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EFFECTS OF ADAPTIVE LEARNING STRATEGY ON SENIOR SECONDARY STUDENTS' INTEREST IN BIOLOGY IN AKKO, GOMBE STATE, NIGERIA

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ABSTRACT

The study examined how senior secondary two students in Akko, Gombe State, Nigeria, responded to an adaptive learning strategy in terms of their interest in ecology. The study was prompted by the students' low performance in the senior secondary school biology external examination, particularly in the area of Akko Local Government. To direct the investigation, two purpose of the study and two research questions were developed, and the hypotheses were tested at the 0.05 level of significance. The non-randomized pre-test, post-test control group design was specifically used in the study's quasi-experimental research design. 2407 secondary school students studying biology in the eleven public senior secondary schools in the Gombe State local government area made up the population. 120 senior secondary two biology students from two public secondary schools were chosen as the sample as intact classes. These two secondary schools were chosen through basic random sampling methods. The Students Ecology Interest Questionnaire (SEIQ) which have reliability scores of 0.861 instruments was used to collect the data. The study's conclusions demonstrated a statistically significant difference between the experimental and control groups' posttest achievement mean scores for SSII students studying ecology. The mean score of SSII students' posttest interest in Ecology varied significantly between the experimental and control groups. The study's conclusions suggest that adaptive learning can be utilized to increase students' interest in and performance in ecology, and consequently, biology as a whole. The study concluded with some recommendations, one of which is that in order to raise secondary school students' academic performance, teachers must become proficient in the skills and methods of adaptive learning.

INTRODUCTION

It is impossible to overestimate the importance of science and technology to the advancement of any nation. This is so because science is the cornerstone that supports the majority of technological advancements. According to Rau (2018), science is a body of organized knowledge that is primarily used through methodical experimentation and observation to study physical and natural phenomena. Agbo (2015) defined science as a systematic body of knowledge that aims to investigate nature through its processes, products, skills, and interests in a previous study. Therefore, science is the process of acquiring knowledge. It is a dynamic human activity concerned with understanding of the working of things in our environment. This can only be achieved through science education. Science education is a process of imparting and acquiring scientific knowledge. One of the purposes of science education is to help the individuals to maximise their potentials for optimal self and national development.

There are other three-fold purposes of science education. These three purposes include the preparation of the more willing and able students with special ability for higher studies, acquisition of multidimensional (different aspect) scientific and technological literacy and lastly, to apply the acquired skills to everyday living. Through the knowledge of science and technology, a nation develops its manpower in such critical areas as medicine, engineering, architecture, agriculture, Science Teachers and other science-based profession and technologies. The importance of science and technology in Nigeria can be felt clearly in the areas of transportation, communication, agriculture, health care, space exploration, food production and so on.

Science is made up of three basic subjects that are classified as core science such as Biology, Chemistry and Physics. Biology is a branch of science which studies life. The subject covers the studies of living organisms (animate) and how they interact with each other and their environment. It examines the structure, function, growth, origin, evolution and genetics of living and interactions with the environment. Biology classifies and describes organisms, their functions and how species come into existence; it is a basic human science that has always involved the understanding, composition, function and survival of living things and their interactions in nature. It is an area of science that is concerned with the study of living organisms, their behaviour, their functions, their origin, development and their relationships with their environment. Biology is also a study that ranges from microscopic, cellular and

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molecular to the biosphere encompassing the earth's surface and its environment. The content of the subject provides an opportunity to present science in areas of Medicine, Agriculture, Biotechnology, Genetics, engineering, food production industries and environmental studies. This could be the reason why the subject is recognised in Nigeria.

Biology is an integral part of science. It is a subject that deals with the living system. The interrelatedness between Biology, Chemistry and Physics has made the development of several techniques that led to advancement in medicine, pharmacy, petrochemical, agriculture and engineering possible. Through the understanding of phenomena such as genetics and photosynthesis, one could infer that biology has gone a long way to improve the social and economic prospect of mankind. Biology encompasses living organism, how it functions and what these functions are, how it develops, how living things come into existence and how they react to one another and with their environment. Biology takes into account, interactions between living and non-living things. It also encompasses theoretical and experimental activities by which human beings try to find solutions to their everyday problems. Various authors have defined Biology in different ways.

Azmi (2015) defined biology as that branch of science which involves the study about life of plants, animals, humans and any other type of living organisms. The above definition implies that biology is a subject that deals with the study of plants and animals. Babagana, Yaki and Idris (2016) seems to agree with this when they defined biology as the branch of science concerned with the study of life that embraces the structure, growth, functioning and evolution of living things. Eldon, Enger and Rose (2017) stated that the nature of science and the fundamental biological concepts is so important for any person, regardless of his or her occupation. Biology can also be viewed as a subject that studies lives. This is because it studies the interrelationship between living organisms. Biology encompasses various topics that are life's processes, for example, movement, respiration, nutrition, irritability, growth, excretion and reproduction. These life's processes are characteristics of all living things and living things are the things that have life and can carry out life's activities. Biology is a natural science concerned with the study of life and living organisms, including their structure, function, growth, evolution, distribution and taxonomy. Biology is one of the science subjects that senior secondary students offer in senior secondary certificate examinations in Nigeria (FRN, 2014). It is a popular subject among students and its popular nature among other science subjects has made it a distinct choice for all students (Lawal, 2011).

Biology has been identified as the bedrock of understanding life, treating ailment and maintenance of the ecosystem. It is an interesting study that ranges from microscopic cellular molecules to the biosphere, encompassing the earth surface and its living organisms. Biology can therefore be defined as the science of life (Ogunleye, 2012), it is a natural science that involves the study of life and living organisms including their physical and chemical structure, function, development and evolution. Biology involves several sub disciplines.

Anderson (2018) carried out a study on teaching to address diverse learning needs (adaptive learning): development and validation of a differentiated instruction scale. The objective of the study included among others to develop and implement adaptive learning as a strategy in the selected few units of ecology standard and its effect on the achievement, concept attainment and process skills of students belonging to different intelligent groups. The study was quasi-experimental in nature when non-randomized pre and posttest design was used. The design for the study was also a comparative research in which an experimental group was compared to a second group that was taught in a lecture, teacher-centered manner called the control group. The sample was 100 ninth grade biology students from two classes in a high school in Detroit, US.A. The data were collected via a pre and post-administration of the Biology Achievement Ecology Test (BAET). One of the classes was randomly chosen as experimental group (58), which was taught using adaptive learning and the other was control group (42) which did not receive any presentation adaptive learning but lecture method. The study conducted in six weeks. The material covered was about ecology. The data was analyzed using mean, standard deviation, and a two-way ANOVA. The result from the study showed that adaptive learning instruction was more effective that lecture instruction in improving ecology achievement of the participating students. The study did not consider other variables like gender. This study under consideration will consider gender as an intervening variable. The study even though was in adaptive learning, was carried out in America, this study will be carried out in Akko Local Government Area, Gombe state, Nigeria.

Poor teaching methods have been pointed out as one of the reasons for underachievement in biology by the students. Teaching methods are being blamed because the teacher's instructional method plays an important role in skill acquisition and meaningful learning. This implies that the success of the educational system depends largely on the teacher and the implementation of various teaching strategies in the classroom. These strategies should be more of student centred. One of such strategies is the adaptive learning.

Adaptive learning as defined by Moskal, Carter and Johnson (2017), is one technique for providing personalized learning, which aims to provide efficient, effective, and customized learning paths to engage each student. Adaptive learning systems use a data-driven approach to adjust the path and pace of learning, enabling the delivery of personalized learning at scale. Adaptive systems can support changes in the role of faculty, enable innovative teaching practices, and incorporate a variety of content formats to support students according to their learning needs. Adaptive learning tools collect specific information about individual students'

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behaviors by tracking how they answer questions. The tool then responds to each student by changing the learning experience to better suit that person's needs, based on their unique and specific behaviors and answers.

Strimel, (2014) carried out a study on the effects of adaptive learning on students' performance in technology based course. This study was conducted among students of the second year SMPP 2 Hudilo, in the academic year of 2013/2014. There were 86 students selected as sample and divided into the experimental and control group. The study used a pre-test and post-test only control group design. The analysis was made by using ANOVA facilitated by SPSS version 16.0 for windows. The result indicated that (1) there was a significance effect of adaptive learning on students' self-confidence (F=834.104 and sig=0.000; P<0.05). (2). There was a significance effect of adaptive learning on students' machine handling competency (F=70.325 and sig= 0.00; P=0.05) (3) simultaneously, self-confidence and students' machine handling competency (F-observed< 0.05).This study revealed the effects of adaptive learning strategy to students' self-confidence and students machine handling competency of the second grade SMPP 2 Hudilo in the academic year2013/2014. The study is similar to the present study in the strategy used but the present study will be carried out in biology among secondary school students.

Prast, Weijer-Bergsma, Kroesbergenand Van Luit, (2015) researched on the effects of adaptive learning on students' achievement in primary school mathematics. The sample of the study consists of (80) pupils. The sample is distributed as follows: (44) students in the first experimental group which is taught according to adaptive learning strategy and (36) students in the control group which is taught according to traditional way of teaching. The two groups are matched in terms of the following variables: the students age (in months), their intelligence, their achievement in sciences (in the fourth primary stage) the researcher has constructed an achievement test which include (20) items. These items are multiple choice items. The validity of this test has been ascertain and also reliability is obtained by using Pearson Correlation formula which yield (0.83) coefficient, after analyzing the results statistically it has revealed a statistically significant differences in favor to the experimental groups the first and the second lines in achievement and retention. This means that adaptive learning helps in enhancing pupils achievement in the primary schools. The study did not indicate the method of data analysis and the location. The present study will state its methods of data analysis and will be carried out in Akko Local Government Area of Gombe state.

Interest is a powerful dictator and motivator in the learning process. Interest is the feeling that prompts one to spontaneous activity. Interest according to Sulde and Sulde (2016) can be defined as an emotion that triggers the feeling that prompts one to spontaneous activity. Students are likely to pay adequate e attention to learn, remember, imagine and read more readily when their interest and emotions are positively provoked towards the subject. Interest is therefore a tendency to seek out and participate in any type of activity, as a personal preference for one activity over another. Interest as a human sentiment, goes along with values, attitudes and other forms of human preferences. This means that interest motivates and compels attention, operating at the realm of affective domain. Factors that affect interest include personal and socioeconomic/environmental factors. Personal factors include students' physical, health and physical development, mental health and development, age, sex, pattern of instinctive behaviour, emotions and sentiments. The socio-economic status includes rearing practices in the family, cultural status, education, among other aspects. Interest therefore makes the students to feel alert, awake and excited at the delivery of learning instructions in the biology class. The overall outcome of interest is that interest may lead to achievement on the part of the student. Interest as a human sentiment, goes along with values, attitudes and other forms of human preferences. This means that interest motivates and compels attention (Ogundele, 2010), operating at the realm of affective domain. Factors that affect interest include personal and socioeconomic/environmental factors.

According to Aggrawal (2010), interest is a powerful dictator and motivator in the learning process. The implication is that, students are likely to pay attention to learn, remember, imagine and read more readily when their interest and emotions are positively provoked. Interest is therefore a tendency to seek out and participate in any type of activity, which Okoli (2005) sees as a person's preference for one activity over another. Interest therefore makes the students to feel alert, awake and excited at the delivery of learning instructions. The teacher would energize the students by introducing varieties into his/her teaching. The interest students develop has a powerful influence on their behaviour, which lasts unto older years, even after school, meaning that interest can affect students' academic performance.

Researchers have examined how teachers can increase students' interest and engagement in the classroom. According to Mazer, (2012), students' interest can be triggered in the moment by certain environmental factors such as teacher behaviours. He discovered that increase in emotional arousal heightens a students' attention, which makes it easier to encode more information. The teachers' behaviours stimulate emotional arousal in students, which leads to greater emotional interest and learning engagement. The implication is that, these actions of interest demonstrated by the teacher during teaching makes students to experience cognitive interest and eventual greater academic achievement. For instance, Uhumuabi and Umoru (2005) investigated the relationship between interest and achievement in mathematics and sciences. They found that achievement of students in mathematics and sciences depend largely on students' interest they generate while studying these subjects. They further found that intrinsic and extrinsic interests are important determinants of achievements in mathematics and sciences.

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There has been various research works on gender and biology with conflicting views. The conflicting research finding can be hinged on enrolment and achievement in biology by both male and female. Gender has remained an issue in the front burner of academic discourse. Scholars have become enthusiastic on addressing issues that continued to create differences among people on the basis of gender which has continued to have adverse consequences on sustainable economic and technological development of the nation. Olorundare (2019) defined gender as stereotyping to a collection of commonly held beliefs or opinions about what are "appropriate" behaviors and activities for males and females. Miller and King (2014) view gender as a social, historical and cultural construct and conditioning, indicating acceptable and preferable forms of behavior and attitudes for both men and women in the society. This researcher is of the view that there is no conclusive research on gender and achievement.

Imam and Dada (2012) defined gender as the social roles, responsibilities, and behavior created in our families, societies and culture. It also includes the expectations held about the characteristics, aptitudes and likely behaviors of both men and women. These roles are passed on from generation to generation. (United States Aid for Individual Development (USAID), 2015). Gender can also be viewed as a socially ascribed attribute which differentiates feminine from masculine. For Ekeh (2010), gender is a socio-cultural construct that assigns roles, attitudes and values considered appropriate for each sex. Oraifor (2010) opined that sex is based on biological and physical differences between male and female while gender refers to cultural understanding about what constitutes masculinity and feminity in a society. Gender differences in science are a global phenomenon that is confined to countries with high numbers of out of school girls. Benson (2012) noted that one factor that militates against science literacy is gender discriminatory barriers in African societies that operate against equitable participation of boys and girls in science education. He observed that one out of four girls of school age is actually in school. Curricular pedagogic practices and class-room organization, according him, further hinder the access and retention of girls in science education.

