and indigenous women's reading groups in Maharashtra (Bykov 1911; Deshpande 2008).

In France, Germany, Britain and the United States, feminist factions emerged within the socialist and anarchist movements. Initiations of female academies, colleges, and in the year 1900, some national feminist organisations had joined global networks, including the International Women's Suffrage Association (Holton 2010). Despite not being coined until 1870 in France, the word ‘*feminist*’ spread quickly around the world (Offen 2000, 19–20). It began to be used as a broad term to encompass many justifications and forms of activity against patriarchy and in favour of the welfare of women as a whole (Offen 2010, 16).

El Movimiento Feminista was the title of Elvira Lopez's doctoral dissertation on the global expansion of feminism, which she wrote in Argentina in 1901. She traced the movement's philosophical roots to ‘*Inglatera*,’ where Wollstonecraft, Mary Astell, and Saint Thomas More were prominent figures. She then described how its ideas expanded to the United States and other countries (Lopez 1901, 206). By 1914, the word ‘*feminism*’ had taken over as the preferred name for advocacy on behalf of women, including the now-universal fight for women's suffrage (Cott 1987, 3, 14).

A Vindication of the Rights of Woman appeared in five further English editions in London and New York in the first half of the nineteenth century after being completely translated into French, German, Dutch, and Danish within a decade of its publication in 1792 and excerpted in a Spanish magazine (Kitts 1994; Botting 2013a). In preparation for their campaign to add women's suffrage in the fifteenth amendment to the United States constitution, Susan B. Anthony and Elizabeth Cady Stanton published the complete passage in their feminist newspaper in 1869. Constitution (Botting and Carey 2004). Due to the book's 100th anniversary, two rival editions with forewords by Englishwomen Millicent Fawcett and Elizabeth Robins Pennell were published. Between 1890 and 1892, their editions were printed numerous times in London and New York; copies of each were autographed and donated to the American Library of Congress by women's suffragist Carrie Chapman Catt. New translations into German by Bertha Pappenheim in 1899 and



the first translation into Czech by Anna Holmová in 1904 came after them. Comparative analysis of the forewords to the centennial-era editions of the *A Vindication of the Rights of Woman* indicates the lasting power of Wollstonecraft's first-person style of argumentation for feminists' self-understandings of their movement.

FIVE INTRODUCTIONS TO CENTENNIAL EDITIONS OF A VINDICATION OF THE RIGHTS OF WOMAN

A draught of the introduction to a never-finished centennial edition of *A Vindication of the Rights of Woman* was written by Olive Schreiner, the South African author best known for her 1883 feminist novel, *Story of an African Farm*. As Burdett has demonstrated, the colonial expatriate participated actively in Karl Pearson's '*Men's and Woman's Club*' in London in 1885 and 1886 (which was initially intended to be named after Wollstonecraft). She met publisher Walter Scott through Pearson's network. Scott urged the young feminist to present a fresh version of *A Vindication of the Rights of Woman* after learning about her desire to analyze the late Victorian '*sex question*' through theory (Burdett 1994). Schreiner spent three years working on the project before giving up in 1889. Although she began by reiterating the typical British Victorian criticism of Wollstonecraft's writing and contributions, her introduction swiftly shifted to a positive rehabilitation of the book's visionary grasp of the '*necessity*' of the '*woman's movement*' (Schreiner [1889] 1994, 190).

According to Schreiner, the author's own experiences as a woman served as the inspiration for the book's call for women's liberation: "*Being a woman, perhaps there was no necessity for her to see it; she knew it*" ([1889] 1994, 190). Her observations of black women in South Africa, who she said exemplified the '*primitive*' and organic foundations of the global female experience of their sex's subjugation, served as the essay's conclusion. Despite having a patronising image of these indigenous women as '*uncivilised*' due to her colonial upbringing, Schreiner opposed British feminists who denied black women the right to vote when the Union of South Africa was established in 1910.

Schreiner described her interactions with the neighbourhood black women as a form of feminist ethnography despite her preconceptions. By separating the first-person voices of herself and the indigenous women she interviewed, she aimed to maintain the cultural differences between them. She recalled, "*I have bent over a woman half flogged to death by her husband, and seen her rise, cut and bleeding, lay her child against her wounded breast, and go and kneel down silently before the grind-stone and begin to grind*" ([1889] 1994, 193).

She had a lengthy discussion with a black lady to better understand her '*deep*' resignation to patriarchal tyranny. She then translated her lengthy explanation. The interviewee's perspective on the black woman's dual burden of racial and sex-based subjugation was captured by Schreiner: "*we are dogs, we are dogs. There may perhaps be a good for the white women; I do not know; there is no good for the black*" ([1889] 1994, 193). The laments of Wollstonecraft and her imaginary alter ego Maria about the birth of women into dominance were mirrored in this African woman's voice as '*I*' and '*we*' statements. Schreiner regarded the black woman's grief as a symbol of the '*necessity*' of women's acquiescence to sexual dominance in primitive civilizations, in contrast to *A Vindication of the Rights of Woman*'s need for political reforms to combat such systemic injustice against women. Schreiner's introduction to *A Vindication of the Rights of Woman* reflects Wollstonecraft's recognition of the rhetorical and methodological significance of employing the '*I*' and the '*we*' in recording women's experiences of denigration at the hands of males, despite its unsettling social Darwinist conclusion.

An academic biography written by Elizabeth Robins Pennell in 1884 defended Wollstonecraft from the popular Victorian British perception of her as a morally reprehensible proponent of free love. When Schreiner's introduction *A Vindication of the Rights of Woman* was left unfinished, she stepped in to finish it for publisher Walter Scott's 1891–1892 edition. First-person narrative was frequently utilised in Pennell's introduction to establish her authority in the expanding but still largely male-dominated field of scholarship on Wollstonecraft and the development of women's rights (1891, xxii). She also emphasised the transnational nature of the feminist movement from Wollstonecraft's time to the present by writing in the first person. Pennell inscribed the essay with her own location, Budapest, 1891, and highlighted Hungarian women's rights theorists who went back to the French Revolution.

Similar to how she did in her biography, Pennell recast Wollstonecraft as an Enlightenment Protestant in order to lessen the shock value of her views on women's human rights to a conservative audience: "*that woman, as a human being, has rights was but the inevitable conclusion of the then new philosophical theory, that 'man is born free,' which, as inevitably, had been developed from the premises of the Reformation*" (1891, viii). In her capacity as a biographer, she also saw the importance of reading *A Vindication of the Rights of Woman* as being based on the authority of Wollstonecraft's firsthand accounts of being a woman: "*had she not seen for herself the unspeakable misery caused by the intellectual and domestic degradation of women, she would not have been so quick to discern the flaw in the reasoning of Rousseau and his French and English disciples. Her book gains in force when it is realized how entirely her arguments and doctrines are based on experience*" (1891, viii). While she identified *A Vindication of the Rights of Woman* as the "*text book of the new generation of believers in women's rights,*" it was Pennell who distanced Mary Wollstonecraft from her contemporary feminist activists. She the others were those who, "*have failed to grasp the true meaning of the 'Vindication'*" (1891, xxii). Pennell's deft feminist language portrayed Wollstonecraft as providing women both a wider and more sensible choice,



implying that some feminists naively desired to avoid sexual difference or household roles entirely: “to live her own life, to follow her own profession, whether this was solely domestic or no” (1891, xxiii).

In her introduction, Pennell rehabilitated Wollstonecraft's biography as well as *A Vindication of the Rights of Woman's* arguments for Victorian readers. She utilised first-person narration sparingly to emphasise how well she understood the most contentious parts of Wollstonecraft's history, “As far as we can be certain,” she remarked that Wollstonecraft's friendship with Fanny Blood during her adolescence was her only “passionate love” much before she fell in love with Gilbert Imlay at the age of thirty-two (1891, xiv). Wollstonecraft mentioned, “I think . . . she was doing what she thought was right” residing with Imlay without having a religious ceremony like a marriage (1891, xv). After Imlay abandoned her for another woman, Pennell finally said, “I know of nothing so terrible in fiction as her second attempt at suicide” (1891, xvi). Pennell's interpretation of the psychological underpinnings of *A Vindication of the Rights of Woman's* arguments served as a template for contemporary research on Wollstonecraft, which frequently takes the form of intellectual or contextual biographies (Todd 2000, Taylor 2003, Gordon 2005).

The centennial edition of *A Vindication of the Rights of Woman* published in 1890 by Millicent Fawcett owes a tribute to Pennell's 1884 biography of Wollstonecraft. Similarly, she described Wollstonecraft as a result of the Reformation and rights-based Enlightenment views. She nevertheless purposefully sidestepped the Victorian debates concerning Wollstonecraft's amorous preferences by citing the authority of modern biographical studies: “the facts of Mary Wollstonecraft's life are now so well known through the biographies of Mr. Kegan Paul and Mrs. Pennell, and her memory has been so thoroughly vindicated from the contumely that was at one time heaped upon it, that I do not propose to dwell upon her personal history” (1890).

Fawcett instead examined *A Vindication of the Rights of Woman's* claims and their impact on the women's rights movement: “I have here endeavored to consider the character of the initiative which she gave to the women's rights movement in England, and I find that she stamped upon it from the outset the word Duty, and has impressed it with a character that it has never since lost” (1890, 29–30). Fawcett symbolically connected her work for the ‘movement’ with the concepts of *A Vindication of the Rights of Woman's* because she was the driving force behind the British women's suffrage movement. In addition, she skillfully highlighted Wollstonecraft's combination of ‘rights’ and ‘duties’ in her reading of the book to persuade the conservative members of her audience that it was morally necessary to support women's rights, especially the right to vote. She drew a comparison between the decency of ‘our time’ and the corrupt culture of the eighteenth century, which Wollstonecraft detested (1890). She asserted that *A Vindication of the Rights of Woman* should provide modern readers a ‘pleasing certainty’ of their moral integrity (1890).

While Fawcett, like Pennell, only seldom used the first person in her preface, she frequently cited *A Vindication of the Rights of Woman's* first-person justifications: “I have already quoted her saying, ‘I do not want women to have power over men, but over themselves’” (1890, 29). Fawcett succeeded in identifying herself, her feminist ‘organisation,’ and her conservative culture with *A Vindication of the Rights of Woman's* thundering moral vindication of female self-governance through the use of such concentric circles of first-person argument. In the end, Fawcett transformed Wollstonecraft into a version of herself: she was “the basically womanly woman,” whose insightful thought foreshadowed the admirable Victorian preoccupation with making women's rights consistent with “the motherly and the wifely inclinations” (1890). Fawcett demonstrated her political savings by highlighting how *A Vindication of the Rights of Woman's* imaginative devotion to women's suffrage, professions in medicine, and economic independence mesh well with marriage and family life both inside Wollstonecraft's work and in their ‘own time.’ Eberle observes that Fawcett was more direct than Pennell in linking the ‘movement’ for women's rights to Wollstonecraft's book, but she overlooks the fact that they both used a feminist rhetorical strategy to defend the importance of Wollstonecraft's life and ideals for their conservative cultures (2002).

A number of German studies of Wollstonecraft's life and work were inspired by the 100th anniversary of her passing, notably Bertha Pappenheim's piece *Das Frauenrecht* (1897) and her newly translated German version of *A Vindication of the Rights of Woman* (1899). Pappenheim was a pioneer in the fight for Jewish women's rights and is best known for establishing the Jüdischen Frauenbundes Deutschlands in 1904. Pappenheim is often referred to as ‘Anna O,’ a well-known early example of hysteria that was partially addressed by Freud and Brauer (the originator of the ‘talking cure’). She became a champion for women's rights as a result of her own struggles, particularly in the field of education. Her fascination in Wollstonecraft, whom she regarded as a sort of ‘mother’ figure for the German Jewish women's movement, was also sparked by this (Loentz 2007).

Pappenheim's version of *A Vindication of the Rights of Woman* contained a preface that discussed Wollstonecraft's biography and beliefs, making it just the second German translation of the book since Salzmann's translation in 1793–1744. In it, she portrayed Wollstonecraft as a wilderness prophetic voice who awoke women's collective knowledge of their rights and obligations as human beings: “the first woman who with overwhelming clarity awoke the consciousness in women— and also had the courage to voice— that women have rights, not assumed through raw force or custom, but rather human rights whose basis lies in irrefutable duties” (1899, xiii). She shared Fawcett's interpretation of Wollstonecraft, in which the author theorised both the moral and political means for emancipating women: “the means [Wollstonecraft] anticipated in achieving emancipation, freeing the soul of women, range from duty to law” (1899, xx).



She translated the treatise to make it more understandable, “*the definitions of women’s duties and rights*” with the ‘*vibrant wish*’ that Wollstonecraft would have “*encounter a better overall understanding today than they ever could one hundred years ago*” (1899, xx). Pappenheim wrote about the treatise for women's legacies in the first person plural, saying, “*when we consider the importance of its doctrines, and the eminence of genius it displays, it seems not very improbably that it will be read as long as the English language endures*” (1899, xii). Pappenheim emphasised, as did Fawcett, that Wollstonecraft did not promote women’s rights without highlighting their related home responsibilities. She strangely described Wollstonecraft, who argued against gendered qualities and advocated for a “*revolution in female manners*” (210) that would acknowledge the equality of morality between the sexes—as a “*a woman, lovely in her person, and in the best and most engaging sense, feminine in her manners*” (1899, xiii). Pappenheim purposefully avoided talking about Wollstonecraft’s avant-garde relationships with Gilbert Imlay and William Godwin, mentioning only how her relationship with Henry Fuseli “*awake her womanly senses*” without mentioning the scandal that followed her purported infatuation with this married man (1899, xiv).

Pappenheim expressed the significance of Wollstonecraft’s life and work in allegorical terms that would particularly appeal to the typical German ladies of her time by sparingly drawing from Godwin's Memoirs in her editorial commentary on *A Vindication of the Rights of Woman*, Wollstonecraft survived a challenging upbringing to declare her female identity as a woman while maintaining her independence. In their roles as forerunners of feminist groups, Pappenheim and Fawcett frequently used the political symbolism of Wollstonecraft’s ‘*womanly*’ persona to advance their own causes. To allay public concerns and misunderstandings about their intention to change traditional gender roles along the more egalitarian lines envisioned in the Rights of Woman, they employed Wollstonecraft as the archetypal feminine feminist. In 1904, the Czech translator Anna Holmová brought Wollstonecraft’s *A Vindication of the Rights of Woman* to Prague. She portrayed Wollstonecraft as more of a timeless emotional touchstone than a current theoretical resource for feminist reform in Austria-Hungary, especially in light of the lively philosophical reception of John Stuart Mill’s *Subjection of Women* (1869) by Czech feminists in the 1880s and 1890s (Feinberg 2006, 22–23). She shared Schreiner’s interpretation of the *Rights of Woman*, seeing it as a manifestation of Wollstonecraft’s lived, and ‘*poignantly felt,*’ personal experiences: “*but for Wollstonecraft her ideas are a direct expression of the content of her heart; they are not borrowed but rather poignantly felt. Their significance stands out clearly, when we consider their uniqueness in the course of life back then*” (Holmová 1904, vi). Holmová astutely observed that this methodological approach to feminism, specifically Wollstonecraft’s preoccupation with include the voices and experiences of women in her justifications for human rights, was the source of her well-known critique of Rousseau. It ‘*pains*’ Wollstonecraft, claims Holmová, that Rousseau “*does not speak to women and that he does not even ask of them to realize the task of liberation, that he proclaims*” (Holmová 1904, xi). The great contribution Wollstonecraft made to feminism was her intellectual interest in women's subjective experiences of oppression and longing for freedom from it, which Holmová here makes apparent.

In order to put her modern readers in a sympathetic but remote relationship with the romantically compelling but philosophically out-of-date Wollstonecraft, Holmová employed the first person plural. She recognised Wollstonecraft’s “*Defense of Women’s Rights . . . contains the entire program of feminism, in fact the whole ideological and emotional foundation, from which grows the emancipation effort. It brought its author fame in her homeland and soon, after being translated into other languages, also in other European countries*” (1904, v). She still confined the treatise’s applicability to ‘*our era,*’ claiming that it was ‘*not a revelation*’ in that time (1904, v). The arguments made by Wollstonecraft for women’s rights were now intellectually archaic and politically pointless because they accurately captured the “*rationalistic religion and rationalistic philosophy of her time*” (1904, vi).

Holmová came to the conclusion that Wollstonecraft’s book’s enduring significance resided less in its ‘*philosophical framework*’ and more in its emotional influence over the ‘*sensibility*’ of its modern feminist readers “*With almost an elementary force stands out the sense that a change, a renewal, is necessary,— and in this immediacy, in this desire, lies the significance of this book, which makes up for its logical and stylistic imperfections. It isolates the author from her [female] contemporaries, but connects her with the striving and longing woman of today, who disagrees with the old ways and who demands freedom to try and to look for new ways*” (1904, xvi). The reception of Wollstonecraft at the turn of the century was well-captured by Holmová. New editions of *A Vindication of the Rights of Woman* were upheld in cities from New York and London to Dresden and Prague as a personal and political emblem of the feminist movement’s beginnings and the ongoing battle of women to negotiate the standards of womanhood and women's rights.

CONCLUSION

A variety of feminists used Wollstonecraft’s atypical life experience as a personal model for their own experimentation in, and literary reflections on, love, sex, and marriage, as shown by the well-known study on her reception in the early twentieth century. There is a tone of proof that many intellectuals, like Emma Goldman, Ruth Benedict, and Virginia Woolf, read Wollstonecraft’s contributions to modern women primarily from a biographical and literary perspective. Since the 1970s, various significant biographical studies of Wollstonecraft’s life and literary analyses of her work have been published. However, it was this symbolic



iteration of Wollstonecraft as a personal icon that was most certainly the most influential on feminist researchers of the second wave. But as the comparison of the forewords to *A Vindication of the Rights of Woman* editions from the centenary era shows, we should not ignore the political and philosophical influence of *A Vindication of the Rights of Woman* on first-wave feminists. The clever rhetoric and first-person argumentation of the essay served as a model for nineteenth-century feminists' own observations on how, for the most downtrodden half of the species, the personal is particularly political. Every generation of feminists has gone back to reexamine Wollstonecraft in an effort to reinterpret her significance for the present. In their serious dedication to researching Wollstonecraft's life and unique style of argumentation for their social movements, first- and second-wave feminists frequently missed her sense of humour. Her *A Vindication of the Rights of Woman* might provide the next generation of women's rights activists with a surprisingly amusing starting point for their new style of mimetic, sardonic, and self-referential social criticism.

REFERENCES

1. Anderson, B. (2000). *Joyous Greetings: The First International Women's Movement*. Oxford: Oxford University Press.
2. Adhikari, A. & Saha, B. (2022). Deconstructing Mary Wollstonecraft: Reconstructing Modern Woman, *International Journal of Multidisciplinary Educational Research*, Vol 11, Issue 7(5), 90 – 94.
3. Adhikari, A. & Saha, B. (2022). Contouring Education: Ruminating Mary Wollstonecraft's Thoughts. *IAR Journal of Humanities and Social Science*; 3(4): 12-17, DOI: 10.47310/iarjhss.2022.v03i04.003
4. Botting, E. H. & Christine C. (2004). Wollstonecraft's Philosophical Impact on Nineteenth-Century American Women's Rights Advocates, *American Journal of Political Science*, 48:4 (October), 707–722.
5. Botting, E. H. (2006). *Family Feuds: Wollstonecraft, Burke and Rousseau on the Transformation of the Family*, Albany: State University of New York Press.
6. Botting, E. H. (2013a). Wollstonecraft in Europe, 1792–1904: A Revisionist Reception History, *History of European Ideas*, 39:4 (May), 503–527.
7. Botting, E. H. (2013b). Making an American Feminist Icon: Mary Wollstonecraft's Reception in U.S. Newspapers, 1800 –1869, *History of Political Thought*, 34:2 (Summer), 273–295.
8. Botting, E. H. (2009). A Family Resemblance: Tocqueville and Wollstonecraftian Protofeminism, in *Feminist Interpretations of Alexis de Tocqueville*, (ed.) Jill Locke and Eileen Hunt Botting, University Park: Pennsylvania State University Press, 99–124.
9. Burdett, C. (1994). A Difficult Vindication: Olive Schreiner's Wollstonecraft, *History Workshop*, 37 (Spring), 177–187.
10. Cott, N. (1987). *The Grounding of Modern Feminism*, New Haven: Yale University Press.
11. Deshpande, P. (2008). *Oxford Encyclopedia of Women in World History*, (ed.) Bonnie G. Smith, vol. 1, 4–5. Oxford: Oxford University Press.
12. Feinberg, M. (2006). *Elusive Equality: Gender, Citizenship, and the Limits of Democracy in Czechoslovakia, 1918–1950*. Pittsburgh: University of Pittsburgh Press.
13. Ginzberg, L. (2005). *Untidy Origins: A Story of Woman's Rights in Antebellum New York*, Chapel Hill: University of North Carolina Press.
14. Gordon, L. (2005). *Vindication: A Life of Mary Wollstonecraft*, New York: Harper Collins.
15. Holmová, A. (1904). "Predmluva," in *Mary Wollstonecraft, Obrana Prá v Ž en*, v–xvi, tr. Anna Holmová. Prague: Jan Laichter.
16. Holton, S. S. (2010). To Educate Women into Rebellion: Elizabeth Cady Stanton and the Creation of a Transatlantic Network of Radical Suffragists, in *Globalizing Feminisms, 1789–1945*, (ed.) Karen M. Offen, 36 –50. London: Routledge.
17. Kitts, S. A. (1994). Mary Wollstonecraft's 'A Vindication of the Rights of Woman': A Judicious Response from Eighteenth-Century Spain, *Modern Language Review*, 89:2 (April), 351–359.
18. Landes, J. (1988). *Women and the Public Sphere in the Age of the French Revolution*, Ithaca, NY: Cornell University Press.
19. Loentz, E. (2007). *Let Me Continue to Speak the Truth: Bertha Pappenheim as Author and Activist*, New York: Hebrew Union College Press.
20. Lopez, E. (1901). *El Movimiento Feminista*, Buenos Aires: Universidad de Buenos Aires.
21. Lorch, J. (1990). *Mary Wollstonecraft: The Making of a Radical Feminist*, Oxford: Berg.
22. Offen, K. M. (2000). *European Feminisms, 1700 – 1950: A Political History*, Stanford: Stanford University Press.
23. Offen, K. M. (2010). Was Mary Wollstonecraft a Feminist? A Comparative Re-Reading of *A Vindication of the Rights of Woman, 1792–1992*, *Globalizing Feminisms, 1789–1945*, ed. Karen M. Offen, 5–17. London: Routledge.
24. Pappenheim, B. [as P. Berthold]. (1899). "Einleitung," in *Eine Verteidigung der Rechte der Frau*, by Mary Wollstonecraft, i–xx, tr. P. Berthold. Dresden and Leipzig: E. Pierson's Verlag.
25. Pennell, E. R. (1891). "Prefatory Note," in *A Vindication of the Rights of Woman*, by Mary Wollstonecraft, vii–xxiv, (ed.) Elizabeth Robins Pennell. London: W. Scott.
26. Poovey, M. (1984). *The Proper Lady and the Woman Writer: Ideology as Style in the Works of Mary Wollstonecraft, Mary Shelley, and Jane Austen*, Chicago: University of Chicago Press.
27. Schreiner, O. (1889) (1994). Introduction to the Life of Mary Wollstonecraft and the Rights of Woman, *History Workshop*, 37 (Spring), 188–193.
28. Stites, R. (1978) (1991). *The Women's Liberation Movement in Russia: Feminism, Nihilism, and Bolshevism, 1860 –1930*, Princeton: Princeton University Press.
29. Tagle, J. E. (2005). Discourses on Women's Suffrage in Chile, 1865–1949, *Historia* 38:2 (December), 257–286.
30. Taylor, B. (1997). For the Love of God: Religion and the Erotic Imagination in Wollstonecraft's Feminism, in *Mary Wollstonecraft and 200 Years of Feminisms*, (ed.) Eileen Janes Yeo, 15–35. London: Rivers Oram Press.



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31. Taylor, B. (2003). *Mary Wollstonecraft and the Feminist Imagination*, Cambridge: Cambridge University Press.
 32. Todd, J. (1991). Introduction, in *Mary Wollstonecraft and Mary Shelley, Mary, Maria, and Matilda*, (ed.) Janet Todd, vii–xxvi. New York: Penguin.
 33. Todd, J. (2000). *Mary Wollstonecraft: A Revolutionary Life*, New York: Columbia University Press.
 34. Wollstonecraft, M. (1989). *The Works of Mary Wollstonecraft*, (ed.) Janet Todd and Marilyn Butler, 7 vols. London: Pickering & Chatto.
 35. Wollstonecraft, M. (1798) (1994). *Maria, or the Wrongs of Woman*, (ed.) Anne K. Mellor. New York: W. W. Norton.
 36. Wollstonecraft, M. (1985). *A Vindication of the Rights of Woman*, (ed.) Miriam Brody. New York: Penguin.



EFFICACY OF PRIMARY SCHOOL TEACHERS IN RAGHUNATHPUR OF PURULIA DISTRICT, WEST BENGAL

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ABSTRACT

The all mighty created the man and education shapes him. It is secretly hidden wealth. Education is parmatma and it brings honour and recognition. No amount of wealth can equal education in this world. Every Nation progress with the quality of Education imparted to its citizens. In this modern age of science, education plays an important role in building up of society. Education is the key to national prosperity and welfare. It is recognized as a mirror of the society and educational institution as Society in miniature. Education enables an individual to understand his responsibilities to society and nation and to become ideal citizen. It is a powerful instrument for change in society. "Education is not limited to the imparting of information or training in imparting of information or training in skills. It has to give the educator a proper sense of values".

INTRODUCTION

In present days teachers are themselves conscious of what is expected of them as teachers in the new social order. They are also concerned with innumerable pressures, tensions and worries about their own status in today's society and proper working conditions in their school environments that often divert and distract them from their real aim as teaching. As a result, by and large, they tend to work mechanically just to receive their salaries as a mere labour force. Their dissatisfaction with the working conditions in schools in particular has significant impairing on the quality of their teaching as in turn on the students performance. This cannot as such so deemed as the hallmark of an effective teacher. The teacher is a dynamic force of the school. A school without a teacher is just like a body without the soul, a skeleton without flesh and blood, a shadow without substance. "There is no greater need for the cause of education today than the need for strong manly men and motherly women as teachers for the young." As social engineers, the teachers can socialize and humanize the young by their man-like qualities. The teacher's task is related to our perception of education. The process of education keeps on changing according to the contemporary demands and needs of the society. Therefore, the present teacher has to play different roles, and he has to be a competent professional, a skilled teacher. He is always expected to be an effective communicator, a designer and user of learning resources, learning facilitator and an active participant in community life.

The role of teacher is considered to be important in all stages of education but a teacher has a predominant part to play at the elementary school level because at this level the school students need the constant attention of their teachers. They consider their teachers as the only source of inspiration and guidance to them. So the question of effectiveness of teachers is very important for the students in particular and the society in general. Elementary education as its meaning suggests caters to the most fundamental needs of all the children and its something that man can't do without. Teachers at elementary level need to be best equipped in terms of his ability to help in laying strong foundations for children's personality. Teaching is an act of sharing knowledge, values, understanding skills and competencies by the learned person. For this task the teachers are also expected to possess good personality, favorable attitude towards teaching with a feeling of pride that they belong to teaching profession. A teacher must be aware of the level and interest of their students. What they have to do next may be the part of a teacher's personality.

AN EFFECTIVE TEACHER

In order to identify an effective teacher, the role and contribution of the teacher to the product of education needs to be examined. This entails that good teacher should possess the knowledge of learner's characteristics, learning process, classroom management, requisite skills to be able to contribute significantly to the outcome of educational process which is the growth of



students in the right direction. There are many activities in this respect. The effectiveness of the educational system largely depends upon the active resourceful and competent teachers. An effective teacher not only imparts the entire educational curricula allotted to him in the best and most efficient manner but also ensures the best possible academic performance and an optimum development of the personalities of the students. In the present scenario when there is a fierce competition in every sphere of life, effectiveness of the teachers becomes imperative to empower the students for facing the emerging challenges of global world. Effective teaching is a par excellence attribute of quality education.

“An effective teacher is the one who quite consistently achieves goals, which either directly or indirectly focuses on the learning of their students.”

CHARACTERISTICS OF EFFECTIVE TEACHER

1. Training in Pre-Service Programme -The ultimate aim of teacher education is to prepare effective teachers- teachers who are capable of bringing behavioral changes in pupils under their charge to an optimum level in relation to the input in terms of human energy and material resources expended in the process. Teacher preparation ought to begin with a sound pre-service teacher education program that may transform an individual into a competent and committed professional functionary, fully equipped with an equally comprehensive professional readiness to perform these tasks with perfection and satisfaction.

2. Academic achievements -Academic achievement reveals scholastic performance of the individual in the curricular subjects and shows learning outcomes.

3. Subject matter knowledge - Subject matter knowledge is another variable that one might think could be related to teacher effectiveness.

4. Intelligence - Intellectual teachers will make full use of their knowledge and provide Intelligence, also known as the general mental ability, helps an individual to adjust to the environment and learn from the past experiences. Operationally speaking, intelligence is the ability which helps an individual to succeed in school or in some job.

5. Teachers as a Role Model - Role Models are people who set good examples by the words they speak and by the actions they take. Role Models can be the people you know personally or people you have learned about in the news at school or on television.

6. Teacher's Character - A flower in bloom is loved by all and in this lies its glory. Similarly, man may be viewed as having achieved everything in life when he becomes perfect in character.

7. Teacher's Personality - Every teacher must have a good personality. Radiant, pleasing and impressive personal appearance, refinement, pleasant manners, enthusiasm, drive, initiative, open mindedness etc., are some of the essential traits of an ideal teacher.

8. Teacher's Mental Health -We speak of education as a lamp lighting another lamp, one life making another life and a spirit speaking to another spirit. We can achieve this objective, if the teachers have good mental health. Students develop interest in those subjects, which are taught by pleasing and genial teachers.

9. Teacher's Physical Health - A teacher should possess a sound body along with a sound mind. He should have a sound physical health, physical energy and vitality. This will make him alert, cheerful, happy, dynamic and enthusiastic.

10. Teacher's Emotional Intelligence - Teachers should be emotionally well balanced. Emotionally healthy teacher will not magnify their importance.

11. Social Adjustment - Sociability is another important quality of a teacher. He should have a sound social philosophy and he should make his best contribution to the society. He should know how to adjust himself to the social surroundings in which he lives. He should not be quiet, retreating and introverted. He should be free from worry, anxiety and egotism. He should mix well in society and take a helpful interest in his neighbour.

12. Teacher's Professional Efficiency -The teacher must possess a strong sense of vocation and true devotion to teaching. He should have a genuine love for his calling. For his professional efficiency, he should have knowledge of psychology and educational philosophy, and a clear understanding of aims, contents, methods and materials of instruction, perfect skill and interest in the teaching . He must possess a fair knowledge of national and international current affairs.

13. Teacher's Accountability - Lessinger advocates that each child has a right to be educated in order to become a productive citizen of a country. The parents and the citizens have a right to know the progress of education of their children.

14. Professional Ethics of Teachers - Teachers, who consider their job as a profession, work only for pay cheque. Their work is considered useful for their own sake. Since perchance they have occupied a professional chair they try for their own good, at the cost of others.

• **Towards Students** - It should be teachers primary duty to understand them, to be just, courteous, to promote a spirit of enquiry, fellowship and joy in them, not to do or say anything that would undermine their personality, not to exploit them for personal interests and to set before them a high standard of character, discipline and personality.

• **Towards Profession** -It should be teachers primary duty to be sincere and honest to their work and to go thoroughly prepared to the class, to endeavor to maintain their efficiency by study and other means; not to do or say anything which may lower their prestige in



the eyes of their students; not to write or encourage the use of help books; not to exert any pressure upon their students or their parents to engage private tuition, not to act as an agent or accept commission and other compensation for recommending books.

• **Towards Society** -It shall be teachers' primary duty to set an example in citizenship, to endeavor to promote the public good, to uphold the dignity of their calling on all occasions, to size up the demands and aspirations of the society, to be dynamic leaders when required and to be ideal followers when desired.

TEACHER EFFECTIVENESS

Teachers who inspire and motivate the students are included in the category of "Effective Teachers. Teacher effectiveness plays a pivotal role in the teaching learning process. It, being the hub of the whole programme, needs close observation and critical analysis. It is generally agreed that the "goodness" of an educational system to a great extent is dependent on quality of teachers available to implement it. An effective teacher may be understood as one who helps in the development of basic skills, understanding, proper work habits, desirable attitude and value judgment. Teacher effectiveness concerns with these outcomes and the objectives of education. It points to the effects of a teacher in the classroom situation.

Effective teachers consistently achieve goals that focus on desired outcomes for their students. Teacher effectiveness is encompassed in knowledge, attitudes, and performance.

Knowledge

Teachers have excellent verbal and written communication skills. Teachers have thorough knowledge of the subjects they teach and pedagogical methods for teaching those subjects to students. Teachers know a variety of pedagogical strategies, and when and with which students these are appropriate and likely to be effective.

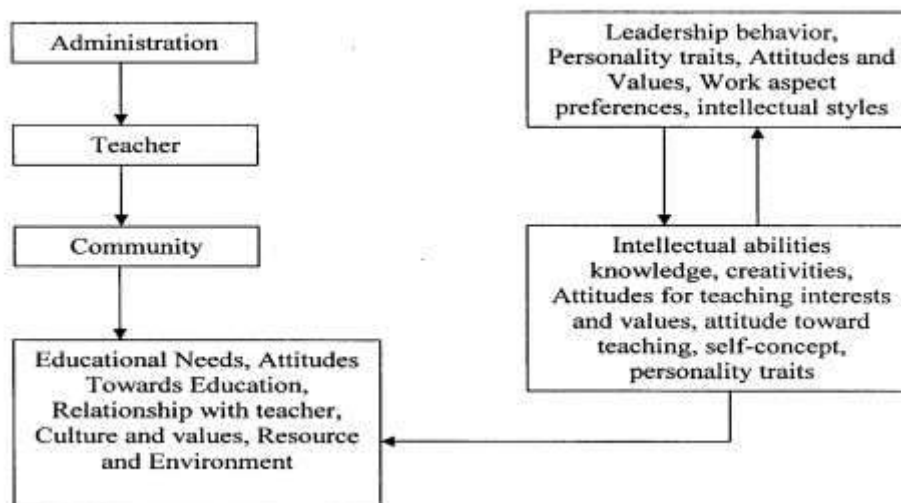
Attitudes

Teachers respect their students regardless of their background, language, or ethnicity. Teachers have high expectations for the learning of all students. Teachers view student errors as a window to their thinking that can be used to improve student learning.

Performance

Teachers' classrooms are well organized, providing an environment that fosters an interest in learning. Teachers develop classroom rules with students and maintain safe and orderly classrooms in which all students are treated fairly and equitably.

A model of Teacher Effectiveness



Factors Influencing Teacher's Effectiveness.

Some of the factors that could have great influence teacher Effectiveness apparently would be : i) Locus of control, ii) Psycho-social maturity, iii) Organizational conflicts iv) Intelligence, v) Academic Back ground, vi) Altitude towards teaching profession, vii) Socio Economic status, viii) Age, ix) Self-Concept, x) Teaching Experience, xi) Professional Training Center, xii) Level of Aspiration, xiii) Climate, and xiv) Job Satisfaction.



REVIEW OF LITERATURE

According to Southern (1974)¹, “An effective teacher is the one who has a sense of humour, ability to understand the students and their problems, ability to explain things clearly so that students can easily understand what is being taught, ability to make any subject interesting to learn, ability to control the class, ability to be ready and willing to help students when they need and ability to be as fair as possible in dealing with students.” In the words of Anderson (1991)², “An effective teacher is the one who quite consistently achieves goal, which either directly or indirectly focus on the learning of the students”.

The most significant factors which influence the quality of education and its contribution to national development are the quality, competence and character of teachers. “Teachers are vital to education and one key element for the facilitation of students learning.” Milan & Darling (1990)³ revealed that teacher effectiveness is the effect that the teacher’s performance has on pupils. Teacher effectiveness depends not only on the competence and performance but also on the responses pupils make. (As cited in Malik, 2005)⁴. American Commission on teacher education (1974) remarked: “the quality of a nation depends upon the quality of its citizens. The quality of its citizens depends, not exclusively but in critical measure, upon the quality of their education. The quality of their education depends, more than any other single factor, upon quality of their teachers.

According to them, an effective teacher is he who has a sense of humour, ability to explain things clearly so that students can easily understand what is being taught, ability to make any subject interesting to learn, ability to control the class, ability to be ready and willing to help students when they need, and ability to be fair as possible in dealing with students.

According to Sheela Mangla, (2001)⁵, “Good teachers show a balance of qualities -continuous growth for excellence, readiness for guidance, set high value standards so that they can equip the children wisely and effectively, they are purposeful whose energies and values are organized and focused on their teaching work; they are thinkers and constructive workers with intellectual bent for achievements; they warm up the students, appreciate their efforts and encourage them to work harder; they have a hunger for vividness, for wholeness and completeness in their ideas, they are sensitive and responsive, they have a conscience and patient and persistently curious.”

Tagore has aptly said, “A lamp can never light another lamp unless it continues to burn its own flame: a teacher can never truly teach unless he is still learning himself.” Pritam Singh (1998) said that, who are: teaching instead of tutoring, checking practices in examinations instead of encouraging them: commanding respect rather than demanding it from their students, observing professional ethics instead of violating it. Such half-backed teachers, who might have had good graduation degrees in their respective subjects, lack the needed professional competence to teach and make pupils good learners and good human beings.

Vijayalakshmi (2002)⁶ conducted a study on factors effecting teacher effectiveness with the objective to find out the effect of some independent variables viz. sex, age, qualification, status of the college, type of college, subject of teaching and designation of the teacher on Teacher - Effectiveness. Sample consisted of 220 lecturers working in degree colleges and colleges of Education.

The main finding was that except age, all variables had no significant impact on the variable under study on teacher effectiveness. Malik (2005)⁷ carried out a study on teacher performance of Senior Secondary School teachers in relation to their job satisfaction and adjustment. The objective was to compare the level of performance of senior secondary school teachers in relation to their age, gender, experience and locality. The sample included 400 senior secondary teachers selected from four districts of Haryana-Bhiwani, Jhajjar, Panehkula and Gurgaon.

Suja (2007)⁸ in a study found that attitude towards teaching, interest in teaching and teaching experience have significant main effect on job commitment of teachers. In other, Usha & Sasikumar (2007)⁹ revealed that teacher commitment is the best predictor of job satisfaction among school teachers. Saxena & Singh (2008)¹⁰ conducted a study on teaching competency of different level teachers with the objective to compare the teaching competency of male and female teachers. A sample of 200 teachers was selected. The result showed that teaching competency of male and female is equal. Sylvester (2010)¹¹ held that the factors like gender, location of institute, educational qualification and years of teaching experience of teacher educators have no impact on their attitude towards teaching profession as well as level of job satisfaction.

Kalra (2010)¹² conducted a study on effect of gender and adjustment on teaching effectiveness of higher secondary teachers with the objective to find out the level of teaching effectiveness of higher secondary school teachers in relation to gender.

SIGNIFICANCE OF THE STUDY

Education is perceived to be a universal phenomenon. It is adequately organized and regulated through formal institution like schools and colleges. There are different factors which determine the quality of education and its contribution to national development. The quality competence and character of teachers are undoubtedly very significant. Nothing is more important than to secure a sufficient supply of high quality personnel to the teaching profession providing them with the best possible professional preparation and to create satisfactory conditions of work to make their teaching more effective. Today the main trust of the whole education system is on “Elementary education” and more so its effectiveness for the all round development of the children. The quality, competence and character of teachers are undoubtedly very significant. Hence, the present study was undertaken to assess the



level of professional commitment of teacher educators and identify the factors responsible for declined commitment and dedication among teacher educators that consequently result in undesirable role played by them in teacher training institutions.

OBJECTIVES OF THE STUDY

- To study the level of Teacher effectiveness of primary school teachers of Raghunathpur Block-1 of West Bengal.
- To study the level of Attitude Towards Teaching of primary school teachers of Raghunathpur Block-1 of West Bengal.
- To study the relationship between the level of Effectiveness and level of Attitude Towards Teaching of primary school teachers of Raghunathpur Block-1 of West Bengal.

METHODOLOGY OF THE STUDY

This present study is based on primary as well as secondary data. The primary data has been collected from 80 teachers with help of questionnaires & survey method. The research tools were administered to 80 teachers of Govt. primary Schools. Before administering the tools, the investigator went to the randomly selected 28 different primary Schools which were situated in Raghunathpur- block1 and contacted the principals of Govt. schools to obtain permission for collecting data from their teachers. The secondary data also collected from, books journals, articles and internet. The collected primary data has been analyzed with help of SPSS tools.

DATA ANALYSIS AND INTERPRETATION

Table No-1: Demographic profile of the Respondents

Gender	Male	Female	Total
	40 (50.00%)	40 (50.00%)	80 (100.00)
Teaching Experience	Less than 10 Years	More than 10 Years	
	27 (33.75)	53 (66.25)	80 (100.00)
Age	Less than 45 Years	More than 45 Years	
	33 (41.25)	47 (58.75)	80 (100.00)

From this table it is clear that, both male and female Primary School Teachers were 50% and 50% Respectively in Raghunathpur Block-1 of West Bengal. In case of the Experience of teacher, Both more than 10 years and less than 10 years Elementary School Teachers were 66.25% and 33.75% respectively. On the basis of age, Both more than 45 years and less than 45 years Elementary School Teachers were 58.75% and 41.25% respectively.

Effectiveness of Elementary School Teachers

The analysis of total sample on teacher effectiveness was done to have picture of the existing level of Teacher Effectiveness among the Government Elementary Teachers of Raghunathpur Block-1 of West Bengal. The total scores obtained by the teachers, their mean and standard deviation are as shown in Table.

Effectiveness of Elementary School Teachers

N	Variables	No. of items	Mean	S.D.
80	Teacher Effectiveness	18	122.60	18.16

Table 2 shows that the mean score and standard deviation of teacher effectiveness are 122.60 and 18.16 respectively. As the obtained mean score falls in the average i.e. average effective, this can be interpreted that elementary teachers of Raghunathpur have been found to be 'average effective' in their level of effectiveness as teachers.

**Comparison of Effectiveness of Demographic profile and Elementary school teachers.****Mean, SD and t-value of Effectiveness of Demographic profile of elementary school Teachers**

Groups	N	Mean	S.D.	t-value
Male	40	112.99	14.94	0.38(N.S.)
Female	40	112.22	17.45	
More than 10 Years	53	121.32	16.61	2.20 (N.S.)
Less than 10 Years	27	79.35	14.69	
Teachers having age 45 years and more	47	114.40	12.87	0.78 (N.S.)
Teachers having age less than 45 years	33	104.97	14.31	

The mean scores of male and female teachers on composite scale were found as 112.99 and 112.22 and S.D. as 14.94 and 17.45 respectively. Since mean scores fall in 'average effective' teachers by their means. Both the groups were found to be almost equal in their effectiveness as teacher, though with a marginal difference in favour of the male teacher (by +.77 mean difference) which may be due to sampling error. The calculated t-value between these two groups 0.38 being less than the table value of 't' at 0.05 level of significance.

Table also shows that t-value of effectiveness of elementary school teachers having teaching experience of 10 years and more with those having teaching experience of less than 10 years is significant at 0.05 level, further it reveals that mean effectiveness score of elementary school teachers having teaching experience of 10 years (121.32) is higher than the mean effectiveness score of elementary school teachers having teaching experience of less than 10 years (79.35) by +5.97, which means that experienced teachers are more effective in teaching than less experienced teachers, even though both of them belongs to 'average effective' teachers by their means.

The above Table reveals that t-value 0.78 for difference in the mean scores of the teachers of the age 45 or more with those of the teacher having age less than 45 years is not significant at 0.05 level of significance. The mean scores of teacher having age 45 or more years, is 114.40 which is higher than the mean scores of teachers having age less than 45 years which is 104.97. Even though both of them belong to 'average effective' teachers, though with a difference of +3.43 mean in favour of the elder group.

SUMMARY

Education is recognized as a mirror of the society and educational institution as Society in miniature. Education enables an individual to understand his responsibilities to society and nation and to become ideal citizen. It is a powerful instrument for change in society. The all mighty created the man and education shapes him. It is secretly hidden wealth. Education is parmatma and it brings honour and recognition. No amount of wealth can equal education in this world. Every Nation progress with the quality of Education imparted to its citizens. In this modern age of science, education plays an important role in building up of society. Education is the key to national prosperity and welfare. It is recognized as a mirror of the society and educational institution as Society in miniature. Education enables an individual to understand his responsibilities to society and nation and to become ideal citizen. The overall level of Attitude Towards Teaching of Govt. primary School teachers of Raghunathpur has been found to be average, which is consistently sustained along all the Attitude Towards Teaching factors chosen for the study i.e. by gender, age, as well as by teaching experience.

REFERENCE

- ¹ Somers, L.G. and Southern, M.L.(1974), "A Rating Scale for Evaluation of Teaching Effectiveness for Use with Junior High School Students." *Journal of Educational Research*, May, Vol. xxv, No.3, PP. (128-133).
- ² Anderson, Lorin W. (1991). "Increasing teacher effectiveness", UNESCO, Report.
- ³ Millan, J & Darling, H.L. (1990), "The New Hand Book of Teacher Evaluation", Corwin Press, Iric.USA.
- ⁴ Sharma, H. L & Malik, D. (2005) *Effect of gender and locality on classroom performance of senior secondary school teachers of Haryana. MDU, Research Journal Vol-4, No-1.*
- ⁵ Sheela Mangala (2001), "Teacher Education - Trends and Strategies", Radha Publications New Delhi.
- ⁶ Vijayalakshmi, G. (2002) *Factors effecting teacher effectiveness. EduTracks Feb. 2002 Vol. I No-5, pp. 35-38.*
- ⁷ Malik, D. (2005). *A Study on Teacher Performance of Senior Secondary School Teachers in Relation to their Job Satisfaction and Adjustment. Unpublished Ph.D Thesis, M. D. University, Rohtak*



- ⁸ Suja, K. (2007). *Interaction effect of attitude towards teaching, interest in teaching and teaching experience of job commitment of primary school teachers. M.Ed Thesis. University of Calicut.*
- ⁹ Usha, P. & Sasikumar, P. (2007): *Teachers "commitment and teachers, selfconcept as predictors of job satisfaction. Edutracks 6, 1,26-29.*
- ¹⁰ Saxena, J. & Singh, S. P (2008) *A study of teaching competency of different level teachers. Psycho Lingua 2008, 38(lpp 76-78)*
- ¹¹ Sylvester, J. M. (2010) *Attitude towards teaching profession and job satisfaction of teacher educators. Edutracks 9, 8, 36-38.*
- ¹² Kalra, R.K. (2010). *Effect of gender and adjustment on teaching effectiveness of higher secondary teachers. Indian Psychological Review 74(3) pp. Mine.*



THE ANALYSES OF CHRONOTOPE OF THE ROAD IN JOHN STEINBECK'S NOVEL "THE GRAPES OF WRATH"

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ABSTRACT

This article deals with Mikhail Bakhtin's concept of the literary chronotope to an analyses of depiction of the road travel in John Steinbeck's novel "The Grapes of Wrath" (1939). The analyses illustrates how the work positions itself in relation to the genre of road narratives. The article further observes how the road chronotope is characterized by a detachment between place and time and contributes to figure out some dilemmas associated with American road genre.