Gender refers to male and female and is a specially constructed phenomenon that is taught about society ascribed different roles, duties, behavior and mannerisms to the two sexes (Makittene, 2016). The researcher added that, gender is a social connotation that has sound physiological background, and is used to refer to specific cultural patterns of behavior that are attributed to human sexes. Akpochafor (2019) supported that gender relates to cultural attributes of both male and female. The author further explained that, gender has to do with personality and control components of self-concept. Unlike sex, this is concerned with only the distinction between male and female based on biological characterizers. Sigh (2010) saw gender as socio- cultural construct that connotes the differential roles and responsibilities of men and women in a particular society. Sigh further explained that, gender determines the role which one plays in non to general politics, cultural, science and economic system of the society.

Statement of the Problem

This study was inspired in response to the poor achievement of senior secondary school students in biology and especially ecology in Akko Local Government Area, Gombe State. The issue of poor achievement of students in biology has been of much concern among science teachers. According to WAEC Chief Examiners' reports of 2016, 2017 and 2018, there has been a decline in students' achievement in biology examinations.

Likewise, the chief examiners (WAEC and NECO) reports of 2015, 2016, 2017, 2018,2019 and 2020 indicated that students perform poorly in biology and in questions regarding ecology in the examinations. Specifically, the chief examiners report of 2015 and 2016 have reported the failure of students in biology to be 302,102 (44.02%) and 315,919 (41.97%) respectively. In 2017, the failure is 9,169,508 (62.776). In some instances, the students avoided answering questions on the topic ecology.

It was also reported by the chief examiner (WAEC) reports (2018) that students found various ecological concepts difficult to understand. The concepts that are difficult include ecosystem, biomes, food chain, food web, and biosphere. The poor achievement and lack of interest in ecology among students can be attributed to poor teaching methods as reported by various researchers such as Egolum and Nwafor (2014) who pointed out that the traditional teaching methods have not yielded expected results. The poor achievement of students in biology have been attested to by other researchers such as Agbowuro (2014) who stated that candidates achieve poorly in biology (especially in questions related to ecology and genetics).

The consequences of not addressing the problem of lack of interest in biology and in ecology in particular is not providing a formidable workforce in important careers and profession in science. It is in the light of this and in an attempt to find an effective instructional approach which would improve Senior Secondary students' interest in biology and especially in ecology, that this study proposes to investigate the effects of adaptive learning strategy on the interest of senior secondary students in ecology in Akko, Gombe State, Nigeria.

Purpose of the Study

The main purpose of the study is to find out the effects of adaptive learning strategy on senior secondary two students' interest in ecology in Akko, Gombe state, Nigeria. Specifically, the objectives of the study are to:

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1. determine the pre-test and post-test interest mean scores of senior secondary two students in Ecology in the experimental and control group in Akko, Gombe State, Nigeria.
2. find out the differences between the post-test interests mean scores of male and female senior secondary two students in Ecology after exposure to adaptive learning strategy.

Research Questions

The following research questions were formulated to guide the study.

1. What are the differences between the pre-test and post-test interest mean scores of senior secondary two students in Ecology in the experimental and control group in Akko, Gombe State, Nigeria?
2. What are the differences between the post-test interests mean scores of male and female senior secondary two students in Ecology after exposure to adaptive learning strategy?

Hypotheses

The following research hypotheses were tested at 0.05 level of significance in the study:

1. There is no significant difference between the post-test interest mean scores of senior secondary two students in Ecology in the experimental and control group in Akko, Gombe State, Nigeria.
2. There is no significant difference between the post-test interest mean scores of male and female students when exposed to the adaptive learning strategy?

METHODOLOGY

Research Design

The study adopted quasi-experimental research design. Specifically, the non-equivalent control group pretest-posttest design. The design was made of two groups namely the control and experimental which were not composed on the basis of randomization. This design was chosen due to the fact that it was impossible to carry out a random assignment of subjects to groups. In this study, the researcher used one arm in a school as the experimental group and another arm in another school as the control group.

Population of the Study

The population for this study comprised of 8 senior secondary schools in Akko Local Government Area, Gombe State who are having same characteristics of being public schools, having more harmonized programs which are uniformly coordinated, having two arms of SSII students offering biology, have been writing WASSCE for the past 10 years, having a biology laboratory with adequate equipment, having teachers with at least degree in (B.Sc. Ed) Biology. The 8 senior secondary schools have a total of 1418 senior secondary students offering Biology, having 811males and 607 females.

Sample and Sampling Technique

The sample for the study was made up of 120(71males and 49 females) students offering Biology from two public secondary schools in Akko Local Government Area, Gombe state. One intact class each was used in the selected schools for control and experimental group. In determining the groups, the researcher flipped a coin to determine which of the intact class served as experimental and the one that served as the control. The use of separate schools was to prevent interferences from the students which may occur if the same school was used for the experimental and control groups.

Instrument for Data Collection

The research instruments that was used for this study is the Students Ecology Interest Questionnaire (SEIQ). The SEIQ sought to elicit information from the students on their interest in ecology before and after subjecting them to adaptive learning.

Method of Data Collection

Two research assistants (one from each school) were trained for 3 days by the researcher to assist in the administration of the instruments. The researcher ensured that each research assistant has a minimum teaching qualification of B.Sc.Ed in biology with some years of teaching qualification and experience. This was necessary to ensure that they possess the required knowledge of the subject matter. In the training process, the researcher went through the instruments and the lesson plans with them. The research assistant for the experimental group was trained on the adaptive learning strategy while the control group was trained on conventional lecture method.

Method of Data Analysis

All the research questions were answered using mean and standard deviation. The Analysis of Covariance (ANCOVA) was used to test the hypotheses.

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ANALYSIS OF RESEARCH QUESTIONS

Research Question 1

What are the differences between the pre-test and post-test achievement mean scores of senior secondary two students in Ecology in the experimental and control group? This can be seen below.

Table 1

Pre-test and Post-test Mean Achievement Scores of SSII Students' in Ecology in the Experimental and Control Groups

Group		Pre-test		Post-test		Mean		
	N	Mean $\bar{x}$	SD	Mean $\bar{x}$	SD	Gain	$\bar{x}$-	Difference
Experimental	53	37.45	8.85	66.77	10.41	29.32		
								24.5
Control	67	37.85	9.49	42.67	9.62	4.82		

Table 3 presents the mean and standard deviation results of pre-test and posttest mean achievement scores of SSII students' in Ecology in the experimental and control groups. The result for experimental group shows that the post-test mean score (x = 66.77, SD = 10.41) is higher than the pre-test mean score of 37.45 and a standard deviation of 8.85 with a mean gain of 29.32, indicating that there was improvement in the achievement of students after exposure to adaptive learning strategy. Also, for the control group the mean score was 37.85 and a standard deviation of 9.49 for the pretest. In the post-test, the mean score was 42.67 and a standard deviation of 9.62 with a mean gain of 4.82. It then means that students in the experimental group had a higher achievement mean score after treatment using adaptive learning strategy as against those in the control group who were not given treatment, with a mean difference of 24.5. This implies that adaptive learning strategy does increase students' achievement in Ecology.

Research Question Two

What are the differences between the pre-test and post-test interest mean scores of senior secondary two students in Ecology in the experimental and control group in Akko, Gombe State, Nigeria?

Table 2

Pre-test and Post-test Interest Mean Scores of SSII Students' in Ecology in the Experimental and Control Groups

Group		Pre-test		Post-test		Mean		
	N	Mean	SD	Mean	SD	Gain	$\bar{x}$-	Difference
Experimental	53	38.60	6.78	63.19	11.61	24.59		
								19.68
Control	67	39.76	6.98	44.67	8.89	4.91		

Table 4 presents the results of pre-test and posttest interest mean scores of SSII students' in Ecology in the experimental and control groups. The result for experimental group shows that the post-test interest mean score (x = 63.19 SD = 11.61) is higher than the pre-test mean score of 38.60 and a standard deviation of 6.78 with a mean gain of 24.59 indicating that there was increase in the interest of students to Ecology after exposure to adaptive learning strategy. Also, for the control group the mean score was 39.76 and a standard deviation of 6.98 for the pretest. In the post-test, the mean score was 44.67 and a standard deviation of 8.89 with a mean gain of 4.91. It then means that students in the experimental group had a higher interest mean score after treatment using adaptive learning strategy as against those in the control group who were not given treatment, with a mean difference of 19.68. This implies that adaptive learning strategy does increase students interest in Ecology.

RESULT OF TEST OF HYPOTHESES

Hypothesis 1

There is no statistically significant difference between the post-test achievement mean scores of senior secondary two students in the control and experimental groups in Akko, Gombe State, Nigeria.

Table 3

ANCOVA Result on Posttest Achievement Mean Scores of Experimental and Control Groups

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	17192.406[a]	2	8596.203	85.629	.000	.594
Intercept	19525.747	1	19525.747	194.500	.000	.624
Pre-test	2.498	1	2.498	.025	.875	.000
Group	17190.830	1	17190.830	171.241	.000	.594
Error	11745.561	117	100.389			
Total	370058.000	120				
Corrected Total	28937.967	119				

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R Squared = .594 (Adjusted R Squared = .587)

Analysis of Covariance (ANCOVA) was conducted to determine if a significant difference exists in the posttest achievement mean score of SSII students in Ecology in the experimental and control groups. Table 7 shows that $F(1,117) = 171.24$, $p < 0.05$, since the p-value of 0.000 is less than 0.05 level of significance ,the null hypothesis was rejected, indicating that there was a significant effect of adaptive learning strategy on students achievement in Ecology. The result further reveals an adjusted R squared value of .587 which means that 58.7 percent of the variation in the dependent variable which is achievement is explained by variation in the treatment of adaptive learning strategy, while the remaining is due to other factors not included in this study. Hence, we can say that adaptive learning strategy can help improve students' achievement in Ecology.

Hypothesis Two

There is no statistically significant difference between the post-test interest mean scores of senior secondary two students in Ecology in the experimental and control group in Akko, Gombe State, Nigeria.

Table 8

ANCOVA Result on Posttest Interest Mean Scores of Experimental and Control Groups

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	10174.582[a]	2	5087.291	48.817	.000	.455
Intercept	11385.049	1	11385.049	109.250	.000	.483
Pre-test	28.171	1	28.171	.270	.604	.002
Group	9986.015	1	9986.015	95.825	.000	.450
Error	12192.718	117	104.211			
Total	357542.000	120				
Corrected Total	22367.300	119				

a. R Squared = .455 (Adjusted R Squared = .446)

Analysis of Covariance (ANCOVA) was conducted to determine if a significant difference exists in the posttest interest mean score of SSII students in Ecology in the experimental and control groups. Table 8 shows that $F(1,117) = 95.83$, $p < 0.05$, since the p-value of 0.000 is less than 0.05 level of significance ,the null hypothesis was rejected, indicating that there was a significant effect of adaptive learning strategy on students interest to Ecology . The result further reveals an adjusted R squared value of .446 which means that 44.6 percent of the variation in the dependent variable which is interest is explained by variation in the treatment of adaptive learning strategy, while the remaining is due to other factors not included in this study. Hence, we can say that adaptive learning strategy can help increase students' interest to Ecology.

DISCUSSION OF THE FINDINGS

The study examined the effects of adaptive learning strategy on senior secondary two students' achievement in ecology in Akko, Gombe state, Nigeria. The results showed that exposure to adaptive learning strategy was found to be effective in improving the achievement of secondary school students in Ecology in Akko LGA as indicated in the result that there is a significant difference between the posttest achievements of students in the experimental and control groups in Ecology. This finding is in line with that of Park and Datnow (2017) who carried out a study on ability grouping and differentiated instruction (adaptive learning) in an era of data driven decision making. The study was carried out in the United State of America. One hundred and twenty high school slow learners in biology were identified and randomly assigned to the lecture group (n = 60) and adaptive learning group (n = 60) respectively. Analysis of the post-test scores indicated that the group taught by the adaptive learning instructional strategy performed significantly ($P > 0.05$) better than their lecture group counterparts. The result of the data analyzed for the study, provided support for the efficacy of the adaptive learning technique in bringing about meaningful learning in ecology concepts in slow learners in the experimental group.

The finding is also in line with Strimel, (2014) who carried out a study on the effects of adaptive learning on students' performance in technology based course. This study was conducted among students of the second year SMPP 2 Hudilo, in the academic year of 2013/2014. The result indicated that there is a significant difference between the posttest achievements of students in the experimental and control groups in machine handling. This a clear evidence that adaptive learning strategy can improve students' achievement. This finding is also in line with Prast, Weijer-Bergsma, Kroesbergen and Van Luit, (2015) who researched on the effects of adaptive learning on students' achievement in primary school mathematics. The sample of the study consists of (80) pupils. After analyzing the results statistically, it revealed a statistically significant differences in favor to the experimental groups

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the first and the second lines in achievement. This means that adaptive learning helps in enhancing pupils' achievement in the primary schools.

It also showed that there was no statistically significant interaction effect of gender and treatment on interest to Ecology. This finding is consistent with that of Petö, Elekes, Oláh, and Király (2020) who carried out a research on the impact of adaptive modelling Instruction on Students' Learning interest; small steps toward an empathic multicultural world through a new perspective of social categorization as a tool in adaptive learning. The strategies adopted were adaptive learning and lecture method. They were taught ecology for 6 weeks and post-tested. An interest test was administered two weeks later. Results indicated significant differences among students in the two instructional groups on students' cognitive achievement. The adaptive learning produced a more positive effect on students' achievement in biology, but there was no statistically significant interaction effect of gender and treatment on interest of the students in Ecology.