KEY WORDS: *Chronotope, space and time, genre, chronotope of the road, physical space, concept, geographical space, chronotopical characteristics, physical space.*

INTRODUCTION

The chronotope is the place and time where the notes of narrative are tied and united. It can be said without qualification that to them belongs the meaning that shapes narrative [1]. In other words we can call them as "organizing center" for the events of the novel or a film. Chronotope directly will effect to the genre of the narration. **Each literary work involves variety of genres chronotopical characteristics** combining specific senses of pace and time . The use of chronotope may help us to precisely capture that particular trend of studies of the text and context [2].

By the aid of the time-spaces the narrator will easily draw the focus of the reader to the multiple past, present or imagined future. For instance, if the scene of narration occurs in the "road" in the mind of the reader unconsciously will appear the images of **path** that the protagonist is going to reach to some destination. Consequently, the chronotope is the clue that hints where and when the events of narration occurs.

The chronotope of the "road" has been widely used in literary studies . Bakhtin in his discussion of specific kinds of chronotope identifies " the chronotpe of the road" of one of the most enduring in Western literature(Bakhtin, 1981;244).In narratives containing the road chronotope, the protagonist undertakes a journey, in which the distance travelled typically stands in stable relation to the amount of the time elapsed. The protogonist's travel are often paralleled by a metaphorical inner journey, where "the choice of a real itinerary equals the choice of the " path of life" (Bakhtin 1981: 120)

Bakhtin demonstrates some examples of chronotope of the road with Apuleius' "The Golden Ass" , in which the hero Lucius is transformed into a donkey and wanders in search the road to return to his original state, acquiring new prospectives on Roman society along the way.[3]

The scholar Timo Muller considers that analyses of chronotope emphasizes the environmental dimension of the narration as it draws the attention to the concrete physical spaces in which stories take place. Muller analyses the chronotope of the **road** which for the conception of the Bahktin was means of the meeting place , however in modern literature no longer brings people together in this way, because of the means of transportation have altered the way we perceive the chronotope of the road. Nowadays, as Muller considers, car drivers want to minimize the time they spend on the journey. They are interested in the road as physical space, the natural environment around the road, or the environmental implications of their driving [4]

We can see a clear contrast with earlier literary examples such as Robert Frost's poem " The road not taken" or John Steinbeck's novel "The Grapes of Wrath", where the road is described as a part of the natural environment and travelers are interested in that environment.

METHODS AND RESEARCH

In the following article we will discuss and analyze the chronotope of the road throw the examples given in "The Grapes of Wrath".



“The Grapes of Wrath” is a novel depicting the life path of American migrants which considered as a road novel. This novel is a brilliant example of how the author used the chronotope of the road to emphasize protagonists feelings by demonstrating the mixture of the space and time.

In the novel Steinbeck tries to illustrate the hard conditions in which the family of farmers like the Joads needed to endure during the Dust Bowl. The all novel is centered to the open road that Joad family had to take and that voyage in the open road from Oklahoma to California could have been how the American dream was formed by the disastrous conditions that was occurring during that time.

The road the migrants take to California is too difficult for a person to travel even today. “Highway 66- Historic Route 66” can be pretty rough for modern means of transportation, but this road was a will for living, hope for future. The road of Oklahoma had become the path of despair, but the road leading to California seemed like a Heaven promising work and prosperity.

“Highway 66 “is the main migrant road. 66 the long concrete path across the country waving gently up and down on the map, from the Mississippi to the Bakersfield – over the red lands and grey land twisting up in to the mountains crossing the Divide and down into the bright and terrible desert and across the desert to the mountains again into the rich California valleys .” (John Steinbeck, 156)

From the given extract the reader can easily imagine the flow of migrants, their sweat, their hardship. The author masterly depicted the chronotope of the road, visualizing each elements of the road so purely. Only by the aid of this passage the reader comprehends how the road of life of the protagonist was full of battle, difficulties and thrust for beautiful life.

“66 is path of people in flight , refugees from dust and shrinking land, from the thunder of tractors and shrinking ownership , from the desert’s slow northward invasion, from the twisting winds that howl up out of Texas, from the floods that bring no richness to the land and steal what little richness is there. From of all these the people are in flight, and they come into 66 from the tributary side **roads**, from the wagon tracks and the rutted country roads. 66 is the mother **road, the road of the flight.**” (John Steinbeck, 156)

The following extract depicts the life path of the protagonist of that time, how they were bored of the problem of the shrinkage of the land, from the dust and even the thunder of tractors. It seems the road 66 would give a hope to refuge all the problems and live a happy life without above mentioned problems.

“The people in flight streamed out on 66, sometimes a single car, sometimes a little caravan. All day they rolled slowly along the **road**, and at night they stopped near water. In the day ancient leaky radiators sent up columns of steam, loose connecting rods hammered and pounded. And the men driving tucks an the overloaded cars listened apprehensively. How far between towns ? It is a terror between towns . If something breaks – well, if something breaks we camp right here while Jim walks to town and gets a part and walks back and – how much food we got?.....’ F we can get to California where the oranges grow before this here ol’ jug blows up “(John Steinbeck, 157)

The details of this passage stress the difficulty and precariousness of the protagonists’ journey on the road 66. They must be aware of every hustle, noise which might signal a vast problem that could lead to misfortune in their desperate journey. The constant worry about money and food grinds them down. Here Steinbeck shows his sympathy to the migrants and emphasizes how their path of destiny was full of sorrow and misfortune. But the symbol of the ” orange” again gives them hope for going on their journey on the open road in the search of better life.

RESULTS AND DISCUSSIONS

The novel “The Grapes of Wrath”(1939)is a sort of work that Steinbeck combines the elements of geographical space with the road chronotope. He combines the narrative elements of the road, geographical space, the space of nature, the space of heroes and urges his heroes to move forward. John Steinbeck uses spatial details like the scene of the road, the scene of the journey, the scene of the desert, the scene of the earth. All these details are connected to each other with the road chronotope as all events in the novel occurs in the open road. The will for the promised “Heaven” makes the Joad’s get ready for the road. The Joad family have a faith that moving to California will tackle all the problems what they have , since this land seems to be a truly paradise, where there is an abundance of food supply and a chance having a good job.

By the usage of highway-roads the author wanted to add a panoramic picture of reality. In this he follows the traditions of M. Twain and J. London. Later, this chronotope is used by D. Kerouac in the novel “On the road” (1957), in which allusions to the book “The Grapes of Wrath” are clearly traced. [5]

In the novel the roads crossed with desert. Here deserts illustrates the border of the old and new lives, destinies of the protagonists. Crossing the roads beyond deserts is too hard for old people and even takes the lives of many of them, but it also urges them to go on and increases their will power.

Many other examples can be found in “The Grapes of Wrath” and each time the open road serves to represent adventure, discovery, escape, freedom, rebellion and often upon the myth of the West about existing utopian society that promising better standard of life. The chronotope of the road in the novel offers a pure critique of the existing society where the protagonists try to find the right way by taking to the road .



REFERENCES

1. Auge' Marc, 1995. *Non-Places: Introduction to an Anthropology of Supermodernity*. Trans. By John Howe. London: Verso.
2. Alexandra Ganser, Julia Puhlinger, Markus Rheindorf, 2006. *Bakhtin's Chronotope on the Road: Space, time, and Place in Road Movies since the 1970's*, *Facta Universitatis*, pp. 1-17
3. Bakhtin Mikhail, 1981. *The Dialogic Imagination: Four Essays*. Trans. By Caryl Emerson and Michail Holquist. Austin: University of Texas Press
4. Enevold, Jessica, 2002. "Men and Women on the Move: Dramas of the Road " *Collusion and Ressistance: Women writing in English*. Ed
5. John Steinbeck, 1939, "The Grapes of Wrath"
6. Julie Hansen, Uppsala and Dalarna University. *Space , time, plane travel in Walter Kirn's novel Up in the air*, 1-10 pp
7. <http://people.kzoo.edu>
8. <http://library.um.edu.mo>
9. <http://core.ac.uk>
10. [www. Cairn.info/revenue –management -2013](http://www.Cairn.info/revenue-management-2013)



CUSTOMER SEGMENTATION USING MACHINE LEARNING

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ABSTRACT

RFM (Recency, Frequency, Monetary) analysis is a method to identify high-response customers in marketing promotions, and to improve overall response rates, which is well known and is widely applied today. Less widely understood is the value of applying RFM scoring to a customer database and measuring customer profitability. RFM analysis is considered significant also for the banks and their specific units like online shopping. A customer who has visited an online shopping site Recently (R) and Frequently (F) and created a lot of Monetary Value (M) through payment and standing orders is very likely to visit and make payments again. After evaluation of the customer's behaviour using specific RFM criteria the RFM score is correlated to the online shopping, with a high RFM score being more beneficial to the online shopping as well as in the future. Data mining methods can be considered as tools enhancing the online shopping RFM analysis of the customers in total as well as specific groups like the users of online shopping.

KEYWORDS-*Data Mining online shopping, RFM analysis, Clustering*

I. INTRODUCTION

In recent years, there has been a massive increase in the competition among firms in sustaining in the field. The profits of the company can be improved by a customer segmentation model. Customer retention is more important than the acquisition of new customers. According to the Pareto principle [12], 20% of the customers contribute more to the revenue of the company than the rest. Customer segmentation can be performed using a variety of unique customer characteristics to help business people to customize marketing plans, identify trends, plan product development, advertising campaigns and deliver relevant products. Customer segmentation personalizes the messages of individuals to better communicate with the intended groups.

The most common attributes used in customer segmentation are location, age, sex, income, lifestyle and previous purchase behavior. Here, segmentation is done using behavioral data since it is commonly available and continuously evolving with time and purchase history. RFM (Recency, Frequency, and Monetary) analysis is a renowned technique used for evaluating the customers based on their buying behavior. A scoring method is developed to evaluate scores of Recency, Frequency, and Monetary. Finally, the scores



of all three variables are consolidated as RFM score ranging from 555 to 111 [11] is used to predict the future patterns by analyzing the present and past histories of the customer. In this context, it has been observed that the scores of three factors Recency, Frequency and Monetary directly proportional to customer's lifetime and retention. Once the values of recency, frequency and monetary are calculated, the K-Means algorithm is applied to the variables to clusters of the customer base. The behavior of each cluster is analyzed to find the group of customers who give more profits to the company. Similarly, clustering is performed using two other algorithms namely, Fuzzy C – Means clustering and the proposed method with chosen initial centroids in the existing K– Means algorithm. The motivation of the paper is to propose a method for choosing initial centroids for K-means algorithm and to impose the method to segment the customer with reduced iteration and time. Now that clusters of customers are found, it is necessary to understand the differences between these groups of customers. A thorough analysis is performed on the clusters to aid in finding the targeted customers and bestows them with appropriate promotions and offers. Also, a novel Repetitive Median based K-Means algorithm is proposed with an intension to reduce the number of iterations than the traditional clustering algorithms.

II. LITERATURE REVIEW

TABLE I - Literature Review

Reference No.	CHARACTERISTICS	DISADVANTAGES	ENHANCEMENTS PERSPECTIVE
[1]	<ul style="list-style-type: none"> Image conversion, pre processing - HOG Feature Extraction. Implementation of various other machine learning algorithms. 	<ul style="list-style-type: none"> Health and beauty company RFM analysis + K means clustering 	To propose a model that clustered customers into segments according to RFM.
[2]	<ul style="list-style-type: none"> Inclusion of image segmentation. SVM and Naive Bayes classifiers used 	<ul style="list-style-type: none"> A sample of 369 from the population 5939 Hotel customers RFM analysis + K means clustering. 	<ul style="list-style-type: none"> Aim to segment hotel customers Eight clusters were obtained according to their RFM score Loyal customers, loyal summer season customers, collective buying customers
[3]	<ul style="list-style-type: none"> Multiple machine learning classifiers used. Higher levels of accuracy achieved with deep learning models. Used CNN classifier instead of regular SVM 	<ul style="list-style-type: none"> A real data from a Chinese company RFM analysis + K means clustering + Decision tree 	<ul style="list-style-type: none"> To propose a model to accurately predict monthly supply quantity, using the RFM approach To select attributes to cluster customers into different groups.
[4]	<ul style="list-style-type: none"> Inclusion of image segmentation. SVM and Naive Bayes classifiers used 	<ul style="list-style-type: none"> Useful only in Retailing sector RFM analysis + K means clustering + Association rule 	<ul style="list-style-type: none"> Suggested a approach of customer classification.
[5]	<ul style="list-style-type: none"> Segmentation and analysis of the image is done. RaspberryPi module used. 	<ul style="list-style-type: none"> .Context: Iran Data from 250 bank customers. FM analysis + Two step clustering 	<ul style="list-style-type: none"> Aim only to identify the main clusters of bank customers in order to help classifying customers. To create more efficient customer strategies.



III. PROPOSED SYSTEM

Before focusing on customer segmentation, a question might arise as, why it is necessary to segment the customers? Because it is not possible to treat every customer the same, the customers will shift to a better option. Customers with experience on being available over various platforms will develop new tastes and that might grow into their personality to adapt. It is wise to adapt different initiatives in order to counter such. But there are very standard and effective segmentation procedures available. Here, implementation is done using one of them to a business. RFM,

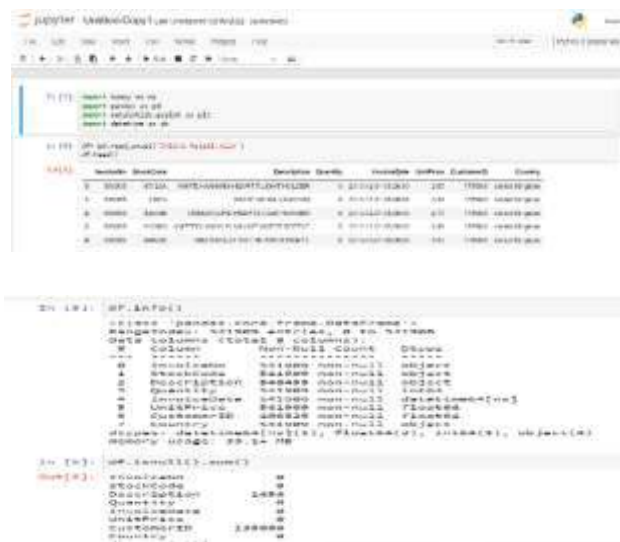
- Low Value: fewer active customers, very less frequent buyer/visitor the others and add very small or zero or sometimes even negative revenue.
- Mid Value: These are the grey area customers. They invest not too much and not too high and are frequent and add decent revenue.
- High Value: They produce high revenue in a company are frequent and hardly unavailable. The kind of not worth losing.

The proposed methodology can be broadly divided into 4 steps Step-1 is calculating Recency, Frequency, and Monetary Value. Step-2 is applying a machine learning algorithm that is unsupervised for detecting imique groups or clusters for each class segment, Step-3 is selecting a Machine Learning Model, and Step-4 is building and running the machine learning model. The analysis done in RFM (recency, frequency, and monetary values) model divides customers that are important on the basis of consumption of service by customers, the frequency of their visit and the amount of investment they introduce to the company. These act as the three variables which are separated from a huge chunk of database. Thus, the loyalty value of customers is obtained from recency, frequency and monetary value of customers. Hence considering Recency, Frequency, and Monetary value as the three criteria for getting the loyalty value of customers is the RFM model. The elaborated definitions would be,

Recency of last purchase (R): The interval between the latest buying and the present time of a customer is represented by it. The recency value increases if the interval value decreases,

Frequency of purchase (F). The time period of buying for a customer within a particular interval like twice in a week, once in a year is represented by Frequency. The value of F increase if the number of transactions within a specific interval increase too, Monetary value of the purchase (M): The monetary value is the purchases value of a service or a product in a specific time period. The value of M increases with the value of monetary.

IV. DATA PREPARATION





The image shows a screenshot of a data analysis tool displaying several tables of customer data. Each table has columns for Revenue, Frequency, Monetary, R_Score, F_Score, M_Score, and RFM_Score. The data is organized into multiple sections, likely representing different customer segments or time periods. The tables contain numerical values for each metric, and the overall layout is typical of a data visualization or reporting software interface.

VI. FUTURE WORKS

A case study was carried out using the datasets collected within two years period by a sports store in Turkey through its e-commerce website. According to experimental study results, the proposed approach provides better product simple recommendations, by considering several parameters together; the customer's segment, the current RFM values of the customer, potential future customer behaviour, and products frequently purchased together.

VII. CONCLUSION

There is a vital role in customer segmentation for retail companies, Better segmenting of customers is pivotal in reaching a company's sales target. Companies get a better understanding of the target market if the customers that have equivalent requirements, necessities and behaviour are grouped together. Thus, companies could reevaluatethe current course ofaction and develop a new method for better sales, such as; update marketing, price management, promotions, building extra customer touchpoints, etc.

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**REFERENCES**

1. Etzion, O., Fisher, A., & Wasserkrug, S. (2004, Walk), *e-CLV: a modeling approach for client lifetime assessment in e-commerce spaces, with an application and case consider for online barbers*. In *innovation, e-Commerce, and e-Service, 2004. IEEE04. 2004 IEEE Worldwide Conference on* (pp. 149-156). IEEE,
2. Cui, G., Wong, M. L. & Lui, H. K. (2006). *Machine learning for direct marketing response models: Bayesian networks with evolutionary programming*. *Management Science*, 52(4), 597-612
3. Chen, Y. S., Cheng, C. H., Lai, C. J. Hsu, C. Y., Syu & H. J. (2012). *Identifying patients in target customer segments using a two-stage clustering-classification approach: A hospital-based assessment*. *Computers in Biology and Medicine*, 42(2), 213-221.
4. He X., Li, C., 2016. *The research and application of customer segmentation on e-commerce websites*. In: *2016 6th International Conference on Digital Home (ICDH), Guangzhou*, pp. 203-208. doi:10.1109/ICDH.2016.050.
5. Cho, Young, Moon, S.C., 2013. *Weighted mining frequent pattern-based customer's RFM score for personalized u-commerce recommendation system*. *J. Converg*: 4, 36-40.
6. Zahrotun, L., 2017. *Implementation of data mining technique for customer relationship management (CRM) an online shop tokodipers.com with fuzzy e-means clustering*. In: *2017 2nd International conferences on Information Technology, Information Systems and Electrical Engineering (ICITISEE), Yogyakarta*, pp. 299-303.
7. Sheshasaayee, A., Logeshwari, L., 2017. *Efficiency analysis of the TPA clustering methods for intelligent customer segmentation*. In: *2017 International Conference on Innovative Mechanisms for Industry Applications (ICIMIA), Bangalore*, pp. 784-788.
8. Lu, H., Lin, J. Lu., Zhang, G., May 2014, *A customer churns prediction model in the telecom industry using boosting*. *IEEE Trans. Ind. Inf.* 10 (2), 1659-1665.
9. Jiang, T., Tuzhilin, A. March 2009. *Improving personalization solutions through optimal segmentation of customer bases*. *IEEE Trans. Knowledge Data Eng.* 21 (3), 305-320. <https://doi.org/10.1109/TKDE.2008.163N>.
10. Shab. S., Singh. M., 2012. *Comparison of a Time Efficient Modified K-mean Algorithm with K-Mean and K-Medoid Algorithm*. In: *2012 International Conference on Communication Systems and Network Technologies, Rajkot*, pp. 435-437.
11. G. Yu and M. Haiying, "Customer Segmentation Study of College Students Based on the RFM," in *International Conference on E-Business and E-Government, Guangzhou, China, 2010* pp. 3860-3863. doi: 10.1109/ICEE.2010.968.
12. Srivastava, R. (2016). *Identification of customer clusters using RFM model: a case of diverse purchaser classification*. *International Journal of Business Analytics and Intelligence*, 4(2), 45-50.



HOMOTOPY GROUP OF SPHERES, HOPF FIBRATIONS AND VILLARCEAU CIRCLES

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ABSTRACT

Unlike geometry, spheres in topology have been seen as topological invariants, where their structures are defined as topological spaces. Forgetting, the exact notion of geometry, and the impossibility of embedding one into other, the homotopy relates how one sphere of i dimensions can wrap another sphere of n dimensions.

METHODOLOGY

Depending on the pattern, the relation can be of three types, $i = n$, $i < n$ or $i > n$. Each of them has their affine properties and uniqueness that defines homotopy in the mathematical field of algebraic topology. The most important part of homotopy is the Hopf fibrations where $i > n$ and there a special type of mapping and stereographic projection takes place which can be justified by the relation $S^1 \rightarrow S^3 \rightarrow S^2$. S^1 is a 1-sphere or a circle which when which exists in the form of points inside the 2-sphere, and the mapping, that transforms, the 3-sphere to the 2-sphere, where each point of 2-sphere acts as a circle in 3-sphere, generates in turn the third homotopy group of the 2-sphere that is^[1-5],

$$\pi^3(S^2) = \mathbb{Z}, \quad \text{where } \mathbb{Z} \in \mathbb{R}$$

If we assume that the stereographic projections that is made by the transform mapping $S^1 \rightarrow S^3 \rightarrow S^2$ where the third homotopy groups fiber is a 3-dimensional torus of surface area $2\pi R \times 2\pi r$ then along with the 2-circles, the major R and minor r there exists also a pair of circles produced by cutting the torus analytically at a certain angle produces a pair of circles called Villarceau cir-



cles where they meet all the latitudinal and longitudinal cross sections of the torus at a point of the minor radius being the locus of the torus where the other 3-circles intersected and passed through^[4,8,9-15].

The n dimensional sphere is known as S^n which is defined geometrically as a set of points $n + 1$ in the Euclidean space E^n with a distance 'unit' from the origin. The $\pi^i(S^n)$ or the homotopy group of degree i denotes a continuous mapping from a S^i sphere to a S^n sphere. What exactly is preserved in this mapping are the equivalence class, a class where the Abelian groups are attached to topological spaces, that in turn generates an 'addition' operation over this classes^[5-13].

There exists 3 regimes depending upon the fact whether $i = n$, $i < n$ or $i > n$ that I will summarize below^[9-19];

- [1] The trivial homotopy group exists in the mapping of $0 < i < n$ where the mapping maps all of S^i to single points of S^n which can also be termed as continuously deformable in terms of the mapped surface.
- [2] For, $i = n$ there exists a degree by which it can be determined that, how many times a sphere is wrapped around itself in the form of the mapping. To ease out, this type of mapping is non-trivial and it can be denoted as an integer $\pi^n(S^n) = \mathbb{Z}$, where $\mathbb{Z} \in \mathbb{R}$ where a continuous mapping of every point on the first circle is mapped to the second circle, where, the point on the first circle rotates around it, then the point on the second circle has already moved several times depends upon the degree of the mapping.
- [3] The third mapping is the most important mapping where $i > n$ and can be treated as a Hopf fibrations where the mapping occurs in a non-trivial fashions, depending on these dimensions by Adams's theorem as;

$$\begin{aligned} S^0 &\rightarrow S^1 \rightarrow S^1 \\ S^1 &\rightarrow S^3 \rightarrow S^2 \\ S^3 &\rightarrow S^7 \rightarrow S^4 \\ S^7 &\rightarrow S^{15} \rightarrow S^8 \end{aligned}$$

Hopf fibration is also known as Hopf bundle or Hopf map which is actually, a fiber bundle constructed over a topological spaces where E, B, F be the elements, the fiber bundle is then denoted by;

$$F \rightarrow E \rightarrow B$$

Where $p: E \rightarrow B$ satisfies the following results^[7,15,20];

- If we say E is the total space, where B is the base, F is the fibre then E is the fibration over B with fibre F .
- $p^{-1}(b) \cong F$
- $\forall b \in B \exists$ there is a neighborhood U of b , in a way $p^{-1}(U)$ is homeomorphism (surjective, injective, hence bijective) to $U \times F$ via $\delta: U \times F \rightarrow p^{-1}(U)$
- We have $p \circ \delta = \pi$ where $\pi: U \times F \rightarrow (U)$ is the projection of $U \times F$ into U .

Since in the long exact sequence $\dots \rightarrow \pi_i(F) \rightarrow \pi_i(E) \rightarrow \pi_i(B) \rightarrow \pi_{i-1}(F) \dots$ the group homomorphism $\pi_i(S^1) \rightarrow \pi_i(S^3)$ the mapping collapsed as there is only a deformed point from $S^1 \rightarrow S^3$ breaks into short exact sequences $0 \rightarrow \pi_i(S^3) \rightarrow \pi_i(S^2) \rightarrow \pi_{i-1}(S^1) \rightarrow 0$ which can give to split isomorphisms as^[1-6];

$$\pi_i(S^2) = \pi_i(S^3) \bigoplus \pi_{i-1}(S^1)$$

As $\pi_{i-1}(S^1)$ vanishes for i in atleast 3 the element $\pi_i(S^2)$ and $\pi_i(S^3)$ are totally isomorphic when i is atleast 3. Thus split by suspension homomorphism occurs^[9-12].

What has been developed as a fundamental technique and uniquely focused area of research is the computation of positive k for the homotopy group $\pi_{n+k}(S^n)$ where it is independent of n for $n \geq k + 2$ and is known as the stable homotopy group of spheres and has been computed upto the maximum value of k as 64. On an existing ring R these groups forms the stable coefficients of extraordinary cohomotopy theory. However, the unstable value has been computed and quite erratic upto the value of $k < 20$. Adams spectral sequence is an important technique for computing stable homotopy groups, while most modern computations came from Jean-Pierre Serre.

To describe the n - sphere, it is notable to mention some of its properties for the sake of homotopy, note that, it is a sphere, not a solid ball^[7,8,14,20].



- Any 2-sphere occupies the E^3 space and has the equation form $x_0^2 + x_1^2 + x_3^2 = 1$ with a distance from equal point from the centre as implicit sphere. However, this can be generalizes to spheres of $n - dimensions$ in the equation forms $x_0^2 + x_1^2 + x_3^2 \dots \dots \dots + x_n^2 = 1$.
- Any Disc contained within the circle by the inequality relation $x_0^2 + x_1^2 \leq 1$ which produces the rim (or the circumference) of the circle S^1 having the equation form $x_0^2 + x_1^2 = 1$. Now, think of a balloon, inflated with air, just punctured it and you will get a disc, close the puncture with a drawstring and the repair that you will get is D^2/S^1 generalizes to D^n/S^{n-1} producing S^n . This is called disc with collapsed rim. Take the points lying on the boundary of the Disc and glued it above the rim D^1 in the Northern Hemisphere, while doing the same in the Southern Hemisphere then what will be produced is a *CW Complex*.
- The last one is the most important and known as the suspension of the equator. If we take all the points on the equatorial plane and extends it upwards and downwards in NH and SH then, what we get is 2-Hemispheres and for each positive integer n the topological space can be written as $\sum S^n$ with the $n - sphere$ $x_0^2 + x_1^2 + x_3^2 \dots \dots \dots + x_n^2 = 1$ has the equator $x_0^2 + x_1^2 + x_3^2 \dots \dots \dots + x_{n-1}^2 = 1$ with the suspension $\sum S^{n-1}$ produced on S^n .

In terms of open sets, the essence of homotopy group, is that, it preserves continuity relations. One is topologically mapped to other. The first of the fundamental (homotopy) group, is a path connected topological space that is $\pi_1(X)$ where mapping is done from a pointed circle (S^1, s) to the pointed space (X, x) where the map is being bijected from s into x . These maps established under equivalence classes keeping the base point x fixed, where a continuous map has been made called as null homotopic $S^1 \mapsto x$. These classes of maps becomes an ‘equator pinch’ where one maps the equator in the form of a pointed sphere (here circle) to a point whose both sides are the upper and lower spheres making it look like a ‘bouquet of spheres, where the upper and lower sphere’s pointed equator in the middle makes a pinch and completes the map which formulizes as^[14-20];

$$\bigvee_{i \in I} X_i = \prod_{i \in I} X_i / \sim$$

This characterizes a wedge sum, which is ‘a one point union’ between two pointed topological spaces X and Y giving the quotient space of the disjoint union of X and Y by identifying $x_0 \sim y_0: X \vee Y = (X \amalg Y) / \sim$ where \sim is the equivalence closure relation, with the closure relation $\{(p_i, p_j): i, j \in I\}$ where its associative and commutative upto homeomorphism.

The pointed $i - sphere$ associated with the i^{th} homotopy group with $\pi_i(X)$ with (S^i, s) is trivial, abelian, finitely generated for the null homotopic classes and for X equal to S^n (for all positive n). A continuous map induces a bijection (or homeomorphism with associated holonomy) with their i^{th} homotopy group isomorphic for all i .

Some associated mappings are^[9,15,4-12,15-18]:

- [1] $\pi_1(S^1) = Z$ where a circle has been wrapped around another circle yielding an integer that can be treated as the winding number of the loop and generates an infinite cyclic loop as windings if not done in the opposite direction can be repeated infinitely.
- [2] $\pi_1(S^1) = Z$ where a 2-sphere (3-dimensional sphere) is warped around a 2-sphere.
- [3] $\pi_1(S^2) = 0$ where the warping of a circle to a sphere ultimately lasso out and end up in a point as the base dimension or the mapping is done from S^1 to S^2 .
- [4] $\pi_3(S^2) = Z$ where this mapping is interesting and known as Hopf fibrations where the projection takes place on $S^1 \rightarrow S^3 \rightarrow S^2$. Lets discuss this in detail below.

Take a complex vector space C^2 and identify its columns $z = \begin{Bmatrix} z_1 \\ z_2 \end{Bmatrix}$ where $z_i \in C$ where the complex projective line $P(C^2) = CP^1$ obtaining from $C^2 \setminus \{0\}$ by factoring out the equivalence relation $z \sim w$ iff $w = \gamma z$ for some $\gamma \in C^\times = C \setminus \{0\}$. As this equivalence class is bijective corresponding to 1-dimensional subspaces, therefore, this C^2 can be the projective space, if one restricts to 3-sphere $S^3 \subset R^4 = C^2$ providing $z^\dagger z = 1$ and factor out $z \sim w$ iff $w = \gamma z$ for some $S^1 \cong U(1) = \{\gamma \in C, |\gamma| = 1\}$, then using the stereographic maps from CP^1 to the 2-sphere S^2 , the complex coordinates are^[6-15];



$$\alpha := \frac{z_2}{z_1} \mapsto \left(\Re \frac{2\alpha}{1 + |\alpha|^2}, \Im \frac{2\alpha}{1 + |\alpha|^2}, \frac{1 - |\alpha|^2}{1 + |\alpha|^2} \right)$$

Wherever $z_1 \neq 0$,

$$\beta := \frac{z_2}{z_1} \mapsto \left(\Re \frac{2\beta}{1 + |\beta|^2}, \Im \frac{2\beta}{1 + |\beta|^2}, \frac{1 - |\beta|^2}{1 + |\beta|^2} \right)$$

Wherever $z_1 \neq 0$, a smooth map $\pi: S^3 \rightarrow S^2 \subset R^3$ can be expressed as;

$$z \mapsto (2\Re \bar{z}_1 z_2, 2\Im \bar{z}_1 z_2, |\alpha|^2 - |\beta|^2) =: R(z)$$

In CP^1 , α, β are the inhomogeneous complex coordinates around $0, \infty$. This is the Hopf map where π is the projection in order of S^3 the principle fiber bundle over the base space $S^2 \cong CP^1$ with the structure group $U(1)$.

“The linkage can be visualized by the stereographic projection of a 3-sphere to its equatorial 3-plane, one obtains one family of Villarceau circles on each torus of a system of nested coaxial concentric tori orthogonal to the unit 2-sphere in that 3 plane. The linking of the fibres used by Hopf to obtain the homotopy group $\pi^3(S^2) = \mathbb{Z}$ ”

Alternatively, using Geometric rotations (Quaternions) with the rotation group $SO(3)$ and Spin Group $Spin(3)$ diffeomorphic to the 3-sphere, the spin group acts on S^2 transitively by rotations which makes the Hopf fibration as the 3-sphere, the principle fiber bundle over the 2-sphere. Let's take the quaternionic coordinates $q = \omega + ix + jy + kz$ where $i^2 = j^2 = k^2 = ijk = 1$ are the three complex numbers associated with the coordinates x, y, z . The rotation can be given by;

$$\begin{bmatrix} 1 - 2(y^2 - z^2) & 2(xy - \omega z) & 2(xz - \omega y) \\ 2(xy + \omega z) & 1 + 2(x^2 + z^2) & 2(yz - \omega x) \\ 2(xz - \omega y) & 2(yz + \omega x) & 1 - 2(x^2 + y^2) \end{bmatrix}$$

The above formulae for the projection bundle makes the fixed unit vector along the z axis $(0,0,1)$ rotates to another unit vector given as;

$$2(xz + \omega y), 2(yz - \omega x), 1 - 2(x^2 + y^2)$$

Which acts as a continuous function of the coordinates ω, x, y, z which is the image of q on the 2-sphere where the unit vector has been transformed via the z axis, containing the fiber for a given point on S^2 . Taking three fixed points on S^2 as a, b, c , the q rotates angle ϑ via q_ϑ as;

$$q_\vartheta = \cos \vartheta + k \sin \vartheta$$

Which rotates by 2ϑ along the z axis and sweeps a great circle in the fiber S^3 where a, b, c being not the antipode, $(0,0,-1)$, the quaternion forms;

$$q_{(a,b,c)} = \frac{1}{\sqrt{2(1+c)}} (1+c - ib + ja)$$

As long as the base point is fixed. This sends to the antipode $(0,0,+1)$ in the composite quaternion form $q_{(a,b,c)}q_\vartheta$ which are points on S^3 sphere, as;

$$q_{(a,b,c)}q_\vartheta = \frac{1}{\sqrt{2(1+c)}} ((1+c) \cos(\vartheta), a \sin(\vartheta) - b \cos(\vartheta), a \cos(\vartheta) + \sin(\vartheta), (1+c) \sin(\vartheta))$$



Due to the multiplication of the $q_{(a,b,c)}$ space with its composite way q_θ there forms a geometric circle where the final fiber $(0,0,-1)$ can be defined $q_{(0,0,-1)}$ equal to i producing,

$$((0), (\cos(\vartheta)), (-\sin(\vartheta)), (0))$$

Now, coming to the point of Villarceau circles, the pair circle can be produced if the torus can be cur obliquely at a special angle. Nested with other two circles, the major and the minor circles, the equations can be produced specific to that circle without the loss of generality, keeping the radius of a circle r in the xz plane with the axis of revolution at z the radius being centered at $(R, 0, 0)$, the existence can be defined;

$$0 = (x - R)^2 + z^2 - r^2$$

Sweeping replaces x by $\sqrt{x^2 + y^2}$ and removing the square root produces a quartic equation;

$$0 = (x^2 + y^2 + z^2 + R^2 - r^2)^2 - 4R^2(x^2 + y^2)$$

The surface that has been swept by the xz plane includes a second circle;

$$0 = (x + R)^2 + z^2 - r^2$$

Now, the circle has two common internal tangent lines, with slope at the origin found from the right angle with the hypotenuse R and opposite side r (which has the right angle at the point of tangency), then $\frac{z}{x} = \pm r/\sqrt{R^2 - r^2}$ and choosing the plus sign produces a bitangent to the torus;

$$0 = xr - z\sqrt{R^2 - r^2}$$

While rotating this frame, all the bitangent planes swept by;

$$0 = xr \cos \varphi + yr \sin \varphi - z\sqrt{R^2 - r^2}$$

The intersection of the planes gives a pair of symmetric circles;

$$-r \sin \varphi, r \cos \varphi, 0$$

A more flexible approach has been given by a quartic approach of the torus;

$$0 = (x^2 + y^2 + z^2 + R^2w^2 - r^2w^2)^2 - 4R^2w^2(x^2 + y^2)$$

And setting w to 0 gives a double point intersection equation at;

$$0 = (x^2 + y^2 + z^2)^2$$

Coming back to the homotopy group, the framed cobordism of manifolds can be easily expressed as an existing homotopy group $\pi_{n+k}(S^n)$ with its associated framed cobordism group $\Omega_k^{\text{framed}}(S^{n+k})$ of the holomorphic submanifolds S^{n+k} where every map is homotopic to a differentiable domain map M^k in a 'framed' k -dimensional manifold S^{n+k} as;

$$M^k = f^{-1}(1,0,0,0, \dots, 0) \subset S^{n+k}$$



Like the projection $f: S^n \rightarrow S^n$, the Hopf bundle $f: S^3 \rightarrow S^2$ can be generated by the embedding of $S^1 \subset S^3$ in a framed way as;

$$\pi_3(S^2) = \Omega_1^{\text{framed}}(S^3) = \mathbb{Z}$$

For, $\pi_n(S^n)$ or $\pi_{4n-1}(S^{2n})$ with $n \geq 0$ there exists an infinite cyclic group with an abelian group having the p -components torsion for all primes p . For S^n spheres, p -components torsion occurs at $k < 2p - 3$ in $\pi_{n+k}(S^n)$, where for S^2 the first p -torsion occurs at $k = 2p - 3 + 1$. The torsion in odd times p for odd dimensional spheres can be given by,

$$\pi_{2m+k}(S^{2m})(p) = \pi_{2m+k-1}(S^{2m-1})(p) \bigoplus \pi_{2m+k}(S^{4m-1})(p)$$

Where p -torsion is defined as, Let M be a module over a ring R , then the value given as;

$$M_p := \begin{cases} x \in M \\ x^{p^n} = 1 \\ p - a \text{ fixed prime} \\ n \in \mathbb{N} \end{cases}$$

Is the p -torsion submodule of M .

The J -homomorphism can be defined as the image $J: \pi_k(SO(n)) \rightarrow \pi_{n+k}(S^n)$ which is a subgroup of $\pi_{n+k}(S^n)$ for $k \geq 2$ where $SO(n)$ is the special orthogonal group in dimension n which preserves the fixed point when operations are needed for composing group transformations. In the stable homotopy range, $n \geq k + 2$ the homotopy group $\pi_k(SO(n))$ depends on $k \pmod{8}$ known as the Bott periodicity over a interval of 8 with the J -homomorphism given by,

- k is congruent to 0 or 1 (mod 8) if there exists a order 2 cyclic group.
- k being congruent to 2,4,5,6 (mod 8) then its trivial
- k being $4m - 1 \equiv 3 \pmod{4}$ if the group is cyclic to the order of the denominator $B_{2m}/4m$ where $2m$ is the Bernoulli number.

Through the orthonormal group, the Bott group $O(\infty)$ are periodic to the order $\pi_n(O(\infty)) \cong \pi_{n+8}(O(\infty))$, the first 8 homotopy groups are,

$$\begin{aligned} \pi_0(O(\infty)) &\cong \mathbb{Z}_2 \\ \pi_1(O(\infty)) &\cong \mathbb{Z}_2 \\ \pi_2(O(\infty)) &\cong 0 \\ \pi_3(O(\infty)) &\cong \mathbb{Z} \\ \pi_4(O(\infty)) &\cong 0 \\ \pi_5(O(\infty)) &\cong 0 \\ \pi_6(O(\infty)) &\cong 0 \\ \pi_7(O(\infty)) &\cong \mathbb{Z} \end{aligned}$$

Given, the ring structure;

$$\pi_*^S = \bigoplus \pi_k^S \quad \forall k \geq 0$$

Three groups can be categorized as $\begin{cases} (U) - \text{Unitary group} \\ (O) - \text{Orthogonal group} \\ (Sp) - \text{Symplectic group} \end{cases}$



The periodic Bott's results are,

$$k = 0,1 \begin{cases} \pi_k(U) = \pi_{k+2}(U) \\ \pi_k(O) = \pi_{k+4}(Sp) \\ \pi_k(Sp) = \pi_{k+4}(O) \end{cases}$$

The 2nd and 3rd isomorphisms intertwined to give 8-periodicity results;

$$k = 0,1 \begin{cases} \pi_k(O) = \pi_{k+8}(O) \\ \pi_k(Sp) = \pi_{k+4}(Sp) \end{cases}$$

	S^1	S^2	S^3	S^4	S^5	S^6	S^7	S^8	S^9	S^{10}
π_1	\mathbb{Z}	0	0	0	0	0	0	0	0	0
π_2	0	\mathbb{Z}	0	0	0	0	0	0	0	0
π_3	0	\mathbb{Z}	\mathbb{Z}	0	0	0	0	0	0	0
π_4	0	\mathbb{Z}_2	\mathbb{Z}_2	\mathbb{Z}	0	0	0	0	0	0
π_5	0	\mathbb{Z}_2	\mathbb{Z}_2	\mathbb{Z}_2	\mathbb{Z}	0	0	0	0	0
π_6	0	\mathbb{Z}_{12}	\mathbb{Z}_{12}	\mathbb{Z}_2	\mathbb{Z}_2	\mathbb{Z}	0	0	0	0
π_7	0	\mathbb{Z}_2	\mathbb{Z}_2	$\mathbb{Z} \times \mathbb{Z}_{12}$	\mathbb{Z}_2	\mathbb{Z}_2	\mathbb{Z}	0	0	0
π_8	0	\mathbb{Z}_2	\mathbb{Z}_2	\mathbb{Z}_2^2	\mathbb{Z}_{24}	\mathbb{Z}_2	\mathbb{Z}_2	\mathbb{Z}	0	0
π_9	0	\mathbb{Z}_3	\mathbb{Z}_3	\mathbb{Z}_2^2	\mathbb{Z}_2	\mathbb{Z}_{24}	\mathbb{Z}_2	\mathbb{Z}_2	\mathbb{Z}	0
π_{10}	0	\mathbb{Z}_{15}	\mathbb{Z}_{15}	$\mathbb{Z}_{24} \times \mathbb{Z}_3$	\mathbb{Z}_2	0	\mathbb{Z}_{24}	\mathbb{Z}_2	\mathbb{Z}_2	\mathbb{Z}
π_{11}	0	\mathbb{Z}_2	\mathbb{Z}_2	\mathbb{Z}_{15}	\mathbb{Z}_2	\mathbb{Z}	0	\mathbb{Z}_{24}	\mathbb{Z}_2	\mathbb{Z}_2
π_{12}	0	\mathbb{Z}_2^2	\mathbb{Z}_2^2	\mathbb{Z}_2	\mathbb{Z}_{30}	\mathbb{Z}_2	0	0	\mathbb{Z}_{24}	\mathbb{Z}_2
π_{13}	0	$\mathbb{Z}_{12} \times \mathbb{Z}_2$	$\mathbb{Z}_{12} \times \mathbb{Z}_2$	\mathbb{Z}_2^3	\mathbb{Z}_2	\mathbb{Z}_{60}	\mathbb{Z}_2	0	0	\mathbb{Z}_{24}

Homotopy groups of spheres as computed upto $\pi_{13}(S^{10})$. Ref [21]

REFERENCES

1. Syed, S. Group structure on spheres and the Hopf fibration. UBC Grad Student Seminar. Published.
2. Field, M., and Swift, J. W. (1994). Hopf bifurcation and the Hopf fibration. *Nonlinearity*, 7(2), 385–402. <https://doi.org/10.1088/0951-7715/7/2/005>
3. Bhattacharjee, D. (2022s). Generalization of Grothendieck duality over Serre duality in $deg \square$ Cohen-Macaulay schemes representing Calabi–Yau 3-fold on Bogomolov–Tian–Todorov Theorem. *Research Square*. <https://doi.org/10.21203/rs.3.rs-1781474/v1>
4. Urbantke, H. (2003). The Hopf fibration—seven times in physics. *Journal of Geometry and Physics*, 46(2), 125–150. [https://doi.org/10.1016/s0393-0440\(02\)00121-3](https://doi.org/10.1016/s0393-0440(02)00121-3)
5. Mendelson, B. (1990, July 1). *Introduction to Topology: Third Edition (Dover Books on Mathematics) (Third)*. Dover Publications.
6. Bhattacharjee, D. (2022p). Establishing equivalence among hypercomplex structures via Kodaira embedding theorem for non-singular quintic 3-fold having positively closed (1,1)-form Kähler potential $\mathbb{Z}^{-1} \partial \bar{\partial}^* p$. *Research Square*. <https://doi.org/10.21203/rs.3.rs-1635957/v1>
7. Definition of $\mathbb{S}p$ -torsion module. (2014, January 2). *Mathematics Stack Exchange*.



<https://math.stackexchange.com/questions/624924/definition-of-p-torsion-module>

8. Bhattacharjee, D. (2022u). *Generalized Poincaré Conjecture via Alexander trick over C-isomorphism extension to h-cobordism on inclusion maps with associated Kan-complex*. Research Square. <https://doi.org/10.21203/rs.3.rs-1830184/v1>
9. Flegg, G. H. (2001, September 4). *From Geometry to Topology (Dover Books on Mathematics) (Illustrated)*. Dover Publications.
10. Bhattacharjee, D. (2022aj). *Suspension of structures in two-dimensional topologies with or without the presence of $g \geq 1$ genus deformations for canonical $2^2\eta$ stabilizer points*. Research Square. <https://doi.org/10.21203/rs.3.rs-1798323/v1>
11. Dorst, L. (2019). *Conformal Villarceau Rotors*. *Advances in Applied Clifford Algebras*, 29(3). <https://doi.org/10.1007/s00006-019-0960-5>
12. Wood, R. (1966). *Banach algebras and Bott periodicity*. *Topology*, 4(4), 371–389. [https://doi.org/10.1016/0040-9383\(66\)90035-8](https://doi.org/10.1016/0040-9383(66)90035-8)
13. Bhattacharjee, D. (2022d). *An outlined tour of geometry and topology as perceived through physics and mathematics emphasizing geometrization, elliptization, uniformization, and projectivization for Thurston's 8-geometries covering Riemann over Teichmüller spaces*. TechRxiv. <https://doi.org/10.36227/techrxiv.20134382.v1>
14. Switzer, R. M. (1975, September 13). *Algebraic topology--homotopy and homology (Die Grundlehren der mathematischen Wissenschaften in Einzeldarstellungen mit besonderer Berücksichtigung der Anwendungsgebiete)*. Springer-Verlag.
15. Bhattacharjee, D. (2022ah). *Rigorously Computed Enumerative Norms as Prescribed through Quantum Cohomological Connectivity over Gromov – Witten Invariants*. TechRxiv. <https://doi.org/10.36227/techrxiv.19524214.v1>
16. Bergen, J., Catoiu, S., & Chin, W. (2019, October 17). *Hopf Algebras (1st ed.)*. CRC Press.
17. Bhattacharjee, D., Roy, S. S., & Behera, A. K. (2022b, August 31). *Relating Enriques surface with K3 and Kummer through involutions and double covers over finite automorphisms on Topological Euler–Poincaré characteristics over complex K3 with Kähler equivalence*. Research Square. <https://doi.org/10.21203/rs.3.rs-2011341/v1>
18. Cox, D. A., Little, J. B., & Schenck, H. K. (2011, July 7). *Toric Varieties (Graduate Studies in Mathematics)*. American Mathematical Society.
19. Tom Dieck, T. (1985). *The homotopy type of group actions on homotopy spheres*. *Archiv Der Mathematik*, 45(2), 174–179. <https://doi.org/10.1007/bf01270489>
20. Bhattacharjee, D. (2022as, August 16). *Generalization of Quartic and Quintic Calabi – Yau Manifolds Fibered by Polarized K3 Surfaces*. Research Square. <https://doi.org/10.21203/rs.3.rs-1965255/v1>
21. Brunerie, G. (2016). *On the homotopy groups of spheres in homotopy type theory*. ArXiv, [abs/1606.05916](https://arxiv.org/abs/1606.05916).