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THE INFLUENCE OF PSYCHOEMOTIONAL OVERLOAD ON THE STATE OF THE AUTONOMIC NERVOUS SYSTEM OF ATHLETES

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ABSTRACT
The purpose of the research - to study the influence of psycho-emotional overload on the development of vegetative dystonia in athletes involved in difficult coordination sports. Materials and methods. We examined 45 athletes aged 11–15 years (average age 13.71±0.67 years) with diagnosed vegetative dystonia syndrome. There were 29 (64.4%) boys and 16 (35.6%) girls. All athletes were divided into two groups: 25 (55.5%) children - with signs and 20 (44.5%) children - without signs of psycho-emotional overload. The control group consisted of 15 healthy children matched by age and gender. The results of the study showed a clear relationship between the psycho-emotional state and the functional status of the autonomic nervous system. Athletes with vegetative dystonia are characterized by increased anxiety, mainly reflecting indicators of personal anxiety.
KEYWORDS. *psycho-emotional overload, autonomic nervous system, vegetative dystonia, athletes, difficult coordination sports.*

The autonomic nervous system regulates the functioning of internal organs and systems, primarily the athlete's heart, which plays an important role in achieving top sports results [1,2].

Often, during long-term training, an athlete experiences stress, which leads to dysfunction of the autonomic nervous system [3,4], one of which is autonomic dystonia. [5]. In addition to psycho-emotional overload, the development of vegetative dystonia is facilitated by somatomorphometric features and hormonal changes [6-9], but their role has not been sufficiently studied.

When identifying vegetative dystonia, the study of heart rate variability is of great importance, with the help of which it is also possible to determine pre-start changes and functional capabilities of athletes and assess the recovery period [3,10]. It should also be taken into account that heart rate is the most striking indicator of deviations arising in regulatory systems that precede hemodynamic, metabolic, energy disorders and may be the earliest prognostic signs of impaired adaptation to psycho-emotional overload during sports training [11,12]

THE PURPOSE OF THE RESEARCH

to study the influence of psycho-emotional overload on the development of vegetative dystonia in athletes involved in difficult coordination sports.

MATERIALS AND METHODS

We examined 45 athletes aged 11–15 years (average age 13.71±0.67 years) with diagnosed vegetative dystonia syndrome. There were 29 (64.4%) boys and 16 (35.6%) girls. All athletes were divided into two groups: 25 (55.5%) children - with signs and 20 (44.5%) children - without signs of psycho-emotional overload. The control group consisted of 15 healthy children matched by age and gender.

Children mainly complained of headaches, dizziness, pain and discomfort in the heart area, rapid heartbeat, a feeling of "lack of air," weakness, fatigue, irritability, a feeling of "crawling goosebumps," anxiety, tremors of the limbs, difficulty falling asleep, insomnia. During examination, tachycardia or bradycardia, the presence of systolic murmur, numbness and/or paresthesia of the extremities were detected; hyperhidrosis; sensory impairment, etc.

All subjects underwent a comprehensive clinical examination with a thorough study of the functional state of the autonomic nervous system, including registration of heart rate, ECG, study of heart rate variability, measurement of blood pressure, functional testing (orthostatic test, Mathinet test), calculation of the Kerdo index, assessment of anxiety on the Spielberg-Hanin scale. Before the research, informed consent was obtained from the parents of the athletes.

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RESEARCH RESULTS

In both groups, despite the fact that the indicators of reactive anxiety were within the acceptable norm, they tended to increase. Moreover, they were more pronounced in group 1 (22.87±4.9 and 27.1±7.9 points, respectively). Indicators of personal anxiety exceeded the norm in both groups (43.5±7.2 and 39.8±9.1 points, respectively). The differences between the children of both groups and the control group are statistically significant in terms of personal anxiety ($p < 0.01$), and between patients in group 1 and the control group - in terms of reactive anxiety ($p < 0.05$) (Fig. 1).

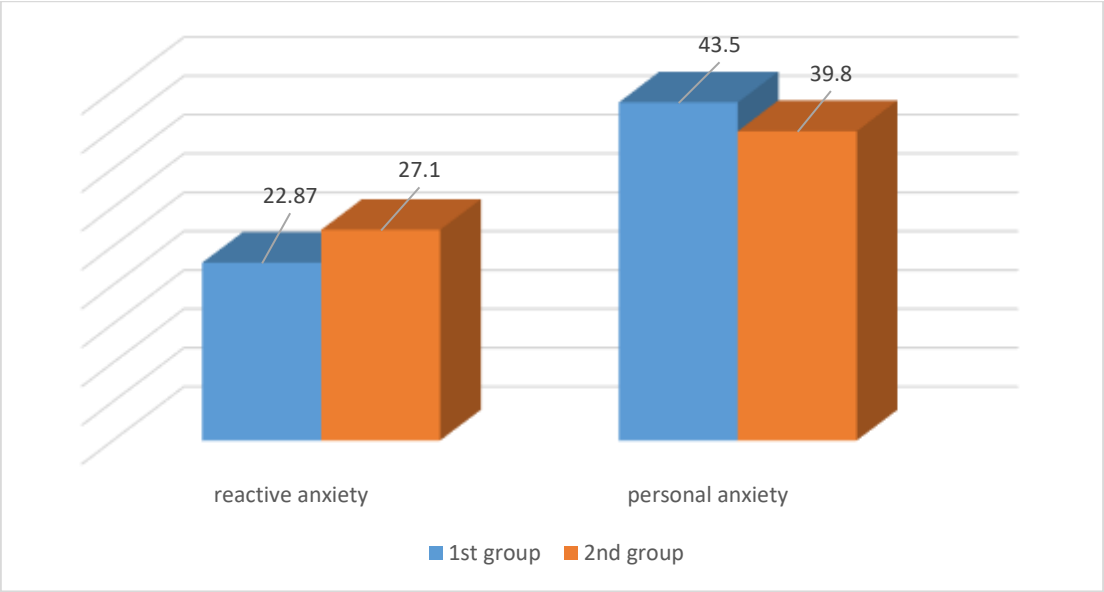


Fig.1. Comparative analysis of anxiety, points

When analyzing the survey results, a direct strong correlation was established: r1 =0.61, r2 =0.7, r3 =0.79, which indicates the interdependence of these indicators.

It can be concluded that the severity of the stressful situation is equivalent for both groups. At the same time, significantly higher values of the studied indicators in patients with severe emotional stress (group 1) indicate a high degree of anxiety, formed under the influence of unfavorable external factors.

When assessing the type of vascular response against the background of functional testing in patients with vegetative dystonia, a predominantly dystonic type of reaction was recorded, more typical for group 1 (60% versus 40%, accompanied by an increase in systolic pressure to 185 mm Hg and a sharp decrease diastolic pressure to "0" (the "infinite tone" phenomenon) (Fig. 2.). In this case, dizziness, general weakness, pallor of the skin, acrocyanosis, severe tachycardia (up to 160 beats/min and above) were observed. The recovery period was 10 minutes or more. Such a reaction to physical activity was regarded as unfavorable.

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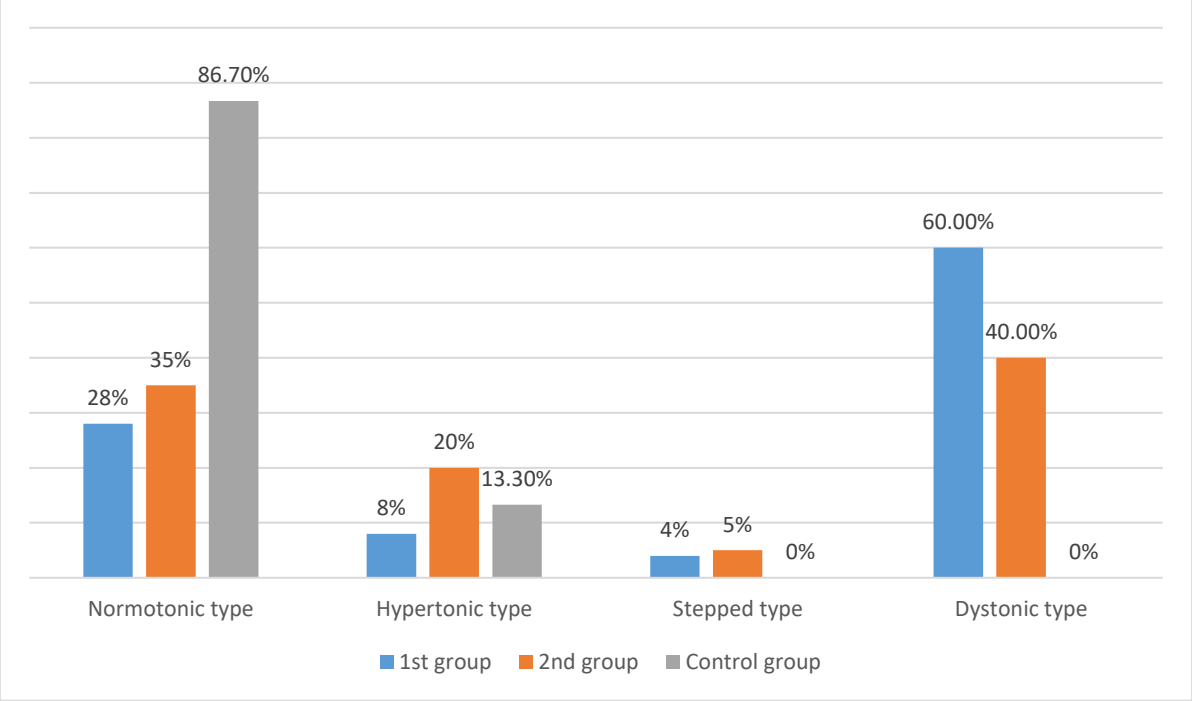


Fig.2. Martin Functional Test Results

When calculating the autonomic Kerdo index, a predominance of the activity of the sympathetic division of the autonomic nervous system was established in both groups, which was confirmed by the results of an orthostatic test, and in the control group the average index values corresponded to normotension.

Thus, the results of the study showed a clear relationship between the psycho-emotional state and the functional status of the autonomic nervous system. Athletes with vegetative dystonia are characterized by increased anxiety, mainly reflecting indicators of personal anxiety.

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THE ROLE OF INDIGINOUS LANGUAGES IN REDUCING THE SPREAD OF HIV AND AIDS, A CASE STUDY OF GOMBE STATE, NIGERIA

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ABSTRACT
This research investigates the role of indigenous languages in combating the spread of HIV/AIDS, focusing on Gombe State, Nigeria. Despite widespread efforts to educate the public about HIV/AIDS, language and communication barriers persist, hindering effective dissemination of preventive measures. Utilizing a descriptive study design, semi-structured interviews and questionnaires were employed to gather qualitative data from community members, healthcare providers, and local leaders. Statistical analysis revealed significant associations between demographic variables and awareness levels. Findings indicate that while participants demonstrated awareness of HIV/AIDS symptoms and prevention methods, gaps exist in understanding transmission routes, particularly oral transmission. Media, particularly local and international outlets broadcasting in indigenous languages, emerged as primary sources of information. The study highlights the importance of leveraging local languages in health communication to enhance awareness and preventive behaviors. Recommendations include expanding media campaigns in indigenous languages to curb HIV/AIDS transmission within Gombe State.

KEYWORDS: *Indigenous languages, HIV/AIDS, communication, prevention, Gombe State, Nigeria.*

1.1 INTRODUCTION

The HIV/AIDS epidemic continues to be a major public health issue with serious repercussions for impacted areas. Nigeria, one of the most populous nations on the continent, struggles with a high rate of HIV infections. Sub-Saharan Africa has been disproportionately affected. Utilizing the strength of indigenous languages is a distinctive and much underappreciated strategy among the many ones being used to stop the spread of HIV and AIDS. Indigenous languages play a unique role in the social, cultural, and communicational fabric of communities, and there is growing interest in their potential contribution to HIV/AIDS awareness, education, and prevention.

Gombe State stands out with remarkable linguistic diversity and rich cultural past that serve as the perfect backdrop for investigating how locally rooted indigenous languages can be used to stop the spread of HIV/AIDS. Understanding the impact of indigenous languages in information dissemination, community participation, and behavioral change is an important area to investigate because HIV/AIDS continues to be a complex interaction of medical, social, and cultural issues.

In order to reduce the risks posed by health outbreaks, such as HIV/AIDS, public health authorities, such as the Centres for Disease Control and Prevention (CDC), have been utilizing risk communication strategies. These strategies involve disseminating scientifically-based health messages through various communication channels to specific target audiences. The CDC has taken the lead in the battle against HIV/AIDS by developing public awareness campaigns that seek to inform and increase understanding of the significance of adopting HIV/AIDS preventive measures through straightforward yet powerful health messages to safeguard the public. The health messages also encourage people to adopt preventative health behaviours, such as avoiding the use of unsterilized needles and wearing condoms during sexual activities. In an effort to change their behaviour, to maintain public safety, such preventive health interventions must be implemented in both rural and urban settings that are open to the public.

At the heart of this study lies understanding how the linguistic diversity and cultural richness of Gombe State can be harnessed effectively to combat the spread of HIV/AIDS. Specifically, this research aims to address the critical question of whether indigenous languages can serve as a potent tool in reducing the prevalence of HIV/AIDS and whether the strategies employed can serve as a model for similar regions facing comparable health challenges.

Although, massive campaign was done to enlighten the public about the HIV/AIDS virus in Gombe State, its dangers (weakened immune system) and preventive methods. Many of the local people of Gombe State are not aware of these preventive measures due to language and/or communication barriers.

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2. DESIGN OF THE STUDY

This is a descriptive study that took place in Gombe State, Nigeria using semi-structured interviews with open-ended questions and gather qualitative data from community members, healthcare providers, and local leaders. A questionnaire is designed to collect data from the respondents. Ten questions were designed and administered to each respondent after informed consent. After counting and coding, the questionnaires were numbered and archived. The collected data were analyzed using Statistical Package for Social Sciences (SPSS) version 23.