CONSUMER BEHAVIOUR ANALYSIS: SUSTAINABLE FOOD WRAPPING WITH BEESWAX

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ABSTRACT

Modern food wrapping makes food safe, dependable, shelf-stable, and hygienic. However, the majority of food wrapping is single-use and cannot be re-used. Single-use food wrapping has a huge environmental impact, from plastics in our waterways to harmful production by-products. A natural eco-friendly, sustainable alternative to plastic wraps is "Beeswax Food Wraps". Despite being eco-friendly and sustainable wrapping, consumers seldom use it. Although it's no secret that single-use food wraps are a hazard to our seas, ecosystems, and globe, even then, we find it difficult to break free from our non-eco-friendly habits. The present paper aims to analyse the consumer perception of green products. Furthermore, the study investigates consumers' level of satisfaction with the different types of food wraps and analyses the factors influencing the purchasing behaviour of beeswax food wraps among consumers. A structured questionnaire was used to collect the primary data, which was then analysed using the Chi-Square Test of Independence, One-Way ANOVA test, Spearman Rank-Order Correlation Coefficient and descriptive statistics. The results reveal an important insight concerning the behaviour of consumers towards Beeswax Food Wraps and green product purchase. The study found that in spite of consumers growing awareness of green products and environmentally harmful practices, Beeswax Food Wraps still have a long way to go.

KEYWORDS - *Beeswax Food Wraps, Green Product, Green Consumption, Plastic Wraps, Aluminium Foil, Sustainable Wrapping, Consumer Behaviour.*

INTRODUCTION

Food packaging is fundamental to the food industry, and without it, the food industry would not be able to survive, and consumers would not be able to operate. Food chains today are distinguished by their broad geographical distribution as well as worldwide value networks. Plastic and aluminium food wrapping has massive economic benefits among various wrapping materials available. Since time immemorial, people have depended on plastic and aluminium due to their low-cost, versatility, durability and high strength-to-weight ratio. Apart from being highly demanding, these food wrappers pose many threats to the environment.

The environmental impact of single-use food wrapping is enormous. Most food wrappings are meant to be used once and then discarded rather than reused or recycled, and it makes up almost half of all municipal solid waste. The majority of food wrapping is wasted and is either buried in a landfill or becomes trash that is swept into the environment by water and wind flow. Plastic and aluminium food wrapping contains certain chemicals that prove harmful to the human body. These chemicals attach themselves to the food surface and enter the human body causing chronic ailments like cancer, heart failure and dysfunction of body organs. Due to their unrestricted use, microplastic is found in 77% of human beings causing damage to body cells. Thus, the ease of food wrapping is overshadowed by the harmful effects and waste generated by plastic wrapping.

Non-biodegradable food wrapping must be substituted with environmentally friendly packaging. Sustainable food wrapping has been a popular topic among consumers and marketers, and it is also in line with rising consumer understanding of environmental sustainability.

The present study aims to analyse the significance of sustainable beeswax food wraps and consumer behaviour regarding green consumption.

Made from the concept of green wrapping, the natural alternative for plastic and aluminium wraps is "Beeswax Food Wraps". Beeswax food wraps are a more environmentally conscious, food-safe, and sustainable solution to plastic and aluminium food wraps: wrap sandwiches, rotis, idlis, raw fruits and vegetables, or paneer in them. Made from GOTS (The Global Organic



Textile Standard) certified organic cotton fabric printed with herbal dyes, pure natural unbleached beeswax, organic cold-pressed coconut oil, and natural tree dammar gum, these wraps are sustainable, reusable and biodegradable. Beeswax has an anti-microbial effect on food, which protects food from spoilage. Beeswax wrappers are breathable, so they keep your food fresh for a long time. Plastic, on the other hand, promotes mould growth.

Beeswax food wraps in India are manufactured by various small scale industries. The firms are working to make the world a greener place by offering beeswax wraps, which are handcrafted food storage wraps that may successfully replace non-biodegradable wraps. Due to a lack of consumer awareness and high costs, beeswax food wraps are not so popular among people. To promote the product and alter consumer perceptions, consumer awareness is a must.

CONCEPTS AND REVIEW OF LITERATURE

This section discusses the concepts and the related literature. The discussion is divided into three sections - Green Consumption Behaviour, Green Product and Beeswax Wrap.

Green Consumption Behaviour

Green Consumption is a problematic concept, not least because it is a visible oxymoron. Green means conservation of natural resources, while consumption usually involves destroying them. Green Consumption is also disputed as a theory, relying heavily on context as a set of processes, as well as complexity and has many aspects in both theory and practice. Green might be assumed to relate only to environmental issues, but these are subtly intertwined with the social and economic strands of sustainable development. (1)

Research conducted by Bhatia and Jain (2013) highlights consumers' perceptions and preferences about green marketing processes and products with the help of a structured questionnaire. The results of the analysis revealed a high level of awareness about green marketing practices and products among the consumers. Green values were also found to be high among the respondents. It also revealed that the view that overall green values, awareness about green products and practices and the perception regarding the seriousness of marketing companies towards green marketing had a positive significant impact on consumer persuasion to buy and prefer green products over conventional products. (2)

Cost is an important barrier to consumption, especially switching to renewable energy. It is also often why people do not buy sustainable products; they may want to, but they may not be able to afford them. Across the statistical boards, the biggest obstacle to adopting consumer behaviour based on stability is negligence. Between 1 of 10 and 1 of 3 agree with this statement - and that suggests that brands need to do more to communicate with consumers. (3)

Bhatia and Jain in their research paper also stated that "Consumers were strongly agreeing with the importance of green marketing practices." But contradicting this they also included that consumers felt that green products are priced higher than conventional products. When asked about the factors that affect the purchase of green products, consumers rated "awareness about green products" first with a mean score of 4.31, followed by "availability of green products", and "product price" in second and third position. This implies that marketers have to extensively market and communicate the availability of green products to the consumers. (4)

Green Products

A green product is a sustainable product designed to minimise its environmental impacts during its whole life cycle and even after it's of no use. Green products are usually identified by having two primary goals – reducing waste and maximising resource efficiency. They are manufactured using toxic-free ingredients and environmentally-friendly procedures and achieve certifications such as GreenPro, Environmental Product Declaration (EPD), Life Cycle Analysis (LCA), etc. (5)

Green products have many advantages; some of them include being energy efficient, durable and often have low maintenance requirements. They are free of ozone-depleting chemicals and toxic compounds and don't produce toxic by-products. They are often made of recycled materials or content or renewable and sustainable sources. They are usually obtained from local manufacturers or resources and are biodegradable or easily reused either in part or as a whole. (6)

A company named Nielsen in 2015 in their report explained the scope of green products in the future. In this report, they revealed that about 3 out of 4 "millennials" claim that they are willing to pay more money for sustainable offerings. The younger group, i.e about 15-20, said that they would choose product A instead of product B if the company producing A would be "committed to positive social and environmental impact". (7)

Salman Shamsi and Zainus Siddiqui in their research paper on Green product and consumer Behaviour, concluded that "Consumers mainly refrain from using green products due to their unavailability as well as unawareness about such products. However, 31.2% of the respondents feel that the cost of installation/usage of green products is higher than regular products of the same category" Along with this, they found that there are many other factors that motivates consumers to buy green product "It is clearly seen that environment sustainability is the most effective factor followed by personal consciousness of the respondents that persuaded them to buy a green product." (8)

According to the analysis in "Environmental strategies and green product development: an overview on sustainability-driven companies" research paper it was seen that "The percentage of green product developers exceeds the percentage of green product non-developers. The same result is obtained in almost all sectors, except for the 'healthcare' and the 'consumer' sectors."



Furthermore, the shares of green product developers and non-developers do not show significant differences among geographical areas, meaning that there is no geographical area more oriented to the green product development than the other areas. (9)

Beeswax Wrap

Beeswax is a substance that creates the structure of a honeycomb; bees extract wax to form honeycombs where they can store honey. Thanks to its rich hydrophobic properties, beeswax is actually present in cosmetics and body products. Also, beeswax is used in the food industry: as a wrapping film to ripen or as a food additive and to give light to products. Similar to the honey it contains, beeswax has also been shown to have several medicinal properties, such as healing scratches, inflammation, and burns. (10)

The main focus of our research is Beeswax Wraps. They are the wraps made from organic cotton coated with beeswax, organic jojoba oil and tree resin; beeswax wrap is an alternative natural food wrap with antibacterial properties and can be used as the lid to cover bowls or plates of food or to wrap fruit, vegetables, bread, cheese, herbs, baked goods and other food products, for on-the-go convenience. (11)

Beeswax wraps have many pros which can attract a customer. Beeswax wraps are breathable, which keeps your food fresher for longer, unlike plastic which accelerates mould growth. Beeswax wraps are easily cleaned with cold water and mild detergent and can be left to drip dry. Proper care will allow them to last for up to 1 year. Switching from single-use plastic to reusable Beeswax Food Wraps that are compostable and biodegradable, is a neat way to reduce household waste while helping the planet. (12)

A research paper from University of Montana states that Beeswax wrap in the coming year will become popular due to the benefits it possesses. According to this, "Manufacturers of beeswax wraps promote their products as being superior to traditional wrapping materials by providing both a physical barrier and a potential antimicrobial effect." This gives an optimistic view that Beeswax wraps can dominate the market in the near future and hence the demand for beeswax wrap can increase leading to fall in its prices. (13)

Another research project stated that there is a high level of dissatisfaction amongst the consumer when it comes to the use of aluminium foil, this can give way to beeswax wrap to make an entrance in the market. The only problem that comes in the way is the lack of awareness about the existence of this product and the benefit it provides. Due to the lesser demand in the market the prices of beeswax wrap is relatively more leading to increase in prices which in fact becomes another reason for consumers to not prefer beeswax wrap. (14)

OBJECTIVES

The present study was undertaken with the following objectives:

- To know consumers' buying behaviour towards reusable beeswax wraps.
- To understand the satisfaction level of consumers towards the food wraps they use.
- To recognise the factors motivating and demotivating the purchase of beeswax wraps.
- To identify the factors that will help accelerate the demand for beeswax wraps.

HYPOTHESIS

The following hypotheses were drawn for the purpose of the study:

H₀₁ - There is no significant relationship between green product purchase and the gender of the respondents.

H₀₂ - The positive attributes of green products do not affect consumer perception.

H₀₃ - There is no significant difference between the highest motivating factor for purchasing beeswax food wraps and the age of the respondents.

H₀₄ - There is no correlation between the usage of beeswax food wraps and the purchase price of it.

RESEARCH METHODOLOGY

The research design used for the study is a descriptive design that emphasises on identifying the various factors affecting consumers' purchasing behaviour concerning reusable beeswax food wraps and green products. The methodology adopted for the research paper is that of a mixed research method where both quantitative and qualitative techniques are used to understand and analyse the research problem.

Research Approach

The present study is an academic paper based on primary data collected through a sampling method and an interview. It involves an intensive discussion with an industry expert and the CEO of Brown Living India. A well-structured sample of 252 respondents from diverse demographic regions was collected. This survey was conducted online through Google Forms. Newspaper articles and relevant websites constituted the secondary data sources.

**Method of Analysis**

The methods used for the analysis of the data collected include the Chi-Square Test of Independence, One-Way ANOVA test, Spearman Rank-Order Correlation Coefficient and descriptive statistics.

RESULTS**A. Outcome of Structured Interview**

According to Brown Living India's CEO, excessive exposure to plastic in her workplace prompted her to search for alternatives to plastic in everyday life, in turn inspiring her to start her own company. She mentioned that beeswax wraps caught her eye because of their volatile properties and reusability.

In response to a question regarding the current state of environmental awareness among people, she pointed out that although awareness is growing among many, there is still a significant distance to cover due to the lack of availability and knowledge of green products.

In respect to the availability of beeswax wraps, she acknowledged that many green products are not readily available to consumers primarily due to their inaccessibility in physical stores, which again contributes to the inability to change consumer behavior. While recapitulating the reasons, it was interpreted that these products are not available in physical stores because high manufacturing costs damage the firms' costing systems.

Furthermore, she asserted that the price of green/eco-friendly products will tend to decline as more buyers and sellers seek out these products. In other words, as more products become available, they will become less expensive. Therefore, she appeared optimistic that green products will be more readily available in physical stores within 3-4 years, despite the current trends.

Another equally important issue raised by her was the high price of green products. On average plastic and aluminium foils are quite cheaper than beeswax wraps which can be reused 100 times, indicating how the product price as compared to product quality plays a vital role in shaping consumer behaviour.

As we discussed the challenges that the manufacturers of beeswax wraps face due to lack of awareness of the product, it became apparent that this problem is more like a chicken and egg dilemma since manufacturers must decide whether to increase supply while demand is low or wait for demand to rise before increasing supply.

Towards the end of the interview, the interviewee threw some light on how habits can be changed only if they are called out. Thus, it is crucial to resonate with consumers in order to change their behaviour.

As a whole, the interview assisted us in identifying the reasons for current sales trends of beeswax food wraps and provided an opportunity to discuss their future.

B. Analysis of Data and Hypothesis Testing

H_{01} - There is no significant relationship between green product purchase and the gender of the respondents.

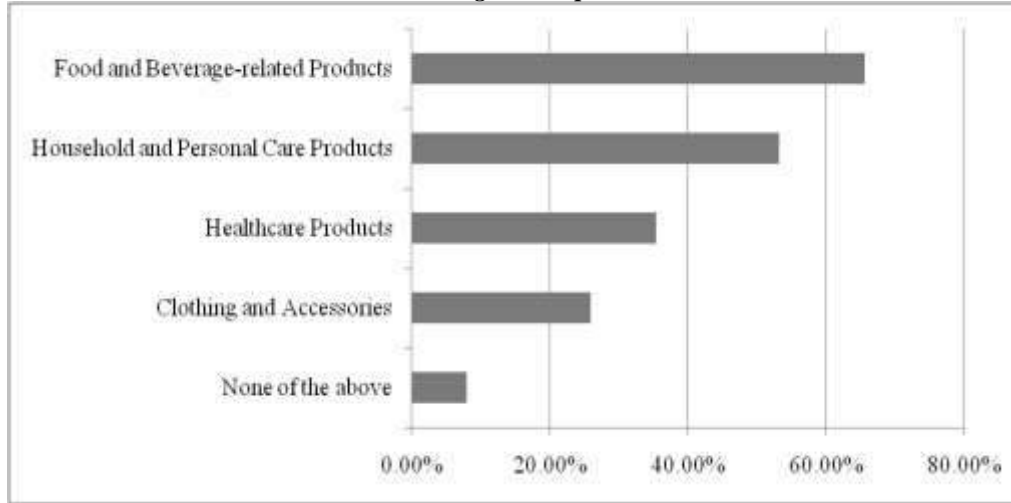
Table 1
Results of the Chi-square test

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	12.142	5	.033
Likelihood Ratio	12.576	5	.028
Linear-by-Linear Association	.063	1	.802
N of Valid Cases	252		

Interpretation: Table 1 shows that the significance of chi-square is 0.033, which is less than 0.05 (5%). So, the null hypothesis cannot be accepted at a 5% significance level, concluding that there is a significant relationship between green product purchase and the gender of the respondents.



Figure 1
Green Products usage in the past three months



Interpretation: The chart shows the different types of green products people used in the past three months. Evidently, food and beverage products are the most commonly consumed green products, followed by household and personal care products. Consumption patterns indicate that consumers are health conscious and prefer to purchase a variety of eatables and personal care products.

H₀₂ - The positive attributes of green products have does not affect consumer perception.

Table 2
Likert Scale Analysis Using Mean (in percentage)

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean
Good for the Environment	73.4	23.0	3.2	.4	0	1.3
Are Healthy	52.4	38.5	8.7	.4	0	1.57
Good Quality	35.3	41.7	21.0	2.0	0	1.89
Reasonable Price	8.3	18.7	37.7	30.6	4.8	3.04
Are Well-promoted	10.3	22.6	39.3	24.2	3.6	2.88
Are Easily Accessible	7.9	23.4	38.5	26.2	4.0	2.94
						2.27

Interpretation: The results of this survey indicate that respondents have a slightly positive attitude toward green and eco-friendly products. Therefore, the null hypothesis has been rejected.

Table 3
Ranking of Challenges Faced

	Frequency	Percentage	Ranking
High cost	171	67.9	1
Lack of trust	65	25.8	5
Difficult to change habits	72	28.6	4
Not enough awareness	89	35.3	3
Not easily available	132	52.4	2



Interpretation: Most consumers perceive green products to be expensive and unavailable to purchase, which discourages them from purchasing them. Moreover, some consumers believe that unawareness, lack of trust, and difficulty in changing one's habits are also demotivating factors that influence their purchasing decisions.

Table 4
Satisfaction Level of Food Wraps used by Consumers

	Satisfaction Level
Plastic Wrap	87.09
Tissue Paper	83.51
Beeswax Wrap	76.92
Parchment Paper	72.41
Aluminium Foil	60.22

Interpretation: Study results show that people are the least satisfied with aluminium foils even though it is the most used food wrap as compared to beeswax wraps which are the least used.

H₀₃ - There is no significant difference between the highest motivating factor for purchasing beeswax food wraps and the age of the respondents.

Table 5
Results of one-way ANOVA test

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10.910	2	5.455	5.685	.004
Within Groups	238.943	249	.960		
Total	249.853	251			

Interpretation: Table 5 shows that the significance of one way ANOVA test is 0.04, which is less than 0.05 (5%). So, the null hypothesis cannot be accepted at 5% significance level, concluding that there is a significant difference between the highest motivating factor of purchasing and the age of the respondents.

H₀₄ - There is no correlation between the usage of beeswax food wraps and the purchase price of it.

Table 6
Correlation Coefficient

		Beeswax Food Wraps Usage	Purchase Price of Beeswax Food Wraps
Beeswax Food Wraps Usage	Correlation Coefficient	1.000	-.055
	Sig. (2-tailed)	.	.388
	N	252	252
Purchase Price of Beeswax Food Wraps	Correlation Coefficient	-.055	1.000
	Sig. (2-tailed)	.388	.
	N	252	252

Interpretation: The usage of beeswax food wraps and their purchase price is negatively correlated with the correlation coefficient of -0.55. This indicates that consumers may be more inclined to use it if the purchase price is less and vice-versa.

CONCLUSION

Beeswax wraps retain a relatively low market share, despite consumer's growing interest in environmental concerns and green products. As a result, understanding the reasons for consumer's behaviour regarding beeswax wrap purchases becomes necessary. From the responses collected, it was determined that unavailability of such products in physical stores, lack of trust,



unawareness, and difficulty changing one's habits are few major factors that refrain consumers from using these products. Consumers tend to be driven by value, often measuring the benefits and utility they gain from buying products. The above findings suggest that consumers become more willing to purchase green products when they recognize the value they provide to both themselves and the environment. To this end, enterprises should strive to increase Beeswax Wraps' perceived green value as much as possible.

The present study results can be used by marketers, manufacturers, and the government to promote beeswax food wraps proficiently. The lack of awareness and unavailability of sustainable food wraps should be checked upon to remove the impediment to their usage. Advertisements and promotional activities focusing on the environment can motivate green product purchase and usage. Moreover, the personal consciousness of consumers must be given due consideration. Awareness programs about environmental degradation due to plastic packaging and the benefits of sustainable food wrapping can be launched to help consumers become conscious of their actions.

REFERENCES

1. Ken Peattie *The Center for Business Relationships*. (n.d.). "Green consumption: Behavior and norms." *Annual Reviews* https://www.annualreviews.org/doi/full/10.1146/annurev-environ-032609-094328#_i2
2. Bhatia, M., & Jain, A. (2013, May 28). "Green Marketing: A study of consumer perception and preferences in India." *Electronic Green Journal* <https://escholarship.org/uc/item/5mc39217>
3. "Shifting sands: How consumer behaviour is embracing sustainability." *Deloitte Switzerland* <https://www2.deloitte.com/ch/en/pages/consumer-business/articles/shifting-sands-sustainable-consumer.html>
4. Bhatia, M., & Jain, A. (2013, May 28). "Green Marketing: A study of consumer perception and preferences in India." *Electronic Green Journal* <https://escholarship.org/uc/item/5mc39217>
5. *Green product certification*. Conserve Consultants. (n.d.). Retrieved March 15, 2022, from <https://www.conserveconsultants.com/green-product-certification#:~:text=A%20green%20product%20is%20a,waste%20and%20maximizing%20resource%20efficiency>
6. ภิญโญ เทพพล. (1970, April 1). "01 APR, what is a green product?" *leafgreenerme* <https://leafgreenerme.com/what-is-a-green-product/>
7. Amund, & About The Author Amund Environmentalist and creator of Sustainability Matters. I have a goal of connecting eco-conscious consumers and brands to expand the overall focus on sustainable products and services. (2022, March 4). "What is green marketing and its scope in the future?" *SMD.com* <https://sustainabilitymattersdaily.com/what-is-green-marketing-and-its-scope-in-the-future/>
8. "Green product and consumer behavior: An analytical study." (n.d.) https://www.researchgate.net/publication/321586759_Green_Product_and_Consumer_Behavior_An_Analytical_Study
9. Albino, V. (2021, April 23). "Environmental strategies and green product development: An overview on sustainability-driven companies." *Business Strategy and the Environment* https://www.academia.edu/47628022/Environmental_strategies_and_green_product_development_an_overview_on_sustainability_driven_companies
10. Fratini, F., Cilia, G., Turchi, B., & Felicioli, A. (2016, July 26). "Beeswax: A minireview of its antimicrobial activity and its application in medicine." *Asian Pacific Journal of Tropical Medicine* <https://www.sciencedirect.com/science/article/pii/S1995764516301407>
11. Pearce, A. (2021, September 10). "Why you should use beeswax wraps." *Good Housekeeping* <https://www.goodhousekeeping.com/uk/house-and-home/household-advice/a30651443/beeswax-food-wrap/>
12. "10 amazing benefits of beeswax food wraps." *millbee.com*. (n.d.) <https://millbee.com/blogs/blog-and-events/10-benefits-of-beeswax-wraps>
13. Beck, D. E., Lane, K. M., Shiel, C. A., & Welke, K. F. (n.d.). "Food spoilage in beeswax impregnated cotton cloth wraps compared to standard storage methods." *ScholarWorks at University of Montana* <https://scholarworks.umt.edu/beekeeping/1/>
14. "A topic model approach to identify and track emerging risks from ..." (n.d.) https://orbi.uliege.be/bitstream/2268/250553/1/Topic_Modelling_Tracking_Media_Adulteration_2020.pdf



SOCIAL POSITION OF MERCHANTS OF BUKHARA EMIRATE

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ABSTRACT

In the article has been analyzed the Bukhara region has been located on the “Great Silk Road” connecting the countries of the Near and Middle East with China and India since ancient times, the majority of the population were merchants and they actively engaged in commercial activities with different nations, and the fact that different strata of the population engaged in trade in the Emirate of Bukhara is analyzed with the help of historical sources.

KEY WORDS: *Emirate of Bukhara, commercial affairs, domestic market, cities, agriculture, horticulture, cash crops.*

INTRODUCTION

Since ancient times, the territory of Bukhara is located on the “Great Silk Road”, which connects the countries of the Near and Middle East with China and India, most of the inhabitants are merchants, and they have been active in commercial activities with various nations, so it is called “Madinat ut-Tujjor” meaning “City of Merchants” is also famous for its qualities [1, p.36]. Therefore, the position of Bukhara merchants was high not only inside the country, but also outside it in economic and social-political terms.

RESEARCH METHODS

In fact, different strata of the population were engaged in trade in Bukhara Emirate. According to sources, the number of traders in the markets fluctuated seasonally. The start of seasonal farming operations in the spring also had an impact on the decrease in domestic market sales compared to the summer and autumn seasons. For example, in winter, 250 merchants were active in the big city markets of Bukhara, Samarkand, Karshi, Kattakorgon, Karmana, and in summer and autumn, the number of sellers reached 350-400 at the expense of farmers. 100 traders worked in the markets of Khoja Arif, Kumushkent, Peshku, Boston, Sultanabad, Yangikurgan, Pirmast districts of the emirate in winter, and 140-150 in summer and autumn [2, p.25-27].

RESULTS AND DISCUSSIONS

Residents living in each province and district of the emirate specialize in growing their own products for the markets. In particular, the majority of residents of Vobkent and Shofrikon districts were wealthy merchants [3, p.36]. Pirmast district grew grapes, Khutfar mainly agricultural products and needed to buy more craft products. In addition to Uzbeks, 100 Indians, about 200 Iranians and 500 Jewish families lived in Karmana. Rich Jews were engaged in money exchange in the markets [3, p.39].

Karnob district was engaged in the breeding of a large number of thoroughbred Arabian horses. Karnobs were also involved in the trade of water from Kir spring and Naiman spring. They sold water in buckets. 1,000 coins per hour and 20,000 coins per day were paid for irrigating crops with spring water [3, p.42]. Turkmen tribes made up the majority of the population of Kerki region, and they were rich and wealthy. The men of the population were engaged in agriculture, and the women wove various rugs and woolen cloths from camel wool and regularly delivered them to the market. Craftsmen of the cities of Karshi, Termiz and Sherabad in the eastern region have a special place in the field of carpet weaving. In particular, the trade of Qamashi village’s Arab carpets was very active in the market of Karshi city. Especially, Karshi and Sherabad carpets were popular with their designs. In fact, Sherabad’s various replica carpets were exhibited in Paris at that time and received high praise. The carpets were sold to the markets of India, Russia, Iran, and Turkey by large merchants from Bukhara, Afghanistan, and the Caucasus.

In the market of Guzor Begili, the trade is also intense. This market is equal in size to the market of Makarevsky Fair in Russia. More than 5,000,000 coins are traded every week. For example, 53,000 sheep are slaughtered for sale in the markets every week in Guzor and its districts. Cattle breeders from the cities of Bukhara, Samarkand, Karshi, Shakhrisabz and various districts came here and bought a large number of large cattle. A person who did not see the market with his own eyes did not believe in the



number and breadth of trade deals concluded in it. The inhabitants of the eastern part of Guzar were engaged in the trade of gypsum, lead ore, mountain mummy, firewood and coal.

The territory of the Karakol region is large and the population is dense. But he was hardly engaged in trade. The region was famous for breeding Karakol sheep, agriculture and products obtained from salt mines in the western part [3, p.29]. The black curly wool of the Karakol sheep and the bluish-gray variety grown by the Karshi Arabs are of high quality and are considered a popular product. Therefore, under the leadership of the emir himself, big merchants such as Ubaydullahhoja, Nasriddinboy, Yakhyoboy and Jorabek Arabov spent their personal funds from 15,000-20,000 to 400,000 coins for the sale of black sheep skins every year. Despite the dense population of Charjoi Bek, it was considered one of the regions with a good economic condition and developed trade. Coal loaded on more than 10,000 camels from orchards in the south was taken to the Bukhara city market and sold [3, p.63]. In addition to coal trading, the population has gained fame in the markets by horticulture and cultivation of cash crops.

The people of Hisar were engaged in grain cultivation and supplied the markets of the whole emirate with wheat flour and grain. Rich merchants made up the majority of the Barlos tribe. Also, olachas woven by artisans, knives and daggers made by blacksmiths, and seals were popular. People from Denov settled along the slopes of Bobotog, engaged in dry farming, making charcoal from maple trees in the forests, picking almonds and selling them. Tajiks grew grapes and supplied markets in all cities and villages of Hisar with raisins [3, p.123].

The above examples confirm that almost all segments of the population traded in the internal markets of the Bukhara Emirate. Among them, we can see that from the representatives of the emir's family to the court officials, in particular, qushbegi, devanbegi, korchiboshi, large landowners, scholars, artisans, and farmers were engaged. In a word, people who have a certain amount of free products or capital are actively involved in trade relations.

Bukhara merchants were masters of their work. One of the tourists who came to the Emirate of Bukhara evaluated them as follows: "Trade is in the first place in Bukhara. So far, I have never seen merchants in any market of other countries treat their customers with special attention. Merchants first invite customers to tea, and then make trade agreements with them". In the emirate, merchants are divided into several groups according to their position in society and their financial capabilities. This situation also served as an indicator showing specific internal social stratifications among the merchants. In this regard, the first category of the city's merchants were "merchants", who were mainly engaged in caravan trade [4, p.38]. Such merchants gained an understanding and detailed knowledge of various countries and cities behind their trades. The second category included rich merchants who kept their goods in caravansary in large cities and carried out large-scale wholesale trade [5]. Traders in Bukhara are conventionally divided into three categories according to the scope of their activities, foreign trade, intercity trade and domestic market traders. Foreign trade was mostly in the hands of large merchants. They owned trade and craft facilities, stalls and caravanserais, which brought a lot of income to the country. In particular, the merchants belonging to the emir's house traded black sheep skins in the "New Emir" palace in Bukhara, and cotton raw materials in the "Old Emir" palace. In "Kushbegi Palace" there was a hotel for Iranian merchants, and in "Rajabbek Palace" of Devonbegi, a large storehouse was used to store goods of merchants [6].

By the beginning of the 19th century, large merchants, through their assistants, bought raw materials such as cotton, silk, and black leather directly from farmers in various cities and villages. In particular, in one of the archival documents of that time, it is noted that a merchant named Hayitmuradboy took and sold a large amount of goods such as carpets, palos, woolen blankets, silk gauzes, large bags and khurjun bought from Kalif region to the city of Bukhara [7]. Also, each craftsman working in the cities of the emirate had his own name according to the type of work. For example, weavers of various fabrics - weavers, leather workers - tanners, book binders - bookmakers, money changers - money changers, makers of various metal household items - blacksmiths, pottery makers - potters, poplar, willow, mulberry and walnut chests and those who make shelves - master carpenters, and those who build boats and ships - are called boatmen and shipwrights[8]. Various trade goods produced by these artisans were considered the most sought-after products of domestic and foreign markets.

As large merchants in the emirate conclude various national trade agreements to carry out large-scale trade, they have attracted knowledgeable mirzas who are good at accounting and writing. In the domestic markets of the Emirate, those engaged in wholesale trade of all goods had several small servants, that is, mirzars, who were assigned their duties at the workplace. One of them was considered to be a trusted representative of his master, who settles accounts with regular customers, receives money, locks cash in a safe and fulfills the responsibility of the treasury. The mirzas who worked with rich merchants were assigned a monthly salary based on mutual agreement. Emirati traders included independent traders who had their own shops in different cities, shopkeepers who rented the shops of very rich traders, sellers of goods aimed at meeting daily needs - grocers, and there were also sellers-carriers carrying things by hand [9].

Another group of traders was made up of people who wandered around the villages and small towns around the city on market days. They bought certain types of products and raw materials from rural markets in cash or barter and then sold these products in urban markets. They were peddlers, and after collecting a certain amount of capital from their trade, they bought or rented a shop and sold the goods of the rich merchants in the city to the nation [10]. Brokers played a special role in the development of trade in the internal markets of Bukhara Emirate [11]. Brokers occupy an important place in domestic markets and stalls, and without their participation, buyers, especially nomads from the steppes and villagers who came to city markets, did not sell or buy anything.



Brokers also took an active part in retail sales processes in Bukhara city markets. In particular, they could always be found at the sale of livestock on every market day. According to information about Bukhara: "A broker who received 5-10 silver coins for one animal from a buyer who came to the market to buy livestock, conducted trade with the seller. After the transaction reaches the specified amount, the broker shakes the hands of the seller and the buyer and completes the transaction. Then the broker charged the seller and the buyer not 1-2 coins, but 3-4 coins for the service fee. Before the seller and buyer give this money to the broker, he made 1 or 2 more trades in the market" [12]. So, the brokers tried to agree the price of the goods sold between the buyer and the seller and received a certain amount of service fee for this work. In addition, money changers, cashiers and commission agents [13] also served in trade.

In the economic life of the city of Bukhara, the money changers, who are engaged in the exchange of various currency units, also played an important role. In particular, According to P.I. Demezov, in Bukhara in the first half of the 19th century there was a separate market of money changers named "Chorsui Sarrafon" [14, p.58]. According to I.V. Vitkevich, besides the Bukharians, who were engaged in money exchange, the money-changers' market was mainly occupied by Indians, who carried out usury [14, p.98]. Money changers also belonged to the social structure of merchants, and they also had their own market, caravanserai, and living quarters.

In the development of trade in the Bukhara Emirate, khassid, that is, middlemen, also played a special role among merchants. Qassids mediated between merchants and buyers in the timely return of money for the loaned merchandise. At that time, the big merchants in Bukhara made trade relations with their colleagues in different districts and by lending their goods for a certain period without paper documents, without receipts.

Russian tourist N. Stremukhov, who was in the Emirates, explains this type of trade as follows: "Bukharans do not want to buy various products for cash, but borrow them for a short or long term with the condition of paying in installments. In Bukhara, merchants carry out trade without any paper documents until a certain fixed period, only by giving loans in person with the presence of a broker appointed by the government" [16]. So, in the city of Bukhara, skilled middlemen-cashiers, who undertook to collect the debts of big merchants within the specified period, were also actively involved in trade relations.

The largest trade turnover in the country was in the hands of representatives of the emir's house and palace officials. In particular, during the reign of Amir Nasrullah Khan, the sale of blackcurrants was carried out only in the courtyard of Sarayi Barra, which belonged to the new madrasa of the emir [17]. An official decree was also issued prohibiting the sale of cattle without the permission of the emir. Those who disobeyed this decree had their property confiscated and were even sentenced to death. On the other hand, it should be noted that even during the reign of Amir Muzaffar, due to the many violations of this decree, in 1868, trading in this palace was strictly prohibited [18].

CONCLUSION

In conclusion, it can be noted that the social and ethnic composition of merchants operating in the Bukhara Emirate during the research period was different. The markets of Bukhara have played an important role in the economic life of the country, as well as connecting and mediating in foreign trade relations. Therefore, from emirs and courtiers to scholars, artisans and peasants with moderate capital were engaged in trade. On the other hand, it should be noted that Bukhara merchants who saw the world through foreign trade or interacted with different categories and strata of the population as a result of trading activities had a broad outlook, were educated and aspired to enlightenment.

REFERENCES

1. *Muhammajonov A. Ancient Bukhara (archaeological records and history). - Tashkent: Fan, 1991. - p. 49.*
2. *Mansirev O. P. Market trade // Turkestan collection. T. 528. - St. Petersburg, 1868. - p. 25-27.*
3. *Muhammad Sadiq Gulshani. Tarikh-i humayun (Lucky date). / Translation from Tajik Amriyazdon Alimardonov, Lola Dodkhudoeva. - Dushanbe, 2016. - P. 36.*
4. *Mukminova R.G. Social differentiation of the population of the peoples of Uzbekistan (late XV-XVI centuries). - Tashkent: Fan, 1985. - p. 38.*
5. *Grebenkin A.D. Tajiks // Russian Turkestan ... - p. 25.*
6. *Khanikov N. V. Description of the Bukhara Khanate ... - p. 105.*
7. *National Archive of Uzbekistan. Fund.I-126, list 1, work 1107, page 7.*
8. *Sukhareva O. A. Bukhara XIX - early XX centuries ... - P. 236.*
9. *Tursunov N.O. Develop urban and rural settlements in northern Tajikistan. in the XVIII beginning. XX centuries (historical and ethnographic essays) - Dushanbe, 1991. - P. 126.*
10. *Grebenkin A.D. Tajiks... - p. 25.*
11. *Sukhareva O.A. The late feudal city of Bukhara... - P. 15.*
12. *Timofeich. Pulse of Bukhara... - p. 174.*
13. *Borisov V.M. Russian-Arabic Dictionary. - Moscow, 2008. - P. 35.*
14. *Demaison P.I., Vitkevich I.V. Notes on the Bukhara Khanate ... - P. 58.*
15. *Demaison P.I., Vitkevich I.V. Notes on the Bukhara Khanate - P. 98-99.*
16. *Stremoukhov N. A trip to Bukhara // Russian Bulletin. T. 117. - St. Petersburg, 1875. - p. 667.*
17. *National Archive of Uzbekistan. Fund.I-126, list 1, work 1158, page 4.*
18. *National Archive of Uzbekistan. Fund.I-126, list 1, work 1158, page 5.*



A COMPILATION OF DIFFERENT ANJANA YOGAS EXPLAINED FOR ADHIMANTA CHIKITSA IN SUSRUTHA SAMHITHA, ASHTANGA HRUDYA, ASHTANGA SANGRAHA, YOGATRATNAKARA, CHAKRADATTA

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ABSTRACT

Adhimantha is one of the detailed explained diseases in context of netra rogas by all acharyas. Even though an exact correlation is not available from the detailed explanation in the samhithas we can correlate diseases ranging from conjunctivitis to glaucoma under the context of adhimantha and abhishyanda. Wide variety of treatment modalities as both sarvanga shodana and kriyakalpa are available in ancient literature. of which anjana yogas play a major role. however an attempt to compile the various anjana yogas mentioned for abhishyanda and adhimantha can help in aiding to plan the treatment depending on the availability of drugs and efficacy of use. here an attempt is made to compile the various anjana yogas mentioned in susrutha samhitha, ashtanga hrudya, ashtanga sangraha, yogatratnakara, chakradutta

KEYWORDS: Adimantha, Anjana, Abhishyanda

INTRODUCTION

- Adhimantha is one among the sarvagata netra roga explained by Acarya Susruta¹ and Vagbatta² which are of 4 types mainly
 - Vataja
 - Pittaja
 - Kaphaja (Kriyakalpas) have been explained by different Acharyas in Samhithas. This article is a compilation of different Anjana Yogas explained in Susrutha Samhitha, Ashtanga Hrudaya, Ashtanga Sangraha, Yogaratnakara and Chakradutta
 - Raktaja
- All Acaryas explain Adimanta samprapti as when the Abhisyanda left untreated it will lead to the disease called Adimanta which presents with symptom of *Nayane teevra vedana*³
- Acarya Yogaratnakara explains the symptoms of Adimanta as *Atyarta Utpata, nirmadyade arda siraso atyartam*⁴

All Acaryas have not given a special treatment protocol for adimanta everyone explains that the same treatment protocol followed for abhisyanda is to be followed.⁵

AIMS AND OBJECTIVES

Aim

To compile and analyse the different anjana yogas explained for adhimantha chikitsa in susrutha samhitha, ashtanga hrudya, ashtanga sangraha, yogatratnakara, chakradutta



Objectives

To compile and study the references regarding the various anjana yogas scattered in susrutha samhitha, ashtanga hrudya, ashtanga sangraha, yogatratnakara, chakradutta mentioned in adhimantha chikitsa
To study and understand the role of anjana yoga in adhimantha chikitsa

MATERIALS AND METHODS

The literature study was done from the ayurvedic texts, contemporary textbooks and all the available e-resources regarding the treatment protocols, especially anjana yogas in adhimantha

RESULTS

ADHIMANTHA CHIKITSA

Acarya sushruta

Vataja adimanta cikitsa⁶

Acharya explains that for vataja abisyanda and adimanta should be given the following⁶

- Snehana
- Raktamokshana
- Sneha virecana followed by sneha or kasaya vasti
- Then he explains to go for **tarpana, putapaka, ascotana, dhoomapana, nasya, snehadara and sirovasti**

Pittaja adimanta cikitsa⁷

- Raktamokshana and virecana
- Netra seka, lepa nasya and anjana
- And pitta visarpa cikitsa to be followed
- Tarpana seka and nasya

Kaphaja adimanta cikitsa⁸

- Rakta mokshana
- Swedana
- Avapeeda nasya
- Dhooma
- Seka, pralepa
- Kavalagraha
- Rooksa ascyotana
- Rooksa putapaka
- The patient is advised to take tiktaka grita every fourth day also advised to follow apatarpana
- Prevent intake of kapha vardhaka ahara

Raktaja adimanta⁹

- Snehana with koumbi sarpi or mamsa rasa
- Followed by siravyadha
- Virecana with sneha dravya added with sita and sarpi
- Sirovirecana
- Followed by pralepa, parisheka, nasya, dhoomapana
- Ascyotana, abyanga, tarpana and putapaka
 - In vataja adimanta & abisyanda ie for the pitta and kaphaja condition in the pragroopa avasta only one has to start with tiksna gandusa nasya and upavasa¹⁰
 - For all varieties of disease acarya explains to use bidalaka made of patra, ela, marica, swarna gairika, rasanja, yasti, candana, saindava¹¹
 - Avakundana with sita, marica, manohva-4parts, lodra -16 parts
 - Avacoornana with aranya and kulatta made into potali and boiled in juice of cowdung skin is peeled of and dried and powdered and used to relive pain
 - Vyosa abaya, yasti, tutta, lodra powdered and fine powder is made tied into a potali and soaked into bronze vessel containing dhanyamla and the water is used for seka
 - One pala of kantakari is boiled in sixteen pala of water and decoction reduced to one eighth. This deloction mixed with honey, used for seka
 - Sigru pallavarasa is mixed with ksoudra and seka is done



- Acarya cakradutta explains cikitsa in 59th chapter
- It is explained that the same treatment of abisyanda is to be continued and if it fails then dahana karma is done above bhru region
- For abisyanda he explains treatment as
 - Langana
 - Lepana
 - Sweda
 - Siravyada
 - Virecana
 - Anjana
 - Ascyotana

Anjana yogas

	Susrutha samhitha	Ashtanga hrudaya	Ashtanga sangraha	Yogaratanakara	Chakradutta
Vataja adhimantha	Madhuka +rajani+pathya+ devadaru in goats milk ¹²		Prapaundarika amlaki bruhati dvaya darbha dasamoola satavari talisapatra manjishta and nilotpala with sita and sthanya or with madhuka kantakari kashaya	Haridradi anjana-haridra,daruharidra, madhuka,draksa,devadaru,aja ksira ²⁸	Brihatyadi varti-brihati,eranda mula &tvak, sigrumula and saindava lavana powdered wit aja ksira ³⁰
	1 part gairika 2 part saindhava 4 part pippali 8 part sunti turned to anjana ¹³		Swetalodra madhuka- ghrita bharjita(equal quantity)soaked in sthanya		
	Snehanjana ¹⁴		Sankha madhuka saindhava bruhati moola bhavana with aja dugdha in copper vessel for 7 days mascerated for 7 times made into gutika		
			Suvarna gairika soaked in divya ambasa in nisi and dried in diva for 7days made into anjana gutika		
			Darvi 50 pala sarib=va madhuka kakoli 1 pala nishadvaya mrudvika kasmarya sunisannaka manjishta lodhra usira candan in 1 drona jala reduced to 1/8 th and made to rasakriya		
Pittaja	Juice of palasa or sallaki with honey and sarkara ¹⁵	Sumanakhoraka,sanka,triphal,madhuka,anjanana made into gulika with divya vaari ²⁵	Prapaundarika amlaki bruhati dvaya darbha dasamoola satavari talisapatra manjishta and nilotpala with sita and sthanya or with madhuka kantakari kashaya		Haridradi anjana-haridra,daruharidra,madhuka,draksa,devadaru,aja ksira ³¹
	Rasakriya made of palindi or madhuka with honey and sugar ¹⁶		Swetalodra madhuka- ghrita bharjita(equal quantity)soaked in sthanya		



	Rasakriya made of musta phena vidanga dhatri bijaka ¹⁷		Sankha madhuka saindhava bruhati moola bhavana with aja dugdha in copper vessel for 7 days mascerated for 7 times made into gutika		
	Talisa+ ela+ gairika +usira+ sankha- made into anjana ¹⁸		Suvarna gairika soaked in divya ambasa in nisi and dried in diva for 7days made into anjana gutika		
	Rasakriya made of dhataki +syandana in breast milk ¹⁹		Darvi 50 pala sariva madhuka kakoli 1 pala nishadvaya mrudvika kasmarya sunisannaka manjishta lodhra usira candan in 1 drona jala reduced to 1/8 th and made to rasakriya		
	Lodra+draksha+sarkara+utpala+ya shti+vaca in breast milk ²⁰				
	Varnaka+candana+udumbara – in sudha jala ²¹				
	Samudraphena+stanya+honey ²²				
Kaphaja ²³	Hingu+tuta+triphala+maduka+prapoundarika in suda jala	Saindava,triphalava,vyosa,sankhanabi,samudraphena,saileya,sarga made into varti ²⁶	Bruhati twak suti rajata and kamsya bhasma bhavana with dahi pasted in tamra patra for 7 days and mixed with marica abhaya haridra trikatu triphala vidanga and rolled into gutika	Sriparni, patala,datri,dhataki,tilvaka,arjuna,bruhati puspa, bimbi,lodra and manjista ground with iksu or ksoudra ²⁹	Parijata valkaladyanjana- parijata valkala swarasa,tilataila,kanjika and saindhava lavana ³²
	Pathya+haridra+maduka in suda jala		Haritaki+ tutta+ marica(1/8 th of tutta) made into varti		Saindava,pippali,kushta and parni with triphala kashaya and suramanda ³³
	Triphala+trikatu+haridra+vidanga in suda jala		Vidanga churna soaked in varuna		
	Valaka+kusta+devadaru+sanka+patata+amlavyosa+mansila in suda jala		Sanka bhasma soaked in bijapuraka		
	Jati+karanja+sob anjana+ in suda jala		Varti made of swarnagairika saindhava manasila lakshana karanjaka surasa sankha talisa kushta kalingaka devadaru naladajatimukula and rasanja in suramanda		
	Fruit of kantakari+sigru+ flower of brihati daya+ rasanjana+candan		Powder of pushpa kasisa soaked in juice of surasa kept in tamra patra for 7 days		



	a+saindava+man asila+lasuna in suda jala made into varti				
			Kandacitra varti saindhava vyosha vara vidanga lodra prapaundarika madhuka tuttaka trakshysasaila and tamra chuna bhavana in aja dugdha made into varti		
			Paste of manasila saindhava sweta marica macerated in matulunga swarasa		
Raktaja ²⁴	Patala+arjuna+ka smari+dataki+dat ri+bilva+brihatid waya+bimbilota+ manjista made into pisti with iksu rasa or madu is made into gutika and anjana is done	Sumanaksharaka,san ka,triphal,maduka,a njana made into gulika with divya vaari	Adhaki,kuryata patali, sreeeparni vidula arjuna, bhruhathi champaka malati moola bhavana wityh kharjura rasa made into gutika	Sriparni, patala,datri,dhataki,t ilvaka,arjuna,bruhati puspa, bimbi,lodra and manjista ground with iksu or ksoudra	
	Candana+kumud a+patraka+silajat u+kunkuma+loha + tamra+rajata+tuta +nimba niryasa +anjana +tripuka + kamsyamala – made into gulika of yavakara with madu and used as anjana				
Unspecified		²⁷ pasupada gulika – Pundarika,yasti,darv i -8 pala made into kasaya with Idrona jala and reduced to 1/8 th and is still cooked and added with 10 pala of puspanja and 1 karsa of marica is added rolled into gutika and used as <i>anjana</i>	Tutta bhavana in gomutra /stanya/ajadugdha 25 times		Gairikadi gudika anjana – 1 part gairika,2 parts saindava,4 part pippali and 8 part tagara – made into gutika ³⁴
			Badari patra yashtyahva tutta dhatriphala taken sama pramana and bhasma is prepared and anjana is to be done		Darvyadi rasakriya- daruharidra,patola,maduka ,nimba,padmaka and utpala boiled in 4 times wate and reduced to quarter and reheated till it solidifies, cooled and used as anjana ³⁵



			Mastu tutta mardana in tamra patra till attains krushna varna		Bilva patra rasanjana-bilvapatra swarasa moxed with saindhava lavan and ghee rubbed with varatika in copper vessel mixed with stanya and fumigated with gomayagni ³⁶
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DISCUSSION AND CONCLUSION

In classics acharya explains different types of anjan under the category of snehana lekhana and ropananjan.