2.1 Area of the Study

The study will be conducted within Gombe State, located in north-eastern Nigeria, it shares boundary with five states, namely, Yobe State to the North, Bauchi State to the West, Borno State to the East, Taraba, and Adamawa to the South.

2.2 Sample and Sampling Techniques

The study was conducted using probability sampling techniques, in which three local governments were selected from each senatorial zone, making a total of nine local governments out of the eleven in the study areas. In each local government, 100 interviewees were selected randomly.

2.3 Method of Data Collection

Semi-structured interviews with open-ended questions to gather qualitative data from community members, healthcare providers, and local leaders was conducted with the native languages speakers, preferably Fulfulde, Hausa, Tangale, Tera, and Waja, to capture rich narratives and experiences and a questionnaire was designed based on currently available information about HIV/AIDS, according to the literature. The questionnaire consist of four major sections. The first section measured socio-demographic variables including gender, age, educational level, employment status and local government of residence. The second section included items that are designed to measure respondents' awareness of the following: HIV/AIDS symptoms, transmission routes, precautionary measurements, and possible treatment options. Participants responded to each statement with either "yes" or "no." A scoring system was applied, with each correct answer given one point while incorrect answers receive zero points. The rest of the questionnaire sections involved items that evaluated participants' beliefs and emotions towards HIV/AIDS.

2.4 Method of Data Analysis

The collected data was analyzed using Statistical Package for Social Sciences (SPSS) version 23. A confidence interval (CI) of >95% was adopted. Descriptive statistics was used to report the results, including means, frequencies, and standard deviations (SD). Statistical differences between the various awareness subscales and gender were determined by a 2-tailed Student's t-test. Significant associations between various socio-demographic variables and awareness subscales was evaluated using a one-way ANOVA. A p-value of 0.05 is considered significant.

3. RESULT

The study enlisted 450 individuals of which 133 (29.55%) were male, and 317 (70.45%) were female. The largest portion of participants were derived within the 18-30 age bracket, while the fewest came from the 35 to 50 age range. Females made up the majority of participants. Additionally, over half of the participants had completed only secondary education.

Table 1

Variables	Total %	Total awareness score			P (value)
		Inadequate	Average	Adequate	
		n%	n%	n%	
Gender					<0.05
Male	133(29.55)	45(34.2)	55(40.7)	33(25.1)	
Female	317(70.45)	100(31.5)	130(41.5)	86(27.0)	
Age group					<0.05
<18	68(15.4)	16(23.4)	37(54.2)	15(22.4)	
18-34	119(26.5)	41(35.1)	37(30.7)	41(34.2)	
35-50	176(39.3)	39(22.2)	71(40.5)	66(37.3)	
50-60	87(19.1)	30(35.1)	42(47.8)	15(17.1)	
Education					<0.05
Degree	110(24.4)	25(31.5)	34(31.4)	41(37.1)	
Secondary level	255(56.8)	118(46.4)	76(29.8)	61(23.8)	
Primary level	56(12.5)	32(57.5)	14(25.0)	10(17.5)	
Uneducated	29(6.4)	22(75.0)	4(15)	3(10.0)	

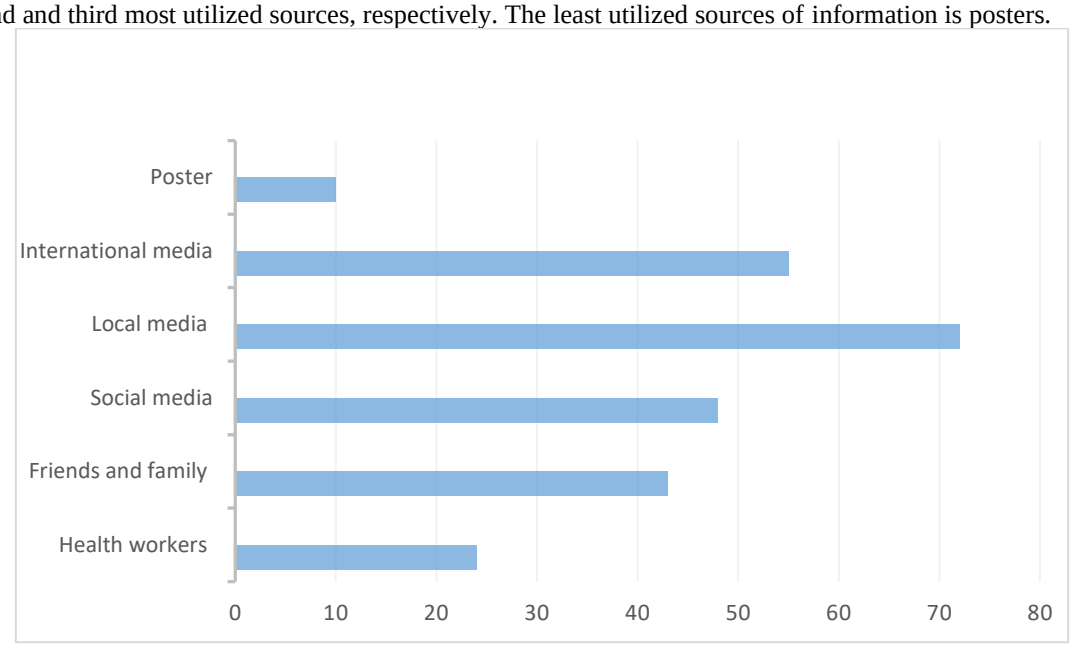
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Table 2 presents participants' responses to various questionnaire items concerning the transmission, prevention, and symptoms of HIV/AIDS. The majority of participants demonstrated awareness of HIV/AIDS symptoms, while most were knowledgeable about condom use and avoiding unsterilized needles as preventive measures. On average, more than half of the participants showed a moderate level of awareness regarding HIV/AIDS symptoms, prevention, and transmission.

Table 2

Variable	Statement	n (%)
Symptoms	Fever and body weakness	393(87.5)
	Chills/ Rash	380(85)
	Swollen lymph nodes	251(55.8)
	Fatigue	234(52.0)
	Night sweats	410(91.2)
Transmission route	Mouth	57(12.6)
	Anus/penis/vagina	407(90.5)
	Broken skin	162(36.0)
	Pregnant women	277(61.6)
Preventive techniques	Use latex condoms (rubbers) for sex	382(84.9)
	Use water-based lubricants lotion	69(15.3)
	Never share needles to take drugs.	369(82.0)
	Avoid getting drunk	70(15.6)
	Get tested and treated for other STIs	330(73.5)
Treatments options using medication	Nucleoside reverse transcriptase inhibitors (NNRTIs)	108(24.0)
	Non- Nucleoside reverse transcriptase inhibitors (NNRTIs)	409(91.0)
	Protease inhibitors (NNRTIs)	213(47.5)
	Fushion inhibitors	247(54.9)
	Pharmacokinetic enhancers	320(71.0)

Figure 1 illustrates the sources of awareness among participants. The most commonly utilized sources of information on HIV/AIDS were local and international media outlets broadcasting in local languages. Social media and information from family and friends were the second and third most utilized sources, respectively. The least utilized sources of information is posters.



4. DISCUSSION

Nigeria possesses a diverse array of multilingual societies, spanning from the far northeast to the south-south regions. These native languages are deeply rooted within their respective communities, serving as the bedrock of cultural identity, encompassing norms,

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values, folklore, idioms, and more (Asekere and Asaolu, 2020). The significance of indigenous languages in communication delivery and campaigns during such crises are widely recognized by scholars such as Igboanusi, Odoje, and Ibrahim (2016), Oyesomi et al. (2020), and Ogunyombo and Bello (2020).

Gombe State, situated in north-eastern Nigeria, historically had Fulfulde as the dominant linguistic and cultural influence until the mid-20th century. However, in recent decades, Hausa has emerged as the predominant lingua franca across northern Nigeria, including Gombe State. Despite this, numerous minority languages remain actively spoken. Among them are Fulfulde, Hausa, Tangale, Tera, and Waja, each boasting sizable communities of native speakers. Consequently, Gombe State is characterized as a multilingual state.

The research findings indicate that local and international media serve as primary sources of information for individuals seeking knowledge about HIV/AIDS. This underscores the crucial role of media communication in disseminating accurate and reliable information about the virus. Studies have shown that respondents from European countries such as the Netherlands, Germany, and Italy, as well as Australian citizens, rely on traditional media (such as television and news outlets) for their primary information about HIV/AIDS. Unsurprisingly, social media emerges as an important information source due to its easy accessibility and widespread usage, particularly in developing nations. This trend may be attributed to the dissemination of official governmental reports about the virus through traditional media channels using indigenous languages in Gombe State.

Participants' responses regarding symptoms, transmission, and prevention of HIV/AIDS reflect their actual knowledge and awareness levels. They demonstrated a comprehensive understanding of HIV/AIDS symptoms, which closely resemble those of fever, body weakness, chills, rash, and swollen lymph nodes, among others. However, only a small percentage of respondents were aware that HIV/AIDS can be transmitted orally, despite sexual transmission being well-established as its primary route (Rothan and Byrreddy, 2020). Those who do not believe in the transmission of the virus are more likely to underestimate the importance of the preventive measures recommended by the World Health Organization (Sallam et al., 2020). These individuals are often isolated from the digital world, lacking access to both local and international media.

5. CONCLUSION

The study underscores the importance of using local languages as a preventive measure to mitigate the spread of HIV/AIDS. This approach has significantly enhanced the level of awareness about symptoms, transmission, prevention, and treatment among the studied population. Encouraging more media campaigns in local languages is recommended as a means of curbing the spread of HIV/AIDS within Gombe State.

6. ACKNOWLEDGEMENT

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DEVELOPMENT AND ASSESSMENT OF POLYHERBAL SOAP FOR TREATING BACTERIAL SKIN INFECTIONS

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ABSTRACT

Bacterial skin infections pose a significant health concern worldwide, necessitating the development of effective and safe treatment options. This research aimed to formulate and evaluate a polyherbal soap utilizing natural ingredients known for their antimicrobial properties, including neem, hibiscus, rose petals, tulsi, turmeric powder, aloe vera, lemon zest, along with a glycerine soap base, rose water, and vitamin E capsule. The soap formulation process involved the extraction of active constituents from the selected herbs using appropriate solvents and incorporating them into a glycerine soap base. The formulated soap underwent comprehensive physicochemical characterization, including pH determination, moisture content analysis, and stability testing. Furthermore, the antimicrobial efficacy of the polyherbal soap was evaluated against common bacterial strains known to cause skin infections through agar well diffusion and broth dilution methods. Additionally, the safety profile of the soap was assessed through skin irritation testing using a human skin patch test. Results demonstrated that the formulated polyherbal soap exhibited desirable physicochemical properties, with a pH conducive to skin health and optimal moisture content. Moreover, the soap displayed significant antimicrobial activity against bacterial pathogens, including Staphylococcus aureus and Streptococcus pyogenes, attributed to the synergistic effects of the incorporated herbal extracts. Importantly, the soap demonstrated excellent safety profiles with no adverse skin reactions observed in the patch test. Overall, this study underscores the potential of polyherbal soap as a promising alternative for the management of bacterial skin infections, offering a natural and safe therapeutic option for consumers. Further clinical trials are warranted to validate its efficacy and safety in real-world settings.

KEYWORDS : *Antimicrobial activity, Physicochemical characterization, Stability testing, Agar well diffusion, Broth dilution, Skin irritation testing, Safety profile, polyherbal soap.*

INTRODUCTION

Bacterial skin infections represent a significant public health concern globally, with their prevalence and severity continuing to rise. These infections are often challenging to treat due to the emergence of antibiotic-resistant bacterial strains and the adverse effects associated with conventional antimicrobial agents. Consequently, there is an urgent need to explore alternative therapeutic approaches that are effective, safe, and sustainable. Herbal remedies have garnered increasing attention as potential candidates for combating bacterial infections, owing to their rich reservoir of bioactive compounds with antimicrobial properties.

Each of these botanicals possesses unique antimicrobial properties attributed to the presence of bioactive compounds such as alkaloids, flavonoids, polyphenols, and essential oils. Neem, for instance, is well-known for its broad-spectrum antibacterial activity against various pathogens, including Staphylococcus aureus and Escherichia coli. Similarly, turmeric powder contains curcumin, a potent antimicrobial agent effective against several bacterial strains implicated in skin infections.

By synergistically combining these herbal extracts, the polyherbal soap formulation aims to harness their collective antimicrobial potential, thereby offering a comprehensive and efficacious solution for bacterial skin infections. Moreover, the incorporation of ingredients such as aloe vera and vitamin E not only enhances the therapeutic efficacy of the soap but also provides soothing and moisturizing benefits, promoting skin health and repair.

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The development of polyherbal soap represents a departure from conventional antibiotic-based therapies, offering a natural and sustainable alternative with minimal risk of adverse effects. Furthermore, the use of botanical ingredients aligns with the growing consumer preference for eco-friendly and plant-based products. However, despite the promising therapeutic potential of polyherbal formulations, their formulation, standardization, and evaluation remain relatively unexplored areas in dermatological research[1].

Therefore, this study endeavors to fill this knowledge gap by comprehensively investigating the formulation parameters, physicochemical characteristics, antimicrobial efficacy, and safety profile of the polyherbal soap. The findings of this research hold significant implications for the development of novel therapeutic interventions for bacterial skin infections, offering healthcare practitioners and consumers alike a safe, effective, and sustainable alternative to conventional antimicrobial agents.