In vataja adhimantha commonly used anjana yogas are vatahara in nature. Considering all the anjana yogas for vataja adhimantha and abhisyanda madhuka haridra, bruhathi gairika and ksheera are the key ingredients explained by all acharyas. Madhuka is madhura vipaka and seeta veerya pacifies vata, haridra being tridosha hara acts on vata. Bruhati being vata kaphahara and gairika being madhura rasa snigdha guna seeta veerya pradhana and vatahara and the common explained bhavana dravya being ksheera which has vatahara and vatanulomana guna help in pacifying vata dosha.

In the context of pittaja adhimantha the common drugs explained by all samhthas are madhuka madhu chandana usheera and gairika. Out of all madhuka being madhurara rasa snigdha guna seetaveerya and mdhuravipaka thus aid to pitta shamaka action. Chandana having madhura rasa laghu guna and seeta veerya thus reducing pitta. Ushira also having madhura rasa laghu guna and sheeta very helping in reduce the vitiated pitta. Gairika being madhura rasa snigdha guna sheeta virya and madhura vipaka have pitta shamaka action. Considering all of the above drugs it is clear that all of them have madhura rasa sita veerya and madhura vipaka hence they all are pittashamaka in action and they can thus subside all the symptoms due to pitta in abhisyanda and adhimantha caused due to pitta.

Among the kaphaja adhimantha anjana yogas the most used drugs by all acharya include saindhava trikatu triphala vidanga bruhati which have tikshna and lekhana properties, it helps in pacifying kapha

The judicious use of various anjana yogas mentioned in ayurveda for both adhimantha and abishyanda chikitsa when use properly at the right time may help in managing the cases efficiently. many such compilations on scattered yogas of shalaky tantra for every roga should be compiled for more efficient and easy use.

REFERENCES

1. Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes: Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 6 Sloka 3 Pg 102 1st Edition
2. Ashtanga Hridayam English Translation : Prof K.R Srikantha Murthy Ch 15 :Pg 137 7th Edition 2014
3. Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes: Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 6 Sloka 10 Pg 103 1st Edition
4. Yogaratnakara English Translation By Dr Madham Shetty Suresh Babu, Chowkhamba Sanskrit Series Office
5. Ashtanga Hridayam English Translation : Prof K.R Srikantha Murthy Ch 16 :Pg 146 7th Edition 2014 Sloka 21
6. Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes: Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 9 Sloka 03 Pg 118 1st Edition
7. Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes: Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 10 Sloka 3 Pg 123 1st Edition
8. Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes: Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 11 Sloka 3 Pg 127 1st Edition
9. Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes: Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 12 Sloka 4,5,6 Pg 130 1st Edition
10. Ashtanga Hridayam English Translation : Prof K.R Srikantha Murthy Ch 16 :Pg 142 Sloka 1: 7th Edition 2014
11. Ashtanga Hridayam English Translation : Prof K.R Srikantha Murthy Ch 16 :Pg 142 Sloka 2: 7th Edition 2014
12. Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes: Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 9 Sloka 14 Pg 120 1st Edition
13. Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes: Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 9 Sloka 15 Pg 120 1st Edition
14. Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes: Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 9 Sloka 16 Pg 120 1st Edition
15. Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes: Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 9 Sloka 16 Pg 120 1st Edition
16. Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes: Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 10 Sloka 7 Pg 124 1st Edition
17. Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes: Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 10 Sloka 7 Pg 124 1st Edition
18. Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes: Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 10 Sloka 7 Pg 124 1st Edition



19. *Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes:Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 10 Sloka 8 Pg 124 1st Edition*
20. *Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes:Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 10 Sloka 8 Pg 124 1st Edition*
21. *Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes:Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 10 Sloka 10 Pg 124 1st Edition*
22. *Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes:Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 10 Sloka 12 Pg 120 1st Edition*
23. *Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes:Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 11 Sloka 7-10 Pg 127 1st Edition*
24. *Sushruta Samhita Vol 3 Uttara Tantra With English Translation Of Text And Dalhana's Commentary With Critical Notes:Prof Dr Vasant C Patil Dr Rajeshwari Nm Ch 12 Sloka 11-16 Pg 132 1st Edition*
25. *Ashtanga Hridayam English Translation :Prof K.R Srikantha Murthy Ch 16 :Pg 146 Sloka 23 : 7th Edition 2014*
26. *Ashtanga Hridayam English Translation :Prof K.R Srikantha Murthy Ch 16 :Pg 146 Sloka 24 : 7th Edition 2014*
27. *Ashtanga Hridayam English Translation :Prof K.R Srikantha Murthy Ch 16 :Pg 146 Sloka 25-27 : 7th Edition 2014*
28. *Yogaratanakara English Translation By Dr Madham Shetty Suresh Babu,Chowkhamba Sanskrit Series Office 1st Edition Pg1132*
29. *Yogaratanakara English Translation By Dr Madham Shetty Suresh Babu,Chowkhamba Sanskrit Series Office 1st Edition Pg 1135*
30. *Cakradatta English Translation By Dr Madham Shetty Suresh Babu Choukamba Krishnadas Academy First Edition Ch 59 Pg 448*
31. *Cakradatta English Translation By Dr Madham Shetty Suresh Babu Choukamba Krishnadas Academy First Edition Ch 59 Pg 448*
32. *Cakradatta English Translation By Dr Madham Shetty Suresh Babu Choukamba Krishnadas Academy First Edition Ch 59 Pg 450*
33. *Cakradatta English Translation By Dr Madham Shetty Suresh Babu Choukamba Krishnadas Academy First Edition Ch 59 Pg 454*
34. *Cakradatta English Translation By Dr Madham Shetty Suresh Babu Choukamba Krishnadas Academy First Edition Ch 59 Pg 449*
35. *Cakradatta English Translation By Dr Madham Shetty Suresh Babu Choukamba Krishnadas Academy First Edition Ch 59 Pg 448*
36. *Cakradatta English Translation By Dr Madham Shetty Suresh Babu Choukamba Krishnadas Academy First Edition Ch 59 Pg 448*



MANAGEMENT OF NON-COMMUNICABLE DISEASES DURING 2018 FLOOD IN KOZHENCHERRY TALUK OF KERALA

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ABSTRACT

Kerala is a multi-hazard-prone state. Recently, disaster administration has developed effective strategies for three phases of disaster management: mitigation and preparedness, response, and recovery. Infectious disease management is well addressed in health disaster management. The prevalence of non-communicable diseases (NCDs) is high in Kerala's population, and many receive inadequate treatments during catastrophes, particularly flood times. Displacement during floods causes loss of access to existing medicines or assistive devices and loss of prescription. Disruption of treatment will result in later-stage complications and emergencies. Steps for NCD management policies in each phase of disaster are described in this paper

INTRODUCTION

Kerala, the southernmost state of India, has been experiencing devastating climate change over the last few years. The state suffered high rainfall in 2018 and 2021 due to irregular monsoons. According to the Times of India report (2018), one million people were displaced, and more than three thousand camps were operated in the state due to the heavy flood of 2018. Furthermore, most residents lost their shelters and were rescued to camps without having medicines or medical reports. Also, insulin shortages were experienced in camps of Pathanamthitta, one of the most affected districts (Business Standard, 2018). Power supply disruption caused the malfunction of the cold storage system and had a consequence on the insulin therapy for diabetes mellitus

Kerala has a high risk of NCDs. It also had the highest hypertension prevalence rate as per the state-wide prevalence study conducted by the Indian Council of Medical Research (2017). In addition, according to the study, about 27% of men and 19% of women have diabetes, and more than 50% of death rates in 30-60 age groups are accounted to NCDs. But disaster management often focuses on preventing outbreaks of infectious diseases. Hence, during floods and disasters, NCD patients face the risk of complications due to discontinuing medicines.

Controlling of NCD must be incorporated into the health management plans during a disaster because of the significant risk of morbidity and mortality. Those patients face the risk of complications due to discontinuing medicines. Hence, it is essential to include NCD guidelines in disaster management plans.

LITERATURE REVIEW

Several studies revealed its increased risk during the humanitarian crisis (Pradhan, 2022, Christine et al. (2022). The effectiveness of management depends on the availability of medicines and technologies. But then, emergency care mainly focuses on infectious diseases and injuries in a complex disaster and avoids caring for NCD patients (Slim Slama et.al, 2016).

The study of Parasuraman (2020) included NCD management during a disaster's preparedness and response stage. The study advises following six steps:

1. Prioritising diseases - In Kerala Diabetes, hypertension, cardiovascular disease, stroke, chronic pulmonary obstructive disease, and chronic kidney disease are considered priority NCDs.
2. Estimation of patients and drug stock needed to be made available for one month's requirement
3. Prepare standard protocol for treatment and referral at primary care settings, including shelters.
4. Mapping private and public secondary and tertiary care facilities to treat complications
5. Public engagement and education on the importance of self-identification of known patients,



6. Daily reporting of the number of consultations on the above diseases and drug usage.

Kerala State Emergency Operations Centre published 'Minimum Standards of Relief' in May 2020. It detailed the minimum standards followed in six areas: temporary shelters, food, water, health, sanitation and hygiene, and waste management. They defined it as the "minimum level of services that are essential to ensure the survival and dignity of the people affected by disasters". Consideration of patients with diabetes, cardiac illness, and hypertension in relief camps and priority for timely availability of meals are included. Medical assessment, referral facilities, and regular medicine supply should be maintained.

PROBLEM STATEMENT

NCD patients suffered health issues during the 2018 flood in Kerala. This study was conducted to evaluate its management in disaster settings through the following objectives.

1. To understand the issues these patients confronted in the relief camp in Kerala
2. To identify the later stage complications they experienced
3. To analyse the efficiency of NCD management plans in relief camps

METHODOLOGY AND OBSERVATION

PARTICIPANTS

Twenty participants were interviewed with semi-structured questions. They were the residents of Pathanamthitta district, one of Kerala's most severely flood-impacted districts. They were affected by the 2018 flood and displaced to the relief camp.

THEMES

Three themes were made after analysing the minimum standard requirement in camp settings provided by the Kerala state disaster management authority (2020) and the NCD management protocol. They are (i) health issues faced by NCD patients in camps, (ii) the impact of flood-like disasters on their later life, and (iii) current NCD management plans in camp settings.

Topics covered in the interview

- Availability of medicine as per the ailments
- Provision for vaccinations of infants
- Availability of insulin and other emergency medicines
- Continuous monitoring of disease outbreaks
- Medical assessments for chronic diseases such as HIV, NCD, tuberculosis
- Facilities for referral services in the case of any worsening health conditions
- Availability of female health volunteers
- Supply of iron and folic acid, provision for TT injection to pregnant ladies
- Regular medicine supply for people with diabetes, hypertension, cardiac illness, bed-ridden, dialysis patients
- Facilities for psychosocial support
- Mobile medical teams
- Providing sanitary napkins, food for pregnant women and infants, nutritional assessment, and assuring the quality of drinking water
- Availability of doctor once a day
- Active surveillance for epidemics, supplements for pregnant women, lactating women, malnourished children, and people living with chronic medical conditions under the guidance of the camp doctor.
- Surveillance of nutritional status and diseases of public health importance such as measles, diarrheal diseases (cholera, dysentery), acute respiratory infections, and diseases of epidemic potential such as hepatitis and meningitis.

What are the health issues faced by NCD patients in camps?

Among the participants, ten were diagnosed with NCDs like diabetes mellitus and hypertension early. The diabetic patient, insulin-dependent for the past ten years, forgot to bring insulin to the camp. He was following a diabetic diet plan and but it got interrupted. The hypertensive patient had medicines with him but could not maintain a diet. He monitored his blood pressure with the help of medical staff available in camps. He worried about the conditions of his house and livelihood.

...the 2018 floods were an unexpected one. Adequate warnings were not given by them [authorities]. We were displaced very quickly. We didn't take any dresses, medicines or necessary items. When we reached there [camp], someone came and asked about the details such as name, address, medicines taken, diseases, symptoms of rat fever, etc..... I informed them that I had forgotten to bring my insulin. They told me that tablets would provide by them. But I didn't get those [tablets]. (P1, participant)



.... I took tablets for diabetes during the flood. I bought and stored those (tablets) just before the flood. So, I continued it. I felt disappointed as I had to take food like bread which would raise my blood sugar. (P13, participant)

What was the blood sugar and blood pressure level after leaving the camp?

Both NCD patients got minor complications in the later stage. The diabetic patient was advised to increase his insulin intake. The hypertensive patient had a variation in blood pressure in his first check-up within two days after leaving the camp.

..... I took insulin after three days. On the way back home, my right big toe got injured as the road was full of mud and remains of the washed-off road. I consulted a doctor and took TT. I had to go four kilometres from my hometown as the hospital near my home was thoroughly damaged by floods. The wound did not heal even after taking antibiotics. The doctor advised me to check my blood sugar level, which was slightly raised. He prescribed me to increase to four units of insulin. It took about four months to heal my wound. (P5, participant)

.... I did not feel any distress while on camp. After three days I reached my home. It was full of mud, and I lost many of my documents and utensils. After two days, I went for my monthly check-up in the hospital. At that, I found a slight increase in my blood pressure level. It had remained at the same level for two to three months. I continued my medicines with a slight increase in dose as per the consultant's advice. Later it came down to my previous level. (P8, participant)

Were all the current health management plans on disaster response observed in the camps?

In the camp, there was a shortage of insulin and emergency medicines. There were medical assessments for chronic disease, but due to the unavailability of essential medicines, many NCD patients experienced sudden discontinuation of medications. Camp authorities continuously monitored the outbreaks of infectious diseases such as Leptospirosis and diarrheal diseases. The camp maintained an adequate number of female health volunteers. Facilities for psychosocial support were not available. There was no provision for nutritional assessment and dietic food for NCD patients.

... In our camp, we had some health facilities, and ASHA workers enquired daily regarding illness and rat fever. I got ointment for the wound in my feet. (P18, participant)

..... ASHA worker enquired about our health status. Otherwise, we did not get any services from doctors. She (the ASHA worker) gave us medicines for rat fever. (P17, participant)

RECOMMENDATIONS AND CONCLUSIONS

The following recommendations are formulated after referring to the public health guidelines to flood events, the Sendai Framework, the Operational framework of climate resilience, Integration of NCD care in emergency response and preparedness. It is recommended to National and State Disaster Management Authority.

EMERGENCY PHASE

1. Integrating NCDs in Initial Rapid Assessment

NCD services should be included in the health state of state emergency management plan. Rapid assessment procedures can be used to determine the exact needs and state of health of NCD patients. Consider local risks and vulnerable groups among them. Compare their necessities with available resources and make them public. Continuity of medication should be ensured to avoid worsening the disease condition. Relief camps should be equipped with the facilities to address minor medical emergencies or give essential life support before referring to higher health care.

2. Map NCD service provision

The district-wise mapping will help to monitor and evaluate the NCD services and connect them with deserved. The location and available facilities of health centres are plotted and matched with the location of NCD patients. It also helps in identifying potential overlaps and gaps in service provision.

3. Organize NCD services delivery with a focus on integrating into primary health care

Evidence-based and cost-effective NCD protocols should be implemented in primary health care. It should be equipped with essential medicines and technologies, a trained health workforce, resources for health information, and appropriate referral systems. Identify the sub-group of NCD based on severity and treatment required. It will avoid interruptions of treatment for the patients on controlled medications. Minor symptoms of advanced NCD could be managed by providing basic care at the primary health care level. People should be informed about the availability of subsidized NCD medicines and affordable health care.

POST EMERGENCY PHASE OR DURING SLOW-ONSET EMERGENCIES

1. Debrief on lessons learned from the crises.

The post-disaster needs assessment learns about the success and deficiencies of response.



2. Strengthen health system response

Establish state pharmacy protocols for the cold storage and transportation of medicines, vaccines, and medical equipment during disasters. Stakeholder mechanisms for provisions of rapid information exchange, appropriate treatment, and risk reduction strategies. Enhancement of professional and technical capacities of the health workforce in NCD management. Early identification of risks, avoiding exposure to hazards, and awareness of prompt interventions to save lives in extreme weather conditions. National and state health budget plans include resources to increase resilience to climate change. Projects and programs regarding health system resilience could be submitted to and granted by the international climate change funds.

3. Strengthen public health response to NCDs

The national public health system should coordinate programs to deal with NCDs in disaster periods. The risk could be reduced by conducting health promotions.

4. Monitoring and evaluation of Emergency response to NCD

Knowledge gained through these will help to improve contingency planning. Development of NCD relevant indicators of all three phases based on the above

Appropriate and well-defined strategies will manage NCDs in emergency conditions. These are recommended for disaster management of Kerala's health sector to avoid emergencies and complications of NCD in a disaster setting.

REFERENCES

1. *Business Standard*, 2022, *How Kerala's robust healthcare system helped avert crises during the flood*, 23 August 2022
2. Christine, N. Robyn, B., Rebecca, L., Lydia, W. Pooja, A., Anand, S. et al. 2022, *Systematic review on chronic non-communicable disease in disaster settings*, *BMC Public Health*
3. *Integration of NCD Care in Emergency Response and Preparedness*, 2018, *World Health Organization Regional Office for South-East Asia*.
4. *Minimum Standards of Relief*, 2020, *Kerala State Emergency Operation Centre, Office of Kerala Disaster Management Authority*
5. Nousheen, A., Rabia, N., Zafar, F. 2022, *Impact of Floods on District Health Care System Resilience to Maintain Health Care Services in Pakistan: A Qualitative Study*, SSRN, Elsevier
6. *Operational framework for building climate resilient health systems*, 2015, *World Health Organization*
7. Parasuraman, G., Rontgen, S., Bipin, G. et al. 2021, *Provision of the Continuum of Care to Noncommunicable Diseases Post-Floods in Kerala, India 2018*, *Disaster Medicine and Public Health Preparedness*, Cambridge University Press.
8. *Public Health Guidelines for Flood Events*, 2019, *National Centre for Disease Control, Ministry of Health and Family, Government of India*.
9. *Sendai Framework for Disaster Risk Reduction 2015-2030*, 2015, *Resolutions adopted by the General Assembly on 3 June 2015*, *United Nations*.
10. Slim, S., Hyo-Jeong, K., Gojka, R., Philippa, B., Heiko, H., Cherian, V. et al. 2016, *Care of non-communicable diseases in emergencies*, *National Library of Medicine*.
11. *Status of Non-Communicable Diseases in India 2017*, (2022), *Indian Council of Medical Research, Ministry of Health and Family Welfare*
12. *The Times of India*, 2018, *Kerala floods: Over one million in relief camps, focus on rehabilitation*, 21 August 2018



APPROACHES TO THE STUDY OF EDUCATIONAL AND PEDAGOGICAL WORKS OF NOSIRIDDIN TUSI

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ABSTRACT

This article provides information about the three main approaches towards the study of educational and pedagogical works of great thinker Nosiriddin Tusi. The three main directions under the study include the historical, philosophical and literature studies in the world science. The analysis of the works of scientists, who contributed to the research of Nosiriddin Tusi is also clarified.

KEY WORDS: *philosophical approach, literature studies, pedagogical views, educational importance, positive outcomes, upbringing young children*

INTRODUCTION

The life and fate of Nosiriddin Tusi, unusually full of bright events, has long attracted the attention of scientists. Studies on him can be divided into several groups, differing among themselves in the fields of science, the presentation of specific historical material, as well as in chronological order. The first group consists of the works of Tajik, Russian, Western and Iranian researchers containing information about Nosiriddin Tusi in a historical aspect.

LITERATURE REVIEW

Important research on the history of Khorasan and Movaraunnahr during the Mongol period belongs to Russian oriental studies. The capital work among them is "Turkestan in the era of the Mongol invasion" by V.V. Bartold. In the sources section, he emphasizes the importance of Nosiriddin Tusi's information about the Mongol period. V.V. Bartold notes the significance of the "Zij-i Ilkhani". In his work "The Mongol conquest and its impact on Persian culture", the scientist believes that, despite all the negative consequences, the Mongol conquests contributed to trade and the exchange of cultural values¹. However, V.V. Bartold was not alien to the idealization of the Mongol statehood and the historical significance of the Mongol invasion for Central Asia and Iran. The concept of V.V. Bartold had a serious influence on the development of the history of the Mongol invasion. The most important aspects of the socio-economic history of the Mongolian period are considered in the works of I.P. Petrushevsky².

A significant contribution to the development of some aspects of the topic under study was the capital work "Empire of the Steppes" by the famous Western researcher Rene Grousset, where various problems of the history of Movaraunnahr, Khorasan and Iran in XIII were studied³. Among foreign researchers, the merits of G. Zuter, who compiled the large reference book "Die Mathematiker und Astronomer und ihre Werke" should be noted⁴. The reference book covers almost all the most significant works of scientists of the East of the Middle Ages. G. Zuter, studying in detail the works of scientists of the East, notes three periods in the development of the science of the East. The second period, which covers 1200-1275, the scientist connects with the scientific activity of Nosiriddin Tusi. In particular, the author emphasizes that "algebra, thanks to Omar Khayyam, trigonometry and astronomy, thanks to Nosiriddin Tusi, reached the peak of their development in the Middle Ages."

RESULTS AND DISCUSSIONS

From the point of view of the problem we are studying, the monograph "History of the Mongols" ("Tarihi mugul") by the Iranian scholar Abbas Iqbal is of particular interest, where the author covers in detail the life and work of Nosiriddin Tusi, calling him the great thinker of the Muslim East. In another study by A. Iqbal "History of Iran" (in four volumes), created on the

¹Bartold, V.V. Works: in 9 volumes / V.V. Barthold. - M., 1963. -V.1. -p.87; Works: in 9 volumes / V.V. Barthold. - M., 1966. -V.6. - P.189-198.

²Petrushevsky, I.P. Agriculture and agrarian relations in Iran in the XIII-XIV centuries / I.P. Petrushevsky. - M., - L., 1960. - P. 492.

³Rene Grousset. Imperial Sahonavardon / Rene Grousset; per. in Persian A. Rasuli. - Tehran, 1363. P. 628

⁴Zuter, G. Die Mathematiker und Astronomer und ihre Werke / G. Zuter. - Berlin, 1963. P. 354



basis of a multilateral and thorough analysis of primary sources, the author introduces a lot of new things into the study of the political and cultural history of the Iranian peoples of the period under study⁵.

For historical studies of the era of Mongol rule, general works on the history of individual peoples of the East are of great importance. Among them, the work of scientists from the Institute of History, Archeology and Ethnography of the Academy of Sciences of the Republic of Tajikistan, the publication "History of Iran" by Cambridge University and the work of Soviet scientists "History of Iran from ancient times to the end of the 18th century"⁶ stands out for the richness of the material used sources and the posing of a number of questions. The famous Soviet historian A.Y. Yakubovsky devoted several of his works to the study of the Mongolian period⁷. The works of the scientist contain a deep analysis of sources and scientifically based conclusions.

The second group consists of works containing information about Nosiriddin Tusi in the field of philosophy. Another Academician A.M. Bogoutdinov in the middle of the last century wrote that "the legacy of Nosiriddin Tusi has not yet been studied." In the last decade, Tajik scientists have written several works devoted to the philosophical views of the scientist. M.N. Boltaev, Kh. Dodikhudoev, M.A. Tavonofar⁸ made a great contribution to the study of philosophy and social thought of the XIII century, their studies contain scattered but valuable information about the life, work and activities of Nosiriddin Tusi. The work of the Tajik scientist M.N. Boltaev, consisting of 19 chapters, 13 chapters are devoted to the activities of Nasiruddin Tusi. In this work, M.N. Boltaev gives detailed information concerning the life and work of the scientist and his contribution to the development of the natural and human sciences. It should be noted that the Tajik researcher focused more on the philosophy of Nosiriddin Tusi. The author of the monograph "Issues of Epistemology and Logic in the Works of Ibn Sina and His School" is convinced that Khoja was a materialist and one of the prominent followers of Ibn Sina. Another merit of M.N. Boltaev was that, based on the analysis of literary works published in Iran, he first introduced a wide range of Tajik readers to the poetic heritage of Nasiruddin Tusi. To support his conclusions, M. Boltaev cites examples of Tusi's poetic heritage in Russian and Tajik. These passages were borrowed from the monograph of the famous Iranian literary critic Said Nafisi "Khoja's Poetry". M. Boltaev argued that the poems of Nosiriddin Tusi have a philosophical meaning to a greater extent. M. Boltaev is of the opinion that Nosiriddin Tusi was a materialist. But this statement is not shared by a number of researchers who later investigated the philosophy of the scientist. For philosophical research and expansion of the historiographic base, the monograph of the famous Tajik philosopher, academician M. Dinorshoev "Philosophy of Nosiriddin Tusi" is of great importance⁹.

The work cites several legends or stories from the life of Tusi, indicating that during his lifetime, Khoja, like Ibn Sina, enjoyed great authority among the people. M. Dinorshoev argued that Tusi not only defended the philosophy of Ibn Sina from the fierce attacks of Ghazali and Razi, but also managed to develop it. Consequently, the conclusions of Dinorshoev M. contradict the views of M. Boltaev. M. Dinorshoev, examining the works of Tusi "Asas-ul-iktibas", "Ravzat-ut-taslim", "Sharkh-ul ishorat", "Isboti vojib", "Akhloki Nosiri", comes to the conclusion that the views of Nosiriddin Tusi vacillated between materialism and idealism. This suggests that he was a metaphysician. At the same time, M. Dinorshoev sets a number of tasks for Tajik scientists. First of all, he compares Tusi's philosophy with his predecessors as well as his contemporaries. M. Dinorshoev came to the conclusion that only the study of the social, socio-political and ethical views of Nosiriddin Tusi on the basis of his theory of freedom of expression, as well as a comprehensive study of his works on the natural sciences and the determination of their role in the development of philosophy and science, will allow researchers to say the last word on Tusi's philosophical views¹⁰. Undoubtedly, the determination of the contribution of Nosiriddin Tusi to the development of science and culture of the Tajik people is possible only as a result of a new approach to the study of his heritage. Based on this, today Tajik researchers have prepared and published a number of his works. H. Shoikhtiyorov in his monograph "The Social Philosophy of Nasiruddin Tusi" explores a number of issues, including: housekeeping, ethics and civil policy. The researcher managed to reveal the social and ethical essence of Tusi's works using modern approaches. Examining the political problems in Tusi's works, the Tajik researcher determined that Tusi is convinced that relations between cities and states, as well as relations between rulers, largely depend on the stability of civil society. Exploring the political views of Tusi, H. Shoikhtierov argues that the social status of cities and states depends on the level of mutual relations between the rulers.

⁵Iqbol Abbos. *Tarikhi mugul = History of the Mongols / Abbos Iqbol*. - Tekhron, 1387. P. 342;

⁶*History of the Tajik people / ed. R.M. Masov*. - Dushanbe, 2013. - T.III. p. 580; *History of Iran. Age of the Mongols. Study of the University of Cambridge / per. H. Anusha*. - Tehran, 1381. - T.V. p 684; Pigulevsky, N.V., Yakubovsky, A.Y. *History of Iran from ancient times to the end of the XVIII century / N.V. Pigulevsky, A.Y. Yakubovsky*. -L.: Leningrad. un-ta, 1958. - 390 p.

⁷*The formation of the Mongolian state. The conquest by the Mongolian state of Central Asia and the invasion of the Tatar-Mongol invaders in Transcaucasia and Eastern Europe // Essays on the history of the USSR. The period of feudalism IX-XV centuries: in part 2. - M., 1953. - Part 1. - P.802-812; Yakubovsky, A.Y. *Maverannah and Khorasan under the Mongol yoke in the XII-first half of the XIV centuries. / A.Y. Yakubovsky // History of the Uzbek SSR: in 4 volumes*. - Tashkent, 1967. - T.I. -p.543.*

⁸Boltaev, M.N. *Issues of epistemology and logic in the works of Ibn Sina and his school / M.N. Boltaev*. - Dushanbe: Irfon, 1965. - 600 p.; Dodikhudoev, H. *Essays on the Philosophy of Ismailism / H. Dodikhudoev*. - Dushanbe: Donish, 1976. - 142 p.; *Philosophical Ismailism / H. Dodikhudoev*. - Dushanbe, 2014. - 496 p.; Tavonofar, M.A. *Religious-Philosophical and Socio-Political Views of the Nizarites of Alamut: Author. cand. philosophy Sciences / Tavonofar Murod Ali Ishok*. - Dushanbe, 2015. - 24 p.

⁹Dinorshoev, M. *Philosophy of Nasiriddin Tusi / M. Dinorshoev*. - Dushanbe: Donish, 1968. - 155 p.; 2nd. ed. - Dushanbe, 2012. - 191 p.

¹⁰Dinorshoev, M. *Philosophy of Nasiriddin Tusi / M. Dinorshoev*. - Dushanbe: Donish, 1968. - 155 p.; 2nd. ed. - Dushanbe, 2012. - 138 p.



Tajik researcher Rustam Komilov in his work “The Theory of Utopian Society in the History of Tajik-Persian Culture”¹¹ defines the main problems of an ideal society and comes to the conclusion that Tusi was of the opinion that a person improves only in society. In this regard, R. Komilov argues that according to the views of Tusi, a person who eschews society and people is deprived of human virtues. The Tajik researcher believes that for Tusi, the main means of developing human society is the production of public goods. The main merit of R. Komilov is that comparing the views of Tusi and Farabi, he comes to the conclusion that both philosophers strive for peace, condemn conflicts between peoples and states.

The third group is the research of scientists in the field of literature. The English scholar E. Brown in his “History of Persian Literature” describes in detail the state of the culture of Iran, Khorasan and Maverannah during the period of Mongol rule. In the preface to the work of Atomalik Juvaini “Tarihi chakhonkushoy”¹², he characterized the main features of the era of the Mongol conquest. In the research works of Z. Safo, A.E. Bertels, J. Ripka, H. Mirzozoda¹³ provides brief but valuable information about the biography and literary heritage of Nosiriddin Tusi. In 2009, Tusi’s famous work “Akhloki Nosiri” was published in Dushanbe in Tajik. It can be said with confidence that the publication of this book was one of the important events in the cultural life of modern Tajik society. Tusi’s work was prepared by Salimov N.Y. and Gaffurov U.A. In the preface of the book, the compilers showed the enormous role of Nosiriddin Tusi in the development of science and culture of the Tajik people¹⁴. Tajik scholars M. Dinorshoev, M. Boltaev, N. Soliev, U. Gafforova highly appreciate Tusi’s other treatise – “Meyor-ul-ashhor”. They note that this work is one of the most important sources for the study of Aruz. Tajik scientist Urvatullo Toirov prepared and published “Meyor-ul-ashhor” by Nosiriddin Tusi¹⁵. In this work, he considers the theoretical aspects of poetry, including poetic genres, rhymes, and measures.

CONCLUSION

Based on these considerations, it can be argued that Nosiriddin Tusi is one of the founders of the theory of aruz in Tajik-Persian poetry. As part of this study, we analyzed a number of Tusi’s poetic works, including “Si fasl dar marifati takvim” and “Madkhali manzum dar ilmi nujum”. Thus, a review of sources and literature showed that most of the works deal with general issues. This indicates that the life and work of Nosiriddin Tusi and a number of issues in the history of the Tajik people related to his era have not been studied and covered sufficiently. Until now, there are no special studies in modern history and oriental studies, the object of which was the life and work of Nosiriddin Tusi. In connection with the foregoing, we believe that this important, complex and little-studied topic needs a comprehensive development and serious scientific analysis.

REFERENCES

1. Bartold, V.V. *Works: in 9 volumes / V.V. Barthold. - M., 1963. -V.1. -p.87; Works: in 9 volumes / V.V. Barthold. - M., 1966. -V.6. - P.189-198.*
2. Bertels, E.E. *Nasir-i Khosrov and Ismailism / E.E. Bertels. - M., 1959. - 290 p.;*
3. Boltaev, M.N. *Issues of epistemology and logic in the works of Ibn Sina and his school / M.N. Boltaev. - Dushanbe: Irfon, 1965. - 600 p.*
4. Brown, E. *History of Iranian Literature (Tarihi adabiyot dar Eron) / E. Brown; per. M. Solech. - Tehran, 1358. - 1164 p.*
5. Dinorshoev, M. *Philosophy of Nasiriddin Tusi / M. Dinorshoev. - Dushanbe: Donish, 1968. - 155 p.; 2nd. ed. - Dushanbe, 2012. - 191 p.*
6. Dodikhudoev, H. *Essays on the Philosophy of Ismailism / H. Dodikhudoev. - Dushanbe: Donish, 1976. - 142 p*
7. *History of Iran. Age of the Mongols. Study of the University of Cambridge / per. H. Anusha. - Tehran, 1381. - T.V. p 684;*
8. *History of the Tajik people / ed. R.M. Masov. - Dushanbe, 2013. - T.III. p. 580;*
9. Iqbol Abbos. *Tarikhi mugul = History of the Mongols / Abbos Iqbol. - Tekhron, 1387. P. 342;*
10. Komilov, R. *Theory of Armenian society in the history of Persian-Tajik culture / R. Komilov. -Dushanbe: Education, 1997. - 288 p.*
11. Mirzozoda, A. *Tarikhi adabiyoti tojik = History of Tajik literature / A. Mirzozoda. - Dushanbe, 1983. -V.2. – 434 p.*
12. *Nasiruddin Tusi. Me'yar-ul-ash'or /N. Tusi; development of U. Toir, M. Abdulloev, R. Jalal. - Dushanbe, 1992. - 152 p.*
13. *Nasiruddin Tusi. Morality of Nasiri /N. Tusi; development of N. Salimov, U. Ghafforova. - Dushanbe: Shujoyan, 2009. - 388 p.*
14. Petrushevsky, I.P. *Agriculture and agrarian relations in Iran in the XIII-XIV centuries / I.P. Petrushevsky. - M., - L., 1960. - P. 492.*
15. *Philosophical Ismailism / H. Dodikhudoev. - Dushanbe, 2014. - 496 p*
16. Pigulevsky, N.V., Yakubovsky, A.Y. *History of Iran from ancient times to the end of the XVIII century / N.V. Pigulevsky, A.Y. Yakubovsky. -L.: Leningrad. un-ta, 1958. - 390 p*
17. *Rene Grousset. Imperial Sahanavardon / Rene Grousset; per. in Persian A. Rasuli. - Tehran, 1363. P. 628*
18. Ripka, Jan. *History of Persian and Tajik literature / Jan. Ripka; trans. from Czech; ed. and author before I.S. Braginsky. –*

¹¹Komilov, R. *Theory of Armenian society in the history of Persian-Tajik culture / R. Komilov. - Dushanbe: Education, 1997. - 288 p.*

¹²Brown, E. *History of Iranian Literature (Tarihi adabiyot dar Eron) / E. Brown; per. M. Solech. - Tehran, 1358. - 1164 p.*

¹³Sappho Zabehullo. *History of Literature in Iran = Tarihi adabiyot dar Eron / Safo Zabekhullo. - Tehron, 1332. - V.1. p. 764 ; Bertels, E.E. *Nasir-i Khosrov and Ismailism / E.E. Bertels. - M., 1959. - 290 p.; Ripka, Jan. History of Persian and Tajik literature / Jan. Ripka; trans. from Czech; ed. and author before I.S. Braginsky. -M.: Progress, 1970. - 440 p.; Mirzozoda, A. Tarikhi adabiyoti tojik = History of Tajik literature / A. Mirzozoda. - Dushanbe, 1983. -V.2. – 434 p.**

¹⁴Nasiruddin Tusi. *Morality of Nasiri /N. Tusi; development of N. Salimov, U. Ghafforova. - Dushanbe: Shujoyan, 2009. - 388 p.*

¹⁵Nasiruddin Tusi. *Me'yar-ul-ash'or /N. Tusi; development of U. Toir, M. Abdulloev, R. Jalal. - Dushanbe, 1992. - 152 p.*



M.: Progress, 1970. - 440 p.;

19. Sappho Zabehullo. *History of Literature in Iran = Tarihi adabiyot dar Eron / Safo Zabekhullo. - Tehron, 1332. - V.1. p. 764 ;*
20. Tavonofar, M.A. *Religious-Philosophical and Socio-Political Views of the Nizarites of Alamut: Author. cand. philosophy Sciences / Tavonofar Murod Ali Ishok. - Dushanbe, 2015. - 24 p.*
21. *The formation of the Mongolian state. The conquest by the Mongolian state of Central Asia and the invasion of the Tatar-Mongol invaders in Transcaucasia and Eastern Europe // Essays on the history of the USSR. The period of feudalism IX-XV centuries: in part 2. - M., 1953. - Part 1. - P.802-812*
22. Yakubovsky, A.Y. *Maverannahr and Khorasan under the Mongol yoke in the XII-first half of the XIV centuries. / A.Y. Yakubovsky // History of the Uzbek SSR: in 4 volumes. - Tashkent, 1967. - T.I. -p.543*
23. Zuter, G. *Die Mathematiker und Astronomer und thre Werke / G, Zuter. – Berlin, 1963. P. 354*



REAL-TIME HIDDEN DATA TRANSMISSION USING LORA

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ABSTRACT

Nowadays, it has become a crucial task in transferring confidential data for military departments, many multinational companies, etc. The important requirement is that the data that has been transmitted should not be visible to hackers or third parties from another end. To satisfy this requirement LoRa technology is used. Long-distance and low-power wireless communication technologies such as LoRa, Sigfox, and Narrowband-Internet of Things (NB- IoT) were developed in recent years. These technologies can contribute to indoor and outdoor smart applications with minimal power consumption. In this study, the LoRa wireless communication technique was used as the primary data communication method, enabling the device to communicate without requiring an Internet connection or a SIM card. This technology can be implemented in military and defense areas.

KEYWORDS: Lora, Arduino Nano, Bluetooth, Zigbee, Wi-Fi

1. BACKGROUND

Data transmission is one of the fundamental issues in modern data networks. We can transmit the data through many wireless technologies like Bluetooth, Wi-Fi, Cellular network, etc. But each of them has its own disadvantages.

Wi-Fi

Especially public Wi-Fi networks are prone to be hacked due to their wireless nature. You will experience a decrease in Wi-Fi strength as you move away from the access point. The range of Wi-Fi networks is usually between 100 and 150 feet. For a standard home, the amount is sufficient, but for building structures, it can pose a problem.

Bluetooth

Wireless technologies have limitations on how fast they can transmit data; usually, faster connections make for more energy use. Because Bluetooth is designed to be energy-efficient, the data it sends is relatively slow. Hence, it is not possible to use Bluetooth for communications over long distances, particularly.

Cellular

We cannot use this for solutions that require high bandwidth. Wireless communication is affected by physical obstructions, weather conditions, and other wireless devices' interference.

2. INTRODUCTION

A common requirement in today's world is that, the transfer of data or files from one computer to another. Bluetooth and Wi-Fi are the most popular wireless communication technologies available today for interacting with IoT devices. However, Bluetooth and Wi-Fi technologies consume a lot of power. Various technologies have been developed, but prior to the development of LoRa technology, none of them was suitable for transmitting information over long distances without consuming a lot of power. In LoRa Technology, very long-distance transmissions can be accomplished with minimal power consumption.

LoRa

Semtech introduced LoRa (Long Range), a wireless technology with long-range, low-power, and secure data transmissions for M2M (Machine-to-Machine) and IoT (Internet of Things) applications. LoRa enables the wireless connection of sensors, gateways, machines, devices, etc. LoRa Technologies operates in different frequency bands in different countries:

- In the USA, it operates at 915 MHz
- In Europe, it operates at an 868 MHz
- In Asia, it operates at 865 to 867 MHz, and 920 to 923 MHz bands.

3. COMPONENTS USED

3.1 Sx1278 LoRa Ra-02

Based on SEMTECH's SX1278 wireless transceiver, Ra-02 is an advanced wireless transmission module. With a communication range of 10,000 meters, the system uses advanced LoRa spread spectrum technology. For spread spectrum communications over long distances, the SX1278 RF module is suitable. Low power consumption makes it efficient.



Fig.1: Ai Thinker LoRa Series Ra-02

In addition, LoRa modulation technology has obvious advantages over traditional modulation in terms of anti-blocking and selection, which solves the problem that traditional modulation does not adequately consider distance, interference, and energy consumption at the same time.

Module Model	Ra-02
Interface	SPI
Frequency Range	410-525 MHz
Power Supply	3.3V
Weight	0.45g
Max Transmit Power	18±1 dBm

3.2 Arduino Nano

Several ports on the Arduino Nano allow it to communicate with a computer, another microcontroller, or any other Arduino. Arduino's software contains a serial monitor that allows for the sending and receiving of simple textual data.



Fig.2: Arduino Nano

The Arduino Nano can be programmed with the help of Arduino software. We can navigate through the Tools -> Board menu, and choose "Arduino Duemilanove or Nano w/ ATmega328" (based on your board's microcontroller).

3.3 20X4 LCD display

The LCD stands for liquid crystal display, whose light modulation is based on liquid crystals. A liquid crystal display

consumes less energy than a light-emitting diode or plasma display.

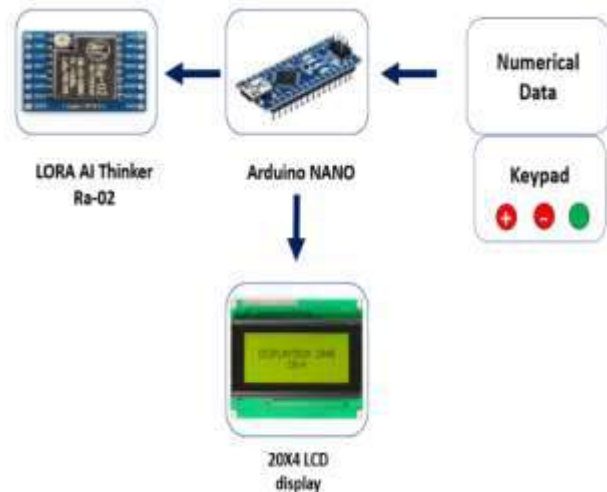


Fig.3: 20X4 LCD display

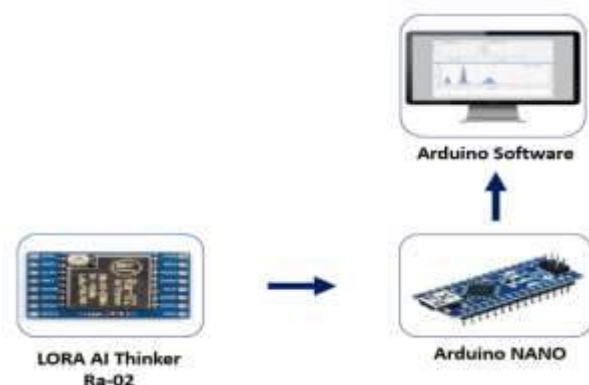
In a 20X4 LCD module, there are four rows in a display, a row can contain twenty characters, and a display can contain eighty characters.

4. BLOCK DIAGRAM

4.1 Transmitter



4.2 Receiver



5. WORKING

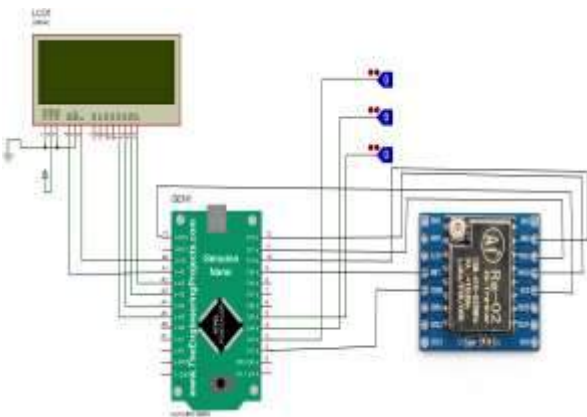
Every data must be transmitted using a wired or wireless communication method. Thus, in this paper, the data is transmitted via LoRa, the acronym for Long Range, a wireless communication technology at both ends that are used to transmit the data. From the transmitter station, the data can be sent with the help of the joystick which consists of three buttons that performs the operations like increment, decrement, and sending the data. The data that is being sent is displayed on LCD.

Similarly, on the other station, the data received can be displayed on the serial monitor of Arduino. The data that was being sent is in the form of numerical rather than alphabetic. Hence, it is highly confidential and difficult to decode except for the officials who can understand.

6. HARDWARE DESCRIPTION

6.1 Transmitter Side

We have used an Arduino Nano and LoRa module for the transmitting side. The circuit diagram for connecting an Arduino Nano with LoRa module is shown below.

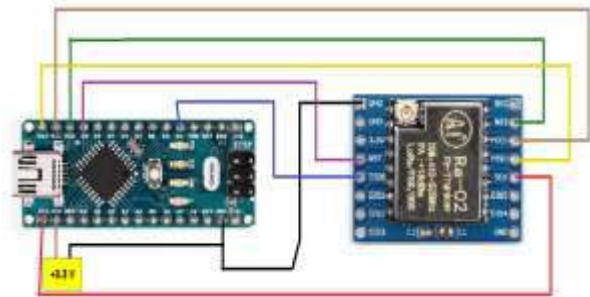


LoRa module consists of 16 pins, 8 on each side. Among these, six of them are used by GPIO pins which range from DIO0 to DIO5 while four of them are used as Ground pins. In the next step, we have to establish a connection between the SPI pins on the LoRa and the SPI pins on the Arduino board as shown above. The following table shows the connections of the pins.

LoRa Sx1278 Module	Arduino Nano Board
3.3V	-
Gnd	Gnd
En/Nss	D10
G0/DIO0	D2
SCK	D13
MISO	D12
MOSI	D11
RST	D9

6.2 Receiver Side

While considering the Receiving side, we have used an Arduino Nano with a LoRa module. The circuit diagram shows the connection between Arduino Nano and LoRa is shown below.



The connections almost remain the same for the transmitting as well as receiving side.

7. SOFTWARE DESCRIPTION

As soon as the hardware is ready, we can proceed with Arduino IDE, which already has a LoRa library created by Sandeep Mistry. In order to access and add the library, open the Arduino IDE and select Sketch -> Include Library -> Manage Libraries. By searching for LoRa Radio, we can find the library created by Sandeep Mistry and click the Install button to install the library.

8. DESIGN

8.1 Transmitter



8.2 Receiver



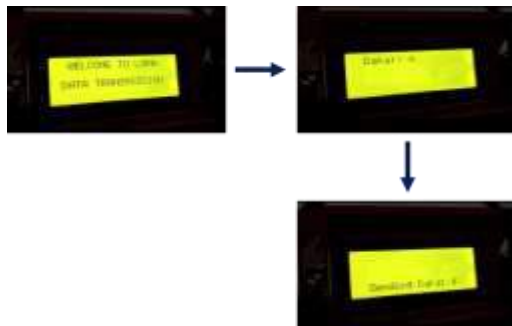


9. FINAL SETUP

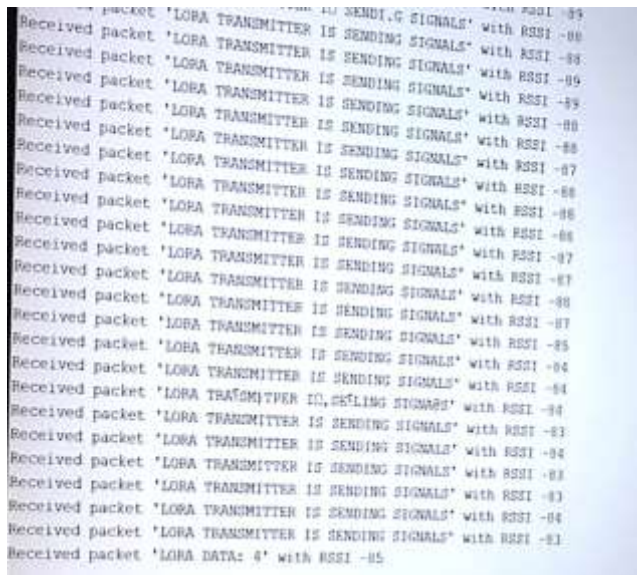
As soon as the program is uploaded, open the Serial monitor for the Receiver on the Arduino Board. When we choose the data to be sent and press the send button on the transmitting side, the serial monitor of the receiver will display it. Here there will be an RSSI (**Received Signal Strength Indicator**) value for each message that was received by the LoRa module. RSSI's value will always be negative. The value closer to zero signifies a stronger signal. The signal strength decreases as the devices are moved further apart.

10. RESULTS

10.1 Transmitter Side



10.2 Receiver Side



11. COMPARISON OF KEY FEATURES OF WIRELESS TECHNOLOGIES

Wireless Standards	Bluetooth	Wifi	Zigbee	LoRa
IEEE spec...	IEEE 802.15.1	IEEE 802.11b	IEEE 802.12.4	-
Power Consumption	Medium	Medium	Low	Low
Transmitting Range	1 to 100m	100m to several km	1 to 100m	3-5km (urban areas), 10-15(rural areas)
Power Profile	7-40 hrs	2-3 years	Atleast 2 years	10 years
Data Rates	1-3 Mbps	10-100+ Mbps	20-250 kbps	300 bps-50 kbps
Frequency Band	2.4 GHz	2.4 GHz	868/915MHz; 2.4 KHz	169/433/868/915 MHz

12. CONCLUSION

With the help of LoRa, users can establish long-distance transmission, extended battery life, as well as high capacities while expanding their sensor networks without compromising on transmission distance or power consumption. As of now, LoRa operates mostly in free frequencies, including 433, 868, and 915 MHz. Thus, LoRa technology offers great distances, and lower power consumption (long battery life) at a low cost.

13. REFERENCES

1. R.Nagarajan, R.Dhanasekaran "Implementation of Wireless Data Transmission in Monitoring and Control", *International Conference on Communication and Signal Processing, 2013*
2. V.Abinayaa, Anagha Jayan "Case Study on Comparison of Wireless Technologies in Industrial Applications", *International Journal of Scientific and Research Publications, February 2014*
3. Aloys Augustin, Thomas Clausen and William Mark Townsley "A Study of LoRa: Long Range & Low Power Networks for the Internet of Things", *MDPI, September 2016*
4. Lidia Pocero Fraile, Stelios Tsampas, Georgios Mylonas, Dimitrios Amaxilatis "A Comparative Study of LoRa and IEEE 802.15.4-Based IoT Deployments Inside School Buildings", *IEEE, August 2020*
5. Ruobing Liang, Liang Zhao, and Peng Wang "Performance Evaluations of LoRa Wireless Communication in Building Environments", *MDPI, July 2020*
6. Dong Hyun Kim, Jun Young Lim, Jong Deok Kim "Low-Power, Long-Range, High-Data Transmission Using Wi-Fi and LoRa", *6th International Conference on IT Convergence and Security (ICITCS), September 2016*



7. Himadri Chaudhary, Birju Tank, Honey Patel "Comparative Analysis of Internet of Things (IoT) based Low Power Wireless Technologies", *International Journal of Engineering & Technical Research*, January 2018
8. Nishakar Kankalla, Kasireddygaru Anirudh Reddy, Nimmagadda Hariproya "Cryptographic efficient data transmission in defense stations using LoRa", *International Research Journal of Engineering and Technology (IR- JET)*, March 2019
9. Christos Bouras, Apostolos Gkamas, Vasileios Kokkinos, Nikolaos Papachristos "Using LoRa Technology for IoT Monitoring Systems", *10th International Conference on Network of the Future (NoF)*, 2019



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INFORMAL SECTOR AND POVERTY ERADICATION STRATEGIES IN THE NEW NORMAL OF COVID-19 PANDEMIC IN NORTH-WEST, NIGERIA

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ABSTRACT

This study was conducted to find out informal sector and poverty eradication strategies in the new normal of covid-19 pandemic in North-West, Nigeria. A descriptive survey research design was used for the study. The population consisted of all the registered Small and Medium scale Enterprises (SMEs) in Kano the largest city in the zone, Kaduna, Zaria, Sokoto, Katsina, Gusau, Garki and Funtua. These were metropolitan/commercial cities in each State in the North-West, Nigeria. It was hypothesized that there was no significant difference in the responses of the respondent groups on the level of effect of COVID-19 pandemic on the informal sector in North-East Nigeria; there was no significant difference in the responses of the respondent groups on the strategies adopted for the eradication of poverty among informal sector workers in North-West Nigeria in the new normal COVID-19 pandemic; there was no significant difference in the responses of the respondent groups on the factors that militate against the effective application of the strategies adopted for poverty eradication among the informal sector workers in North-West Nigeria in the new normal COVID-19 pandemic. Mean, t-test and correlation analysis were used to analyze the data. All the hypotheses were retained. It was recommended among others that the State governments in the region should set aside emergency fund targeting informal sector in the zone. And that deferment of taxes or waiver of taxes, lower interest rate could also be embarked on by the appropriate policy makers in the zone to make informal sector remain afloat in the new normal COVID-19 pandemic.

KEYWORDS: Poverty reduction, information sector, flexible loan, cost loan

INTRODUCTION

The COVID-19 pandemic put dents on every sector of the affected countries, and the informal sector was no exception. The coronavirus outbreak ravaged human health, disrupted the livelihood of thousands of people, and impacted negatively on the global economy (Craven et al. 2020; Amare et al., 2020). Confirmed cases of the novel coronavirus named Covid-19, which was first reported in December, 2019 in the Chinese province of Hubei and declared a pandemic by the World Health Organization in March 2020 is now over 28 million worldwide, 1,344, 403 in Africa, and 55,829 in Nigeria as at September 2020. The presence of the virus in Nigeria was first reported on February 27, 2020, when an Italian citizen visiting Nigeria tested positive for the virus, caused by SARS-CoV-2. On 9 March 2020, a second case of the virus was reported at Ewekoro, Ogun State, a Nigerian citizen who had contact with the Italian

index case. The rapid spread of the COVID-19 virus led countries around the world into a health crisis.

The informal sector which is undeniably critical to the growth and development of the global economy was affected by the pandemic. The informal sector which is a good source of job creation, aids the development of local technology and source of development to indigenous entrepreneurs (Alaye-Ogan, 2012; Erdem, 2011), and enormously contributed to nation-building was seriously affected at the peak of the pandemic (Aderemi, Olu-Young, Taiwo, & Adejumo, 2019; Tehseen & Ramayah, 2015).

The lack of social protection coverage for informal sector in the North west apparently made it more difficult for the informal sector to build resilience against the Covid-19 pandemic and recover quickly from the economic fallout in the region. Besides, activities in the informal sector is characterized



by underlined workplace, unsafe and unhealthy working condition, low level of skills, lack of access to information, financial, training and technology, lack of adequate micro-level incentives such as a low level of education, lack of access to economics resources and other business services.

The informal sector contributes more than 90% of all economic activities and more than 50% of all employment opportunities globally and also, accounted for more than 40% of GDP in developing nations (Garba, 2020). The informal sector in the North-west geopolitical zone, Nigeria, as obtained in other parts of the globe, performs a key role in the economic development of the country. The sector accounts for 90% of all businesses in Nigeria (Gbandi & Amissah, 2014). Given the severity of the disease, the COVID-19 pandemic posed tremendous challenges to the performance of the informal sector.

COVID-19 is a disease cause by a new corona virus originated from Wuhan in china. This pandemic has been declared by World Health Organization (WHO) on march 11, 2020. Covid 19 is now a global emergency, given its impact on the entire global population and economy (AUC, 2020). The impact of this virus is affecting the entire global economy and more drastically crippling the activities in such areas like falling in oil prices, tax revenues, foreign exchange receipts, foreign financial flows, travel restriction, frozen labour management and reduction at tourism (Nuabuife, Okoli, and clear, 2020). Many nations around the Covid has lockdown their economy just to contain the spread of the disease that is treating human existence, particularly increased level of individual inability, to enjoy the basic acceptable standard of living (poverty).

This present study analyzed the strategies adopted to eradicate poverty among informal sector workers in the new normal COVID-19 pandemic in North-West, Nigeria and recommend response measures and strategies for governments, development partners and actors in the sector.

Problem Statement

The COVID-19 pandemic caused over 5.9 million deaths globally (WHO, 2022) and resulted in an economic crisis for almost all countries. The safety measures taken to restrain the spread of the virus such as quarantine, travel restrictions, closure of educational and business institutions, reduced public gatherings disrupted economic activities worldwide. The pandemic was predicted to harm the low-income population, especially the informal sector workers with vulnerable employment and minimal health or social safety.

In the North-West, Nigeria comprising Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto, and Zamfara, the slump in demand for goods and services resulting from the pandemic and its concomitant restrictive measures caused a loss of income and jobs for informal workers, whose livelihood depends on consumption-driven economic activities. There were some major factors behind the reduced demand for consumption

during this crisis. First, restriction on movement caused demand for non-essential goods to decline. Second, the lockdown and the pandemic hurt peoples' earning capacity, which reduced their consumption expenditure (Onyekwena, & Ekeruche, 2020).

Major shutdowns in North-West, Nigeria have cut demand for informal sector workers, who produced good/services in or immediate neighbors for local and domestic markets. Similarly, the market infrastructure for handicraft and home-based products were frozen, as products could not be sold or transported resulting in the loss of business capital. Again, Federal, State and Local Government interventions tend not to be mindful of the realities of the informal sector following the effects of the COVID-19 pandemic, leaving the sector without adequate social and economic security. This tend to be forcing the informal sector workers to turn to alternative sources of social and economic securities which might not be sustainable and sufficient for poverty eradication. It is in the light of the aforementioned ill-developments that this study was prompted to examine the informal sector and poverty eradication strategies in the new normal of COVID-19 pandemic in the North-west, Nigeria so as to make recommendations based on empirical evidence to promote and sustain the informal sector in the zone. This is the thrust of the study.

Research Questions

The following research questions guided the study:

1. What is the level of effect of COVID-19 pandemic on the informal sector in North-East Nigeria?
2. What are the strategies adopted for the development of the informal sector in North-west Nigeria towards poverty eradication in the new normal COVID-19 pandemic?
3. What are the factors that militate against the effective application of the strategies adopted for the development of the informal sector in North-west Nigeria towards poverty eradication in the new normal COVID-19 pandemic?

Research Hypotheses

The following null hypotheses were generated and tested at 0.05 level of significance:

- Ho1: There is no significant difference in the responses of the respondent groups on the level of effect of COVID-19 pandemic on the informal sector in North-East Nigeria
- Ho2: There is no significant difference in the responses of the respondent groups on the strategies adopted for the eradication of poverty among informal sector workers in North-West Nigeria in the new normal COVID-19 pandemic.
- Ho3: There is no significant difference in the responses of the respondent groups on the



factors that militate against the effective application of the strategies adopted for poverty eradication among the informal sector workers in North-West Nigeria in the new normal COVID-19 pandemic.

LITERATURE REVIEW

Conceptual Framework

The Meaning of Informal Sector

The International Monetary Fund IMF (2018) described the informal sector as block economy, economy of the street, underground economy and unethical economy. The International Labour Organization ILO, (2019) defines the informal sector as all economic activities by workers and economic units that are in law or in practice not covered or insufficiently covered by formal arrangement in terms of financial inclusion and policy development strategies. The informal sector is dominated by retail trade and composed of activities related to the selling of food stuffs, clothes, textile works, radio repair, iron works, watch repairs, sewing, weaving, photography, laundry, carpentry, sale of recharge cards, barbing, hair dressing saloons, etc. and survival activities such casual and unpaid jobs (Jegade & Opatola, 2020).

Theoretical Framework

Based on the nature of this research, the study of informal sector in north-west political zone, Nigeria is anchored on institutional theory. The institution on other hand theory often seeks to examine impact of environment on certain phenomenon (Urban, 2013). Past works posit that different environmental situations affect the manner certain phenomenon behave and exploit opportunities (Scott, 1992).

The theory explains how institutional efficiency are consider either as weak or unavailable (Sulter et al, 2013). An institutional framework is considered weak if it lacks the necessary capacity/strategies to ensure that policies work effectively or its operations or policies of institution undermines the system it ought to protect and thereby stifles the whole system (Kistruck, et al, 2015). In the N-W region perspective, one the institutional policies/strategies to incentive system, defines poverty right access to financial resources, safety standards and regulatory programmes which affect the greater of informal sectors. The question now is whether there is capacity to do that or not.

The Linkage between COVID-19 Pandemic and the Performance of Informal Sector

The deadly disease (COVID-19) spread to almost everywhere in the world at an incomparable level. Therefore, because of the lockdown, the informal sector was affected and have weakened the available human and economic resources such as workmen, materials, transport, etc (Craven, Liu, Mysore, & Wilson, 2020). This caused the closure of many

businesses and equally affected their performances. The lockdown, movement restriction, market closure, and social distancing as announced by the government also truncated the movement of goods and services which stand as the backbone and which the informal sector depends on for their smooth routine activities.

The informal sector, together with their employees are an integral part of social and economic systems of day-to-day life globally. This important role played by the informal sector faced threats from unmatched effects of the coronavirus. The customers, as well as facilitators of informal sector, were under the threat of business bankruptcy as a result of the recession experienced globally (Wuen & Wu, 2020).

Challenges that Faced the Informal Sector during COVID-19 Pandemic

The demand for goods and services rose and the majority of businesses started showing a sign of liquidity problem due to the problem of cash reserves of the informal sector. Hence, any liquidity problem from this sector of the economy resulted in liquidation in many other large businesses. International businesses were particularly vulnerable because of the shortage of US dollars for their transactions (Wuen and Wu, 2020). For the informal sector engaging in production activities, operations during lockdown became a problem because factory floors are not designed for social distancing. The movement of people to other places for the safety of life resulted in the disappearance of workers and filling the gap created may be difficult for the informal sector.

METHODOLOGY

A descriptive research design was used for the study. This method involves gathering data about the target population from a selected sample size and generalizing the findings obtained from the analysis of the sample to the entire population (Afolabi 1993).

The target population for this study consisted of all the registered Small and Medium scale Enterprises (SMEs) in Kano the largest city in the zone, Kaduna, Zaria, Sokoto, Katsina, Gusau, Garki and Funtua. These were metropolitan/commercial cities in each State in the North-West where the study was based. North-West is one of the six geopolitical zones of Nigeria representing both a geopolitical and political region of the country' North-West. The current rate of poverty evidence in the five regions is 43.28% which is above the national average rate of 21.7% and the rate of vulnerability to poverty is at 72% (NBS, 2022).

The population and sample frame for this study is 1,975,934 and 1,459 which represent the region population and registered membership groups in the region respectively (NBS, 2021). The registered membership groups were divided into strata, using the Stratified Random Sampling Technique (SRT), and the sample size determination formula of Yamane cited in



Odumegu (2021), 1,459 SMEs were sampled. These sampled SMEs were found in the agricultural sector, general trading, construction, general services, transport and distribution, hotels and restaurant, and educational sectors of the region.

General trading represents the sale items such as foodstuffs, water and firewood; construction category represents the manufacturing of building blocks the sale of cement and other building materials; general services represents business activities such as barber shop, hair salons, shoe repairs and communication services. Transport and distribution category represent tax, owners/driver; hotels and restaurant category represent guest houses and food services. The education represents basic schools only. The study measured poverty eradication in terms of the survival of SMEs in the new normal

of COVID-19 pandemic in the North-West, Nigeria by capturing most SMEs growth data for a period of five years (2015-2020).

The instrument used to gather the data needed was the questionnaire. The questionnaire was designed on Likert five-point scale of strongly agree, agree, undecided, disagree and strongly disagree. Out of the total 1,459 questionnaires distributed to SMEs' owners, 1,070 were returned generating a response rate of 73.3%. Frequency counts and simple percentages were used to determine the responses of the respondents on their personal data while mean was used to analyze the data emanating from the research questions. Multiple regression analysis was used to analyze the data. Data was computed and analyzed using Statistical Package for Social Sciences (SPSS, Version 20).

RESULTS

Table 1: Profile of Sampled SMEs in North-West Geopolitical Zone

Demographic Variables	Frequency	%
Sectoral Distribution		
Agriculture	243	16.7
Construction	315	21.6
Hotels and restaurants	75	5.1
Transport and distribution	512	35.1
General trading	178	12.2
General services	98	6.7
Education	38	2.6
Total	1,459	100

Table 1 shows the profile of sampled SMEs (informal sector) in the North-West, Nigeria. The data shows that 243 (16.7%) were in Agriculture; 315 (21.6%) were in Construction; 75 (5.1%) were in Hotels and Restaurants while 512 (35.1%) were in Transport and distribution. Furthermore,

178 (12.2%) were in general trading 98 (6.7%) were in general services and lastly, 38 (2.6%) were in education. It shows clearly that majority of the informal (35.1%) sector workers in the area were in transport and distribution, followed by Construction (21.6%).

Table 2 Age of SMEs in the Selected Cities in North-West Geopolitical Zone

Age of Business (Years)	Frequency	%
0-10	711	48.73
11-15	275	18.85
16-20	65	4.46
21 years and above	119	8.16
Total	1459	100

Table 2 shows the age of SMEs (informal sector enterprises) in the selected cities in North-West, Nigeria. The data shows that 711 SMEs representing 48.73% have existed from between 0-10 years; 275 representing 18.85% have existed from between 11-15 years; 65 representing 4.46% have existed from between 16-20 years while 119 representing 8.16% have existed for 21 years and above. This means that

majority of the enterprises in the informal sector (48.73%) were not as old as others and so could have been swept off their feet by the COVID-19 pandemic. This percentage is followed by those that have existed only for between 11-15 years with a percentage of 18.85. these ones too could have been seriously affected leading to the poverty of the informal sector workers.

**Table 3 Rating of the Effect of Lockdown on the Informal sector in North-West Geopolitical Zone by the Informal Sector Workers**

Rating	Frequency (n=242)	Percentage	Mean	SD
Low	65	4.45	33.3161	.91236
Moderate	408	28.0		
High	986	67.5		
Total	1459	100.00		

Source: Field Survey (2022)

The descriptive analysis reveals that out of 1,459 total respondents, 986 representing 67.5% rated high level of effect of lockdown on informal sector performance in North-West, 408 representing 28.0% rated a moderate level, while 65 representing

4.45% rated the effect to be on a low level. This shows that the majority of the respondents (67.5%) rated high effect of the lockdown on the informal sector in the North-West geopolitical zone.

Table 4: Mean Score on the Strategies adopted for the Development of the Informal Sector in North-West Nigeria towards Poverty Eradication in the New Normal COVID-19 Pandemic by the Two Groups

SN	Strategies	SMEs Owners		SMEs Staff		t-value
		Mean	Std	Mean	Std	
1	Granting of sufficient loan amount to informal sector workers.	3.7547	0.791	3.7581	0.694	0.03
2	Customer-friendly loan repayment process.	3.3057	0.993	3.7258	0.728	3.14
3	Low interest rates on loans.	3.8075	0.705	3.8065	0.596	0.01
4	Easy loan accessibility requirements.	3.8830	0.595	3.9677	0.254	1.10
5	Easy loan collateral.	3.7887	0.697	3.7097	0.710	0.80
6	Financial grants from the government.	3.3019	1.03	3.5000	0.901	1.39
7	Affordable loan processing fee.	3.7792	0.795	3.7194	0.615	1.01
8	Free post COVID-19 training workshops for informal sector workers.	3.7698	0.731	3.8065	0.596	0.37
9	Flexible schedule of loan repayment.	2.8453	1.139	3.6129	0.797	5.02
10	Skill development programmes.	3.0264	1.143	3.6452	0.770	4.05
11	Provision of agricultural inputs for those in the sector.	3.4038	1.007	3.9032	.433	3.82
12	Provision of supporting materials for all in different sectors.	3.6868	0.800	3.7097	0.710	0.21

The scores for the two groups (the SMEs owners and the SMEs staff) on item 1 in the table support the notion that granting of sufficient loan amount was one of the strategies adopted for the development of the informal sector in North-West Nigeria towards poverty eradication in the new normal COVID-19 pandemic. By the scores of 3.7547 and 3.7581 for the SMEs owners and the SMEs staff respectively, the two groups seem to agree that granting of sufficient loan amount was a strategy. However, there was no agreement between the SMEs owners and the SMEs staff on the notion that customer-friendly loan repayment process was a strategy. The SMEs owners

disagreed with the notion while the SMEs staff were of the view that customer-friendly loan repayment process was a strategy.

Both groups agreed that low interest rates on loans and easy loan accessibility requirements were strategies adopted for the development of the informal sector in North-West Nigeria towards poverty eradication in the new normal COVID-19 pandemic. These are indicated by the high scores on items 3 and 4 respectively in the table. The two groups also share the same opinion on the opinion that easy loan collateral was one of the strategies as indicated in item 5 in the table. There was no consensus among the respondents on the notion that financial



grants from the government was one of the strategies. The SMEs owners particularly disagreed with this opinion while the SMEs staff seem to have the impression that the statement is true. All the respondents agreed with the notion that affordable loan processing fee was a strategy. This is indicated by the high scores for item 7 in the table.

In item 8, the two groups agreed that free post COVID-19 training workshops for informal sector workers was a strategy. But while the SMEs owners disagreed that flexible schedule of loan repayment was a strategy as shown in item 9, the SMEs staff agreed with the notion. The difference between the two groups on this item was very high as indicated by the observed t-value of 5.02 for item 9 in the table. In item 10, the SMEs owners disagreed that skills development programmes is

a strategy but the SMEs staff had a contrary opinion and the difference between the two groups was also very high as indicated by their mean scores and the observed t-value of 4.05 in the table. For item 11, where the provision of agricultural inputs for those in the sector was assessed as a strategy, the SMEs owners did not agree it was a strategy but the SMEs staff were of the opinion that it was a strategy and the difference between the two groups on this opinion is high as indicated with a t-value of 3.82 in the table. However, on item 12, the two groups agreed that provision of supporting materials for all in different sectors was a strategy adopted for the development of the informal sector in North-West Nigeria towards poverty eradication in the new normal COVID-19 pandemic

Table 5: Mean Score on the Factors that Militate against the Effective Application of the Strategies adopted for the Development of the Informal Sector in North-west Nigeria towards Poverty Eradication in the New Normal COVID-19 Pandemic

SN	Factors	SMEs Owners		SMEs Staff		t – value
		Means	Std	Mean	Std	
1	Negative attitude	2.5605	0.252	3.4810	0.249	2.77
2	Corruption	4.5736	0.265	4.6274	0.263	1.53
3	High level of illiteracy	3.8431	0.225	3.8582	0.222	0.59
4	Insecurity	3.7757	0.201	3.7791	0.193	0.15
5	Cultural practices	3.9301	0.177	3.9339	0.198	0.18
6	Religious practice	3.9167	0.152	3.9130	0.171	0.20

The scores as indicated in the table above did not reveal much difference in the opinion of the respondents as regards the factors that militate against the effective application of the strategies adopted for the development of the informal sector in North-west Nigeria towards poverty eradication in the new normal COVID-19 pandemic.

The two groups tend to agree that negative attitude, corruption, high level of illiteracy, insecurity, cultural practices and religious practices have impact on the effective application of the strategies adopted for the development of the informal sector in North-west Nigeria towards poverty eradication in the new normal COVID-19 pandemic.

Table 6: t-test on the Level of Effect of COVID-19 Pandemic on the Informal Sector in North-West Nigeria by the Two Groups

Status	Mean	STD	SE	t-value	DF	P-value
Movement Restriction						
SMEs owners	45.1434	2.468	0.152	2.88	325	0.006
SMEs staff	46.0968	1.725	0.219			
Market Closure						
SMEs owners	31.3962	1.512	0.093	1.43	325	0.154
SMEs staff	31.6935	1.313	0.167			
Social Distancing						
SMEs owners	39.1887	1.631	0.100	0.084	325	0.401
SMEs staff	39.000	1.391	0.177			

Note: N = 1459,

DF = 325,

P>0.05

The observed t-value on the effect of movement restriction by the two groups is 2.88 which is higher than the critical value of 1.96 at the same degree of freedom. The observed level of significance is 0.006 (P < 0.05). On this premise the hypothesis could be rejected. This means that the

SMEs owners are significantly different from the SMEs staff in their opinion on the effect of movement restriction on the informal sector in the North-West, Nigeria. But a look at the mean score indicates that both SMEs owners and SMEs staff agreed that movement restriction has significant impact on the



informal sector in the North-West, Nigeria since all of them agreed by their mean score on the variable.

On The effect of market closure, there was no significant difference between the two groups. The observed t-value (1.43) is lower than the critical value of 1.43 and the observed significant level 0.154 is higher than 0.05 ($P > 0.05$). However, the mean score for both groups indicated that they agreed on the effect of market closure on the informal sector in the North-West, Nigeria.

Table 7: Correlation Analysis

The relationship between the independent variable and the dependent variable which could result to the poverty of the informal sector workers is presented here. The variables displayed consist of SME's performance as the dependent

The opinion of the SMEs owners and SMEs staff on the effect of social distancing on informal sector in the zone did not differ significantly as indicated in the table. The observed t-value for the test of difference between the groups is 0.084 while the critical value is 0.401 and the observed significant level is 0.230 ($P > 0.05$). But the mean scores for the two groups indicate that they both agreed that social distancing could have some significant impact on the informal sector.

variable while the independent variables were Lockdown, Movement Restriction, Market Closure, and Social Distancing as the independent variables.

Table 8: Pearson Correlation between Variables Lockdown, Movement Restriction, Market Closure, Social Distancing, and SMEs Performance in North-West, Nigeria

	X1	X2	X3	X4	Y
Lockdown (X1)	1				
Movement Restriction (X2)		1			
Market Closure (X3)			1		
Social Distancing (X4)				1	
SMEs Performance (Y)					1

****.** Correlation is significant at the 0.01 level (2-tailed).

Source: Field Survey (2022)

Table 5 indicates that the COVID-19 variable that had the highest correlation of 0.570 is Market Closure, which means it had the highest positive effect on the informal sector in North-East geopolitical zone. Variables such as Movement Restriction and Lockdown also recorded positive correlation values of 0.565 and 0.444 respectively with informal sector performance in in North-West geopolitical zone. Lastly, Social Distancing recorded a low positive correlation value of 0.391 with informal sector performance in the zone. This means that the informal sector was seriously affected by COVID-19 pandemic. The data shows how the informal sector in the North-West battled with the lockdown, movement

restriction, market closure, and social distancing which could had affected the poverty level of the informal sector workers in the area under study.

The multiple linear regression model used for the study is indicated in mathematical terms as follows: $Y = \beta_0 + \beta_1LD + \beta_2MR + \beta_3MC + \beta_4SD + \mu_i$ Eq (1) Where Y = Informal sector Performance indicating the state of Small and Medium Enterprises (DV), LD = Lockdown (IV), MR = Movement Restriction (IV), MC = Market Closure (IV), and SD = Social Distancing (IV).

CONCLUSION

Findings from the analysis showed that the informal sector was seriously affected the COVID-19 pandemic in the North-West geopolitical zone leading to the poverty of the informal sector workers. Consequently, there were strategies adopted for the development of the informal sector in North-West Nigeria towards poverty eradication in the new normal COVID-19 pandemic. These were meant to help the informal sector workers to regain their balance and get out of the circle of poverty that the pandemic plunges them into.

Recommendations

In view of the findings of this study, the following recommendations are made to enhance the development of the informal sector in North-West Nigeria towards poverty eradication in the new normal COVID-19 pandemic:

1. A spike reduction in operations and sales of the informal sector will metamorphose into cash-trap. This would increase the vulnerability of the informal sector in the North-West, Nigeria to other external shocks. Therefore, the State governments in the region should set aside emergency fund targeting informal sector in the zone.



2. Deferment of taxes or waiver of taxes, lower interest rate could also be embarked on by the appropriate policy makers in the zone to make informal sector remain afloat in the new normal COVID-19 pandemic.
3. Proactive plans should put in place in anticipation of events such as COVID-19 that may likely affect the informal sector in the zone.
4. The informal sector in North-West, Nigeria should adopt online or digital sales and services.
5. The informal sector in North-West, Nigeria should improve on their mode of communication, they should

communicate early with employees on policies and procedures, changes, engaging with workers' unions where appropriate.

6. There is the need for all stakeholders in Nigeria including government, financial institution, private organizations and family members to refocus their attention on the development of the informal sector which has the capacity to provide employment to less privileged individuals.

REFERENCES

1. African Union Commission (2020). *Impact of the Corona Virus (Covid-19) on the African Economic*. Retrieved from <https://www.tralac.org/news/article/14883-impact-of-the-coronavirus-covid-19-on-the-african-economy.html> accessed on 14th May, 2020.
2. Agyapong D. (2010). *Micro, Small and Medium Enterprises. Activities Income Level and Poverty Reduction in Ghana. - A Synthesis of Related Literature*. *International Journal of Business and Management*, 5(12), pp.196-205
3. Ajakaiye O. (1998). *Conceptualization of Poverty in Nigeria, Proceedings of the 7th Annual Conference of the Central Bank of Nigeria Zonal Research Units Makurdi June 8-2*
4. Anwar, A. I & Amrullahi, A. (2017). *The Impact of Financial inclusion Towards Poverty Reduction Indonesia*. *Advances in Economics, Business and Management Research* Vol. 40
5. Auwar, A. Uppun, P & Reviani, I. T. A. (2016). *The Role of Financial Inclusion in Poverty Reduction in Indonesia*. *Journal of Business and management* Vol. 18(6), 37-39
6. Blattman, C. Green, E.; Jamison, J.; Annan, J. 2014. *Employing and empowering marginalized women: A randomized trial of microenterprise assistance*.
7. Bryman, A. & Cramer, D. (2006). *Quantitative data analysis with SPSS 12 and 13: A guide for social scientist*. London: Routledge.
8. CBN (2013). *Federal Government to Float N220bn Fund for Financial Inclusion in Nigeria* Central Bank of Nigeria Publication. 34-39.
9. Clark, H. (2013). "Financial inclusion and HIV/AIDS: some issues for consideration for the workshop a micro-finance and HIV/AIDS". *Journal of Parker*, 2(3): 23-26.
10. Grimm, M. Paffhausen, A. 2015. "Do interventions targeted at micro-entrepreneurs and small and medium-sized firms create jobs? A systematic review of the evidence for low and middle income countries,; in *Labour Economics*, Vol. 32, pp 66-85.
11. Gunarshi, T, sayellti, F. & Deweuh, R.L (2018). *Financial inclusion and poverty alleviation: evidence from Indonesia*. *International Journal of Economics, Business and Management Research*, Vol. 2(3)
12. Miller, A. (2016). *Nexus of financial inclusion, poverty reduction and growth, Finance for Alli Promoting Financial Inclusion in West Africa*. Washington DC World Bank Group.
13. Narula R. (2020). *Policy opportunities and challenges from the Covid-19 pandemic for economies with large informal sectors*. *Journal of International Business Policy*, 3, 302–310. <https://doi.org/10.1057/s42214-020-00059-5> View Article Google Scholar
14. Guo F., Huang Y., Wang J., & Wang X. (2022). *The informal economy at times of COVID-19 pandemic*. *China Economic Review*, 101722. <https://doi.org/10.1016/j.chieco.2021.101722> PMID:35058681
15. Pitoyo, A., Aditya, B., & Amri, I. (2020). *The impacts of COVID-19 pandemic to informal economic sector in Indonesia: Theoretical and empirical comparison*, Retrieved on 15 June, 2021. *E3S Web of Conferences* 200, 03014. <https://doi.org/10.1051/e3sconf/202020003014>
16. IMF (2018). *Opportunity for All: Promotion Growth and Inclusiveness in the Middle East and North Africa*, July 2018, Departmental Paper No.18/11
17. *International Labour Organization*. (2016) *World Employment Social Outlook: Youth Trends for 2016*. Geneva: ILO
18. *International Labour Organization*. (2018). *Women and Men in the Informal Economy: A statistical Picture (3rd ed)* Geneva: ILO
19. Loyaza, N, V. (2016) "Informality in the Process of Development and Growth" *The World Economy*. 1856-1916'
20. Okoye, N. (2014), *April National development strategy series*. *He Guardian* p. 31
21. Onugu, B. A. N. (2005). *Small and Medium Enterprises (SMEs) in Nigeria: Problems and prospects*. PhD Thesis. St. Clemens University.
22. Onyekwena, C., & Ekeruche, M. A. (2020). *Understanding the impact of the COVID-19 outbreak on the Nigerian economy*, Retrieved on 14 June, 2021. <https://www.Brookings.Edu/Blog/Africa-in-Focus/2020/04/08/Understanding-the-Impact-of-the-Covid-19-Outbreak-on-the-Nigerian-Economy/> (Accessed 2.06.2022).
23. Sachs, J. (2005). *The end of poverty: How we can make it happen in our lifetime*. London: Penguin Books Ltd.
24. Sanusi L (2011). *Financial inclusion for accelerated micro, small and medium enterprises development: The Nigerian Perspective*. Paper Presented at the 2011 Annual Microfinance and Entrepreneurship Awards.
25. Sanya O & Olumide F. F. (2017). *Financial inclusion as an Effective Tool of Poverty Alleviation: A case of Ekiti State*. *Journal of Economic and Finance*, Vol. 8(4), 01-10
26. WHO (2022). <https://covid19.who.int/> Retrieved on 26 July, 2022.



A REVIEW ON THE FREQUENCY RESTORATION IN A TWO AREA POWER SYSTEM

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ABSTRACT

In the process of achieving frequency restoration in multi area multi source, we came across several problems. First one is to place a controller to maintain and tune the gain parameters of different generation units to get the optimal response by proper optimization technique to simulate the environment for finding the optimal values. Here we are analyzing the Hybrid Differential Evolution Pattern Search based Fuzzy PID controller for AGC of multi area power system. In this work, a two area six-unit hydro, thermal, wind and diesel system were examined. Area-1 consists of hydro + thermal + wind and area-2 consist of hydro + thermal + diesel which is interlinked with a tie-line. The future scope will be on simulation results which validate the present work of hybrid pattern search differential evolution (HPS-DE) with other techniques in terms of frequency deviation, tie-line power deviation.

KEY WORDS: Frequency Restoration, Fuzzy PID, HPS-DE, power generation, multi area multi source.

1. INTRODUCTION

The world is fully enlightened throwing darkness aside with the bulk power generation. But power generation requires much attention with manual as well as automation. Frequency and tie-line power is the main concern in multi area power system, we have to kept and maintain it within specified limits. The main concern we have to put to get effective result is the selection of algorithm for tuning the parameters. Getting the optimal values for PID controller to make the system effective and efficient by the the artificial bee colony (ABC) and differential evolution (DE) are utilized. But artificial bee colony gives better results alone in both fractional and integer models when compared with differential evolution algorithm [1]. As ABC is a global optimization technique because of its robustness, fast convergence. It faces some disadvantages of accuracy in optimal values and premature convergence in later steps. For solving the accuracy problem in getting global optimal value, a chaotic search ABC (CABC) is proposed for tuning the PID control parameter [2].

2. LITERATURE REVIEW

Pretty Neelam et al. (2020), automatic generation control is responsible for regulating frequency under sudden power demands of the end users. Present work is analyzed with two test systems. In test system 1: the proposed hybrid teaching and learning based optimization pattern search algorithm tuned tilted integral derivative controller is better compare to newly published GA/DE optimized different classical controller for AGC in a deregulated environment. In test system 2: a two area six units system in deregulation is considered with appropriate boiler dynamics, govern dead band, generation rate constraint and time delay and the effectiveness of solar thermal power plant is studied in presence of thyristor controlled phase shifter and superconducting magnetic energy storage devices [3].

Naladi Rambabu et al. (2022), this article determines the optimal location of accurate high voltage direct current (AHVDC) tie line and energy storage devices (ESD) on system dynamics of three area thermal-precise wind turbine systems (PWTS) under deregulated scenario. A new controller called fractional order PI and integer order integral derivative with filter is utilized. Their gains are optimized by a crow search algorithm subjecting to minimization of a performance index named hybrid peak area integral squared error (HPA-ISE). System responses with parallel AC-AHVDC tie-line, ESD explore better performance and improves the system dynamics. The optimal location of AHVDC tie-line and ESD are found out in the distributed area.



Investigation with ESD like RFB, UC, and both are carried out and found that optimal AC-AHVDC system with both RFB and UC outcomes best [4].

Mohamed Mokhtar et al. (2020), the problem of regulating the actual power of generating units in reaction to the change of the system frequency and the interchange of patch line power within stated limits is known as load frequency control. The effective operation of multi area power systems requires the total generation to be equal to the total load demand plus transmission losses. The goal of the LFC is to reduce the overall fluctuation of the system frequency as soon as possible with the appropriate power authority to recover the system frequency to its desired value. Objective to design a controller is to improve dynamic response such as decrease of settling time and overshoot of frequencies and tie-line power deviation [5].

Hassan Bevrani et al. (2020), it deals with a novel heuristic based recurrent Hopfield neural network designed self adaptive PID controller for automatic PID controller for automatic load frequency control of interconnected hybrid power system. Designing a self adaptive heuristic particle swarm optimization (PSO) gravitational search algorithm (GSA) based Hopfield neural network tuned PID and cascade controller for ALFC study of more realistic multi-source hybrid power system. Application of FACTS devices inimproving the power quality and stability of power system like UPFC which is extensively used in transmission lines for improving the transient stability, alleviating power oscillations, and providing voltage support to the system [6].

D. K. Chaturvedi et al. (2021), a multi objective optimization-based feature selection with the capability of eliminating features is implemented to create an efficient day ahead price Forecasting. To increase the forecasting accuracy, a backtracking search algorithm is applied as an efficient evolutionary search algorithm in the learning procedure of adaptive neuro fuzzy inference system. Investigation over the day ahead price forecasting is based on the price of electricity (POE) data and demand of electricity (DOE) data in different time intervals [7]. Electricity forecasting techniques :(1) artificial neural network (2) adaptive neuro fuzzy inference system.

J. L. Willems et al. (2019), here the cascaded ID-PD controller is applied for system dynamics control of a hybrid deregulated power system. Impact of solar thermal system and geothermal plant on system dynamics. With the presence of superconducting magnetic energy storage in addition to RES to regulate the system dynamics. For controlling the gains of secondary controller, Satin bowerbird optimization technique is used here. Sensitivity evaluation for the proposed cascaded ID-PD controller [8].

T. Hiyama et al. (2020), this paper presents a novel optimization model for the calculation of the water value of a hydro power plant. The coordination between the medium- and short-term generation scheduling in centralized electricity markets has usually been realized by means of future cost functions that express the expected power supply cost as a function of the systems state at the end of the short-term scheduling horizon. It works on scheduling medium term generation model for computation of the water value of a hydropower plant participating as a price taker in the electricity market operated by OMIE and as a price maker in the reserve market. Optimization process solved by Stochastic dynamic programming [9].

C. S. Chang et al. (2022), it presents a large new scale multi area multi source AGC power system in the restructured environment with different types of power plants such as thermal power plants with reheat turbine, gas, diesel and hydro power units. Proposes a new modified virus colony search algorithm based orthogonal learning to enhance the search space ability. It considers various contracts between Gencos, Transcos and Discos in the restructured regime with different types of unexpected conditions. Some of the Discos may violate their contract to increase their profit, therefore this violation should be added as extra load demand on local areas [10].

S. Bhowmik et al. (2004), a two area multi source power system comprised of thermal hydro wind units in each area is proposed to make scheme more realistic by considering non linearities such as GRC, GDB AND TD. For frequency regulation, a novel controller based on fractional order approach is proposed. To tune fractional order based TID controller parameters using Salp Swarm algorithm in a hybrid power system. The robust analysis of the controller is done for a wide range of variation of $\pm 50\%$ in all system parameters and variation in time delay values. RFB helps in enhancing system performances in terms of reduced overshoot, undershoot with lesser settling time [11].

X. Yu and K. Tomosovic et al. (2004), this paper investigates the problem of event-triggered H_∞ load frequency control (LFC) for multiarea power systems under hybrid cyber attacks, including denial-of-service (DoS) attacks and deception attacks. An event-triggered transmission scheme is developed under the DoS attacks to lighten the load of network bandwidth while preserving a satisfactory system performance. Then, a new switched system model accounting for the simultaneous presence of DoS attacks and stochastic deception attacks is established with respect to the LFC for multiarea power system [12].

3. METHODS and DEVELOPMENT

Initially individual power plants were going to supply the power upto large extent but with the increasing capacity and usage of

power, we ran into deficit power supply. So adapting multi area multi source [13] environments, there will be less scarcity of power demand. Here we are developing a two area five-unit power system as shown in **Figure 1**.

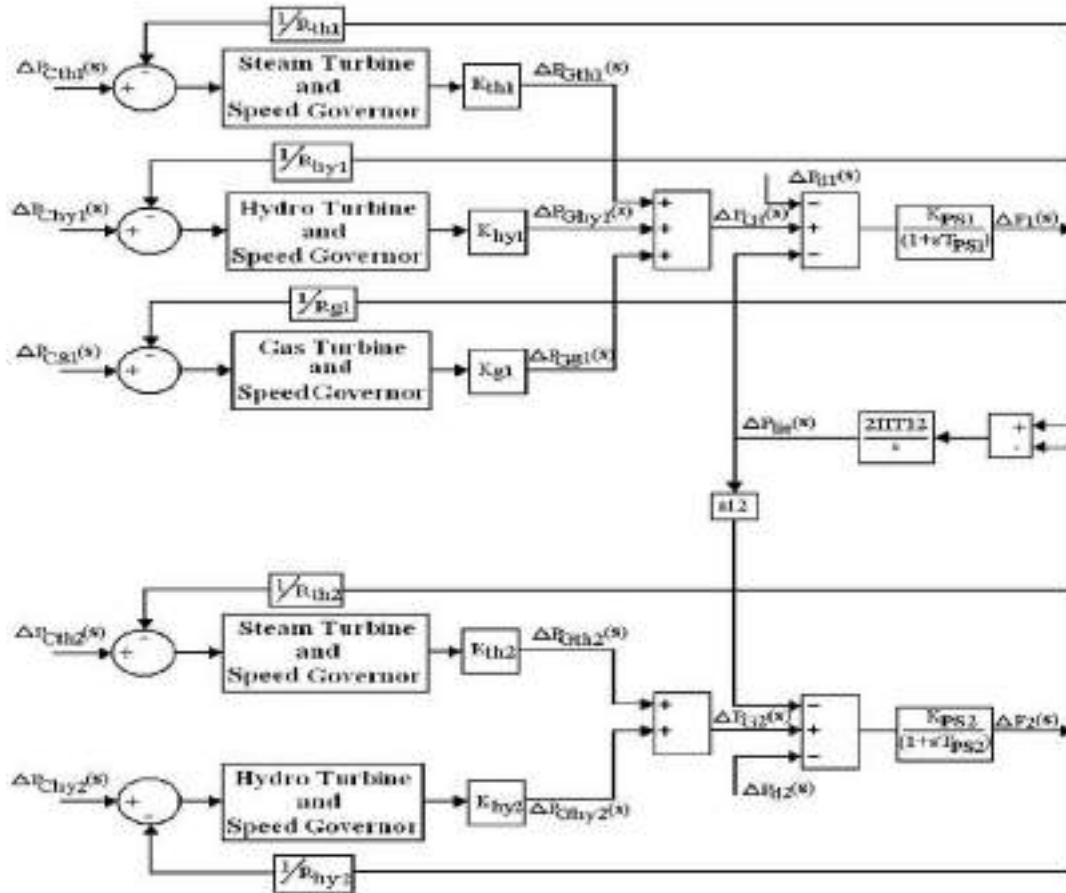


Figure 1: Block diagram of A Two Area Power System

In this two-area power system, generation of power from five units which are hydro, thermal, gas from area1 and thermal, hydro from area2 respectively. These two areas are interlinked with a tie line as shown above. As we are analyzing this system for maintaining frequency and tie-line power within specified limits, effective selection of algorithm with efficient controller is compulsory. From the literature review, it is better to use a hybrid pattern search- differential evolution (HPS-DE) based fuzzy PID for better dynamic response and fast convergence.

3.1 Fuzzy Proportional Integral Derivative Controller

Fuzzy logical approach uses artificial intelligence for error detection and correction. But it lacks a systematic design process, and improper tuning of parameters may lead to the divergence of system stability. Taking all these considerations into account, the fuzzy PID controller [14] was chosen here to solve the AGC problem. The structure of the fuzzy PID is shown in **Figure 2**.

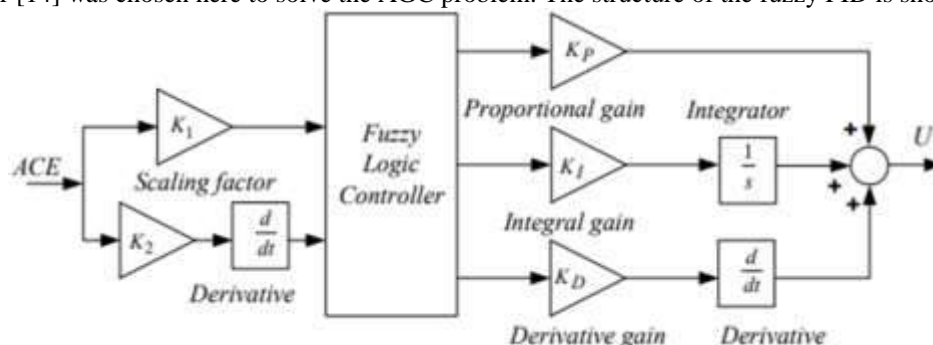


Figure 2: Structure of Fuzzy PID

3.2 Hybrid Pattern Search- Differential Evolution Algorithm

In the current work, an effort has been prepared to analyze a hybrid DE method and PS technique to tune the controller parameters which is shown in below **figure - 3**.