Herbal soap preparation is a medicine or drugs it contain Antibacterial & antifungal agents which mainly uses of part of plants like leaves, stem, roots &fruits to treatment for a injury or disease or to achieve good health. Herbal cosmetics are also known as ―Natural cosmetics . Herbal cosmetics are products which are used to purify and beautify the skin. The main advantage for using an herbal cosmetic is that it is pure and does not have any side effects on the human body; instead enrich the body with nutrients and other useful minerals. Neem leaf and its anti-inflammatory, antiulcer, antimalarial, antifungal, antibacterial, antioxidant, anticarcinogenic property. Tulsi is called the queen of all herbs, it is used widely as Ayurvedic and naturopathic medicines which helps in the healing of the human body in a natural manner. Not only do Tulsi leaves benefit people, but their flowers too. Tulsi can help you get rid of many health problems ranging from fever to kidney stones.

Soap is a salt fatty acid used in variety of cleansing and lubricating products. In a domestic use soap are usually used for washing, bathing and other types of house holding. In industry soaps are used as thickeners, components of some lubricants and precursors to catalyst. When used for cleaning, soap solubilizes particles and grime which can then be separated from the article being cleaned.
The aim of the present study to formulate poly herbal soap containing neem, tulsi, turmeric, aloevera, hibiscus, rose and evaluate the soap for physical and microbial evaluation.[2]

Skin Infections
An infection of the skin that can be caused by bacteria, fungus, viruses or parasites. Skin disease may cause:
• Discolored skin patches (abnormal pigmentation)
• Open sores, lesions or ulcers.
• Peeling skin
• Rashes, possibly with itchiness or pain.
• Red, white or pus-filled bumps.
• Scaly or rough skin.
Bacterial skin infections often begin as small, red bumps that slowly increase in size. Some bacterial infections are mild and easily treated with topical antibiotics, but other infections require an oral antibiotic. Different types of bacterial skin infections include: Impetigo, boils, leprosy.
Viral skin infections are caused by a virus. These infections range from mild to severe. Different types of viral infections include: Chickenpox, Warts and Hand foot and mouth disease. [3]

Ingredients, Equipment & Steps
Ingredients:
1. Neem leaves or neem powder
2. Hibiscus flowers or hibiscus powder
3. Rose petals or rose petal powder
4. Tulsi leaves or tulsi powder
5. Turmeric powder
6. Aloe vera gel
7. Lemon zest
8. Glycerine soap base
9. Rose water
10. Vitamin E capsule

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Equipment

1. Mortar and pestle (for grinding herbs if using whole)
2. Weighing scale
3. Heat-resistant mixing bowl
4. Double boiler or microwave (for melting glycerine soap base)
5. Stirring rod or spoon
6. Soap molds
7. pH meter or pH strips
8. Moisture analyzer
9. Agar plates and incubator (for agar well diffusion method)
10. Test tubes and culture media (for broth dilution method)
11. Skin patch test materials (adhesive patches, hypoallergenic tape, and marker)

Steps

1. Preparation of Herbal Extracts:
   a. Grind or crush neem leaves, hibiscus flowers, rose petals, tulsi leaves, and lemon zest into a fine powder using a mortar and pestle.
   b. Extract the active constituents from each herb by macerating or soaking the powdered form in an appropriate solvent (e.g., water, ethanol) for a specified duration.
   c. Filter the herbal extracts to obtain clear solutions free from solid particles.
2. Soap Base Preparation:
   a. Cut the glycerine soap base into small cubes for easy melting.
   b. Melt the glycerine soap base using a double boiler or microwave until completely liquefied.
3. Formulation of Polyherbal Soap:
   a. Combine the herbal extracts, melted glycerine soap base, aloe vera gel, turmeric powder, rose water, and contents of vitamin E capsules in a heat-resistant mixing bowl.
   b. Stir the mixture thoroughly to ensure uniform distribution of ingredients.
4. Pouring and Molding:
   a. Pour the prepared soap mixture into soap molds of desired shapes and sizes.
   b. Allow the soap to cool and solidify at room temperature or in a refrigerator for faster setting.

Formula :

Sr. No.	Ingredients	Quantity Taken	Category
1	Neem leaves	5 gm	Antimicrobial
2	Hibiscus flowers	3 gm	Antimicrobial
3	Rose petals powder	2 gm	Antimicrobial
4	Tulsi leaves	3 gm	Antimicrobial
5	Turmeric powder	2 gm	Antimicrobial
6	Alovera gel	2 gm	Moisturising, Healing
7	Lemmon zest	2 gm	Antimicrobial
8	Glycerine soap base	30 gm	Base
9	Vitamin E capsule	1 gm	Antioxidant, Healing
10	Rose Water	Q.S	Hydrating, Fragrance

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Drug Profile & Ingredients Profile



1] Neem leaves

Sr.No.	Attributes	Details
1	Taxonomical Information	Kingdom: Plantae Phylum: Angiosperms Class: Eudicots Order: Sapindales Family: Meliaceae Genus: Azadirachta Species: Azadirachta indica
2	Synonyms	Azadirachta indica Nimtree Indian Lilac
3	Organoleptic characteristics	Taste – bitter Odour – pungent strong Colour – dark green
4	Chemical constituents	Nimbin Nimbidin Nimbidol Azadirachtin Salannin Meliacin Quercetin Beta-sitosterol Tannins Flavonoids Alkaloids

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5. Uses

- Antimicrobial Properties: Neem leaves exhibit potent antimicrobial activity against a wide range of bacteria, fungi, and viruses. They are commonly used in traditional medicine for treating bacterial skin infections, such as acne, eczema, and dermatitis.
- Anti-inflammatory Effects: Neem leaves possess anti-inflammatory properties, making them beneficial for alleviating skin irritation and redness associated with bacterial infections.[4]
- Antioxidant Activity: The presence of bioactive compounds like flavonoids and phenolic compounds confers antioxidant properties to neem leaves, protecting the skin from oxidative damage.
- Wound Healing: Neem leaves promote wound healing by accelerating the regeneration of skin cells and reducing the risk of infection.[4]
- Skin Care: Neem leaves are incorporated into skincare products, including soaps and creams, for their cleansing, purifying, and rejuvenating effects on the skin.[5]

2| Hibiscus Flowers



Sr.No.	Attributes	Details
1	Taxonomical Information	Kingdom: Plantae Phylum: Angiosperms Class: Eudicots Order: Malvales Family: Malvaceae Genus: Hibiscus Species: Hibiscus sabdariffa
2	Synonyms	Hibiscus sabdariffa Roselle Sorrel Red sorrel
3	Organoleptic characteristics	Colour – vibrant red Taste – slightly tart Odour – characteristics tangy
4	Chemical constituents	Anthocyanins (e.g., cyanidin, delphinidin) Polyphenols Flavonoids (e.g., quercetin, kaempferol) Organic acids (e.g., citric acid, malic acid) Vitamin C Fiber Carotenoids Pectin

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5. Uses:

- Antimicrobial Properties: Hibiscus flowers possess antimicrobial activity against various bacteria and fungi, making them beneficial for preventing and treating skin infections.
- Antioxidant Effects: The high content of anthocyanins and polyphenols in hibiscus flowers confers potent antioxidant properties, protecting the skin from oxidative stress and premature aging.[6]
- Anti-inflammatory Effects: Hibiscus flowers exhibit anti-inflammatory properties, which can help alleviate skin inflammation and irritation caused by bacterial infections.
- Moisturizing and Hydrating: Hibiscus flowers contain mucilage and pectin, which have hydrating and moisturizing effects on the skin, promoting skin softness and suppleness.
- Skin Brightening: The natural acids present in hibiscus flowers help exfoliate the skin, promoting cell turnover and revealing brighter, more radiant skin.[7]

3] Rose petals powder



Sr.No.	Attributes	Details
1	Taxonomical Information	Kingdom: Plantae Phylum: Angiosperms Class: Eudicots Order: Rosales Family: Rosaceae Genus: Rosa Species: Rosa spp. (multiple species of roses are used)
2	Synonyms	Rose petal powder Rose flower powder
3	Organoleptic characteristics	Colour – pink to reddish brown colour Texture – fine and soft to the touch Odour – Floral aroma
4	Chemical constituents	Phenolic compounds (e.g., flavonoids, phenolic acids) Essential oils (e.g., geraniol, citronellol) Tannins Vitamin C Carotenoids Anthocyanins Quercetin Kaempferol

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5. Uses:

- Antimicrobial Properties: Rose petals exhibit mild antimicrobial activity against certain bacteria and fungi, making them useful for preventing and treating minor skin infections.
- Antioxidant Effects: The presence of phenolic compounds and vitamin C in rose petals confers antioxidant properties, protecting the skin from oxidative damage and premature aging.
- Skin Soothing and Hydrating: Rose petals have soothing and hydrating properties, helping to calm irritation and inflammation while providing moisture to the skin.
- Astringent Action: The tannins present in rose petals have astringent properties, which can help tighten pores and tone the skin.
- Fragrance: Rose petals impart a pleasant floral fragrance to skincare products, enhancing their sensory appeal.[8]

4] Tulsi leaves



Sr.No.	Attributes	Details
1	Taxonomical Information	Kingdom: Plantae Phylum: Angiosperms Class: Eudicots Order: Lamiales Family: Lamiaceae Genus: Ocimum Species: Ocimum sanctum
2	Synonyms	Holy basil Sacred basil Ocimum tenuiflorum
3	Organoleptic characteristics	Colour – bright green Taste – sweet, spicy scent with hints of clove and peppery notes. Odour – strong, aromatic fragrance.
4	Chemical constituents	Eugenol Rosmarinic acid Ursolic acid Oleanolic acid Flavonoids (e.g., orientin, vicenin) Tannins Essential oils (e.g., eugenol, camphor, cineole) Vitamins (e.g., vitamin C, vitamin A) Minerals (e.g., calcium, magnesium, potassium)

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5. Uses:

- Antimicrobial Properties: Tulsi leaves possess strong antimicrobial activity against bacteria, fungi, and viruses, making them effective for treating various skin infections, including bacterial skin infections.
- Anti-inflammatory Effects: The presence of compounds like eugenol and rosmarinic acid in tulsi leaves confers anti-inflammatory properties, helping to reduce skin inflammation and irritation.[9]
- Antioxidant Activity: Tulsi leaves exhibit antioxidant effects due to the presence of flavonoids and phenolic compounds, protecting the skin from oxidative stress and environmental damage.
- Skin Healing: Tulsi leaves promote skin healing and regeneration by stimulating collagen production and enhancing wound closure.
- Stress Relief: Tulsi is known for its adaptogenic properties, helping to reduce stress and promote overall well-being, which can indirectly benefit skin health.[10]

5] Turmeric powder



Sr.No.	Attributes	Details
1	Taxonomical Information	Kingdom: Plantae Phylum: Angiosperms Class: Liliopsida Order: Zingiberales Family: Zingiberaceae Genus: Curcuma Species: Curcuma longa
2	Synonyms	Curcuma longa Indian saffron Haldi (in Hindi)
3	Organoleptic characteristics	Colour – bright yellow orange Taste – slightly bitter Odour – warm, earthy aroma
4	Chemical constituents	Curcuminoids (e.g., curcumin, demethoxycurcumin, bisdemethoxycurcumin) Essential oils (e.g., turmerone, atlantone, zingiberene) Polysaccharides Proteins Vitamins (e.g., vitamin C, vitamin E) Minerals (e.g., potassium, iron, manganese)

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5. Uses:

- Antimicrobial Properties: Turmeric powder exhibits potent antimicrobial activity against bacteria, fungi, and viruses, making it effective for treating bacterial skin infections and promoting wound healing.
- Anti-inflammatory Effects: Curcumin, the primary active compound in turmeric, has strong anti-inflammatory properties, helping to reduce skin inflammation and irritation associated with bacterial infections.[11]
- Antioxidant Activity: Turmeric powder is rich in curcuminoids, which possess powerful antioxidant effects, protecting the skin from oxidative damage and premature aging caused by free radicals.
- Skin Brightening: The natural yellow pigment in turmeric helps brighten and even out the skin tone, imparting a radiant glow.
- Wound Healing: Turmeric powder promotes wound healing by accelerating the formation of new skin tissue and inhibiting bacterial growth, thereby reducing the risk of infection.[12]

6] Alovera Gel



Sr.No.	Attributes	Details
1	Taxonomical Information	Kingdom: Plantae Phylum: Angiosperms Class: Liliopsida Order: Asparagales Family: Asphodelaceae (formerly Liliaceae) Genus: Aloe Species: Aloe vera
2	Synonyms	Aloe barbadensis Mill. Aloe barbadensis Aloe vera gel
3	Organoleptic characteristics	Colour – colourless , slightly yellowish tinge Texture – slightly slimy texture. Odour – odourless, faint herbal scent
4	Chemical constituents	Polysaccharides (e.g., acemannan) Anthraquinones (e.g., aloin, barbaloin) Flavonoids Enzymes (e.g., amylase, lipase) Vitamins (e.g., vitamin A, vitamin C, vitamin E) Minerals (e.g., calcium, magnesium, zinc) Amino acids Salicylic acid

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5. Uses:

- Skin Healing and Repair: Aloe vera gel has long been used for its wound healing properties, promoting the regeneration of skin cells and accelerating the healing process.
- Moisturizing and Hydrating: Aloe vera gel provides intense hydration to the skin, making it an effective moisturizer for dry and dehydrated skin types.
- Anti-inflammatory Effects: The anti-inflammatory properties of aloe vera gel help reduce skin inflammation, redness, and irritation, making it suitable for soothing various skin conditions, including bacterial skin infections.
- Antimicrobial Activity: Aloe vera gel exhibits mild antimicrobial activity against bacteria and fungi, contributing to its effectiveness in treating bacterial skin infections.
- Sunburn Relief: Aloe vera gel has a cooling and soothing effect on sunburned skin, providing relief from pain and inflammation while promoting healing.[13]