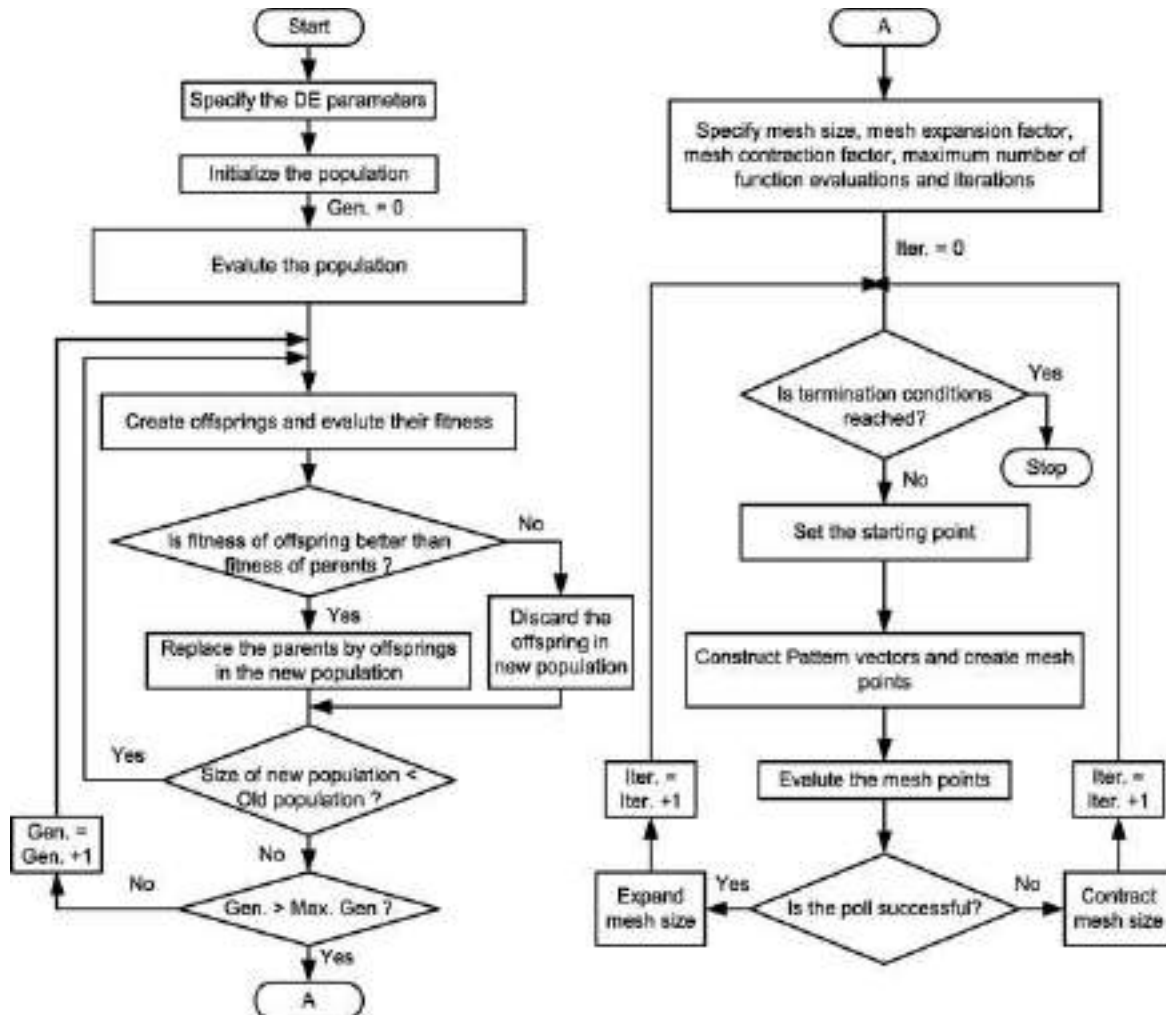


Figure 3: Flow Chart of HPS-DE

Differential Evolution (DE) technique [15] is a straightforward, capable, but effective technique and applied to numerous design problems. It gives remarkable performance for dynamic, multi-objective, constraint problems. Four main steps of differential evolution are, namely initialization, mutation, crossover and selection. The PS method [16] is an easy concept, simple to realize and computationally competent. The PS method calculates a series of spots that could or could not come up to the finest position. The method initiates by a set of positions named mesh, about the original positions. The original positions or present positions are offered through the DE method. So the hybrid pattern search- differential evolution algorithm performs iterations and gives the optimal values.

4. NEED for FREQUENCY RESTORATION

All the loads in industries and utensils are manufactured to work under specified power ratings in terms of frequency, current and voltage. If ever the power supply varies from the generation side, then the loads consuming the power will go unstable and system will face severe malfunction [17]. So, there must be attention to maintain frequency deviation within specified limits [18]. For that purpose, effective controlling mechanisms need to be addressed in terms of obtaining fast convergence, robustness, accuracy in optimum values.



5. CONCLUSION

Frequency restoration helps in maintaining the frequency within specified limits with fast restoration capability. It will be implemented in all generation systems as well as distribution systems. Now a days power generation takes place from different sources like renewable and non-renewable as power demand is increasing day by day. So not only keeping concern on generation but also in maintain and avoiding malfunctions in distributing as it going to affect end users severely. Then dynamic responses need to be improved in terms of frequency deviation and tie-line power deviation. From the analysis, there will be a much scope in avoiding frequency deviation and tie-line power deviation by using hybrid pattern search differential evolution (HPS-DE) based fuzzy PID controller in two area power system.

REFERENCES

1. Senberber, Halit, and Aytakin Bagis. "ABC Algorithm Based System Modelling for Tuning the Fractional Order PID Controllers." *Elektronika ir Elektrotechnika* 24.5 (2018): 3-9.
2. Yan, Gaowei, and Chuangqin Li. "An effective refinement artificial bee colony optimization algorithm based on chaotic search and application for PID control tuning." *Journal of Computational Information Systems* 7.9 (2011): 3309-3316.
3. Khamari, Dillip, et al. "Automatic generation control of power system in deregulated environment using hybrid TLBO and pattern search technique." *Ain Shams Engineering Journal* 11.3 (2020): 553-573.
4. Babu, Naladi Ram, and Lalit Chandra Saikia. "Optimal location of accurate HVDC and energy storage devices in a deregulated AGC integrated with PWTS considering HPA-ISE as performance index." *Engineering Science and Technology, an International Journal* 33 (2022): 101072.
5. Ranjan, Mrinal, and Ravi Shankar. "A literature survey on load frequency control considering renewable energy integration in power system: Recent trends and future prospects." *Journal of Energy Storage* 45 (2022): 103717.
6. Veerasamy, Veerapandiyam, et al. "Design of single-and multi-loop self-adaptive PID controller using heuristic based recurrent neural network for ALFC of hybrid power system." *Expert Systems with Applications* 192 (2022): 116402.
7. Pourdaryaei, Alireza, et al. "Recent Development in Electricity Price Forecasting Based on Computational Intelligence Techniques in Deregulated Power Market." *Energies* 14.19 (2021): 6104.
8. Farooq, Zahid, et al. "Power generation control of renewable energy-based hybrid deregulated power system." *Energies* 15.2 (2022): 517.
9. Pérez-Díaz, Juan I., et al. "Medium-term scheduling of a hydropower plant participating as a price-maker in the automatic frequency restoration reserve market." *Electric Power Systems Research* 185 (2020): 106399.
10. Ghasemi-Marzbali, Ali. "Multi-area multi-source automatic generation control in deregulated power system." *Energy* 201 (2020): 117667.
11. Sharma, Mandeep, et al. "Optimal fractional-order tilted-integral-derivative controller for frequency stabilization in hybrid power system using salp swarm algorithm." *Electric Power Components and Systems* 48.18 (2021): 1912-1931.
12. Yu, Xiaofeng, and Kevin Tomsovic. "Application of linear matrix inequalities for load frequency control with communication delays." *IEEE transactions on power systems* 19.3 (2004): 1508-1515.
13. Parmar, KP Singh, S. Majhi, and D. P. Kothari. "LFC of an interconnected power system with multi-source power generation in deregulated power environment." *International Journal of Electrical Power & Energy Systems* 57 (2014): 277-286.
14. Sahu, Rabindra Kumar, Sidhartha Panda, and Narendra Kumar Yegireddy. "A novel hybrid DEPS optimized fuzzy PI/PID controller for load frequency control of multi-area interconnected power systems." *Journal of Process Control* 24.10 (2014): 1596-1608.
15. Fan, Shimeng, Xihua Xie, and Xuanyi Zhou. "Optimum manipulator path generation based on improved differential evolution constrained optimization algorithm." *International Journal of Advanced Robotic Systems* 16.5 (2019): 1729881419872060.
16. Sahu, Rabindra Kumar, Sidhartha Panda, and Pratap Chandra Pradhan. "Design and analysis of hybrid firefly algorithm-pattern search based fuzzy PID controller for LFC of multi area power systems." *International Journal of Electrical Power & Energy Systems* 69 (2015): 200-212.
17. Christie, Richard D., and Anjan Bose. "Load frequency control issues in power system operations after deregulation." *IEEE Transactions on Power systems* 11.3 (1996): 1191-1200.
18. Parmar, KP Singh, S. Majhi, and D. P. Kothari. "Load frequency control of a realistic power system with multi-source power generation." *International Journal of Electrical Power & Energy Systems* 42.1 (2012): 426-433.



A RAPID NOVEL ANALYTICAL METHOD FOR SIMULTANEOUS ESTIMATION OF GRAZOPREVRIR AND ELBASVIR BY USING RP-HPLC

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ABSTRACT

The current investigation described a sensitive, selective, precise and accurate RP-HPLC method with photodiode array detector for the simultaneous estimation of antiviral drugs, grazoprevir and elbasvir. The separation and analysis were done on Sunsil C18 analytical column (250 mm x 4.6 mm, 5 μ particle size). 0.1M NaH₂PO₄: methanol [60:40 v/v] in isocratic elution mode was used as mobile phase. The pH of the mobile was adjusted to 4.0 with orthophosphoric acid. The elution of grazoprevir and elbasvir was accomplished with a flow rate of 1.2 ml/min. Detection was performed with photodiode array detector set at a wavelength of 260 nm. The detector response was linear in the concentration of 25-75 μ g/ml for elbasvir and 50-150 μ g/ml for grazoprevir. The limit of detection and limit of quantitation values were found to be 0.137 μ g/ml and 0.574 μ g/ml for elbasvir and 0.290 μ g/ml and 0.968 μ g/ml for grazoprevir, respectively. The method was validated following international conference on harmonization guidelines. The percentage recovery for grazoprevir and elbasvir were found to be in the range of 100.08%-100.45% and 99.60%-100.06%, respectively. The %RSD values are 0.130% and 0.161% for grazoprevir and elbasvir, respectively. The results of validation parameters were found in the acceptance range. The present investigation concluded that the RP-HPLC method with photodiode array detector method was selective for simultaneous estimation of elbasvir and grazoprevir in combined dosage form.

KEYWORD: Elbasvir, Grazoprevir, Method Development, RP-HPLC.

INTRODUCTION

Grazoprevir is a NS3/4A protease inhibitor used against different hepatitis C virus genotype variants [1]. Grazoprevir belongs to second generation hepatitis C virus protease inhibitor [2]. By inhibiting NS3/4A protease enzyme, grazoprevir stops the conversion of viral polyprotein into its functional proteins. Elbasvir is a NS5A protein inhibitor used in the treatment of hepatitis C viral infection [3]. NS5A is a protein important for replication of virus and assembly of virion. The combination of elbasvir with grazoprevir was approved by FDA in 2016 in the treatment of chronic Hepatitis C virus genotypes 1 and 4 [4].

The combination of elbasvir with grazoprevir is not listed official in any pharmacopoeia. Only few methods are found in the literature for the quantification of elbasvir and grazoprevir either individually or in combination. Haiyan et al., [5] established an ultra performance liquid chromatography with tandem mass spectrometry method for the quantification of elbasvir in rat plasma using deuterated elbasvir as internal standard. The separation and analysis was achieved with an UPLC BEH C18 column. The mobile phase consisted of acetonitrile-water (containing 5 mM ammonium acetate with 0.01% acetic acid, pH 4.5) at a flow rate of 0.3 ml/min for 3 min in gradient elution mode. This method was applied to the pharmacokinetics study of elbasvir in rats. Haritha et al., [6] described a liquid chromatography with tandem mass spectrometry method for estimation of grazoprevir and elbasvir simultaneously in human plasma. Agilent TC-C18 (4.6 x 75 mm, 3.5 μ m, 80 \AA) column as stationary phase and acetonitrile: 5 mM ammonium acetate (80:20 v/v) as mobile phase was used for the analysis. Akram [7] determine elbasvir and grazoprevir in bulk and in its pharmaceutical dosage forms using an RP-HPLC method. The separation and analysis are performed using Inertsil ODS column (4.6 x 250 mm, 5 μ m). Acetonitrile and phosphate buffer (pH 3) in the ratio of 40:60 (v/v) with a flow rate of 1 ml/min was used.

The methods of Haiyan et al., [5] and Haritha et al., [6] were not applied to the quantification of elbasvir and grazoprevir in bulk and pharmaceutical dosage forms. Though the RP-HPLC method of Akram [7] was applied to pharmaceutical dosage forms, this method has disadvantages such as less sensitive, less precise increased retention time of drugs. The present study was aimed to develop a cost effective, sensitive and fully validated RP-HPLC method with photodiode array detection method for the simultaneous determination of elbasvir and grazoprevir in bulk and pharmaceutical dosage forms.



EXPERIMENTAL

Mobile phase

All the solvents and chemicals are used in the preparation of mobile phase were of HPLC grade and analytical grade, respectively. 0.1 M NaH_2PO_4 and methanol (Merck India Ltd., Mumbai) in the ratio of 60:40 (v/v) was used as mobile phase. NaH_2PO_4 solution (0.1M) was prepared by dissolving 12 g of NaH_2PO_4 (Sd. Fine Chemicals Ltd., Mumbai) in 300 ml of double distilled water in a 1000 ml volumetric flask and made up to the volume with the same solvent. pH of the mobile phase was corrected to 4.0 with dilute orthophosphoric acid (Sd. Fine Chemicals Ltd., Mumbai). Before use, the mobile phase was filtered through millipore membrane filter and degassed for 15 min.

Instrumentation and chromatographic conditions

Waters 2695 alliance with binary HPLC pump coupled with Waters 2998 PDA detector and Waters Empower2 software was used. Sunsil C18 analytical column (250 x 4.6 mm; 5 μm particle size) was used for separation and analysis of elbasvir and grazoprevir. The temperature of the column was maintained at $25 \pm 2^\circ\text{C}$. Isocratic elution with 1.2 ml/min as flow rate was used. The injection volume was 10 μl . The eluents were detected at 260 nm.

Standard solutions

Elbasvir and grazoprevir reference standard samples were obtained from Lara drugs pvt Ltd. (Hyderabad, Telangana, India). 50 mg of elbasvir and 100 mg of grazoprevir was dissolved in 100 ml of mobile phase in a 100 ml volumetric flask to prepare the stock standard solution. Working standard solutions in the concentrations 25, 37.5, 50, 62.5 and 75 $\mu\text{g/ml}$ of elbasvir and 50, 75, 100, 125 and 150 $\mu\text{g/ml}$ of grazoprevir was prepared from stock solution by aptly diluting the stock solution with the mobile phase.

Calibration curve

10 μl of each of the working standard solutions was injected automatically into the column ($n=3$) under the chromatographic conditions described. The chromatograms and the peak area response of selected drugs were recorded. The calibration curve was constructed by plotting the mean peak area vs concentration of analyte ($\mu\text{g/ml}$). The results of each drug were subjected to regression analysis to compute the regression equation and regression coefficients.

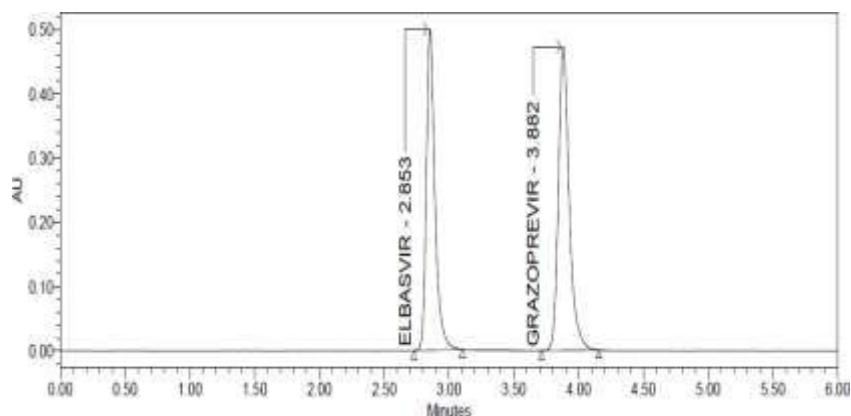
Assay of elbasvir and grazoprevir content in tablet dosage form:

Zepatier tablets (labeled to contain 50 mg of elbasvir and 100 mg of grazoprevir) are used. Ten tablets were weighed, powdered and an accurate weight of the powder corresponding to 50 mg of elbasvir and 100 mg of grazoprevir was transferred to a 100 ml volumetric flask. The analytes were extracted with 30 ml of mobile phase in an ultrasonic bath for 30 min. The resulting solution was diluted to volume with the mobile phase then filtered through a membrane filter (0.45 μm pore size). One ml of tablet sample solution prepared was diluted to 10 ml with mobile phase in a 10 ml volumetric flask. The resulting tablet sample solution contains 50 μg and 100 μg of elbasvir and grazoprevir, respectively. The solution thus prepared was filtered using membrane filter and then analyzed as described in the section "calibration curve". The content of grazoprevir and elbasvir in the tablets were obtained either the calibration curve or regression equation.

RESULTS AND DISCUSSION

High performance liquid chromatography method parameters optimization

In order to achieve good resolution, better sensitivity, good symmetric peak shape for selected drugs several trails were conducted to optimize the chromatographic method parameters (analytical column, composition of the mobile phase, pH, flow rate and analytical wavelength). 0.1 M NaH_2PO_4 and methanol in different ratios and with different pH were tested. The best separation was obtained on Sunsil C18 (250 x 4.6 mm; 5 μm particle size) using a 0.1 M NaH_2PO_4 and methanol in the ratio of 60:40 (v/v) with pH 4.0 as mobile phase pumped with a flow rate of 1.2 ml/min. The column temperature was set at $25 \pm 2^\circ\text{C}$. The maximum response of grazoprevir and elbasvir together was detected at 260 nm and the same wavelength was chosen for the analysis. Using the above described conditions, the retention times for elbasvir and grazoprevir was observed to be 2.853 min and 3.882 min respectively (Figure 1). Total run time of analysis was 6 min.

**Figure 1: Chromatogram of Elbasvir and Grazoprevir by the Developed Method.**

HPLC method validation

Method validation was done in accordance with ICH recommendation [8].

System suitability

Chromatographic parameters associated to the developed method must pass the system suitability limits before the analysis of sample. The relative standard deviation for peak area of drugs, relative standard deviation for retention time of drugs peak response, theoretical plates, resolution and tailing factor for elbasvir and grazoprevir peaks was evaluated using a working standard solution (50 and 100 µg/ml of elbasvir and grazoprevir, respectively). The results (Table 1) pledge the adequacy of the proposed method for routine analysis of grazoprevir and elbasvir simultaneously.

Table 1: System Suitability Results.

Parameters	Elbasvir	Grazoprevir	Recommended limits
Retention time	2.843 (%RSD – 0.435)	3.875 (%RSD – 0.344)	RSD ≤2
Peak area	2299022 (%RSD – 0.082)	2778077 (%RSD – 1.008)	RSD ≤2
USP resolution	-	7.524	> 1.5
USP plate count	9723	10709	> 2000
USP tailing factor	1.370	1.294	≤ 2

Selectivity

The selectivity study was assessed to verify the absence of interference by the components of mobile phase and tablet excipients. For this study, solutions of working standard (50 µg/ml-elbasvir; 100-µg/ml of grazoprevir), tablet sample (50 µg/ml-elbasvir; 100-µg/ml of grazoprevir), placebo blank (contains the tablet excipients and devoid of drugs) and mobile phase blank were injected into the chromatographic system. The chromatograms obtained are shown in Figure 2. The chromatogram confirmed the specificity of the method, because there were no peaks at the retention time of selected drugs in the chromatogram of mobile phase blank and placebo blank. The retention time of selected drug combination in the chromatograms of standard solution and tablet sample solution were almost same.

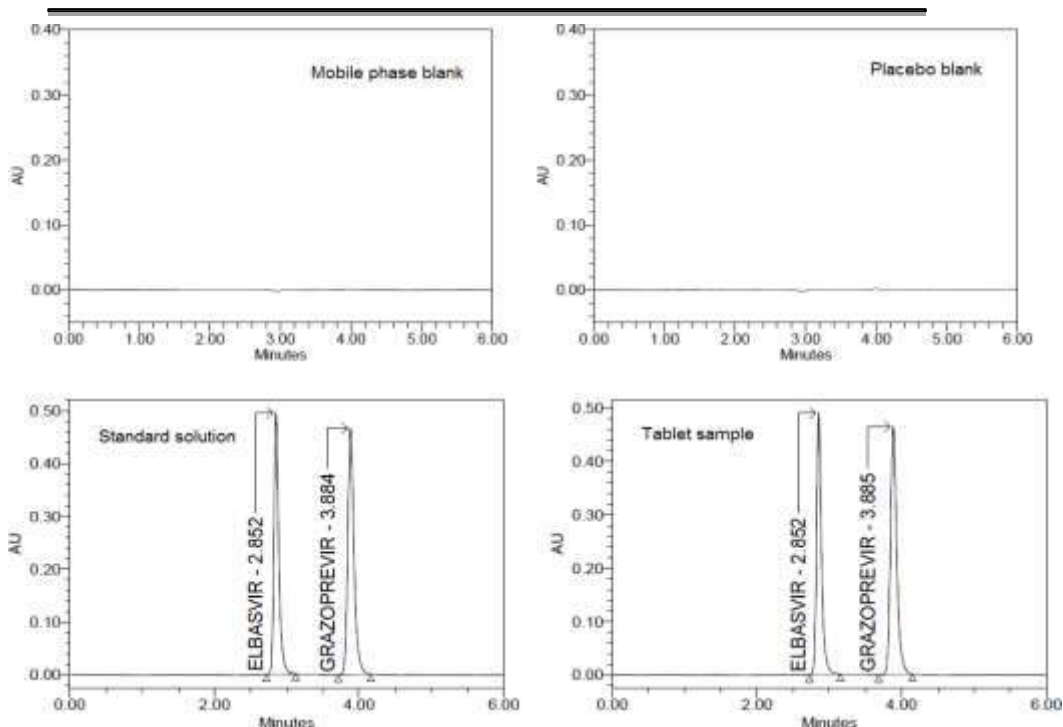


Figure 2: Chromatograms of selectivity studies.

Linearity and sensitivity (Limits of detection and quantification)

Table 2 presents the equation of the regression line, regression coefficient (R^2), slope and intercept for each drug. Excellent linearity with good regression coefficient was found between the peak area and concentration. The linearity was found in the range of 25-75 $\mu\text{g/ml}$ and 50-150 $\mu\text{g/ml}$ for elbasvir and grazoprevir, respectively. The high R^2 value was indicative of good linearity.

The limit of detection (LOD) and limit of quantitation (LOQ) represents the sensitivity of the method. they were calculated based on the signal-to-noise ratio. LOD and LOQ were demonstrated by five injections of elbasvir and grazoprevir at concentrations of LOD and LOQ. The results presented in the Table 2 indicated the satisfactory sensitivity of the method for the assay of elbasvir and grazoprevir. The chromatograms of selected drug combination at LOD and LOQ levels are shown in Figure 3.

Table 2: Linearity and sensitivity results.

Drug	Regression equation ($Y = mX + c$)	Regression coefficient (R^2)	LOD ($\mu\text{g/ml}$)	LOQ ($\mu\text{g/ml}$)
Elbasvir	$y = 45916x + 2322$	0.9998	0.137	0.457
Grazoprevir	$y = 27804x - 1757$	0.9996	0.290	0.968

X = Concentration ($\mu\text{g/ml}$); Y=Area; m=slope; c=intercept.

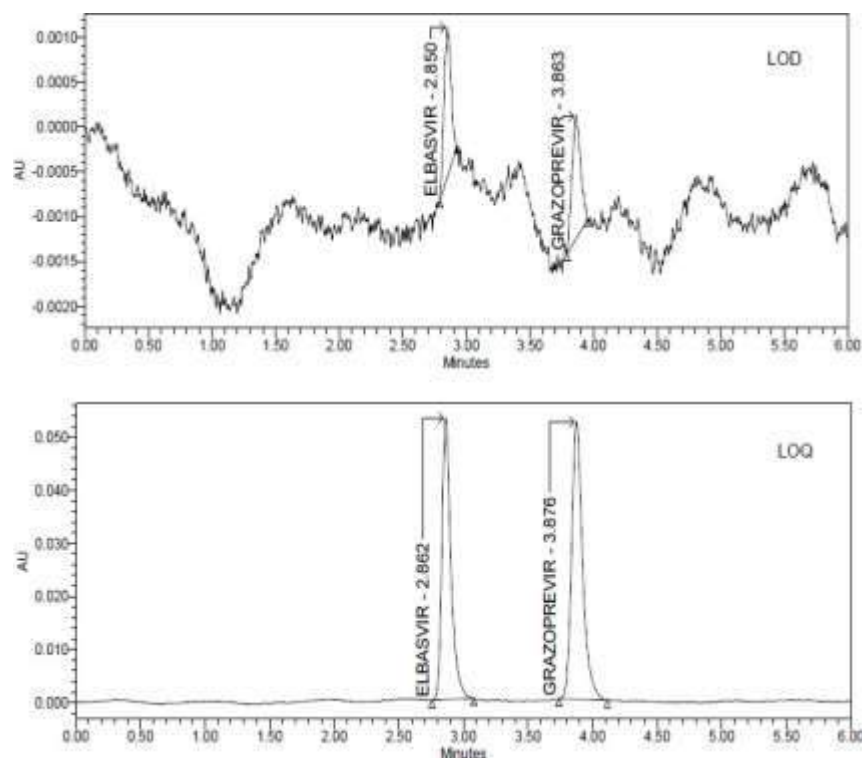


Figure 3: Chromatograms of elbasvir and grazoprevir at LOD and LOQ levels.

Precision

The precision of the method was checked by injecting elbasvir and grazoprevir standard solution 6 times at the 50 µg/ml and 100 µg/ml concentration level. The method precision was expressed as % RSD and found to be 0.161% and 0.130% for elbasvir and grazoprevir, respectively (Table 3). The low percent RSD values indicated the precision of the method.

Table 3: Method Precision Results.

Elbasvir		Grazoprevir	
Peak area	Mean peak	Peak area	Mean peak
2299045	Mean peak	2778843	Mean peak
2292669	area:	2774658	area:
2297777	2296191	2778971	2777029
2299705		2779893	
2291795	%RSD:	2779769	%RSD:
2299011	0.161	2771858	0.130

Accuracy

A standard working solution containing elbasvir and grazoprevir, at concentration level 50 µg/ml and 100 µg/ml, respectively was prepared. The prepared standards were injected 6 times in the HPLC system as a test sample. From the respective peak area counts, the concentrations of elbasvir and grazoprevir were calculated using the detector responses. The accuracy represented in terms of percentage recovery is listed in Table 4. The good percent recovery values indicated the accuracy of the method.

**Table 3: Method Accuracy Results.**

Elbasvir			Grazoprevir			
Concentration taken (µg/ml)	Recovery (%)		Concentration taken(µg/ml)	Recovery (%)		
50	99.20	Mean recovery(%):	100	99.53	Mean recovery(%):	
50	98.93		100	99.38		
50	99.15	99.10	100	99.53	%RSD:	
50	99.23		100	99.57		
50	98.89	%RSD:	100	99.56		0.120
50	99.20	0.150	100	99.28		

The accuracy of the proposed method was again established by recovery studies through standard addition method. For this, the preanalyzed sample solution was spiked with known concentration of elbasvir and grazoprevir at 3 diverse concentration levels (50%, 100% and 150%). The percentage recovery data presented in Table 5 show that the proposed method was accurate and the excipients present in tablets did not obstruct the assay of elbasvir and grazoprevir.

Table 5: Recovery Study Results.

Spiked level (%)	Elbasvir			Grazoprevir				
	Added (µg/ml)	Found (µg/ml)	Recovery (%)	Mean (%)	Added (µg/ml)	Found (µg/ml)	Recovery (%)	Mean (%)
50	24.75	24.70	99.79	99.66	49.50	49.51	100.02	100.08
	24.75	24.62	99.49		49.50	49.60	100.19	
	24.75	24.67	99.69		49.50	49.51	100.02	
	49.50	49.57	100.13		99.00	99.26	100.26	
100	49.50	49.41	99.81	100.01	99.00	99.56	100.57	100.42
	49.50	49.54	100.08		99.00	99.43	100.43	
	74.25	74.23	99.98		148.50	149.14	100.43	
150	74.25	74.28	100.04	100.06	148.50	149.24	100.50	100.45
	74.25	74.36	100.15		148.50	149.14	100.43	

Robustness

The method robustness was established at a concentration of 50 µg/ml (elbasvir) and 100 µg/ml (grazoprevir). To measure the method robustness, the chromatographic conditions were deliberately varied. The studied parameters were: column temperature ($\pm 2^\circ\text{C}$) and flow rate (± 0.1). The system suitability parameters were determined to reveal the method robustness. The results shown in Table 6 indicated that the minute change in the chromatographic conditions did not notably affect the system suitability. Thus, the method is robust.

Table 5: Results of method robustness.

Parameter	Retention time	Peak area	USP count	plate	USP Tailing	USP resolution
Elbasvir						
Flow rate – 1.1 ml/min	3.572	2841800	10645		1.44	-
Flow rate – 1.3 ml/min	2.384	1898190	9087		1.35	-
Column temperature-23°C	3.576	2855300	10744		1.39	-
Column temperature-27°C	2.387	1897586	9256		1.36	-
Grazoprevir						
Flow rate – 1.1 ml/min	4.815	3479251	11932		1.35	7.64
Flow rate – 1.3 ml/min	3.233	2272806	9903		1.24	7.14
Column temperature-23°C	4.822	3486149	11888		1.31	7.64
Column temperature-27°C	3.236	2303683	9810		1.25	7.14



CONCLUSION

The RP-HPLC photodiode array detector system with C18 reversed phase column (250 mm x 4.6 mm, 5 μ m) was used in this investigation. NaH₂PO₄ (0.1M) and methanol in the ratio of 60:40 (v/v) with a flow rate of 1.2 ml/min was selected as the mobile phase. Analytical wavelength of 260 nm was used. The method validation was performed following the guidelines of the International Conference on Harmonization and the results of validation parameters were found to be within the acceptance criteria. The components of mobile phase and common tablet excipients did not interfere with the assay. Therefore, the present RP-HPLC method can be helpful for estimating the concentration of elbasvir and grazoprevir simultaneously in tablet dosage forms in quality control laboratories.

REFERENCES

1. Summa V, Ludmerer SW, McCauley JA, Fandozzi C, Burlein C, et al. MK-5172, a selective inhibitor of hepatitis C virus NS3/4a protease with broad activity across genotypes and resistant variants. *Antimicrob Agents Chemother.* 2012; 56 (8): 4161-4167.
2. Gentile I, Buonomo AR, Borgia F, Zappulo E, Castaldo G, Borgia G. MK-5172 : a second-generation protease inhibitor for the treatment of hepatitis C virus infection. *Expert Opin Investig. Drugs.* 2014; 23 (5): 719-728.
3. Coburn CA, Meinke PT, Chang W, Fandozzi CM, Graham DJ, Hu B, et al. Discovery of MK-8742: an HCV NS5A inhibitor with broad genotype activity. *Chem Med Chem.* 2013; 8 (12): 1930–1940.
4. U.S. Food and Drug Administration. <https://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm483828.htm>.
5. Haiyan L, Hongjiang X, Wei S, Yinsheng Z, Sen Y, Xin H. Validated UPLC/MS/MS assay for quantitative bioanalysis of elbasvirin rat plasma and application to pharmacokinetic study. *J Chromatogr B Analyt Technol Biomed Life Sci.* 2016; 1015- 1016: 150–156.
6. Haritha P, Rao BS, Sunandamma Y. Picogram level quantification of grazoprevir and elbasvir with deuterated internal standards in human plasma samples by LC–ESI-MS/MS. *Indian J Pharm Educ.* 2016; 50 (4): 612-619.
7. NMD Akram. A new validated RP-HPLC method for the determination of elbasvir and grazoprevir in its bulk and pharmaceutical dosage forms. *Int J Chem Pharma Anal.* 2017; 4 (3): in press.
8. ICH Validation of analytical procedures; Text and methodology; Q2(R1), International Conference on Harmonization, 2005.



AN EMPIRICAL STUDY ON LIFE INSURANCE POLICYHOLDERS AND INNOVATIONS IN INSURANCE SECTOR: WITH SPECIAL REFERENCE TO INDIA

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ABSTRACT

In India, insurance has a deep-rooted history. Since 2001, tremendous changes have been observed in the approximately two hundred years old insurance sector. Digitalization, E-insurance, etc. are the new concepts in this sector. The study is explorative; an attempt has been made to identify the level of awareness of life insurance policyholders regarding the innovations in the life insurance sector.

KEYWORDS: *Awareness of policyholders, Digitalisation, E-insurance*

INTRODUCTION

The insurance sector was opened up in the year 1999 facilitating the entry of private players into the industry. With an annual growth rate of 24.31 percent and the largest number of life insurance policies in force, the potential of the Indian Insurance industry is huge. (Pal. et al 2007) Since the opening up of the market, the insurance industry has experienced a lot of innovations in every aspect starting from converting from “monopoly to perfect competition”. At present, the insurance sector is in a transformative stage. E-insurance, digitalization, online sales, and repository systems are some examples of innovations taking place in the insurance sector. All innovations are the bridges between insurance companies and customers, which helps to come together and to have a long-term relationship

This study empirically shows the awareness of life insurance policyholders towards innovations in the insurance sector as well as the impact of such innovations on insurance policyholders of Mangalore city. In Mangalore, almost all life insurance companies have their branches.

LITERATURE REVIEW

Darzi (2012) stated that the insurance industry in India has witnessed a paradigm shift in a relatively short period since liberalization. Sharma (2012) specified that any new technology implemented needs to be customer focused. IT implementations should help customers minimize their effort in dealing with insurance companies. Sahu (2015) stated that the availability of increased capital flow (due to FDI) will enable insurers to increase penetration, with the availability of improved technology through foreign companies, reduced cost, and good practices. Vyas (2015) stated that innovative plans, electronic insurance, and minimal role of agents have contributed to the modernization of the insurance industry in India. Horvath (2015), had the opinion that digitalization helps companies to identify external market developments and trends in both their industries and those of others, through the use of algorithm-based analysis and interpretations of the extensive range of information, and to identify and react early to changes in customer behavior.

CONCEPTUAL FRAMEWORK

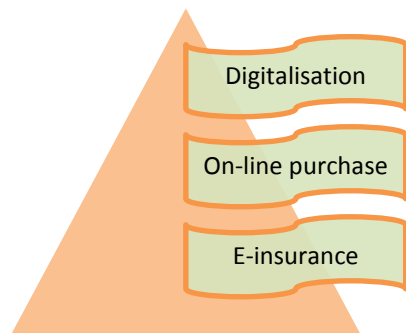
In recent years both insurance companies, as well as customers, are moving towards innovations related to technology. These innovations are considered as Fourth Industrial Revolution. Digitalization is a process where the entire system transforms into digital. Even though, little late, insurance has adopted digitalization in all activities like administration, distribution, etc.

Online purchase of policies is a system where customers can buy directly from companies through self-operated websites of insurance companies.



E- insurance is a concept where policyholders keep their policies in dematerialized form. An electronic insurance policy is a policy document in which an evidence of insurance contract is issued by an insurer and digitally signed, issued in an electronic form.

A repository is a storage system where policies are converted from paper form to digital form. At present in India, there are four repository systems.



OBJECTIVES OF THE STUDY

The present study has two-fold objectives which are listed as follows:

- i. To ascertain the level of awareness of life insurance policyholders towards the innovation of the life insurance sector
- ii. To know the impact of innovations in the life insurance field on life insurance policyholders
- iii. To give any suggestion if any, based on a study

RESEARCH METHODOLOGY

To achieve the objectives of the study an appropriate methodology has been adopted. The present study is exploratory research. The study was limited to Mangalore city. A convenient sampling method was adopted to select the sample. A structured questionnaire with distributed to 75 policyholders which include policyholders of both public as well as private insurance companies. Out of that 60, filled-in questionnaires were received. (80% was the response rate)The percentage method was used to analyze the data. Secondary data has been collected from journals published by IRDA and other magazines and books, reports, and other secondary sources like UGC-Inflibnet, lib, etc.

ANALYSIS AND RESULTS

Table1: Demography of the respondents

Gender	Male	33	55%
	Female	27	45%
	Total	60	100%
Age	<30	10	17%
	31-40	24	40%
	41-50	17	28%
	51>	09	15%
	Total	60	100%
Educational Qualification	Up to S.S.L.C	06	10%
	P.U.C	08	13%
	Degree	30	50%
	Post-graduation	16	27%
	Total	60	100%
Occupation	Agriculture	02	03.3%
	Employed	26	43.3%
	Self-employed	21	35%
	Home-maker	11	18.3%
	Total	60	100%
Company in which policy purchased	Public	32	53%
	Private	28	47%
	Total	60	100%

Source: Primary Data



Table 1 reveals the demography of the respondents. Out of 60 respondents, 55% are male and the remaining 45% are female. It also reflects that out of 60 respondents 17% are aged below 30 years, 40% of the respondents are in the age group of 31-40 years, 28% are in the age group of 41-50 and 15% are in the 51 and above category. From this, it is understood that more number of respondents are aged between 31-40 years of age. Educational qualification of respondents shows that 10% of the respondents are having S.S.L.C or below education. 13% of the respondents completed P.U.C, 50% have a degree and 27% have post-graduation qualifications. It is observed that education level is high in Mangalore city. Out of the sample of 60 respondents, 3.3% are agriculturists, 43.3% are employed (both government as well as private), 35% are self-employed and 18.3% are homemakers. It shows the majority of the respondents are employed. The last part of the table shows the type of company from which respondents have purchased the policy. It shows that 53% of the respondents have purchased a policy from LIC and 47% from other private life insurance companies.

i. The level of awareness of life insurance policyholders towards the innovation of the life insurance sector

Table 2: Table showing the awareness of policyholders towards innovations in the insurance sector

Parameters / Response	Yes	(%)	No	(%)
Awareness regarding usage of computers, mobile and social media in insurance	51	85%	09	15%
Awareness regarding the online purchase of the policy	43	72%	17	28%
Awareness regarding E-insurance	15	25%	45	75%

Source: Primary Data

The above table shows that the majority (85%) of respondents are aware of the usage of computers, mobile and social media in insurance. Among these respondents, policyholders of private insurance companies are more. These respondents told that they receive SMS from the insurance company or agents regarding premium payments. They also told that they saw the use of computers in insurance branches. Responses regarding the online purchase of policy majority (72%) of the respondents are aware. The third question in the section is regarding E-insurance. Of this majority of the respondents are not aware. Only 25% of the respondents told they heard about the concept. Awareness is more in the young generation, who are aged below 40 as well as among the respondents who qualified Degree.

ii. To know the impact of innovations in the life insurance field on life insurance policyholders

Table 3: Table showing the impact of innovations in the life insurance field on life insurance policyholders

Parameters	Yes	(%)	No	(%)	No idea	(%)
Ease of operation	30	50%	15	25%	15	25%
Transparency	36	60%	05	8.3%	19	31.7%
Quality of service	32	53.3%	04	6.7%	24	40%

Source: Primary Data

The above table shows the response for three parameters such as ease of operation, transparency, and quality of service. For the question regarding ease of operation due to innovations adopted in the insurance field, the majority of the respondents (50%) felt there is the ease of operation. 25% ticked for option no idea. The same number of respondents felt there is no ease of operation. For the next parameter, transparency, the majority (60%) ticked for option 'yes'. A majority felt that because of innovations there is less chance of mis-spelling and false promises. 31.7% of respondents ticked for 'no idea'. Regarding the quality of service, 53.3% responded positively. 40% of respondents ticked for 'no idea' and 6.7% of respondents felt there is no improvement in the quality of service. For all three parameters, many respondents didn't have any idea about the impact of innovations in the insurance sector.

FINDINGS OF THE STUDY

- The majority (85%) of respondents are aware of the usage of computers, mobile and social media in insurance.
- The majority (72%) of the respondents are aware of online purchases of the life insurance policy.
- Only 25% of the respondents are aware of E-insurance.
- The majority of the respondents (50%) felt there is ease of operation due to digitalization (includes SMS, use of computer and internet, etc.)
- 60% of respondents agreed there is transparency, after the implementation of innovations.
- 53.3% of respondents felt there is an improvement in the quality of service due to innovations in the insurance sector.
- Many respondents are unaware of the innovations as well as the impact of such innovations.



SUGGESTIONS

Insurance companies, as well as IRDA, can think about

- Awareness camps for their customers regarding the innovations adopted in the insurance sector.
- Awareness programs can be arranged in colleges as well as in gram panchayat or ward meetings as these innovations lead to saving time as well as the environment leading to realizing the dream of paperless communication and a cashless economy.

CONCLUSION

In this less cash, high technology world not updating makes one, fall behind. Insurance penetration can be increased by creating proper awareness and education regarding innovations in the insurance sector. These innovations make a customer self-reliant, which is beneficial for both insurance companies and customers.

LIMITATIONS OF THE STUDY AND SCOPE FOR FURTHER RESEARCH

The present study is limited to Mangalore city and was conducted for three months. The sample size is also limited to 60. The study has used only percentages as a tool of statistics. Hence future studies can be made by covering a larger area for an extended period with more samples, which may result in better information.

REFERENCES

1. Darzi, TanveerAhmad(2012), *Financial Performance of Insurance Industry in Post Liberalization Era in India*. Retrieved from <http://shodhganga.inflibnet.ac.in>
2. Horvath and partners (2015), *White Paper: The Impacts of Digitization on the Management of Insurance Companies Steering Business in a Digital World*. Retrieved from www.horvath-partners.com
3. Sahu, B.K. (2015), *FDI in Insurance Industry in the Context of Universalization of Social Security*, *IRDA JOURNAL*, Vol.13, No.3, pp3-4
4. Sharma. B.S. (2012), *Basic Principles of Insurance, Applications, and Practices*, (pp. 278-279), Delhi; Vista International Publishing House
5. Vyas. Muktak (2015), *A Study of Recent Trends in Insurance Industry*, *Indian Journal of Applied Research*, Vol.5, Issue 9, pp.348-350



THE MAIN FEATURES OF GENDER LINGUISTICS

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ANNOTATION

This article provides information about the main characteristics of gender performance. In addition, in this article it is also discussed the types of gender linguistics. The study of gender in the field of linguoculturology makes it possible to distinguish the ethno-cultural characteristics of the language, as well as to determine the specific characteristics of the national mentality. In addition to the fact that its research methodology has a general philosophical basis, the methods of analysis also change according to the emergence of new trends.

KEYWORDS: *Gender linguistics, intersectoral communication, linguistic phenomenon, psycholinguistic research.*

As in any field of science, gender linguistics is currently evolving in a number of areas based on different methodological principles.

N.Z.Nasrullaeva notes that three main approaches are popular in the study of problems related to the fact that men and women have specific indicators of speech movements [Nasrullaeva 2016: 14-16].

1. The first is the pure gender approach, which aims to shed light on the social nature of male and female languages.

2. In the second approach, called sociopsycholinguistic, male and female languages are limited to identifying indicators of linguistic behavior. The most important thing for linguists conducting research in this area is to collect statistical data and determine the averages. Based on this information, a psycholinguistic theory of the specifics of male and female speech activity is formed.

3. Representatives of the third direction focus on identifying the cognitive aspect of differences in the linguistic activity of men and women. They seek not only to distinguish existing differences and define their activation indicators, but also to form general models of the cognitive basis of linguistic categories [Nasrullaeva 2016: 15].

Popular trends in gender linguistics can be divided into six types in terms of conceptual purpose, research methods and the material under analysis:

- 1) gender studies studying the linguistic behavior of both sexes;
- 2) gender research in the sociolinguistic direction;
- 3) feminist linguistics studying women's language;
- 4) the youngest direction of gender linguistics in the twentieth century is the study of masculinity in language;
- 5) psycholinguistic research. These include neurolinguistics, speech genetics, and analysis of the cognitive features of women's speech;
- 6) Linguocultural research covering cases of gender subcultures.

Since gender linguistics is a science that deals with intersectoral communication, the study of this or that problem can be done in several directions. Emerging fields of science are no exception. In particular, some areas of gender linguistics are closely related to the development of quantum and computer linguistics. Indeed, the results achieved in these areas allow us to gather pre-statistical material for the activation of language in one or another social group.



Sociolinguistic scientists were among the first to engage in quantum analysis of the phenomena of gender linguistics, and in their work provided a large amount of quantitative data on the use of language in certain social groups. V. Labov, who studied the phonological aspects of language use, observed that women choose a more influential form of pronunciation, but the amount of differences in pronunciation between men and women varies depending on the social status of women [Labov 1972]. The scholar also does not forget to point out that in any speaker speech there are cases of variability and that this or that phonological variant is not used uniformly in all situations. This conclusion of V. Labov proves that the opinion of some representatives of gender linguistics that the imbalances in the speech of men and women are biologically conditioned is unfounded.

The work of the English sociolinguist P. Trudgill also focuses on the analysis of the phonological level. The scientist, in particular, said that while women refer to the *n* (*ng*) sound, which is considered more influential, men prefer the abbreviated (*n*) form. Such a difference in the use of sounds depends on what profession women have, i.e. teachers, hairdressers, nurses interact with representatives of different social groups, and this is reflected in their speech activities [Trudgill 1972].

We are aware that the application of quantitative measures to gender research is becoming more widespread. Well-known linguists such as I. Baudouin de Courtenay and V. V. Vinogradov emphasized the importance of referring to the operations of mathematical thinking in the study of linguistic phenomena. According to V. N. Yartseva, "the use of quantity belongs to the functional aspect of the language system, taking into account the amount of use of any linguistic phenomenon is a useful method of analysis" [Tuldava 1987]. However, the effectiveness of the use of the quantitative analysis method depends on the purpose and object of the study. It is difficult to find a solution to any problem by resorting to mathematical apparatus. Based on a quantum approach, certain aspects of linguistic phenomena can be identified. It is also known that methods aimed at collecting statistical data have descriptive and evaluative views. The first task is to summarize and visualize the results, while the second is to evaluate the predicted assumptions on the basis of comparing them with the achieved results. In order to use both methods, it is first necessary to distinguish whether the observed phenomena are general, typical, or individual in nature. Those in the first row are associated with permanent causes, while those in the second row are included in the group of emergencies [Martyntenko 1996: 204; 208].

Psycholinguistic research is one of the fastest growing areas in the field of genealogy. The doctoral dissertation of E. I Goroshko, one of the promoters of this direction, emphasizes the role of associative linguistics in the development of psycholinguistics and gender linguistics, and describes the methodological basis of this approach [Goroshko 2001].

Observations show that men and women have different associative images of the world, which, in turn, indicates that the linguistic behavior of members of different genders takes place within their linguistic consciousness. It is clear that the formation of associative links is influenced by the profession of language speakers, their status in society, life experience, as well as gender [Hoshimova 2011].

The person in the mind "assimilates" reality and accepts the team's response to that reality. The imagination of the world, which is specific to a particular community, organizes consciousness. For this imagination to be renewed, reality must change. Such perceptions are formed through language and speech, and therefore linguistic consciousness underlies human activity. Indeed, in the formation and description of the phenomenon of consciousness, man's attitude to the world is central, and it is important for modern linguistics to know that this attitude affects his speech activity. Although the human mind is formed in the presence of language, we are forced to recognize that it is also related to biosocial factors in the accumulation of cognitive experience in the mind of each individual. Men and women may perceive concepts differently formed in the collective mind and express them differently through linguistic forms.

M. M. Rasulova, O. N. Kolosova and other researchers note that the process of linguistic categorization in the linguistic consciousness of women is different from that of men. [Rasulova 2005].