7| Lemmon zest



Sr.No.	Attributes	Details
1	Taxonomical Information	Kingdom: Plantae Phylum: Angiosperms Class: Eudicots Order: Sapindales Family: Rutaceae Genus: Citrus Species: Citrus limon
2	Synonyms	Citrus limon Lemon peel Lemon rind
3	Organoleptic characteristics	Colour – bright yellow Taste – slightly bitter and acidic Odour – strong, citrusy aroma
4	Chemical constituents	Limonene Citral Citric acid Flavonoids (e.g., hesperidin, naringin) Vitamin C Essential oils Pectin

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5. Uses:

- Antimicrobial Properties: Lemon zest exhibits antimicrobial activity against bacteria and fungi, making it beneficial for preventing and treating bacterial skin infections.
- Astringent Effects: The high citric acid content in lemon zest has astringent properties, helping to tighten pores and tone the skin.
- Skin Brightening: Lemon zest contains natural acids, such as citric acid, which help exfoliate the skin, remove dead skin cells, and brighten the complexion.
- Refreshing and Invigorating: The citrusy fragrance of lemon zest has a refreshing and invigorating effect, awakening the senses and uplifting the mood.
- Antioxidant Activity: Lemon zest is rich in vitamin C and flavonoids, which have antioxidant properties, protecting the skin from oxidative damage and environmental stressors.[14]

8] vitamin E capsule



Sr.No.	Attributes	Details
1	Synonyms	Tocopherol supplement Vitamin E oil
2	Organoleptic characteristics	Colour – slight yellowish color Texture – clear, oily liquid or a viscous gel Odour – odorless
3	Chemical constituents	Alpha-tocopherol Beta-tocopherol Gamma-tocopherol Delta-tocopherol Alpha-tocotrienol Beta-tocotrienol Gamma-tocotrienol Delta-tocotrienol

4. Uses:

- Antioxidant Protection: Vitamin E is a potent antioxidant that helps protect the skin from damage caused by free radicals, UV radiation, and environmental pollutants.
- Skin Healing and Repair: Vitamin E supports skin health by promoting cell regeneration, reducing inflammation, and enhancing wound healing.

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- Moisturizing: Vitamin E helps maintain skin hydration by strengthening the skin's natural barrier function and preventing moisture loss.[15]
- Anti-aging Effects: Vitamin E helps prevent premature aging of the skin by neutralizing free radicals and reducing the appearance of wrinkles, fine lines, and age spots.
- Scar Reduction: Vitamin E is believed to improve the appearance of scars by promoting collagen synthesis and tissue repair, although scientific evidence supporting this claim is limited.[16]

Evaluation Test

Evaluation Test	Description	Inference
Physical Test		
Colour	Observation of the color of the soap, which should correspond to the natural hues of the ingredients used, such as greenish for neem, red for hibiscus, and yellow for turmeric.	Color matches expected hues of herbal ingredients, indicating proper incorporation.
Odour	Assessment of the fragrance of the soap, which should be pleasant and characteristic of the herbal ingredients, such as floral for rose petals and citrusy for lemon zest.	Fragrance is pleasant and consistent with herbal ingredients, enhancing sensory appeal.
Texture	Evaluation of the texture of the soap, ensuring it is smooth and homogeneous without any lumps or gritty particles.	Texture is smooth and uniform, indicating proper mixing and homogenization.
Foamability	Measurement of the lathering ability of the soap when agitated with water, indicating its cleansing efficacy.	Soap produces rich lather upon agitation, demonstrating effective cleansing properties.
Chemical Test		
Ph	Determination of the pH level of the soap, ensuring it falls within the suitable range for maintaining skin health (pH 5.5 to 8.5).	pH falls within the acceptable range for skin health, ensuring compatibility with the skin's natural pH.
Moisture Content	Analysis of the moisture content of the soap, which should be within acceptable limits to prevent excessive dryness or stickiness.	Moisture content is optimal, preventing the soap from being too dry or sticky.
Total Fatty Matter	Measurement of the amount of fatty acids present in the soap, indicating its cleansing and moisturizing properties.	Soap contains adequate levels of fatty acids, indicating effective cleansing and moisturizing abilities.
Chemical Constituents	Identification and quantification of specific chemical compounds present in the soap formulation, such as active constituents from herbal ingredients or vitamin E from the capsules.	Presence and concentration of desired chemical compounds are confirmed, ensuring the formulation's efficacy and potency.
Microbial Test		
Total Bacterial count	Assessment of the total number of bacteria present in the soap formulation, ensuring it meets the specified microbial limits for safety.	Total bacterial count is within acceptable limits, indicating proper manufacturing practices and microbial control.

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Antimicrobial Activity	Evaluation of the soap's ability to inhibit the growth of pathogenic bacteria commonly associated with skin infections.	Soap exhibits significant antimicrobial activity against bacterial strains, validating its efficacy for treating skin infections.
Stability Testing		
Physical Stability	Examination of the soap's physical characteristics (color, odor, texture) over time under various storage conditions (temperature, humidity).	Soap maintains its physical attributes without significant changes over the duration of stability testing, indicating good stability under different conditions.
Chemical Stability	Assessment of the chemical composition of the soap formulation to detect any degradation or changes in the concentration of active ingredients.	Chemical analysis reveals no significant alterations in the composition of the soap, confirming its chemical stability throughout the storage period.
Microbial Stability	Monitoring of microbial growth in the soap formulation over time to ensure it remains free from microbial contamination during storage.	Microbial testing indicates that the soap remains free from microbial contamination throughout the stability testing period, confirming its microbial stability.



Formulated Polyherbal Soap

Result

The polyherbal soap for bacterial skin infection was formulated as per prescribed procedure and evaluated for various parameters, the physicochemical parameters such as colour, odour, appearance, and pH. were tested.Foam height, foam retention, skin irritation test , cleansing ability was determined and observed.

Conclusion

Natural remedies are safe as well as having test side effect. Polyherbal Soap is used as for stop growth of bacteria & cleaning of skin. It promotes natural glow to the skin and additional advantage the polyherbal soap are prepared using different natural ingredients like neem, Tulsi, hibiscus, rose , turmeric, & alovera. The soap is evaluated for their physicochemical properties like colour, odour, ph irritancy.

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THE INFLUENCE OF APPLICATION OF PENALTIES AND SANCTIONS TO OFFENDERS ON ROAD ACCIDENTS REDUCTION IN KAMPALA METROPOLITAN

Norman Musinga, Dr. Samuel Nyambega

BACKGROUND OF THE STUDY

Globally, road accidents cause approximately 50 million severe injuries daily (Bondar, 2021). The rate of road fatalities per 100,000 individuals stood at 11.0% in 2019, down from 14.9% in 2000, marking a 26% decrease. According to the 2018 Global Status Report on Road Safety, there were over 1.35 million fatalities on roads worldwide. Despite a decline observed in 2019, the number of fatalities in the United States remains concerning. In 2019, a total of 36,096 individuals lost their lives on American roads, reflecting a 2.0% decrease from 2018. Comparatively, the European Union recorded an average of 5.1% deaths per 100,000 individuals in 2019, indicating that the United States performed better than some European nations in terms of vehicle collision rates (Bondar, 2021).

Recent data reveal that the United States experienced 1.2 road deaths per 10,000 registered motor vehicles. This figure represents a 36% decrease since 2000 when it was significantly higher at 43% according to research conducted by the National Highway Traffic Safety Administration (NHTSA) (Chafika, 2020). The UN report (2019) supports the argument that by 2030, these fatalities should be halved. Similarly, Choi (2016) postulated an increasing number of disabling and deforming accidents daily, which require all relevant stakeholders to develop concerted efforts to deal with the problem (Choi, 2016). All road users are impacted by these collisions, including transit users, pedestrians, bicycles, and automobile drivers and passengers (Aleksanin, 2020). For example, the expense associated with traffic deaths is enormous.

Bakhtari et al. (2020) reported that the economic costs associated with road accidents totaled USD 242 billion in 2010, equivalent to 1.6% of the US GDP. This included estimated lifetime economic expenses for 32,999 fatalities, 3.9 million non-fatal injuries, and 24 million total vehicle damages. The cost analysis considered various factors such as employer expenses, productivity declines, property damages, medical expenses, compensation, congestion-related costs, legal and judicial expenditures, as well as emergency services like medical, police, and fire services (Bhin, s2020).

Reports show that in 2013 to 2016 there was an increase in road related deaths in over 104 countries while low numbers of deaths were reported in only 48 counties. Despite reports showing a decrease in road related accidents in 2015 of 3,400 deaths, an increase has been reported to date with over 3,700 deaths. Hence meeting the sustainable development goal (Goal 3.6) of halving the road traffic deaths seem to be practically impossible by 2030, unless appropriate mitigating strategies, as well as approaches are adopted to deal with this menace.

Children and adolescents between the ages of 5 and 29 make up the majority of those impacted, accounting for 54% of deaths, which occur to weaker individuals including pedestrians, bikers, and motorcyclists (Amann, 2018). Because of its adverse impacts, traffic accidents represent a significant societal concern, posing substantial challenges to social, economic, and public health realms, causing distress, concern, and alarm among the population (Akpoghomeh, 2021). People under the age of 21 had the biggest drop in deaths (Anene, 2022). Over a 20-year period, fatalities among persons aged 25 to 64 decreased 2.1%, remained unchanged, but deaths among people aged 65 to 74 rose 30%. Road deaths decreased by 8.8% for people who were 75 years and older throughout this time. The form of traffic accidents with the highest occurrence is also a collision, which has a larger likelihood of occurring in a vehicle (35.74%) than it does in a motorbike (16.55%). The afternoon hours between 12: 00 and 17:59 have seen a 29.75% increase in traffic accidents between 2015 and 2019. Men are more likely to die in traffic accidents than women are, with an average of about 2182 (80%) fatalities each year compared to 551 deaths per year for women. In terms of age range, accidents are more likely to harm people between the ages of 20 and 29 than any other age group (Bakhtari Aghdam, 2020).

Furthermore, the issue of road accidents is and will remain a societal as well as the world's problem and its negative implications may remain in place, if enough and applied research is not obtained to mitigate the problem. The rate of fatalities in the community are unbearable. Important to note is that false accusations that society attributes to this problem has worsened the problems further. Therefore, it is pertinent to understand that such a fascinating menace affecting society, must be urgently addressed when not so much impact is created. However, in most of the studies, there exists scanty literature regarding the enforcement of road traffic and safety laws and its connotation on reduction of accidents on roads (Choi, 2016)

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According to the most recent WHO data, 11,730 people died in road traffic accidents in Uganda in 2018, accounting for 4.52% of all fatalities. Uganda is ranked 15 in the world with an age-adjusted death rate of 40.17 per 100,000 people. The results are high when compared to the 38,203 road traffic accident deaths recorded in the United States, or 1.59% of all fatalities. Surprisingly, the number appears lower when compared to neighboring East African nations like Kenya and Tanzania, where the corresponding numbers are 13,484 (5.28% of total fatalities) and 19,058 (5.24% of total deaths), respectively (WHO,2020).

According to a further story from the Independent newspaper on April 30th, 2020, the Traffic Police data for the previous four years indicated that 2,634 pedestrians and cyclists died on Ugandan roads per year. 10,537 pedestrians and riders were killed in accidents between 2016 and 2019 that occurred on city streets, highways, and country roads. This indicates that each day, seven bicycles and pedestrians were killed in collisions. Pedestrians make up 6,210 of the casualties, followed by motorcyclists (3,651) and cyclists (676). According to the police traffic statistics, 1,485 pedestrian deaths occurred in 2019, 1,424 in 2018, 1,384 in 2017, and 1,319 in 2016 (Gallagher, 2020).

Reckless and careless driving behaviors, such as disregarding traffic conditions, driving while fatigued or physically unfit, and failing to maintain safe distances between vehicles, are key contributors to the increasing number of traffic accidents. These accidents, known as road traffic accidents (RTAs), are responsible for over 85% of fatalities and 90% of years lost to disability-adjusted life expectancy in developing countries. Uganda, like many other developing nations, faces a significant challenge with RTAs. They occur daily on Ugandan highways, resulting in a high number of fatalities and injuries, often leading to the loss of entire families. The majority of those affected are in the 20 to 29 age group, considered their prime working years. The burden of injuries and fatalities disproportionately affects low-income individuals, who are often pedestrians, cyclists, or passengers in buses and minibuses (UPF, 2020).

The last four years' worth of traffic police statistics show that at least 2,634 pedestrians and bikers die on Ugandan roads each year. 10,537 pedestrians and riders were killed in accidents between 2016 and 2019 that occurred on city streets, highways, and country roads. According to a study by Katushabe J.D in Rwanda, the Commissioner of Transport at the Works Ministry, at least 3,880 individuals died in traffic accidents in 2019, while 9,635 had serious injuries and survived, and a further 1,175 were hurt slightly. This indicates that each day, seven bicycles and pedestrians were killed in collisions. Pedestrians make up 6,210 of the casualties, followed by motorcyclists (3,651) and cyclists (676) (Gatesi, 2021).

It is thus important to understand that road accidents are not best explained in isolation, and as such possible explanations are used to explain road accidents. In particular, several factors explain for road accidents and some of them include alcohol drinking, fatigue, family problems, social factors and interpersonal relations. However, traffic and safety laws are ranked high in providing an explanation of increased road accidents.

1.2. Statement of Problem

As of now, it is doubtful that Uganda would succeed in stabilizing and lowering the projected number of traffic deaths by 2020, as set forth in the United Nations Decade of Action for Road Safety. This threat is anticipated to worsen for the world's poorest nations in the ensuing decades. The increasing number of road accidents is costly at both global and national level and as such nations need to exploit all possible interventions to mitigate their effects. The increasing number of road accidents may be explained by failure to enforce traffic and safety laws by the responsible authorities, the gap which the current study intends to address.