Since the vocabulary of a language is considered to be the main material of categorization, the nominative system of language is analyzed in most gender studies. It is perceived that the interest in the gender aspects of linguistic naming of events has a long history. One of the main theoretical ideas of feminist linguistics is precisely the critique of the nominative system of language and the proof that it has an aprocentric character.

While acknowledging that gender linguistics is evolving in different directions, it should be noted that new “budding areas are also emerging. In particular, it has not been long since translation analysis has focused on gender analysis” [Goncharenko 1999]. Although the issue of gender inclusion in translation has been mentioned in one form or another by a number of translators, a detailed study of the problem awaits its turn. According to L. Flottou, one of the leading experts in the field, “when the focus is on the cultural and historical features of translation and the gender nature, the meaning created in the translation process becomes the focus. Recognizing that the meaning in the text is gender-specific encourages a deeper understanding of the translation process” [Flottou 2013: 95]. This note by a Canadian scholar testifies to the need for translation and the study of the gender problem in gender linguistics.

The study of gender in the field of linguoculturology, along with the differentiation of ethnocultural features of language, allows to identify specific features of the national mentality. Evidence of this can be seen in recent times when gender linguistics has taken on a mainly linguocultural content and gender differences in the language system have been explored from the perspective of national mentality.

Gender is a dynamic phenomenon, its linguistic and cultural characteristics vary. In addition to the fact that its research methodology has a general philosophical basis, the methods of analysis will change in accordance with the emergence of new directions. In particular, the formation of the fields of pragmalinguistics, cognitive linguistics, emotology, discursive analysis will contribute to the strengthening of the position of gender linguistics, the popularization of new areas of analysis.

REFERENCES

1. Насруллаева Н.З. *Гендер в английской фразеологии*. – Фан, 2016. – 120 с.
2. Flottou Luis von. *Translation and Gender. Translating in the Era of feminism*. – Shanghai: Foreign Language Education Press, 2013. – 114 p.
3. Labov W. *Sociolinguistic Patterns*. – Pennsylvania: University of Pennsylvania Press, 1972.
4. Trudgill P. *Sex, covert prestige, and linguistic change in the urban English of Norwich // Language in Society*, 1972. № 1. – P. 179-195.
5. Гончаренко С.Ф. *Гендерный фактор в концептуально–метафорической картины мира «оригинального поэта и поэти–переводчика: интрига и драма перевоплощения // Актуальные проблемы межкультурной коммуникации*. – М.: 1999. – С. 38-41.
6. Горошко Е.И. *Говорящий пол. (Квантитативные исследования в социо – и психолнгвистике гендерный аспект)*. М.: 2000. www.psycho.rushop/cd 24.
7. Горошко Е.И. *Языковое сознание (ассоциативная парадигма)*. Автореф. дисс... докт. филол. наук. – М.: 2001. – 55 с.
8. Мартыненко Г.Я. *Методы статистического моделирования в языкознании // Прикладной языкознание*. – СПб.: Изд-во С. – Петербург у-та, 1996. – 201-223.
9. Расулова М.И. *Основы лексической категоризации в лингвистике*. – Т.: Фан, 2005. – 268 с.
10. Тулдава Ю. *проблемы и методы квантитивно – системного исследования лексики*. – Таллин: Валгус, 1987. – 204 с.
11. Хошимова Н.А. *Прагматические аспекты при исследовании ассоциаций // Вестник МГОУ. Серия “Русская филология”* 2011. № 6. – С. 91-93.



GENERATORS OF BOREL MEASURABLE COMMUTATIVE ALGEBRA ON COMPACT HAUSDORFF TAKING VON NEUMANN AW* OVER *-ISOMORPHISM

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*For any complex valued functions over any topological space \mathcal{F} there exists a relation in von Neumann algebras of *-graded that is bounded on compact Hausdorff where for category- I, II, III there exists a commutative form of AW* algebras such that to satisfy a monotone complete C* algebra suffice an isomorphic factor \mathfrak{f} on the same AW* tamed as W* having the generators η for a generic group $\eta(\mathcal{G})$ for 2-groups \mathcal{G}_+ and \mathcal{G}_- for the former being additive integers generating the later free group for AW* algebras where compact Hausdorff CH a Borel measure β exists in compact set \mathcal{C} norms the associated Hausdorff space over a locally finite σ – algebra via $\beta(\mathcal{C}) < \infty$.*

KEYWORDS AND PHRASES – Commutative algebra, Operator theory, Hilbert space.

Mathematical subject Classification (MSC) – primary (13-XX, 52-XX), secondary (13-11, 52B20)

METHOD (I) – Establishing Equivalence

For any positive integer ρ we can consider any idempotent element for a general property to suffice that ρ in the relation of an associated element α such that $\alpha^1 = \alpha^{1+1} = \alpha^{1+1+1} = \alpha^{1+1+1+1} = \dots = \alpha^\rho$ where the simplification table states $\alpha^1 = \alpha^{1+1}$. With this if one takes the annihilator^[1-5],

$$\left\{ \begin{array}{l} \text{left} \\ \text{right} \end{array} \right\} \forall \text{concerned commutative rings } R \exists \text{annihilator } \mathcal{A} \exists \mathcal{A} \text{ for } R \text{ suffice } \mathcal{A}_R$$

Where for the left module if there is a set $\mathcal{E} = \{d\} \exists d$ is any number of elements of set \mathcal{E} then \mathcal{A}_R or the annihilator or ring R suffice a relation as per the element μ of ring R ; we get 3 –properties,

$$(A) \left\{ \begin{array}{l} \mathcal{E} = \{d\} \\ \mathcal{A}_R \text{ exists when } d \subseteq \mathcal{E} \forall \mu \in R \text{ and } \mu^0 \in d \end{array} \right.$$



Then the AW^* algebra suffice,

$$(B) \begin{cases} C^* - algebra \\ Baer * -ring \end{cases}$$

\exists $Baer * -ring$ suffice 2 -properties as,

$$(C) \begin{cases} \alpha^1 = \alpha^{1+1} \\ left annihilator L \end{cases}$$

There exists a Rickart $*$ -ring to relate (A) and (C) as,

$$L \subseteq ring R \text{ for } \{\mu \in R \mid \mu L = \{0\}\}$$

Thus getting the relation to suffice (B) in a concrete way with L as the left-annihilator, the generalized W^* -algebra which is again a special case of C^* -algebra for any Hilbert space h^* there is a weak operator topology for the operator \mathcal{J} such that^[2,4],

$$W^* - algebra \simeq C^* - algebra \text{ for a map } \pi: \mathcal{J} \rightarrow \langle \mathcal{J}_{i,j} \rangle$$

Where i, j are vectors of that Hilbert space where isomorphism of the operator exists for an involution parameter $\iota: ring R \text{ to } ring R^{op}$ establishing^[7-10],

$$\iota \left\{ \begin{array}{l} \begin{array}{l} Baer * -ring \xrightarrow{\text{generators}} L \\ Baer * -ring \xrightarrow{\text{generators}} L \\ \downarrow \\ \downarrow \\ \downarrow \end{array} \\ AW^* - algebra \begin{cases} Baer * -ring \xrightarrow{\text{projections}} (\alpha^1 = \alpha^{1+1})^* = (\alpha^1 = \alpha^{1+1}) \text{ in } W^* - algebra \end{cases} \end{array} \right. \begin{array}{l} C^* - algebras \end{array}$$

METHOD (II) – Establishing Factor

Taking the identity operator $\mathbb{1}$ as factor in von Neumann algebras there exists 3 -categories for a unique decomposition in every commutative algebra^[1,8,10-12],

$$(D) \begin{cases} I - discrete, semi - finite, properly - infinite (over P - 1 projections \rightarrow finite) \\ II - continuous, semi - finite, finite \\ III - continuous, semi - finite, properly infinite \end{cases}$$

Respect to the commutative form of AW^* -algebras, (D) exists in a compact Hausdorff for every bounded $*$ -graded von Neumann algebras, Borel measure β can be found for generators η such that for I, II, III norms in a compact set \mathcal{C} for compact Hausdorff \mathcal{CH} where power factors \mathbb{f}_δ establishes over μ relating Araki-Wood factor over^[1-3,11-14],



$$\left\{ \begin{array}{l} I \rightarrow \begin{cases} I_k \text{ for finite } k \\ I_\infty \end{cases} \\ II \rightarrow \begin{cases} II_1 \\ II_\infty \end{cases} \\ III \rightarrow \begin{cases} III_0 \\ III_\infty \end{cases} \forall \mathfrak{f}_\delta \exists 0 < \delta < 1 \end{array} \right.$$

Suffice the commutation over the relation^[1,5,7,8-10],

$$(\varphi \oplus \varphi^0)' = \varphi' \oplus (\varphi^0)' \exists I, II, III \in (\varphi, \varphi^0)$$

Over the generic group^[10,13,14],

$$\eta(G) \left\{ \begin{array}{l} \text{generators } \eta \\ G_+ \rightarrow \text{additive integers} \\ G_- \rightarrow \text{Borel } \beta \text{ for compact Hausdorff } CH \rightarrow \text{locally finite } \sigma\text{-algebra via } \beta(C) \ll \infty \end{array} \right.$$

DISCUSSION

For the associated generators taken over the generic groups having two forms for the later suffice the Borel measurable set, there is a uniqueness and equivalence between AW* generalization to W* with C* where for the categories I, II, III one gets a relative factor \mathfrak{f} which with the affine parameter δ gives the commutative relations for the generic groups that are associated satisfies METHOD (II) in a nice way so as to suffice the earlier relations for the idempotent, rings, Baer, Rickart, weak operator topology in the sense to conclude left-annihilator, projections with the Baer*-ring capturing every parameters of AW* for the related involutions mapping from ring R to opposite ring R^{op} .

REFERENCE

1. Dixmier, J. (2011, October 9). *Von Neumann Algebras*. North Holland.
2. J. (2011, October 9). *Von Neumann Algebras*. North Holland.
3. Christensen, E., Matematik, K. U. I. F. M. F. A. F., & Københavns Universitet. Institut for Matematiske Fag. Afdelingen for Matematik. (2000). *Finite Von Neumann Algebra Factors with Property Gamma*. Københavns Universitet.
4. Bhattacharjee, Deep (2022): *Establishing equivariant class [O] for hyperbolic groups*. figshare. Preprint. <https://doi.org/10.6084/m9.figshare.20445843.v1>
5. Bhattacharjee, D. (2022am, May 10). *Establishing equivalence among hypercomplex structures via Kodaira embedding theorem for non-singular quintic 3-fold having positively closed (1,1)-form Kähler potential $\mathfrak{Z}^{-1}\partial\bar{\partial}^*p$* . Research Square. <https://doi.org/10.21203/rs.3.rs-1635957/v1>
6. Bhattacharjee, D., Roy, S. S., & Behera, A. K. (2022, August 31). *Relating Enriquer surface with K3 and Kummer through involutions and double covers over finite automorphisms on Topological Euler–Poincaré characteristics over complex K3 with Kähler equivalence*. Research Square. <https://doi.org/10.21203/rs.3.rs-2011341/v1>
7. Mortad, M. H. (2018, December). *An Operator Theory Problem Book*. World Scientific. <https://doi.org/10.1142/10884>
8. Eisenbud, D. (1995, March 30). *Commutative Algebra: With a View Toward Algebraic Geometry*. Springer.
9. Bhattacharjee, D. (2022an, August 16). *Generalization of Quartic and Quintic Calabi – Yau Manifolds Fibered by Polarized K3 Surfaces*. Research Square. <https://doi.org/10.21203/rs.3.rs-1965255/v1>
10. Bhattacharjee, D. (2022ao, June 13). *Uniqueness in Poincaré-Birkhoff-Witt Theorem over Algebraic Equivalence*. Authorea. <https://doi.org/10.22541/au.165511635.53854231/v1>
11. Chang, S., & Weinberger, S. (2021, January 26). *A Course on Surgery Theory: (AMS-211) (Annals of Mathematics Studies, 365)*. Princeton University Press.
12. Bhattacharjee, D. (2022ap, July 7). *Generalized Poincaré Conjecture via Alexander trick over C-isomorphism extension to h-cobordism on inclusion maps with associated Kan-complex*. Research Square. <https://doi.org/10.21203/rs.3.rs-1830184/v1>
13. Heunen, C., & Reyes, M. L. (2014, August). *Active lattices determine AW*-algebras*. *Journal of Mathematical Analysis and Applications*, 416(1), 289–313. <https://doi.org/10.1016/j.jmaa.2014.02.041>
14. Saitō, K., & Wright, J. D. M. (2015, January 11). *On Defining AW*-algebras and Rickart C*-algebras*. ArXiv:1501.02434v1 [Math.OA]. <https://doi.org/10.48550/arXiv.1501.02434>



CURRENT PROSPECTS FOR THE DEVELOPMENT OF THE PRIMARY SEED OF SHORTANBAY-1 VARIETY OF COMMON WALL WHEAT IN THE CONDITIONS OF KARAKALPAKSTAN

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ABSTRACT

The article presents the results of the scientific experiments conducted by the Scientific Research Institute of Grains and Legumes, Karakalpakstan Scientific Research Institute, on the introduction of primary seed production of Shortanbay-1 variety of short soft wheat in the conditions of Karakalpakstan. The article focuses on the scientific basis of the establishment of the primary seed production system of Shortanbay-1 variety of winter wheat, which has high productivity and breadmaking properties suitable for different soil and climate conditions of our Republic, on the supply of high-quality seeds to farms specializing in seed production.

KEY WORDS: Spring wheat, variety, seed production, yield, environmental factors, quantity, variant.

INTRODUCTION

Creation of new, early-ripening, local winter wheat varieties with high baking properties, acceleration of ecological tests in different soil and climate conditions of our republic, and organization of the primary seed system of local varieties cultivated on the basis of the scientific basis of the primary seed production system, high-generation production of seeds at low prices, economy of our currency is one of the most urgent tasks of today.

It is finding its solution by ensuring food safety, choosing varieties resistant to different levels of salinity, rational placement of varieties and improving agrotechnology of cultivation, increasing the yield of winter wheat, improving grain quality and organizing seed production.

Paragraph 3.3 of the Decree of the President of the Republic of Uzbekistan №4947 from February 7, 2017 "On the Strategy of Actions for the Further Development of the Republic of Uzbekistan" provides for continuous development of agricultural production, further strengthening of the country's food security, effective use of irrigated, including saline, lands and waters, creation and selection of new varieties of salt-resistant agricultural crops adapted to local soil, climate and ecological conditions, introduction of resource-efficient modern agro-technologies, special attention is paid to the development of grain production. Cultivation of crops on the basis of innovative technologies, along with efficient use of land, improvement of soil conditions, improvement of grain crop cultivation technology, especially development of seed production is urgent.

The President of the Republic of Uzbekistan emphasized the importance of fundamental researches in the development of science and the acquisition of new knowledge and the formation of theories through them, as well as the creation of a solid foundation for future practical researches and innovative developments.

The introduction of new varieties of promising autumn grain crops, the renewal of seeds, which are recommended to be planted with variety replacement and renewal of seeds, will create a basis for obtaining high and quality grain yields from the varieties of grain crops.

The main goal of our scientific work is to grow high-yield (original) seeds of the Shortanbay-1 variety of autumn soft wheat, suitable for different soil and climatic conditions of our republic, with high productivity and breadmaking properties,



resistant to diseases, on the basis of the establishment of the primary seed breeding system on a scientific basis, and to send them to seed production for ensuring delivery to specialized farms.

In our practice, experiments were conducted on the scientific basis of the establishment of the primary seed system of the promising shortanbay-1 variety of autumn soft wheat, which produces high and quality grains in different soil and climate conditions of the Republic of Karakalpakstan, and is introduced to the production of its seeds.

The experiment was conducted at the research station of Karakalpakstan Research Institute of Grain and Legume Crops. As a result of the works in the field of selection carried out in the experiment, the primary seed system of the newly created, promising winter wheat variety Shortanbay-1 was established on a scientific basis. As a result of the works in the field of selection carried out in the experiment, the primary seed breeding system of the promising winter wheat Shortanbay-1 variety was established on a scientific basis, the inspection of families for 1-2 years, the reproduction of seeds grown in the 1st breeding nursery of the seeds grown from the trial nurseries was organized, during the vegetation period in the nurseries. In order to ensure the purity of the variety in the phases of earing and wax ripening, 2 cleaning operations were organized and enough seeds were prepared for the 2nd year propagation nursery.

The goals and objectives of our research are as follows:

Primary breeding of winter wheat in promising varieties, development of seed breeding and scientific basis, preservation of all economic-biological signs characteristic of this variety in the process of breeding.

Primary sowing was carried out in the following scheme.

Primary sowing was carried out in the following scheme.

Breeding kernel, breeding nursery and super elite.

In the first year, 1000 generations of winter wheat primary generation trials were conducted on the promising winter soft wheat variety "Shortanbay-1".

It serves for the production of high-quality seeds, for planting in large areas, and for the increase in the quality and quantity of the products grown in the future. Also, in our conditions, the cultivation of high-generation seeds at low prices will create a basis for reducing the amount of seeds that are brought to the republic from abroad at high prices at the expense of foreign currency.

THE FOLLOWING METHODS WERE USED IN THE RESEARCH

Phenological observation, field and laboratory analyzes carried out in field experiments were evaluated using the "All-Russian Scientific Research Institute of Plant Science" method, biometric analyzes were performed according to the "Method of the State Committee for Testing Agricultural Crops", and evaluation of resistance to rust diseases in field conditions was evaluated using the "Modified Cobb" scale. The accuracy and reliability of the obtained data were analyzed according to the generally accepted method of B.A. Dospekhov "Methods of field experience".

The experiment was carried out in the "Agrotechnics of selection and cultivation of spiked grain crops" department of the station. Scientific work was carried out based on established methods in the station's experimental section.

RESULTS OF THE RESEARCH

Shortanbay-1 variety was planted on September 28, 2021. During the vegetation period, mineral fertilizers were given two times (February 25 and March 25, 2022) and watered on April 9, 2022.

During 2020-2022, the research was conducted at the research stations of Karakalpakstan on 5 winter wheat varieties Shortanbay-1, Garesizlik, Amangul, Utkir, Karakalpak.

The following results were obtained in the experiments carried out in the conditions of the Republic of Karakalpakstan, the northern region of the Republic of Uzbekistan (Table 1).

Table 1.

Influence of spring wheat on yield indicators depending on the varieties in the conditions of the northern region (2020-2022)

t/r	Varieties name	Productivity by years, c/ha		Average productivity, c/ha
		2021	2022	
1	Shortanbay-1	58.2	58.6	58.4
2	Garesizlik	56.5	56.9	56.7
3	Amangul	57.4	58.0	57.7
4	Utkir	48.7	48.2	48.4
5	Karakalpak	57.8	57.2	57.5

In the experiments, the yield was different in the cross-section of years related to wheat varieties. Shortanbay-1, Garesizlik, Amangul varieties increased in 2022 compared to 2021, while Utkir and Karakalpak varieties decreased in 2022 compared to 2021. The average high productivity of varieties was found in Shortanbay-1 variety (58.4 c/ha).

Shortanbay-1 variety showed to be a promising variety in the conditions of Karakalpakstan and was found to be economically effective.



In the experiment, the primary seeding of the newly created, promising autumn soft wheat variety Shortanbay-1 was organized on a scientific basis, and it was shown that if agrotechnics are carried out correctly, it is possible to grow high-generation, fertile, high-quality seeds.

At the end of the first year of the experiment, high-generation seeds of promising winter wheat variety Shortanbay-1 were grown and conditioned.

During the experiments, scientists-breeders of the institute created high-generation super-elite (original) seeds of this variety with the scientific basis of correcting the primary seeding system of the new winter wheat variety Shortanbay-1, which is included among the promising varieties for planting under irrigated conditions in our republic, and delivering it to farms specializing in seed production. has been achieved.

CONCLUSION

During the experiment, the seeds of a promising new variety of the local Shortanbay-1 variety of autumn soft wheat, recommended for planting in the irrigated conditions of our republic, were multiplied, despite the influence of various environmental factors, a high yield was obtained, and the variety showed the possibility of high yield in the conditions of Karakalpakstan.

LIST OF USED LITERATURE

1. *Utambetov D., Khojambergenov G. Agrotechnology of high-yielding grain crops in the Republic of Karakalpakstan. Tashkent-2015.*
2. *G. Allashov, P. Toreshov, A. Pirniyazov . "Influence of sowing dates and seeding rates on the yield of winter wheat in the conditions of the Aral Sea region" Magazine of Agriculture and water economy of Uzbekistan № 8 of 2020 . P. 29-30.*
3. *Allashov.G.E., Utambetov D.U., Toreshov.P.A. Selection of varieties of winter soft wheat most adapted to the conditions of the Aral Sea region. Agrarian science 2020,336(3) Moscow, Russia. P 60-62*



INFLUENCE OF THE USE OF COMPOSTS OF DIFFERENT COMPOSITIONS ON THE GROWTH AND YIELD OF COTTON

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ANNOTATION

The article describes the impact of the use of composts of various compositions on the growth and development and yield of cotton. This is the growth and development of cotton with the use of compost -2 at rates of 10 and 20 t/ha, these indicators, respectively, amounting to 99.8–105.9 cm, the yield of raw cotton averaged 37.1 c/ha and, comparing to control, 6.7 c/ha additional crop.

KEY WORDS: *compost, composition, cotton growth and development, productivity, fertility, soil, phosphogypsum, rice and sawdust, manure, poultry manures.*

INTRODUCTION

Recently, in the cotton growing of the republic, large-scale measures have been taken to apply the optimal norms and terms for the joint use of organic and mineral fertilizers, the use of organomineral composts for plant nutrition. The use of organic fertilizers on gray soils, desert-sandy, gray-brown, taky and other soils makes it possible to obtain high and stable yields of raw cotton.

In this regard, the preparation of composts from phosphogypsum and various organic substances in optimal ratios and carrying out research to improve soil fertility and nutrient uptake by the plant, as well as determining their effect and aftereffect on cotton yields, is relevant.

According to R.K. Kuziev [3; 51-60-p.] in order to preserve, increase soil fertility and regulate the balanced mineral nutrition of plants, it is necessary to revise the system of applying fertilizers for various crops, taking into account the use of new forms of organic fertilizers (lignin, composts, organomineral mixtures, biofertilizers, etc.) and local mineral raw materials. For these purposes, it is necessary to introduce in all natural and economic zones of the republic, for all farms, the practice of collecting, evaluating, composting and applying local organic and mineral fertilizers to the soil.

The data of M. Sorokin, S.G. Okhotnik and T. Yakhina [4, 11-12-p] show that the use of organic fertilizers for cotton contributes to the formation of high-quality raw cotton with good technological indicators of fiber and seeds. At the same time, there is no growth of the tissue of the base of the outer integument of the peel and the chalazal part in the form of loose layered thickenings, leading to a decrease in the mechanical strength of the seed peel and the formation of a skin defect with fiber during ginning.

The results of studies by A.Zh.Bairov, D.Kh.Khamdamov and A.A. Zhuraev [1; 170-173-p; 2; 66-67-p.], showed that organomineral composts obtained from fresh poultry manures with the addition of straw, ammophos (at the rate of 1.5-2.0% of the total mass of compost) and phosphogypsum (5-7% of the total mass compost) are rich in organic matter (37.9-43.7%) and the content of total nitrogen was in the range of 1.55-2.56%. The highest content of organic matter and total nitrogen was observed in option I (poultry manure+straw+soil+ammophos) and in option 4 (poultry manure+straw+soil+phosphogypsum).

Compost was applied on the soil (KR manure + sawdust). Under the influence of long-term use of compost, the physical properties of the soil have significantly improved. The water-retaining capacity increased, incl. moisture available to plants and matrix potential. The parameters of soil porosity have noticeably improved. The biological properties of the soil have improved. As a result, these changes contributed to an increase in crop yields [5; 535-539-p, 6; 7].

MATERIAL AND METHODOLOGY OF THE RESEARCH

Field experiments were carried out in conditions of typical gray soils in the educational and experimental farm of the Tashkent State Agrarian University. We used the methods of UzSRIA in our research.

The experiments were carried out in nine variants, in four repetitions. In the following schemes: 1) N₂₀₀; P₁₄₀; K₁₀₀ (control); 2) NPK + 10 t/ha of manure; 3) NPK + 20 t/ha manure; 4) NPK + 10 t/ha compost - 1; 5) NPK + 20 t/ha compost-1; 6) NPK + 10 t/ha compost - 2; 7) NPK + 20 t/ha compost - 2; 8) NPK + 10 t/ha compost - 3; 9) NPK + 20 t/ha compost - 3 (note:



compost - 1 - (rice and sawdust - 25%, manure - 25%, poultry manures - 45%, phosphogypsum - 5%); compost - 2 - (rice and sawdust - 25%, manure - 25%, poultry manures - 35%, phosphogypsum - 15%); compost - 3 - (rice and sawdust - 25%, manure - 25%, poultry manures - 25%, phosphogypsum - 25%); cattle manure).

RESULTS OF THE RESEARCH

When using various composts, in the first year, an increase under their influence in the 0–30 cm soil layer of the bulk density by 0.05–0.07 g/cm³ and porosity by 2.2–2.6% was revealed, along with this, preservation of their impact in subsequent years in the variants in which composts were introduced.

The optimal effect of the applied composts was observed at a rate of 20 tons/ha of compost-2. At the same time, an increase in the amount of humus in 0–30 and 30–50 cm soil layers relative to the control by 0.115–0.024%, nitrogen by 0.010–0.002% and phosphorus by 0.014–0.003% was also observed.

It is stated that the influence of composts was clearly reflected in the growth and development of cotton in subsequent years. Under the influence of 10 and 20 t/ha of compost -1, the height of the main cotton stem was (1.08) 100–105.2 cm, the number of sympodial branches, as well as the total number of open buds was 13.5–14.9; 10.9–12.7 and 3.43–4.14 pieces, and the weight of cotton in one bud was 4.55–4.72 and, accordingly, relative to the control was higher by 12.0–17.2 cm, 2.0–3.4; 1.5–3.3 and 0.73–1.44 pieces, as well as by 0.35–0.5 grams, and regarding the options in which manure was used, by 2.0–0.5 cm, 0.3–0.5; 0.2–0.2 and 0.23–0.38 pieces, as well as 0.1–0.07 grams. When using compost -2 at rates of 10 and 20 t/ha, these figures, respectively, amounting to 99.8–105.9 cm, 13.7–15.2; 11.0–12.9 and 3.5–4.3 pieces, as well as 4.6–4.75 grams, relative to the control were higher by 11.8–17.9 cm, 2.2–3.7; 1.6–3.5 and 0.8–1.6 pieces, as well as by 0.4–0.55 grams, relative to options 2 and 3, where 10 and 20 tons of manure per hectare were applied, were higher by 1.8–1.2 cm, 0.5–0.8; 0.3–0.4 and 0.3–0.47 pieces, as well as 0.15–0.1 grams. And when using compost -3 in the norms of 10 and 20 t/ha, making respectively the above 98.8–104.6 cm, 13.4–14.7; 10.8–12.5 and 3.35–4.1 pieces, as well as 4.5–4.7 grams, were higher than the control by 10.8–16.6 cm, 1.9–3.2; 1.4–3.1 and 0.65–1.4 pieces, as well as 0.3–0.5 grams and relative to the options where manure was applied, there were no significant differences.

Judging by these indicators, the most optimal among the structural ratios and norms of composts is compost -2 at a rate of 20 t/ha, with the use of which more accumulated productive elements of cotton are compared to other options, where other composts and manure were introduced.

And according to subsequent influences in 2011–2012 the norms of the applied composts, the information corresponding to the above regularities was obtained.

In the control variant, where mineral fertilizers (NPK) were used, the yield of raw cotton, according to the years of research, was 30.8; 30.4 and 29.9 c/ha, and on average for 3 years - 30.4 c/ha (1-fig.).

This means that in this variant, there is a decrease in the cotton yield to 0.9 c/ha from 2010 to 2012. Note that, as noted in the previous sections, the weather conditions in the years of research were almost similar, and therefore such a decrease can only be explained by a decrease in soil fertility.

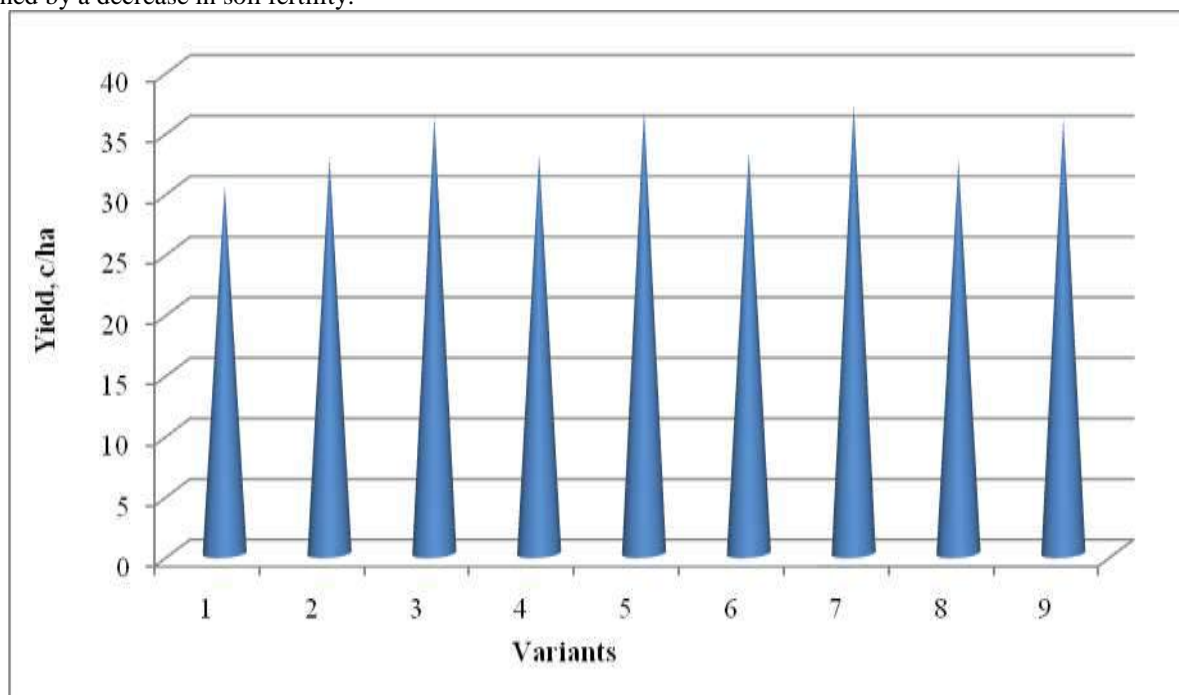


Fig. 1. Average yield for 3 years when composts are used



In variants 2 and 3, where 10 and 20 t/ha of manure were applied against the background of mineral fertilizers, under their influence, 33.0–36.5 quintals/ha of raw cotton was obtained, and under the influence of subsequent years 2011–2012 - 32.8–36.0 and 32.3–35.7 quintals/ha, and on average for 3 years - 32.7–36.1 quintals/ha or, relative to the control, the additional yield was 2.3 and 5.7 quintals / ha.

In the variants where 10 and 20 tons of compost -1 were used, the average yield of raw cotton for 3 years was 32.9 and 36.6 c/ha, and, respectively, compared to the control, 2.5 and 6.2 c/ha additional yield was obtained, and compared to options 2 and 3, where 10 and 20 tons of manure were applied, 0.2–0.5 c/ha of additional yield was obtained. When using 10 and 20 t/ha of compost -2, the yield of raw cotton averaged 33.2–37.1 q/ha and, relative to the control, 2.8–6.7 q/ha of additional yield was obtained, relative to manure norms - 0.5–1.0 c/ha, and relative to the norms of compost -1 - 0.3–0.5 c/ha of additional yield. In the variants where 10 and 20 tons of compost -3 were applied, the raw cotton yield was 32.5–35.9 quintals/ha, or 2.1–5.5 quintals/ha of an additional yield was obtained relative to the control variant.

CONCLUSION

In conclusion, we can say that when comparing the influence of various composts and their influence in subsequent years under conditions of low-fertility lands, the best result was observed when using compost-2 at a rate of 20 t/ha and a high additional yield of 6.7 c/ha was obtained.

BIBLIOGRAPHY

1. Bairov A.Zh., Khamdamova D.Kh., Zhuraev A.A. Ways to obtain organo-mineral fertilizer from poultry waste. // *Materials of the V Congress of the Society of Soil Scientists and Agrochemists of Uzbekistan (September 16-17, 2010)*. T.: 2010. -p. 170-173.
2. Bairov A., Khamdamova D. Organic and organomineral fertilizer sources to increase crop yields and soil fertility. // *Agroilm. Scientific supplement to the journal Agriculture of Uzbekistan*. T.: 2013. 1(25). -FROM. p. 66-67.
3. Kuziev P.K. Problems of fertility of irrigated soils in Uzbekistan // *Materials of the IV Congress of Soil Scientists and Agrochemists of Uzbekistan (9-10 September 2006. GosNIIPA)*. T.: 2005. - p.51-60
4. Sorokin M., Okhotnik S., Yakhina T. Influence of fertility background on defect formation. // *Cotton growing*. 1980. No. 10. - p. 11-12.
5. Carter M.R., Long-term influence of compost on available water capacity of a fine sandy loam in a potato rotation. *Can. J. Soil Sci.* 2007. 87, no. 5. P. 535-539.
6. www.farmit.ru/rasteniievodstvo/udobreniya/organicheskie.
7. www.stroy-spravka.ru/kompostirovanie-otkhodov.



ACCLIMATIZATION OF IN VITRO PROPAGATED CHERRY KRIMSKY-5 (VSL-2) GRAFTS TO OPEN FIELD

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ABSTRACT

In the article, the acclimatization of microclonal propagated cherry Krimsky-5 grafts in different nutrient environments was studied. In this case, grafts were grown on substrates such as "Agrobalt-S", "Agrobalt-V" peat and "Bioghumus" at an air temperature of 25°C and relative humidity of 65-70%. Also, growth and development of microplants in open field conditions, growth dynamics of height and body diameter, number of leaves, leaf surface and root system development indicators are highlighted.

KEY WORDS: *Cherry, microclonal propagation, acclimatization, greenhouse, biometric measurements, phenological observations.*

INTRODUCTION

Acclimatization is described as climatic adaptation of a living organism, especially a plant, to a new environment or getting used to the environment [1,4]. Acclimatization of microclonal propagated plants to greenhouse and field conditions is very important because microclonal propagated incubator conditions and greenhouse or field conditions are very different. Seedlings or branches grown *in vitro* are kept free from stress and in a uniform microclimate with optimal conditions for plant reproduction. Seedlings in cultivation containers, develop and feed heterotrophically in low-light and aseptic conditions, in an environment containing sufficient amounts of sugars and nutrients, and in an atmosphere with high humidity [3]. As a result of these conditions, seedlings with unusual morphological, anatomical and physiological characteristics develop. When microclonal shoots or seedlings are transferred from incubators to the greenhouse, they may rapidly wither or die from the change in environment unless adequate precautions are taken to acclimatize them [6]. When transferring from *in vitro* conditions to *in vivo* conditions, the aforementioned shortcomings must be considered. Successful acclimatization technologies should provide growth in greenhouse or field conditions with low humidity, strong light, autotrophic nutrition, and aseptic environment. Although there are specific methods of acclimatization for some plants, there are technologies common to all plants [5].

MATERIALS AND METHODS

The experiments were carried out in the research institute of horticulture, viticulture and winemaking named after Academician M. Mirzaev within the framework of the practical international cooperation project UZB-Ind-2021-84 - "Enrichment of plant genetic resources in Uzbekistan and India and increasing the scientific potential of researchers". The growth of microclonally propagated Krymsky-5 grafts of cherry was observed from February 11th to February 25th on three different substrates in the acclimatization room. Rooted micro-plants were separated from the nutrient medium, and the residues of the nutrient medium stuck to the root system were washed in running water. Micro-plants were transferred to polystyrene cassettes containing substrates such as "Agrobalt-S", "Agrobalt-V" peats and "Biogumus" and stored in plastic bags in an acclimatization room. In acclimatization, air temperature was 25°C and relative humidity was 70%. During the first four days of cultivation, the covers of the cells were not opened. On the fifth day of acclimatization, microplants were watered. As the upper leaf buds grow, watering is reduced. The full growth phase gradually transitioned into the nursery phase with significantly longer watering intervals. The composition of peat and biohumus used in the process of acclimatization of the Krimsky-5 graft of cherry were as follows: "Agrobalt-S" peat moisture content is 65%, the content of mineral substances is N-120 mg/l, P₂O₅ 80 mg/l, K₂O 140 mg/l, Mg-30 mg/l, Ca-170 mg/l and microelements Cu-9 mg/kg, Mn-40 mg/kg, Zn- 9 mg/kg, Co-0.001 mg/kg. Organic matter was 90% and the pH value was 5.5-6.6.

"Agrobalt-V" peat moisture - 65%, no mineral additives. Organic matter was 95%. pH indicator was -3.0-4.2.

"Biogumus" N-0.9 -3.0%, P₂O₅ 1.3-2.5 mg/kg, K₂O 1.2-2.5 mg/kg, Mg-0.5-2.3 mg/kg, Ca-4.5-8 mg/kg, Fe-0.5-2.5% and microelements Su-3.5-5.1 mg/kg, Mn-60-80 mg/kg, Zn- 28- 35 mg/kg, humus was 10-12%. Organic matter is 40-60% and the pH value was 6.5-7.2 [6].



RESULTS AND DISCUSSION

In the conducted experiments, the length of the graft when planted on February 11 in Agrobalt-S peat on the Krimsky-5 graft on February 25 in the MS (Murasige and Skug) control medium was 5.7 cm, 11.8 leaves and 3.5 cm² of leaf surface.

The height of the Krimsky-5 graft in the DKW (Driver and Kuniyuki) nutrient medium was 6.3 cm, the number of leaves was 12.0 pcs. Also, it was noted that the leaf level is 0.2 cm² higher.

In MS_{tak} (Murasige and Skug, improved) nutrient medium, the length of Krimsky-5 graft grew from 3.2 cm to 5.8 cm, the number of leaves was 12.2 pieces, the leaf area was 3.7 cm², and the height of the graft compared to the control variant was 0.1 cm. Also, it was observed that the number of leaves is 0.4 pieces and the leaf surface was 0.2 cm² higher.

The height of the graft in WPM (Woody plant medium) medium is 5.3 cm, the number of leaves was 11.5 pieces and the leaf area was 3.7 cm², compared to the control variant, the height of the graft is 0.4 cm and the number of leaves is 0.3 less and it was noted that the leaf surface was 0.2 cm² higher.

During the acclimatization of cherry cuttings, when the height of Krimsky-5 cuttings planted on "Agrobalt-B" peat was observed from February 11 to February 25 in the control medium MS, they grew from 3.1 to 4.2 cm, the number of leaves was 11.5, the leaf surface was 3.5 cm².

In DKW nutrient medium Krimsky-5 graft height was 4.1 cm, the number of leaves was 12.1 pieces and leaf surface was 3.6 cm², comparing to the control variant, it was observed that the height of the graft was 0.1 cm lower, the number of leaves was 0.6 pieces and the leaf surface was 0.1 cm² was higher.

In MS_{tak} and WPM media, graft height was 4.2 cm, leaf number and leaf surface increased to 12.5 and 3.8 cm², respectively compared to the control, graft height was the same with leaf number (0.7) and leaf area (0.3 cm²) was observed to be higher.



Figure 1. Growth (A) and growth length (B) of Krimsky-5 grafts on Agrobalt-S peat.

When the height of Krimsky-5 grafts planted in "Bioghumus" was observed from February 11 to February 25, it grew from 3.0 to 3.6 cm in MS control medium, the number of leaves was 11.5, and the leaf area was 3.5 cm². The height of the graft grew by 3.6 cm in DKW, option 3 MS_{tak} and WPM nutrients, the number of leaves was 10.0 pieces and the leaf area was 3.6 cm², compared to the control option, the height of the graft was the same, the number of leaves was 1.5 pieces less and leaf surface was observed to be higher by 0.1 cm².

The growth dynamics of growth of height and body diameter, the number of leaves, the level of leaves and the development of the root system were studied *in vitro*.

According to the results of the study, the bruising of the cherry planted in the open field in the Krimsky-5 graft was studied in 4 different options and 4 repetitions.

100 grafts were planted in each variant. According to the results of the study, the microclonal reproduction *in vitro* made 95.6% of cherry grafting Krimsky-5 (VSL-2) in open field conditions.

The growth length, width, number of leaves and leaf area of the graft under field conditions were observed from April to September. The growth length of the graft in the Krimsky-5 graft variant 1 MS in the control nutrient medium increased from 21.9



cm in April to 84.8 cm in September, and the graft width was 7.8 mm, the number of leaves was 40.0 and the leaf area was 32.5 cm².

In variant 2 in the Krimsky-5 graft on DKW medium, the growth length increased from 31.9 cm in April to 131.3 cm in September, the width of the graft was 9.8 mm, the number of leaves was 41.1, and the leaf area was 33.4 cm² compared to the control variant, it was noted that the growth length of the graft was 46.5 cm higher, the width was 2 mm, the number of leaves was 1.1 pieces, and the leaf surface was 0.9 cm² higher.

In option 3 MS_{tak} and option 4 WPM mediums, graft growth length increased from 39.3 cm in April to 107.2 cm in September, width 9.5 mm, leaf number 35.6 and leaf area 29.7 cm² growth was observed, compared to the control variant, the growth length of the graft was 22.4 cm, the width was 1.7 mm higher, the number of leaves was 4.4 pieces and the leaf area was 2.8 cm² less.

In variant 1, the growth length of the Krimsky-5 graft in the control nutrient medium MS increased from 24.4 cm in April to 82.5 cm in September, the graft width was 6.4 mm, the number of leaves was 42.3, and the leaf area was 32.6 cm².

In the variant 2 DKW medium of Krimsky-5 graft the growth length increased from 25.6 cm in April to 82.5 cm in September, the graft width was 7.4 mm, the number of leaves was 44.1, and the leaf area was 35.6 cm². Comparing to the control variant, the growth length of the graft was the same, the width was 1 mm, the number of leaves was 1.8 pieces and the leaf surface was 3 cm² higher (Figures 1 and 2).

The growth length of the graft in the variant 3 MS_{tak} nutrient medium increased from 42.1 cm in April to 110.8 cm in September, the width increased to 8.6 mm, the number of leaves increased to 38.5 pieces, and the leaf area increased to 30.9 cm², compared to the control option. In comparison, it was noted that the growth length of the graft was 28.3 cm, the width was 2.2 mm higher, the number of leaves was 3.8 pieces and the leaf surface was 1.7 cm² less.

Variant 4 WPM media showed a growth length of 41.3 cm in April to 117.2 cm in September, width 9.8 mm, number of leaves 42.7 and leaf surface 33.2 cm² compared to control. 34.7 cm, 3.4 mm higher in width, 0.4 more leaves and 0.6 cm² more leaf surface.

The growth length of Krimsky-5 grafts in the control medium of variant 1 MS increased from 23.4 cm in April to 85.6 cm in September, the width was 7.1 mm, the leaves were 40.2 pieces, and the leaf surface was 31.4 cm².

Krimsky-5 graft on Variant 2 DKW nutrient medium, growth length increased from 38.1 cm in April to 106.7 cm in September, width 8.6 mm, number of leaves 42.4 pieces and leaf area 33.9 cm², control compared to the variant, the growth length of the graft was 21.1 cm, the width was 1.5 mm higher, the number of leaves was 2.2 more and the leaf surface was 2.5 cm² more.

CONCLUSIONS

The highest growth rate for the Krimsky-5 grafts of cherries prepared in different nutrient media was in the DKW nutrient medium "Agrobalt-S" peat, the growth length was 6.3 cm, the number of leaves was 12.0 pcs. was found to be the most effective peat. In substrates such as "Agrobalt-V" peat and "Bioghumus" the growth length of the graft was determined by the growth of 3.4 cm, the number of leaves up to 10.0 pieces and the leaf surface up to 1.9 cm². It was found that the substrates such as "Agrobalt-V" peat and "Bioghumus" are ineffective for the growth of Krimsky-5 graft.

According to the results of the research, the cherry grown in different nutrient mediums was studied in field conditions on the Krimsky-5 graft from April to September, and when the biometric measurements were calculated, it grew well in the DKW nutrient medium, with the growth length was 31.9 cm, the width was 2.2 mm in September 131.3 cm, 9.8 mm wide, 41.1 leaves and 33.4 cm² leaf area were observed.

REFERENCES

1. Abduramanova S. Growing cherry rootstocks obtained in vitro on typical loam soils // journal "Agroilm" (Agriculture of Uzbekistan). - Tashkent, 2019. - № 3 (59). - P. 44-45. (06.00.00; No. 1).
2. Abduramanova S., Rustamova I. Economic efficiency of cherry rootstocks grown in vitro. // Journal of Agriculture of Uzbekistan. № 6. 2020.
3. Abduramanova S. The in vivo acclimatization of cherry rootstock Krymsk 5(VSL-2) micropropagated on different culture media. // *Academica An International Multidisciplinary Research Journal* ISSN:2249-7137 Vol.10, Issue 8, August 2020 Impact Factor: SJIF 2020=7.13. India-2020.-255-259pp.
4. Buronov F., Kudratillaev J., Valieva M. Technology of microchipping in the process of microclonal propagation of cherry rootstocks. // *Collection of materials international. Scientific practice. Conf. "State, problems, prospects of interregional fruit growing and viticulture"*. - Tashkent: "Info Capital Group", 2018. - P. 160-163.
5. Fila G, Ghashghaie J, Hoarau J, Cornic G (1998) Photosynthesis, leaf conductance and water relations of in vitro cultured grapevine rootstock in relation to acclimatization. *Physiologia Plantarum* 102, 411- 418.
6. Saimnazarov Y.B., Abduramanova S.Kh. In vitro multiplication of cherry rootstock Krymsk 5 (VSL). // *International journal for innovative research in multidisciplinary field – Volume 5, - Issue 1, India, 2019. – P. 77-81. Impact Factor: 6.497.*



KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING LEPTOSPIROSIS PREVENTION AMONG THE NON-PARAMEDICAL STUDENTS

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ABSTRACT

Leptospira, a genus of pathogenic spirochetes, are the source of the infectious disease leptospirosis, which affects both humans and animals. It is connected to environments with inadequate sanitation and agricultural jobs that need contact with animals or water and is regarded as the most prevalent zoonosis in the world. Adventure travel and "mud run" sports or events that expose competitors to fresh water or soil are putting people at risk more and more.

AIM: To assess the level of knowledge, attitude, and practice regarding leptospirosis prevention among the non-paramedical students.

METHODS AND MATERIALS: A descriptive research design was conducted. 60 samples were selected by convenient sampling technique. Self-structured questionnaires were used to collect data from the participants.

RESULTS: The present study suggested that the 26 (43.3%) had inadequate, 19 (31.7%) had moderate and 15 (25%) had adequate knowledge, 25 (41.7%) had adequate, 16 (26.7%) had moderate, 19 (31.7%) had inadequate attitude, 22 (36.7%) had inadequate, 13 (21.7%) had moderate, 25 (41.7%) had adequate practice. The occupation had shown statistically significant association with level of knowledge regarding leptospirosis prevention at $p < 0.05$. This study showed that the majority of respondents had low levels of knowledge, unfavorable attitudes, and poor practices regarding leptospirosis prevention.

CONCLUSION: As a result, leptospirosis prevention knowledge, attitudes, and practices were generally substandard. They might be more likely to get leptospirosis as a result of this discovery.

KEY WORDS: Attitude, Knowledge, Leptospirosis, Non-Paramedical, Practice, Prevention.

INTRODUCTION

"In examining disease, we gain wisdom about anatomy and physiology and biology. In examining the person with disease, we gain wisdom about life."

Leptospirosis is a neglected zoonotic infectious disease caused by spirochetes of genus *Leptospira*, which can be transmitted directly or indirectly though human-to-human transmission is not common^[1]. Being sporadic in nature, it has been reported as the outbreak from developing countries such as Nicaragua, India, Brazil, Thailand, Sri Lanka and from urban areas of developed countries such as USA, France, Japan, Ireland and Germany^[2,3]. Studies have identified that peak incidence of disease occurred during rainy seasons in tropical regions and late summer to early fall in temperate regions, but most of the time outbreak followed periods of excess rainfall^[4]. Besides mentioned climatic factors certain occupation or professions such as farming, butchering, veterinarians and rodent control put individuals at risk for disease. It is estimated that presently one billion of the world's population live in the slum area, which is going to be doubled by 2025 can have a significant impact on the Leptospirosis disease burden^[5,6].

In South East Asia, 447 million people are engaged with agriculture in rural areas of 11 different countries^[7]. Most of the countries sharing similar environmental, cultural and demographic characteristics have reported well number of cases in past few



years, which is again anecdotal just like a tip of the iceberg^[8]. India lacks data on national incidence of Leptospirosis, even though the disease contributes for 12.7% of acute febrile illness^[9].

The most common entry point is through cuts or abrasions in the skin, or through the conjunctiva; infection can also spread through intact skin after prolonged submersion in water, although this usually happens when abrasions are more likely to happen, making it harder to prove. Leptospirosis epidemics have been caused by point water supply pollution, which has been proven to be a source of water-borne transmission^[10]. The mucous membranes of the respiratory system may get infected as a result of inhaling water or aerosols. Animal bites can occasionally result in infection. Rarely has direct transmission between people been proven^[11,12]. Leptospire have, however, been found excreted in human urine months after regaining health. It is believed that *Leptospira* survival after excretion is restricted by the low pH of human urine. There have been reports of sexual activity causing transmission during recovering^[13,18].

The objectives of the present study were

- ❖ To assess level of knowledge, attitude and practice of leptospirosis prevention among the non-paramedical students
- ❖ To find out the association between the level knowledge of leptospirosis prevention among the non-paramedical students with their selected demographic variables.

Material and Methods

The quantitative approach with non-experimental descriptive research design was adopted for the present study. After obtaining an ethical clearance from the institutional ethical committee (IEC) of Saveetha Institute of Medical and Technical Sciences and a formal permission from the selected non paramedical college, the study was conducted. A total of 60 samples who are presently studying in the selected non paramedical college (n=60) and who met the inclusion criteria were recruited as study participants by using Convenience sampling technique. The inclusion criteria for the study, participants, who are available during the study period and who are cooperative and who understand both Tamil and English. During the initial interview, the purpose of the study was explained by the investigator to each of the study participants and a written informed consent was obtained from them. The demographic data and the existing level of knowledge, attitude and practice regarding leptospirosis prevention was exploited by using a self-structured questionnaire and the collected data were tabulated and analyzed by using descriptive and inferential statistics.

RESULTS AND DISCUSSION

SECTION A: DESCRIPTION OF DEMOGRAPHIC DATA OF THE STUDY POPULATION

With regards to age 20 (33.3 %) were between the age group of 13-15 years, with regards to religion 26 (43.3 %) were Hindu, with regards bread winner 23 (42.7%) were husband, with regards to income 36 (60%) were earning 10000-25000 per month, with regards to family 26 (43.3%) were nuclear family, with regards to work 27(45) were clerical worker and with regards to education 25 (41.6%) were secondary education.

SECTION B: ASSESSMENT OF LEVEL OF KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING LEPTOSPIROSIS PREVENTION AMONG THE NON-PARA MEDICAL STUDENTS

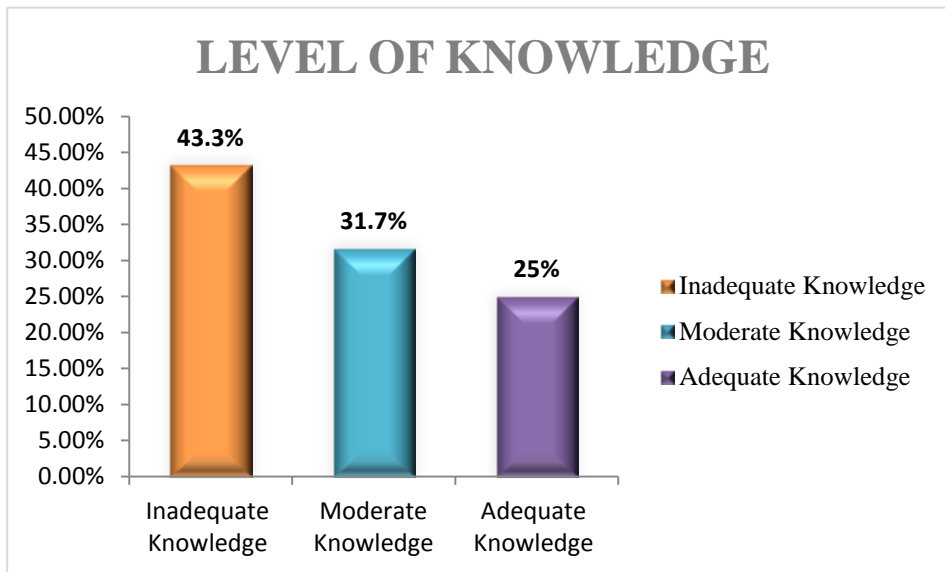
Assessment of Level of Knowledge among the Non-Paramedical Students

The current study identified among our study participants are 26(43.3%) had inadequate knowledge, 19(31.7%) had moderate knowledge and 15(25%) had adequate knowledge regarding prevention of leptospirosis as debited in (Table 1 and Fig 1).

TABLE 1: Frequency and Percentage Distribution of Level of Knowledge among the Non-Paramedical Students

N=60

Level of Knowledge	Frequency	Percentage
Inadequate (1-5)	26	43.3%
Moderate (5-15)	19	31.7%
Adequate (15-20)	15	25%



A descriptive study was conducted by **Ramesh U, Renuka K. (2020)** aiming to assess the level of knowledge on prevention of leptospirosis among schoolchildren. 60 samples were selected by simple random sampling, the data were collected through a formal information questionnaire on the prevention of leptospirosis. In terms of schoolchildren's understanding of leptospirosis prevention, it was shown that 1 (1.7%) had adequate knowledge, 18 (30%) had fairly adequate information, and 41 (68.3%) had poor knowledge^[14].

A cross-sectional study by **Kipper BH, Stein CE, Castro TH, et al. (2020)** included 270 interviewees out of a total of 5,336 residences. 30 streets out of a total of 230 streets were studied, with a sampling error of 5% and a confidence level of 95%. Two questionnaires were used to collect the data at random: one was distributed to the local community to assess their knowledge of the disease, and the other was distributed to every street in the neighborhood to confirm the neighborhood's risk factors. Regarding knowledge about the disease, 93.33% of respondents stated that they had knowledge about the disease, and 98.89% of the interviewees affirmed that they had never leptospirosis yet and 18.89% knew people affected by the disease^[15].

Hence, the level of leptospirosis awareness among students indicated the urgent need for further health education, especially for people with low levels of education.

Assessment of Level of Attitude among the Non-Paramedical Students

The current study identified among our study participants are 25 (41.7%) had inadequate attitude, 16 (26.7%) had moderate attitude and 19 (31.7%) had adequate attitude regarding prevention of leptospirosis as debited in (Table 2 and Fig 2).

TABLE 2: Frequency and Percentage Distribution of Level of Attitude among the Non-Paramedical Students

N=60

Level of Attitude	Frequency	Percentage
Inadequate (1-5)	25	41.7%
Moderate (5-15)	16	26.7%
Adequate (15-20)	19	31.7%

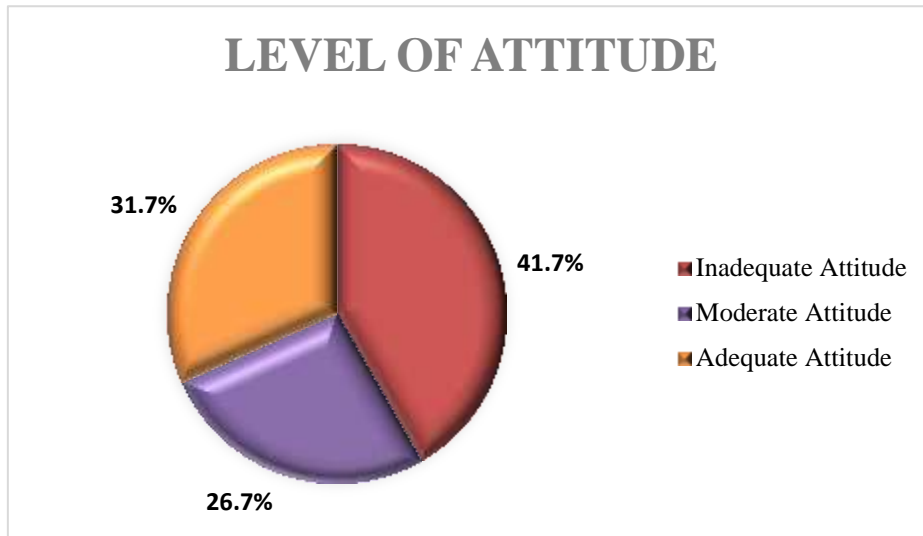


Figure 2: Level of Attitude among the Non-Paramedical Students

Azfar ZM, Nazri SMetc. (2018) conducted a cross sectional study involving 321 town serviceworkers namely garbage collector, town cleaner, landscaper and lorry driver or mechanic. Questions on attitude are designed to be answered using a Likert scale. In the present study, it was found that there was a slightly higher proportion of those with satisfactory (about 52%) than unsatisfactory attitude. The important area that was identified as considering higher risk attitude while respondents were not at work were “wearing any type of shoes” and “walking in flood” as only 35.8% and 68.2% gave favorable answers respectively. For attitude at workplace, it was found that high risk attitude during working like drinking habit and PPE usage were quite alarming^[16].

Bakar SM and Rahman HA (2018) conducted a cross-sectional study with 170 students from veterinary medicine (22 students), nursing (57 students), environmental and occupational health (ENVOCH) (57 students), and other fields (97 students). The study's instrument was a questionnaire. The majority of responders from ENVOCH, nursing, and veterinary medicine—42 (73.7%), 18 (81.8%), and 40 (66.7%)—had a moderate attitude regarding leptospirosis. In contrast, 10 (16.7%) students studying veterinary medicine, 3 (13.6%) nursing students, and 5 (8.8%) ENVOCH students showed high attitudes^[17]. Hence, a large proportion of respondents had shown a negative attitude. Positive attitude towards the exposure to the urine or excretion of infected animals, and also water or soil that being contaminated with secretion of the infected animals should practice in waste handling and waste management.

Assessment of Level of Practice among the Non-Paramedical Students

The current study identified among our study participants 25 (41.7%) had inadequate practice, 13 (21.7%) had moderate practice and 22 (36.7%) had adequate practice regarding prevention of leptospirosis as debited in (Table 3 and Fig 3).

TABLE 3: Frequency and Percentage Distribution of Level of Practice among the Non-Paramedical
N=60

Level of Practice	Frequency	Percentage
Inadequate (1-5)	25	41.7%
Moderate (5-15)	13	21.7%
Adequate (15-20)	22	36.7%

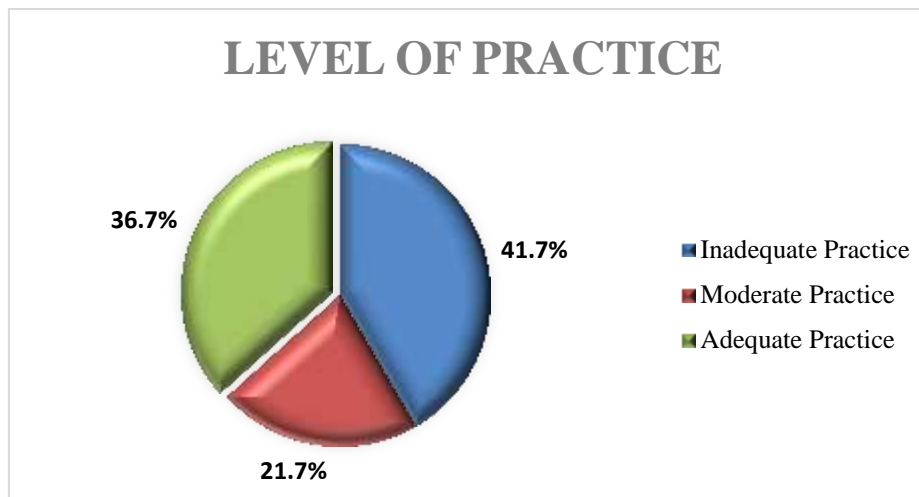


Figure:3 Level of Practice among the Non-Paramedical Students

Bakar SM and Rahman HA (2018) conducted a cross-sectional study with 170 final year students from veterinary medicine (22 students), nursing (57 students), environmental and occupational health (ENVOCH) (57 students), and other fields (97 students). Purposive sampling technique employed and self-structured questionnaire was used. A mean score of 64.32 and standard deviation of 7.70 were used to classify the subjects into three levels (15) namely high level (more than 72), moderate level (57 to 72) and low level (less than 57). Majority of the respondents for all three programmes had moderate practice which were 41 (71.9%), 17 (77.3%) and 44 (73.3%)^[17].

In order to collect 315 respondents, **Abdullah NM and Mohammad WM (2019)** used a cross-sectional study, multistage cluster sampling, and simple random sampling. There are 17 statements in the practice items that represent acceptable and unsatisfactory preventative practices among responders. Practice's average (SD) percentage score was 64.31. (12.19). The bulk of responders (81.3%) generally had poor preventive behavior. In overall, majority of respondents had unacceptable preventive practice (81.3%). Nevertheless, good practice was observed in several items including avoiding to eat or drink while handling waste (93.0%), choosing a clean restaurant (92.4%), and keeping foods in a covered container (91.1%) [19].

The majority of respondents also generally had poor practices for preventing leptospirosis. However, there were still some instances of good behavior when a small majority of respondents avoided eating or drinking while handling garbage.

As a result, leptospirosis prevention knowledge, attitudes, and practices were generally substandard. They might be more likely to get leptospirosis as a result of this discovery. In order to create a focused and well-directed intervention programme on leptospirosis infection, policy makers will need to identify weak areas in their knowledge, attitude, and practice.

SECTION C: ASSOCIATION OF LEVEL OF KNOWLEDGE WITH SELECTED DEMOGRAPHIC VARIABLES OF THE STUDY POPULATION.

The result shows demographic variables such as occupation has significant association with level of knowledge, attitude and practice of leptospirosis at level of $p < 0.05$. Others variables had no association with level of knowledge of leptospirosis prevention.

Bakar SM and Rahman HA (2018) conducted a cross-sectional study with 170 final year students from veterinary medicine (22 students), nursing (57 students), environmental and occupational health (ENVOCH) (57 students), and other fields (97 students). Purposive sampling technique employed and self-structured questionnaire was used to collect data regarding knowledge, attitude and practice about leptospirosis. The study results show that there was a significant association between race and knowledge, also gender and attitude with $p < 0.05$, ($p = 0.008$) and ($p = 0.001$) respectively. Furthermore, there was also an association between attitude and practice ($p < 0.05$). Meanwhile, there was a significant difference on the knowledge between students of ENVOCH with Veterinary Medicine and Nursing with Veterinary Medicine ($p < 0.05$)^[17].

Margaret LaFera Jenni (2019) conducted cross-sectional study aiming to determine awareness and general attitudes about canine leptospirosis and to identify gaps in veterinarians' knowledge in treatment and prevention among 1058 Arizona veterinary medical association members. A 40-questionnaire, self-administered online survey to 1058 Arizona Veterinary Medical Association members, the results using Pearson's Chi-squared or Fisher's exact test; a P-value < 0.05 was considered statistically significant^[20].



LIMITATIONS

The study has some limitations. The researcher could not generalize the study findings as the sample size is relatively small and limited to 60 clients. Only non-paramedical students were included into the study. Another limitation is selected urban area used for data collection. Psychological well-being among clients can differ based on their cultural differences and background. The current study has only few supportive studies in Indian Population due to paucity of literature.

CONCLUSION

In conclusion, this study showed that the majority of respondents had low levels of knowledge, unfavorable attitudes, and poor practices regarding leptospirosis prevention. However, a significant portion of them still had little understanding of the method of transmission and available defenses. Our findings imply that leptospirosis education initiatives should be done specifically for high-risk populations to reach them and raise their knowledge of the disease. If effective steps are not made to address this issue, the number of cases and fatalities will keep rising. The disease's prevention strategies and therapies should be improved, according to public health professionals, researchers, and policymakers.

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REFERENCE

1. Geneva: World Health Organization/ International Leptospirosis Society. Publication; 2003. [Last accessed on 2012 Sep 21]. *Human Leptospirosis: Guidance for Diagnosis, Surveillance and Control*; pp. 1–2. ISBN 92 4 154589 5.
2. Vijayachari P, Sugunan AP, Shriram AN. Leptospirosis: An emerging global public health problem. *J Biosci.* 2008;33:557–69.
3. Ko AI, Galvão Reis M, Ribeiro Dourado CM, Johnson WD, Jr, Riley LW. Urban epidemic of severe Leptospirosis in Brazil. *Salvador Leptospirosis Study Group. Lancet.* 1999;354:820–5.
4. Zaki SR, Shieh WJ. Leptospirosis associated with outbreak of acute febrile illness and pulmonary hemorrhage, Nicaragua, 1995. The Epidemic Working Group at Ministry of Health in Nicaragua. *Lancet.* 1996;347:535–6.
5. Tangkanakul W, Tharnaphornpil P, Plikaytis BD, Bragg S, Poonsuksombat D, Choomkasien P, et al. Risk factors associated with Leptospirosis in Northeastern Thailand, 1998. *Am J Trop Med Hyg.* 2000;63:204–8.
6. Sasaki DM, Pang L, Minette HP, Wakida CK, Fujimoto WJ, Manea SJ, et al. Active surveillance and risk factors for Leptospirosis in Hawaii. *Am J Trop Med Hyg.* 1993;48:35–43.
7. Nardone A, Capek I, Baranton G, Campèse C, Postic D, Vaillant V, et al. Risk factors for Leptospirosis in metropolitan France: Results of a national case-control study, 1999-2000. *Clin Infect Dis.* 2004;39:751–3.
8. Leblebicioglu H, Sencan I, Sünbül M, Altıntop L, Günaydin M. Weil's disease: Report of 12 cases. *Scand J Infect Dis.* 1996;28:637–9.
9. Pate GE, Hogan MC, FitzSimon N, Mellotte GJ. A review of the epidemiology of Leptospirosis in the Republic of Ireland. *Ir Med J.* 2000;93:114–7.
10. Rathinam, S., Vedhanayaki, R., & Balagiri, K. (2019). A Cross-Sectional Assessment of Knowledge, Attitude, and Practice Toward Leptospirosis among Rural and Urban Population of a South Indian District. *Ocular immunology and inflammation*, 1-12
11. Arbiol, J., Orencio, P. M., Nomura, H., Takahashi, Y., & Yabe, M. (2016). Knowledge, attitude and practices towards leptospirosis among lakeshore communities of Calamba and Los Baños, Laguna, Philippines. *Agriculture*, 6(2), 18.
12. Sakundarno, M., Bertolatti, D., Maycock, B., Spickett, J., & Dhaliwal, S. (2014). Risk factors for leptospirosis infection in humans and implications for public health intervention in Indonesia and the Asia-Pacific region. *Asia Pacific Journal of Public Health*, 26(1), 15-32.
13. Cook, E. A. J., de Glanville, W. A., Thomas, L. F., Kariuki, S., de Clare Bronsvort, B. M., & Fèvre, E. M. (2017). Risk factors for leptospirosis seropositivity in slaughterhouse workers in western Kenya. *Occupational and environmental medicine*, 74(5), 357-365.
14. Ramesh U, Renuka K. A Study to Assess the Level of Knowledge on Prevention of Leptospirosis among Schoolchildren in Selected School at Puducherry with a View to Develop Information Module.
15. Kipper BH, Stein CE, Castro TH, da Silva BC, Baumgärtel C. Evaluation of the Level of Knowledge of the Population and Risk Factors Related to Leptospirosis in an Endemic City. *Int Arch Public Health Community Med.* 2020;4:034.
16. Azfar ZM, Nazri SM, Rusli AM, Maizurah O, Zahiruddin WM, Azwany YN, Nabilah I, Asma HS, Aziah BD. Knowledge, attitude and practice about leptospirosis prevention among town service workers in northeastern Malaysia: a cross sectional study. *Journal of Preventive Medicine and hygiene.* 2018 Mar;59(1):E92.
17. Bakar SM, Rahman HA. Knowledge, Attitude and practice on leptospirosis among undergraduate students in University Putra Malaysia. *Mal J Med Health Sci.* 2018;14:104-11.
18. BD A, Wm Z, TJ TZ, RA H, O M, I N, I Z, AW Z. Knowledge, attitudes, practices and health beliefs toward leptospirosis among urban and rural communities in Northeastern Malaysia. *International journal of environmental research and public health.* 2018 Nov;15(11):2425.
19. Abdullah NM, Mohammad WM, Shafei MN, Sukeri S, Idris Z, Arifin WN, Nozmi N, Saudi SN, Samsudin S, Zainudin AW, Hamat RA. Leptospirosis and its prevention: knowledge, attitude and practice of urban community in Selangor, Malaysia. *BMC public health.* 2019 Dec;19(1):1-8.



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20. Jenni, M.L., Woodward, P., Yaglom, H., Levy, C., Iverson, S.A., Kretschmer, M., Jarrett, N., Dooley, E., Narang, J. and Venkat, H., 2019. Knowledge, attitudes, and practices among veterinarians during an outbreak of canine leptospirosis—Maricopa County, Arizona, 2019. *Preventive veterinary medicine*, 172, p.104779.



TEACHER EMPOWERMENT TOWARDS PROFESSIONAL DEVELOPMENT AND EFFECTIVENESS-CONCEPT, NEED AND IMPORTANCE

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ABSTRACT

Generally Teaching is delivered by a teacher to enhance the amount of learning of a learner. To make learning more meaningful, understandable and fruitful to a learner, effectiveness of teaching delivered by a teacher is very essential condition. This concept of teaching-learning process is not exceptional one in case of development in teacher training institutions. Empowered teachers are given the encouragement and support necessary to take risks and engage in Continuous Professional Development (CPD) while collaborating with their colleagues and this process is essential to success in education. Being an empowered teacher means having enough resources and freedom to provide every student with the education that they deserve. The present paper deals in lime light the relationship among teacher empowerment, professional development and effectiveness.

KEYWORDS: *Teacher Empowerment, Professional Development and Teacher Effectiveness*

INTRODUCTION

The term teacher empowerment is used in multiple and sometimes even conflicting ways, probably because of its popularity in educational discourse (Prawat, 1991). We will outline some of the definitions of empowerment before giving our own ideas about the concept. Sometimes empowerment is linked with notions on teacher efficacy (Edwards & Newtons, 1995; Imants et al., 1993; O'Connor & Korr, 1996; Quaglia et al., 1991). Empowered teachers believe that they can affect student learning and can exercise control over important events which may lead to student learning. Knowledge and skills of teachers are necessary conditions for their professional routines, but they do not guarantee success because the relationship between knowledge and actual performance is mediated by self-efficacy. A view is held by Goodmam "Empowered teachers carefully consider the content of what is taught to children is able to creatively use materials, personal talents and innovative resources in planning and implementing learning activities. In particular, these individuals are committed to providing thoughtful and challenges educational experiences for children, thereby encouraging their pupils to become empowered themselves".

Prawat (1991) tries to summarize the literature on empowerment. He states that two dimensions can be discerned on which notions of empowerment can be traced. First, definitions of empowerment refer either to the personal context of teachers or on the context of the work place of teachers, or on the context of the work place of teachers, the classroom or the school. Second, notions of empowerment can relate either to the epistemological or to the political agenda. Most of the definitions outlined above can fairly easily be placed on the dimensions of Prawat.

CONCEPT OF TEACHER EMPOWERMENT

Many educational professionals, including the adaptive team, place heavy emphasis on the importance of being an empowered teacher. However, the concept of empowerment can seem abstract and its meaning in relation to education is sometimes unclear. Defining exactly what is meant by statements such as 'adaptive learning technology empowers teachers' is vital to maximising their impact on the field and illustrating how teachers can become empowered. As such, this post aims to clarify exactly what it means to be an empowered teacher. Dictionary definitions of empowerment generally distinguish between empowerment as "to give power or authority to, especially by legal means" and empowerment as "to enable or permit". This distinction presents the



first problem in defining empowerment in relation to education because it is not immediately clear whether one or both of these definitions relates to being an empowered teacher. Additionally, each definition is somewhat abstract and difficult to link to educational practice. Although the first definition given above emphasises power, being empowered is not the same as being powerful. Power is often defined as “the ability or right to control people or things”, implying that people with power have the authority to influence the actions of others.

While empowered people can have power and powerful people can be empowered, it is possible to be empowered without being powerful and vice versa. In education, creating a hierarchy in which some teachers have power while others are powerless opposes the empowerment process because empowered teachers must be free to exercise their own professional judgment without being restricted by others. A further problem with the conceptualisation of empowerment as “to give power or authority to” is the implication that empowered people are in control. As illustrated above, empowered people do not necessarily have control over others and such a situation would inhibit empowerment in education. It is also important to consider factors such as variability, innovation, and creativity, all of which are central to empowerment even though they can rarely be controlled. Teachers can’t control everything, and expecting them to do so would prevent them from becoming empowered.

NEED AND IMPORTANCE

Teachers’ empowerment is very important and necessary. Frances Bolin defined it as “investing teachers with the right to participate in the determination of school goals and policies and to exercise professional judgment about what and how to teach”. In this view, being an empowered teacher means having access to information and materials and being free to use these resources in a way that meets student needs and targets. Empowered teachers are given the encouragement and support necessary to take risks and engage in Continuous Professional Development (CPD) while collaborating with their colleagues and this process is essential to success in education. Being an empowered teacher means having enough resources and freedom to provide every student with the education that they deserve. Teachers who have not yet experienced empowerment are unable to fully personalise their teaching to the needs of each student and, as mentioned in my recent post about how adaptive learning technology is depersonalising education, students are turning to expensive personalised tuition sessions in search of the full attention of an educator who can provide them with personalised content and feedback. The importance of empowerment is also illustrated by its role in increasing teacher motivation, improving problem-solving skills, and teaching students to become empowered, all of which are vital to improving learning outcomes for every student.

Personal/epistemological: What knowledge and value claims should I accept as valid? This type of empowerment is especially stressed in the literature on teacher reflection, where teachers are not considered consumers of educational products but active participants in the construction of education.

1. Personal/ Political: What do I personally have to offer to the ongoing conversation in education? This type of empowerment is derived from the literature on unequal power relations and oppressed groups in educational settings.
2. School/ epistemological: What should I focus on in the teaching/ learning environment? In this view teachers construct their own environment by making use of theories about teaching and learning.
3. School/ political: what resources and support do I need, as a professional, to be successful in my work? This view on empowerment stresses the need for greater control and autonomy in the work place. A lack of autonomy supposedly reduces teachers.

EMPOWERMENT AS MEANS TO ACHIEVE EDUCATIONAL EFFECTIVENESS

In this paper, I will focus on the teachers as a professional in a school setting and as a part of a school team.

At the context level: Teacher profiles, initial training of teachers, core goals/core curricula, assessment and evaluation system. Teachers profiles are descriptions of the characteristics ascribed to professionals in teaching, for example teachers in primary education

At the school level: Educational leadership and in-service training and forms of intervention and coaching

At the teacher level: procedures for the selection of educational materials and implementation of materials by grouping procedures and teacher behavior

Here are 15 of the many 21st-century professional development skills, or as we like to call it, “Modern skills” that today’s teachers should possess.



PROFESSIONAL DEVELOPMENT

1. Adaptability: In this modern, digital age, teachers need to be flexible and be able to adapt to whatever is thrown their way. New technologies are developed every day that can change the way students learn, and the way teachers teach. Likewise, administrators are changing and updating expectations and learning standards. Being able to adapt is a skill that every modern teacher must have. If it's being able to adapt to the way students learn, the behaviour their classroom exhibits, or their lesson plans, it is a definitely a trait that is a must-have.

2. Confidence: Every teacher needs to have confidence, not only in themselves but in their students and their colleagues. A confident person inspires others to be confident, and a teacher's confidence can help influence others to be a better person.

3. Communication: Being able to communicate with not only your students but with parents and staff is an essential skill. Think about it: Almost all of a teacher's day is spent communicating with students and colleagues so it is crucial to be able to talk clear and concise in order to get your point across.

4. Team Player: Part of being a teacher is being able to work together as part of a team or a group. When you work together as a team, it provides students with a better chance to learn and have fun. Networking with other teachers (even virtually) and solving problems together will only lead to success. Doing so fosters a sense of community not only in your own classroom, but school-wide as well.

5. Continuous Learner: Teaching is a lifelong learning process. There is always something to learn when you are teacher. The world is always changing, along with the curriculum and educational technology, so it's up to you, the teacher, to keep up with it. A teacher who is always willing to go that extra mile to learn will always be an effective, successful teacher.

6. Imaginative

The most effective tool a teacher can use is their imagination. Teachers need to be creative and think of unique ways to keep their students engaged in learning, especially now that many states have implemented the Common Core Learning Standards into their curriculum. Many teachers are saying that these standards are taking all of the creativity and fun out of learning, so teachers are finding imaginative ways to make learning fun again.

7. Leadership: An effective teacher is a mentor and knows how to guide her students in the right direction. She leads by example and is a good role model. She encourages students and leads them to a place of success.

8. Organization: Modern teachers have the ability to organize and prepare for the unknown. They are always ready for anything that is thrown their way. Need to go home sick? No problem, they have a substitute folder all ready to go. Studies show that organized teachers lead more effective learning environments. So it is even more imperative to be organized if you want higher-achieving students.

9. Innovative: A modern teacher is willing to try new things, from new educational apps to teaching skills and electronic devices. Being innovative means not only trying new things, but questioning your students, making real-world connections and cultivating a creative mindset. It's getting your students to take risks and having students learn to collaborate.

10. Commitment: While being committed to your job is a traditional teaching skill, it is also a modern one. A modern teacher needs to always be engaged in their profession. The students need to see that their teacher is present and dedicated to being there for them.

11. Ability to Manage Online Reputation: This 21st-century, modern teaching skill is definitely a new one. In this digital age most, if not all, teachers are online, which means they have an "Online reputation." Modern teachers need to know how to manage their online reputation and which social networks are OK for them to be on. LinkedIn is a professional social network to connect with colleagues, but Snapchat or any other social networking site where students visit, is probably not a good idea.

12. Ability to Engage: Modern teachers know how to find engaging resources. In this digital age, it is essential to find materials and resources for students that will keep them interested. This means keeping up to date on new learning technologies and apps, and browsing the web and connecting to fellow teachers. Anyway that you can engage students and keep things interesting is a must.

13. Understanding of Technology: Technology is growing at a rapid pace. In the past five years alone we have seen huge advancements and we will continue to see it grow. While it may be hard to keep up with it, it is something that all modern teachers need to do. Not only do you just need to understand the latest in technology, but you must also know which digital tools is right for your students. It's a process that may take time but will be greatly influential in the success of your students.

14. Know When to Unplug: Modern teachers know when it's time to unplug from social media and just relax. They also understand that the teacher burnout rate is high, so it's even more critical for them to take the time to slow down and take a moment for themselves. They also know when it's time to tell their students to unplug and slow down. They give their students time each day for a brain break and let them kick their heels up and unwind.

15. Ability to Empower: Teachers inspire, that's just one of the qualities that come along with the title. Modern educators have the ability to empower students to think critically, be innovative, creative, adaptable, passionate, and flexible. They empower them to be



able to solve problems, self-direct, self-reflect, and lead. They give them the tools both digital and knowledgeable to succeed, not only in school but in life.

CONCLUSION

One of the common obstacles to teacher effectiveness is constant organizational change. Far too often, schools change instructional methodologies/programs every few years. In order to be effective in their role, teachers must have the opportunity to master the instructional process, and this takes time. A school's assessment framework, data team process, and instructional routines all take time to embrace and internalize. Therefore, careful consideration should be brought to decisions regarding instructional materials and establishing processes. Schools can achieve higher levels of teacher effectiveness by empowering teachers through a shared and clear understanding of core instructional materials, leveraging several kinds of assessments to build profiles of student ability, informing instructional priorities through the use of data, leveraging research-based methodology for intervention, and embracing the process with consistency. A commitment to this kind of approach benefits teachers, students, administrators and the entire school community. When schools are looking to hire a teacher, there are a few basic requirements that they are looking for: A College degree, experience working with children, and, of course, patience. Teachers need a variety of professional development skills along with knowledge of their subject matter and experience in order to be an effective teacher. Likewise, as the rapid developments in technology infuse into our lives, they affect the way students learn and the way teachers teach. Modern teachers need to be competent in not only basic skills, but new skill sets.

REFERENCES

1. Bill Mulford (2003). *School Leaders: Challenging Roles and Impact On Teacher And School Effectiveness*.
2. Cochran-Smith, M., & Lytle, S. (1999). *Teacher learning communities*. *Review of Research in Education*. 24, 24-32.
3. Dempster, N. (2002c). *The professional development of principals: 3 A review of policy*. *The Practising Administrator*. 24(3), 6-8 & 38-40.
4. Donaldson, G. (2001). *Cultivating leadership in school: Connecting people, purpose and practice*. N.Y.: Teachers College Press.
5. Heck, R. (2000). *Estimating the impact of school quality on school outcomes and improvement: A value-added approach*. *Educational Administration Quarterly*. 36(4), 513-552.
6. Dinesh Kumar, *Right to Education Act-2009: Problem of Age Appropriate Enrolment*, *International Journal of Educational Science and Research (IJESR)*, Volume 2, Issue 1, May-June 2012, pp. 28-332.
7. *Encouraging community participation in school education*. (2015) Retrieved from <http://centralsquarefoundation.org/advocacy/encouraging-community-participation-in-schools/>
8. http://www.rteforumindia.org/sites/default/files/SMC%20Manual%20english%20final_0.pdf from <https://www.hindustantimes.com/india/rte-not-applicable-to-minority-schools-sc/story-cRtNIadKfSbvucvpWT7wiK.html> and <https://www.thehindu.com/news/national/supreme-court-says-no-to-review-of-right-to-education-verdict/article3915647.ece>
9. *Ministry of Human Resource Development Department of School Education and Literacy* (2011).
10. *Sarva Shiksha Abhiyan: Framework for implementation based on the right of children to free and compulsory education act, 2009*. Retrieved from <http://ssashagun.nic.in/docs/SSA-Frame-work.pdf>



A STUDY ON ALTRUISTIC BEHAVIOUR AMONG SECONDARY SCHOOL TEACHERS IN MEDCHAL MALKAJGIRI DISTRICT

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ABSTRACT

Teaching is considered as a sacred profession and teacher act as guide in the lives of students without selfishness not only in the process of education development but also in their public life. Teachers' dedication towards school, society and towards their profession is highly expected so as to have an effective and efficient generation with Altruistic behavior. With this regard the present study is designed to assess Altruistic Behavior among Secondary School Teachers in Medchal Malkajgiri District. The investigation is adopted by descriptive survey method on the sample of 200 secondary school teachers drawn by using the stratified random sampling technique from the specified population. A researcher developed questionnaire is used as the research tool which consists of 40 statements. The study independent variable is Secondary school teachers and dependent variable is Altruistic behavior. The data collected was analysed by using Frequency count, Percentage, Mean, S.D, t-test & ANOVA. The findings of the study are as follows: the majority of the responses (86.86%) are revealing that secondary school teachers are possessing Altruistic behavior in their professional and personal life in Medchal- Malkajgiri district; the findings revealed that Altruistic behavior among secondary teacher found to be insignificant with variables gender, management, subject teaching and years of teaching experience.

KEYWORDS: *Altruistic Behaviour, Teaching, Teacher and Students' development.*

INTRODUCTION

Practicing altruism is the real source of compromise and cooperation; merely recognizing our need for harmony is not enough. A mind committed to compassion is like an overflowing reservoir - a constant source of energy, determination and kindness. This is like a seed; when cultivated, gives rise to many other good qualities, such as forgiveness, tolerance, inner strength and the confidence to overcome fear and insecurity. The compassionate mind is like an elixir; it is capable of transforming bad situation into beneficial ones. Therefore, we should not limit our expressions of love and compassion to our family and friends. Nor is the compassion only the responsibility of clergy, health care and social workers. It is the necessary business of every part of the human community.

Altruism is one aspect of what social psychologists refer to as prosocial behavior. Prosocial behavior refers to any action that benefits other people, no matter what the motive or how the giver benefits from the action. Some people differentiate prosocial behavior from what is sometimes referred to as pure altruism, which involves true selflessness with no expectation or desire for personal gain. In the changing globalised scenario of education teaching has become more challenging and complex. It is now not only a mere interaction between student and teacher but an organised, systematic process in which application of science, technology and consideration of behavioural science is of utmost importance. In this context a teacher should have an all round ability starting from academic superiority to behavioural adaptability. So, presence of some inherent and coherent quality like personality, acceptability, adaptability, values, accountability, professional ethics etc are essential for a teacher to reach the peak of excellence.

REVIEW OF RELATED LITERATURE

Naresh Kumar (2019) Conducted a study on the relationship between altruism and social skills of the adolescents. Altruism Scale (2015) by Rai and Singh and Social Skills Scale (2012) by Sood, Anand and Kumar were used to collect the data. The sample consisted of 200 students of XII class, selected randomly from private schools affiliated to CBSE, New Delhi from Moga District of Punjab, India. The sample was equally categorized between Boys-Girls and Rural- Urban students. Statistical techniques viz. - Mean, Standard Deviation, Standard Error of Means, t-test and Coefficient of Correlation (r) were used to analyze the data. The results revealed that there exists significant relationship between altruism and social skills of adolescents. It means if the adolescents have good social skills their level of altruism will be high and vice-versa.



Vinitha Sree and Rupa Gunaseelan (2018) Conducted study to analyse the direct effect of supervisors' benevolent leadership and subordinates' psychological well-being also the indirect effect of these variables is tested when supervisors' altruistic behavior mediates between them. Data were gathered through structured questionnaires from a sample of subordinates' employing at five-star hotels in Coimbatore. The study scrutinizes whether the findings observed with regard to benevolent leadership in other nations could be generalized to the findings generated in this study. The findings of the hierarchical regression analysis disclosed that supervisors' benevolent leadership possesses a significant positive relationship with subordinates' psychological well-being.

METHODOLOGY

In the present investigation “**Descriptive Survey Method**” is adopted to investigate into intended area of Research.

OBJECTIVES

1. To assess the Altruistic behavior among Secondary School Teachers in Medchal Malkajgiri District.
2. To assess the Altruistic behavior among Secondary School Teachers with regard to gender i.e., male and female in Medchal Malkajgiri District.
3. To assess the Altruistic behavior among Secondary School Teachers with regard to their management i.e., private and government in Medchal Malkajgiri District.
4. To assess the Altruistic behavior among Secondary School Teachers with regard to subjects teaching i.e., Science , Social & Languages.

HYPOTHESES

1. Secondary School Teachers possess Altruistic Behavior in Medchal Malkajgiri District.
2. There is no significant difference in Altruistic Behavior of male & female Secondary School Teachers in Medchal Malkajgiri District.
3. There is no significant difference in Altruistic Behavior among Secondary School Teachers of private and government in Medchal Malkajgiri District.
4. There is no significant difference in Altruistic Behavior among Secondary School subject teacher of Science, Social & Languages.

VARIABLES

INDEPENDENT VARIABLE	DEPENDENT VARIABLE	DEMOGRAPHIC VARIABLE
Secondary School Teachers	Altruistic Behavior	1. Gender a. Male b. Female 2. Management a. Government b. Private 3. Subject Teaching a. Science b. Social c. Language

SAMPLE

A sample of 200 secondary school teachers were taken as sample by using Stratified random sampling technique.

TOOL

In the present study a questionnaire is used consisting of 40 statements. Each statement is given with three options i.e. yes, no & undecided. Respondents were instructed to opt for any one of these options.

STATISTICAL TECHNIQUES USED

Descriptive and inferential statistics are used including Percentages, Mean, S.D and t - test to analyze the data.

**DATA ANALYSIS & FINDINGS****1. ALTRUISTIC BEHAVIOUR AMONG SECONDARY SCHOOL TEACHERS IN MEDCHAL MALKAJGIRI DISTRICT****Table .1**

“Showing the frequencies and percentages of Altruistic Behavior of Secondary school teachers in Medchal Malkajgiri District.”

Responses	Frequencies	Percentage
Yes	6949	86.86%
Undecided	726	9.07%
No	325	4.06%
Total	8000	100%

Interpretation: The above table. 1 infers that 86.86% of the secondary school teachers responses in Medchal Malkajgiri district are showing their altruistic behavior in their profession & personal life; whereas 4.06% of responses are exhibiting absence of altruistic behaviour. Therefore, majority of the responses (86.86%) are revealing that the secondary school teachers have altruistic behavior in Medchal Malkajgiri district.

2. ALTRUISTIC BEHAVIOUR AMONG SECONDARY SCHOOL TEACHERS WITH RESPECT TO GENDER I.E. MALE & FEMALE IN MEDCHAL MALKAJGIRI DISTRICT**Table .2**

“Showing the mean scores, standard deviation, t-value & p-value of male & female of Altruistic Behavior of Secondary school teachers in Medchal Malkajgiri District.”

Gender	N	Mean	SD	t-value	P-value/significance
Male	88	35.28	6.51	1.08	0.28
Female	112	34.32	6.07		

Interpretation: From the above table.7 it is observed that the mean scores of male and female secondary teachers are 35.28 and 34.32 respectively. The obtained t-value 1.08 is found to be insignificant with p-value 0.28 at 0.05 level of significance. Therefore, there is no significant difference between male and female secondary teachers in respect to altruistic behaviour in Medchal Malkajgiri District.

3. ALTRUISTIC BEHAVIOUR AMONG SECONDARY SCHOOL TEACHERS WITH RESPECT TO MANAGEMENT I.E. PRIVATE & GOVERNMENT IN MEDCHAL MALKAJGIRI DISTRICT**Table.3**

Showing means, standard deviation and t-value of Altruistic behavior among Secondary School Teachers with regard to their management i.e., private and government

Management	N	Mean	SD	t-value	p-value/significance
Private	100	35.23	5.73	1.82	0.28
Government	100	34.26	6.77		

INTERPRETATION

From above table. 8 it is observed that the mean scores of private and government secondary teachers are 35.23 and 34.26 respectively. The obtained t-value 1.84 is found to be insignificant with p-value 0.28 at 0.05 level of significance. Therefore, there is no significant difference between private and government secondary teachers with respect to altruistic behaviour in Medchal Malkajgiri District.

4. ALTRUISTIC BEHAVIOUR AMONG SECONDARY SCHOOL TEACHERS WITH RESPECT TO SUBJECT TEACHING IN, I.E. SCIENCE, SOCIAL STUDIES AND LANGUAGES**Table 4**

“Showing sum squares scores, degree of freedom, mean sum squares and p-value of Science, Social and Languages secondary teachers with respect to their Altruistic behavior”



Subject Teaching	N	Sum of squares	Degree of freedom	Mean Sum Squares	F-ratio	P-value
Science	76	1.5708	2	0.7854	0.01976	0.98
Social Studies	55	7828.424	197	39.7382		
Languages	69					

INTERPRETATION: From above table. 9 it is observed that the obtained F-value 0.01976 is found to be insignificant with p-value 0.98 at 0.05 level of significance. Therefore, there is no significant difference between Science, Social and languages secondary teachers with respect to altruistic behaviour in Medchal Malkajgiri District.

CONCLUSION

The role of the teacher in 21st century became multiverse rather having so called conventional teaching learning paradigm. Teachers of today should accept the children as they are further to modify as you want. However, this process requires great concern and humility. Nurturing students can be fully accomplished when teacher acts in different roles i.e., facilitator, parents and friends. Present study findings are inevitable as majority of secondary school teachers succeeding in showing humility and concern for the progressive development of young students. The selfless concern in teachers will not only shape the students in their intellectual development but also guide the students to possess a model personality with which Gandhiji's definition on education for all round development will be accomplished. The secondary school male and female teachers show same compassion, fairness and treat students through a holistic approach and they are enabling students to meet their intellectual and emotional needs. It's proven that gender will not show any impact on services rendered by teachers for the well-being of secondary school students.

REFERENCES

1. *Aysegül Palta (2009) Hakkari University, Hakkari, Turkey, Department of Educational Sciences, Faculty of Education, Conducted a study to Examining the Attitudes and the Opinions of Teachers about Altruism.*
2. *C. Daniel Batson (2016), Altruism in Human. (Volume 2, pp. 329) New York: Oxford University Press.*
3. *Deepti Gupta & Geeta Thapliyal (2015) Assistant Professor, Guru Ram Dass College of Education, New Delhi, India. Assistant Professor, Gitarattan Institute of Advanced Studies and Training, New Delhi, India. Conducted a Study On Prosocial Behaviour And Self-Concept Of Adolescents.*
4. *Divya Pande (2016) Assistant Professor (contractual), R.I.E., Shyamla Hills, Bhopal, India Conducted a Study on Altruistic Behavior Of Pupil-Teachers And Their Attitude Towards Environment.*
5. *Dr. Naresh Kumar (2019) D.A.V. College of Education, Hoshiarpur, Punjab, India, Assistant Professor, Conducted a study on relationship between altruism and social skills of adolescents.*
6. *Donatus Wea S. Turu1 and Paulina Wula2 (2019) Yogyakarta State University, Indonesia, Conducted a study on The Relationships among Job Motivation, Altruistic Behavior and Job Performance of Honorary Catholic Religious Education Teachers in Merauke, Papua.*
7. *Dr. Sajan, K. S and Jayasree, M (2018) N S S Training College, Ottapalam, Kerala, India, Asst Professor and M Ed. Student, Conducted a study on Altruism Of Secondary School Teachers In Relation To Their Gender.*
8. *Dr. G. Kumaravelu (2017) Sri Krishnan College of Education, Department of Education, Tiruttani Road, Arakonam, Tamilnadu (India), Conducted a Study On Altruistic Behavior Of B.Ed., Teacher Trainees In Puducherry Region*
9. *Friedman, Isaac A. (2016) Conducted a study on Altruistic and Narcissistic Expectations of Pre-Service Teachers.*
10. *Karmakar's and Ghosh's (2012) Conducted a Study On Altruistic behaviour of adolescents of different regions of India.*
11. *Luca Negri, Lawrence Soosai-Nathan and Antonella Delle Fave (2013) Conducted a study on Exploration of Altruism in Two Culture.*