Ugandan data underscores the severity of the road accident problem. According to statistics from the Uganda Police Force, road accidents stand out as the most prevalent occurrences in Uganda, particularly within the Greater Kampala Metropolitan area, which has accounted for half of all road crashes in the country over the last decade. Shockingly, 22% of fatal crashes have been reported in this city. According to a report presented to parliament by the Ministry of Works and Transport in July 2022, the numbers are alarming. In 2017, there were 3,500 fatalities and 10,420 serious injuries; in 2018, 3,689 fatalities and 9,541 serious injuries; in 2019, 3,880 fatalities and 9,635 serious injuries; in 2020, 3,663 fatalities and 8,370 serious injuries; and in 2021, 4,159 fatalities and 12,589 serious injuries.

The core issue lies in the fact that road accidents predominantly result from driver-related factors such as speeding, fatigue, obstacles, and alcohol consumption. Despite the government of Uganda allocating Ugx 21.5 billion for road safety programs in the 2022/23 fiscal year, road accidents persist unabated. Therefore, this research endeavors to delve into the extent and nature of these causes, aiming to provide a thorough comprehension of the correlation between the enforcement of road traffic and safety laws and the frequency of accidents in Kampala Metropolitan. Through meticulous analysis of statistical data and conducting comprehensive research, this study aimed at enlighting policymakers and stakeholders regarding the effectiveness of existing enforcement measures while identifying avenues for enhancement. Ultimately, the insights gleaned from this research can lay the groundwork for evidence-based interventions aimed at curbing road accidents and fostering public safety throughout Uganda.

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2.4.1. RELATED LITREATURE

2.4.2. Application Penalties and Sanctions to Offenders on Accident Reduction

Further research by Yasin, (2021), indicated that fines should be both constructive and inescapable when it comes to the enforcement of traffic regulations. Penalties can be a useful strategy for reducing the number of deaths on the road when combined with legislation reform, enforcement, and larger campaigns. One study by (Xu, 2020), conducted in about six nations, reported that drivers in countries with traffic law enforcement committed fewer crimes and violations than those in locations with comfortable and lax enforcement because they were aware of the repercussions of these violations (Xu, 2020).

Additionally, according to a WHO study from 2015, various infraction categories and punishments must be graduated based on the seriousness of the activity, with harsher sanctions for higher levels of violation or for recurrent behavior. For repeat offenders or those who violate the law at a high rate of speed, for instance, attention should be given to license suspension and vehicle impoundment. People were less likely to commit crimes or do them again if they believe they will get harsh punishment (World Bank, 2019).

According to Popova's (2018) study, punishments must be handed out as soon as possible since there is evidence that if the penalty is given right away after the crime is committed, the offender was less likely to perpetrate the same offence again. Delays in the imposition of a penalty can commonly cause the offender to deny committing the crime, have trouble remembering what they did, and commit new crimes. With today's technology advancements, it is conceivable that violations can easily be reported by methods other than postal mail (Nwagwu, 2020).

METHODOLOGY

3.1. Research Design

The study employed a correlational survey design in which the research subjects filled and completed out questionnaires. A correlational survey design, according to Ezeani (2002), is the best since it will help establish the causal link between the research variables. The design also assisted in demonstrating the direction of the connection, including whether there is a positive or negative impact on fewer accidents on the variables of enforcement of traffic and safety regulations.

3.2. Study Area/Site

The study was carried out in Kampala Metropolitan policing area with 3(three) regions comprised of Kampala south, Kampala North and Kampala East which has18 divisions. These areas include Katwe division, Kabalagala division, Kajjansi division, Natete Division, Nsangi division, Entebbe division, kawempe division, Wandegeya division,old kampala division, Nansana division, Kasangati division, Wakiso division, Jinja road division, Kira road division, Kiira division, Mukono division, and Nagalama division.

3.3. Study population

450 police officers working at Central Police Station, both male and female, were included in the research (Human Resources Directorate, 2019). The population was made up of the directorates for engineering and logistics, traffic and road safety, special tasks, welfare, and operations, as well as other members of the local community. The directorate for planning, research, and development was also represented. The researcher believes that the individuals consulted and engaged in the study possess adequate knowledge in their respective fields and have furnished the necessary information for the study.

3.4. Sample size determination

Table 3.1. Category of Target Population and Sample Size

Name of the Department/ Section	Population	Sample Size	Sampling Technique
Criminal Investigation Department(CID)	73	37	Simple random sampling
Field Force Unit(FFU)	81	41	Simple random sampling
Child and Family Protection Unit(CFPU)	34	17	Purposive Non Random
Counter terrorism Unit	47	24	Convenient Radom
Public Relations	23	12	Convenient Radom
International Police(INTERPOL)	38	19	Purposive Non Random
Fire and Rescue Services Unit	24	12	Purposive Non Random
KMP Traffic Unit	130	65	Convenient Radom
Total	450	227	

Source: (Adopted from Central Police Station Human Resources Directorate, 2019).

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The formula used for determination of the sample size per category these calculations were followed per category:
$\frac{Ni}{N} X\ n$ Where Ni is the size of the category
N is the overall population
N is the sample size
Proportional Allocation
The researcher employed both probability (simple and convenient random sampling) and non-probability (purposive sampling) methods due to the study's nature, which necessitated specific information from the respondents. Purposive sampling was utilized to select police personnel from particular sensitive departments such as international police, the child and family protection unit, and the fire and rescue services unit. A sample size of 227 respondents was chosen from a population of 450 at Kampala's Central Police Station for the study. This sample size of 227 was deemed sufficient, a conclusion supported by Krejcie and Morgan's research (1970), which suggests that a sample size of 227 or more is adequate for a population of 450.

3.4.1 Sampling procedures and techniques
The researcher employed both probability (simple and convenient random sampling) and non-probability (purposive sampling) methods because the study required specific information from the respondents. Simple and convenient random sampling was used to select police officers from specific departments where staff were readily available. According to Best and Khan (2003), this method ensures that every component of the population has an equal chance of being selected, thereby reducing bias and enhancing research generalizability (Sekaran, 2003).

3.5. Data Collection Methods
The study involved gathering both primary and secondary data. Primary data collection utilized questionnaires. To address the issue of reducing accidents in the Kampala Metropolitan Area, secondary data was acquired through historical analysis of previously published literature. Deliberate sampling was employed to select traffic officers with adequate knowledge and expertise in the relevant area. This sampling method, as defined by Mugenda and Mugenda (1999), focuses on specific demographic traits of interest, allowing the researcher to effectively address research questions. Only the most qualified candidates meeting the criteria were retained after eliminating those unfit for the research sample.

3.6. Testing of Validity and Reliability/ Trustworthiness
Achieving appropriate levels of validity and dependability for the various data gathering technologies is what data quality control entails.

3.6.1. Validity
Validity refers to how accurately an instrument measures what it's supposed to measure. To ensure the validity of the research instruments, the researcher shared specific questionnaires and an interview guide with peers, teachers, and the supervisor, seeking feedback for improvements and clarifications. This collaborative effort helped refine the instruments by eliminating confusing questions and incorporating ones aligned with the study's objectives. Two experts from this group were selected to evaluate the study materials using a scale of four: extremely relevant (4), barely relevant (3), somewhat relevant (2), and not relevant (1), as part of assessing content validity. CVI is calculated by multiplying the number of items rated as 3 or 4 by both experts by 100 and then dividing by the total number of items in the tool. A valid instrument is one where the CVI falls within the acceptable range of 0 to 1 and is at least 70%

3.6.2 Reliability
The dependability, stability, consistency, and precision of the research tools are what we mean by reliability. The Rwenzori West Policing Area, which is not included in the study sample but has features in common with the Kampala Metropolitan Policing Area, was used as a pilot site for testing the questionnaires in order to verify dependability. As a result, the questionnaires was restructured.

3.7. Data Analysis Techniques and Procedures
In data analysis, a researcher's tasks include organizing data, breaking it into manageable parts, synthesizing information, identifying patterns, determining relevance, extracting insights, and deciding what to communicate (Bogdan & Biklen, 1982). This process enables drawing conclusions that address research questions and align with the study's objectives. Given the study's qualitative and quantitative nature, the analysis was conducted separately in distinct methodologies:

3.7.1. Quantitative Analysis
Collected data was examined by utilizing the statistical software SPSS Version 21.0 application and converted the raw data into codes. The personal information of the respondents was displayed in frequency and percentage tables created from the coded data. The association between the variables connected to the enforcement of road traffic and safety legislation and the decrease in accidents was examined using correlation tables.

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To enhance the quantitative analysis the following comprehensive and insightful assessment of the relationship between enforcement of road traffic and safety legislation was adopted.

Descriptive Statistics: Besides frequency and percentage tables, the study employed measures such as mean, median, and standard deviation to offer a more comprehensive insight into the data and elucidate the findings. Descriptive statistics are valuable for summarizing and presenting key characteristics of variables.

Hypothesis Testing: The study utilized inferential statistics to examine hypotheses concerning the correlation between variables. Specifically, it aimed to elucidate the relationship between the enforcement of road traffic and safety legislation and the reduction of accidents. Techniques such as t-tests or regression analysis were employed to assess the significance of these relationships.

Visualization: Here statistical analysis with data visualization techniques, such as bar charts, scatterplots, or histograms was adopted to the findings and make them more accessible and understandable to a wider audience.

3.8. Ethical Considerations

According to Du Ploy (2009) asserts that ethics in research adhere to a morally recognized set of guidelines that include protecting respondents' privacy, exercising professional control, and maintaining confidentiality. The research goal and direction was disclosed to participants in order to emphasize the ethical problems. To guarantee that participation in the study was voluntary, all participants were informed of the study's confidentiality policies, and a section for consent forms was included to the questionnaire. Informed consent, according to Cohen, Manion, and Morrison (2011), refers to the decision to voluntarily engage in the study. Participants received complete contact information so they may get in touch with the researcher if they have any questions about taking part in the study (Hatch, 2002).

RESULTS AND FINDINGS

	Application of penalties and Sanctions to offenders					
12.	Lack of enforcement contributes to the penalty system's poor efficacy.	12.3	9.5	5.7	47.4	25.1
13.	I condone driving a motorcycle without a current license	21.7	8.0	1.9	24.1	44.3
14.	Sanctions for riding a motorcycle without donning a head-protective crash helmet	8.0	0.9	0.0	37.3	53.8
15.	Imprisonment of drivers who is not using a safety belt while driving is being done at our police station	18.5	26.4	6.5	27.8	20.8
16.	Person riding in a car without a safety belt should pay a fine	4.2	1.9	1.9	22.2	69.9
17.	Fines and Penalties for using a motor vehicle without a current Certificate of Fitness to teach new drivers	0.9	1.4	3.2	29.6	64.8
18.	Driving as a professional driver rather than a student on a motorcycle, in a car, or in a dual-purpose vehicle	6.3	13.5	9.6	47.6	23.1
19.	Use of a motor vehicle for the hiring or reward of the transportation of persons or property without the necessary license	26.9	32.2	3.4	19.7	17.8
20.	Punishing offenders for road traffic and safety laws has been the norm	0.9	3.2	4.2	43.1	48.6
21.	Rewarding of required and preferred traffic behaviors on the Road is one of the best practices	11.3	6.6	8.9	40.4	32.9

Application of Penalties and Sanctions

There's acknowledgment of the importance of enforcing penalties, with a majority agreeing that punishing offenders for road traffic and safety laws has been the norm (91.7% agree or strongly agree). However, there are also indications of lax enforcement, as seen in the responses regarding driving a motorcycle without a current license (68.4% agree or strongly agree).

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4.7. Correlation results for the relationship Between Application of Penalties and Sanctions to Offenders on Road Accidents Reduction

The second hypothesis posited that the application of penalties and sanctions to offenders would have a significant impact on reducing road accidents in Kampala Metropolitan. To test this hypothesis, Pearson's correlation coefficient was employed, as illustrated in Table 4.5.

Table 4.5: Pearson's correlation results showing the relationship Between Application of Penalties and Sanctions to Offenders on Road Accidents Reduction

		Application of Penalties	Road Accidents Reduction
Application of Penalties	Pearson Corr.	1	.249**
	(2-tailed)		0.001
	N	211	211
Road Accidents Reduction	Pearson Corr.	.249**	1
	(2-tailed)	0.001	
	N	211	211

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

The relationship between Application of Penalties and Sanctions to Offenders on Road Accidents Reduction

The second hypothesis proposed a significant impact of implementing penalties and sanctions on reducing road accidents in Kampala metropolitan. The correlation coefficient (r) of 0.249 suggests a moderate positive correlation between these factors. Furthermore, the p-value (P) being less than 0.01 indicates that this relationship is highly unlikely to have arisen by random chance. They suggest that implementing penalties and sanctions for offenders of traffic laws could be an effective strategy for reducing road accidents. Policymakers may consider strengthening enforcement mechanisms and penalties to deter risky behaviors on the road. Similarly, law enforcement agencies could prioritize efforts towards enforcing traffic regulations and imposing appropriate sanctions on offenders. This may include measures such as increased patrols, surveillance cameras, and stricter penalties for traffic violations. These findings could support public awareness campaigns highlighting the consequences of traffic violations and the importance of adhering to road safety regulations. Such campaigns could emphasize the correlation between penalties for offenders and the overall reduction in accidents, promoting responsible driving behavior.

Given the positive relationship identified, resources could be allocated towards enhancing the capacity for enforcement and adjudication of traffic violations. This may involve investing in technology, training for law enforcement personnel, and improving the judicial process related to traffic offenses.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

5.0. Introduction

This chapter integrates existing theoretical insights, police practices, and the researcher's recommendations to outline areas for improvement and identify new research directions. It encompasses a summary of the study, conclusions derived from the findings, and recommendations for future actions

5.1. Summary of the Findings

5.1.1. Demographics

The study had a relatively balanced representation of gender within the police force, with a slight majority of female respondents. Most respondents had attained either a certificate or a degree as their highest level of academic qualification. There was a diverse range of experience levels among respondents, with a relatively even distribution across different tenure categories. The Traffic and Road Safety Directorate had significant representation within the police force. Predominant age group among respondents fell within the 32-41 years range. A substantial majority of respondents were married

5.1.2. Enforcement of Road Traffic and Safety Laws Dimensions and Accidents Reduction

Concerns were raised about the standards of driver training and licensing, indicating a need for improvement. While there's acknowledgment of the importance of enforcing penalties, there are also indications of lax enforcement in certain areas.

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Recognition of the need for improvement in traffic safety laws, with concerns about gaps in regulations. Dangerous attitudes towards speeding were prevalent among respondents, indicating a need for stricter enforcement. Acknowledgment of the importance of vehicle inspection, although non-compliance was evident in certain areas.

Firstly, the study found no statistically significant relationship between regular training and sensitization for drivers and the reduction of road traffic accidents. This suggests that factors other than training and sensitization may contribute more significantly to accident reduction.

Conversely, there was a moderate positive correlation between the application of penalties and sanctions to offenders and the reduction of road accidents. These findings suggest that implementing penalties and sanctions for traffic law offenders could be an effective strategy for reducing accidents. This underscores the importance of strengthening enforcement mechanisms and penalties to deter risky behaviors on the road.

Moreover, the study revealed a significant positive relationship between the review of traffic and safety laws and the reduction of road accidents. This implies that as the review and updating of traffic laws increase, there tends to be a corresponding decrease in accidents. Therefore, ongoing evaluation and updating of traffic and safety laws may contribute positively to efforts aimed at reducing road accidents in the area.

Additionally, there was found to be a moderate positive correlation between driving speeds, adherence to speed limits, and the reduction of road accidents. Enforcing speed limits and promoting safe driving practices may play a crucial role in mitigating the occurrence of road accidents in the area.

Furthermore, there was a significant positive relationship between vehicle requirements and inspection and the reduction of road accidents. Compliance with vehicle requirements and inspection protocols was associated with a decrease in the occurrence of accidents. Ensuring vehicles meet regulatory standards and undergo regular inspections may thus play a crucial role in lowering the frequency of road accidents.

In conclusion, the study underscores the importance of comprehensive measures, including enforcement of penalties, review of laws, adherence to speed limits, and vehicle inspections, in reducing road accidents. Policymakers and law enforcement agencies should prioritize these measures to enhance road safety and mitigate the risk of accidents in Kampala Metropolitan.

5.2. Recommendations

Strengthening of enforcement mechanisms and penalties to deter risky behaviors on the road. This can involve increasing police presence, implementing stricter enforcement protocols, and imposing heavier penalties for traffic violations. By ensuring that consequences for reckless driving are swift and severe, individuals are more likely to adhere to traffic laws and regulations, ultimately leading to a safer road environment for all.

Prioritizing efforts towards enforcing traffic regulations and imposing appropriate sanctions on offenders. This entails allocating resources and manpower towards actively monitoring and enforcing compliance with traffic laws. Law enforcement agencies should focus on identifying and addressing high-risk areas, such as intersections with high accident rates or zones prone to speeding. By proactively addressing these areas, authorities can effectively reduce the likelihood of accidents occurring.

Public awareness campaigns highlighting the consequences of traffic violations and promoting responsible driving behavior. These campaigns should highlight the consequences of traffic violations, such as the potential for injury, loss of life, and legal ramifications. Additionally, promoting responsible driving behavior through educational initiatives can help instill a culture of safety and accountability among road users.

Allocation of resources towards enhancing the capacity for enforcement and adjudication of traffic violations. This includes investing in technology, such as surveillance cameras and speed detection devices, as well as providing training for law enforcement personnel. By equipping authorities with the necessary tools and skills, they can more effectively identify and address traffic violations, ultimately contributing to a reduction in road accidents.

Ongoing evaluation and updating of traffic and safety laws to contribute positively to efforts aimed at reducing road accidents. Regular evaluation and updating of traffic and safety laws are necessary to adapt to evolving road conditions and emerging safety concerns. This involves conducting thorough assessments of existing laws and regulations, identifying areas for improvement, and implementing necessary revisions or updates. By ensuring that traffic laws remain relevant and effective, authorities can better address emerging road safety challenges and mitigate the risk of accidents.

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Enforcing speed limits and promoting safe driving practices to mitigate the occurrence of road accidents. This can involve implementing measures such as speed limit signage, speed bumps, and traffic calming measures to encourage compliance with speed limits. Additionally, promoting safe driving practices through education and awareness campaigns can help reinforce the importance of adhering to speed limits and exercising caution while driving.

Ensuring vehicles meet regulatory standards and undergoing regular inspections to lower the frequency of road accidents. This involves enforcing compliance with vehicle safety regulations, such as proper maintenance, functioning lights, and adequate tire tread depth.

Overall, these findings underscore the need for comprehensive measures to strengthen enforcement, improve regulations, and promote responsible driving behaviors to enhance road safety in the studied area.

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FEATURES OF THE AUTONOMIC NERVOUS SYSTEM IN ATHLETES DOING COMPLEX-COORDINATION SPORTS

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ABSTRACT
The article presents the results of a study of the functional state of the autonomic nervous system of athletes involved in sports gymnastics. At the same time, the results of the study showed the relationship between qualifications and growth in the activity of adaptation mechanisms and the activity of the parasympathetic link of regulation.

KEYWORDS: *autonomic nervous system, athletes, sports gymnastics, Kerdo index, Hildebrant coefficient*

Adequate assessment of the functional state of the autonomic nervous system and its adaptive capabilities during the training process requires improvement of methods of medical and pedagogical control over athletes [Минко О. В., Марков К. К.].

The importance of current examinations is increasing with the aim of early detection of transitional functional states of the body of young athletes in the training process, as well as prevention of the initial phenomena of fatigue, overtraining, reducing the level of reactivity of the central nervous system, immunodeficiency and reducing resistance [Saclova L. et al.. Green J. H. Баратова С]. A typical psychophysiological state in sports is high tension and, as its variety, sports stress, which contributes to the development of autonomic dysfunctions [Булгаков М. С., Маринич В. В., Эбзеева Е. Ю.].

Currently, the study of the autonomic nervous system in athletes is becoming more relevant due to the increasing loads in the training, pre-race and competitive periods, which also lead to overstrain of the functional capabilities of the autonomic nervous system, leading to a decrease in sports results and the development of pathological conditions [Маринич Saclova L. et al. l, , Turmel J. et a,].

THE PURPOSE OF THE RESEARCH is to study the functional state of the autonomic nervous system in athletes involved in sports gymnastics.

MATERIALS AND METHODS

The study was conducted in Sports school specialized in athletics and sports in 2023-2024. 60 male athletes aged 17-24 years involved in sports gymnastics were examined (average age 21.43±1.69 years). All athletes are divided into two groups depending on their qualifications: the 1st group consisted of 22 (36.7%) athletes who qualified as candidates for master of sports and master of sports; in the 2nd group - 38 (63.3%) athletes of the 1st and 2nd categories. The control group consisted of 25 healthy guys matched by age.

To complete the assigned tasks, the Kerdo index and the ratio of heart rate to RR (Hildebrant coefficient) were calculated, the duration and color of dermographism were determined.

The Kerdo index (IC) is an indicator used to assess the activity of the autonomic nervous system. It shows the ratio of excitability of its sympathetic and parasympathetic departments. The Kerdo index is calculated using the formula:

$$IR = 100 * (1 - DBP / HR)$$

When the value of this index is greater than zero (sympathicotonia), they speak of the predominance of stimulating influences in the activity of the autonomic nervous system; less than zero (vagotonia) - about the predominance of inhibitory reactions; if equal to zero (eutony) - about functional equilibrium. The Kerdo index will be over than zero if the pulse is over than diastolic pressure, equal to zero if they are equal, and less than zero if DBP exceeds the pulse [Азимок О. П].

The Hildebrant coefficient is the ratio of heart rate to respiration rate per minute. Normally, this coefficient is 2.8 – 4.9 [Фудин Н. А.].

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When studying the color of the stripes, white dermographism indicates increased excitability of the vasoconstrictors of the skin and the sympathetic part of the autonomic nervous system; diffuse red dermographism - about increased excitability of the parasympathetic department.
All obtained results were subjected to statistical processing.

RESEARCH RESULTS

When studying the ratio of excitability of the sympathetic and parasympathetic parts of the autonomic nervous system, it was found that 62.6% of group I athletes had eutonia, 7.7% of athletes had sympathicotonia, 29.7% had vagotonia. While in group II, eutonia was detected in 77.5% of cases, vagotonia - in 19.2% of cases, sympathicotonia - 3.3%. In the control group, 80.8% had eutonia, 8.2% had sympathicotonia, and 11% had vagotonia (Fig. 1).

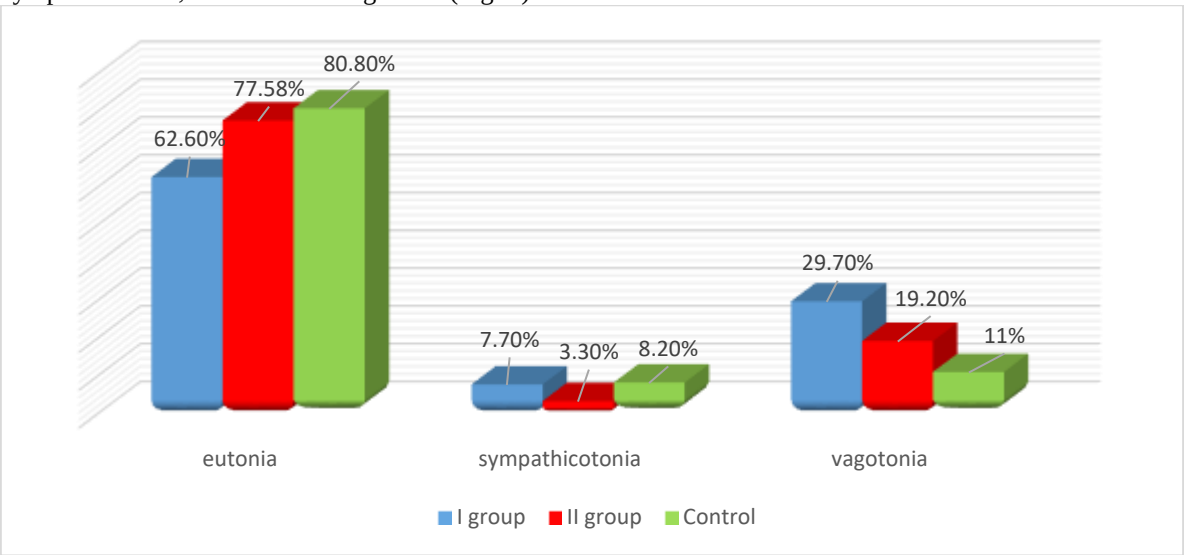


Fig. 1. Comparative analysis of the results of calculating the Kerdo index (%)

When calculating the Hildebrant coefficient, the results of 55.7% of group I gymnasts were within the normal range. 17.1% of athletes had sympathicotonia, and 27.1% had vagotonia. In group II, this coefficient was within normal limits in 68.1% of cases; 6.4% had sympathicotonia, 25.5% had vagotonia. In the control group, 77.2% of athletes were within normal limits, 5.7% had sympathicotonia, and 17.1% had vagotonia (Fig. 2).

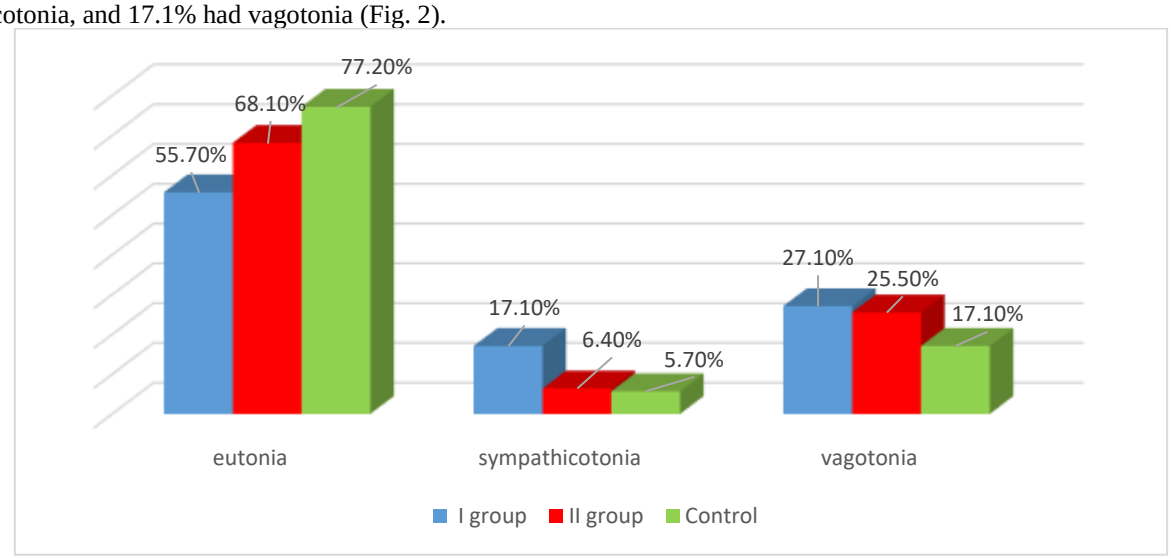


Fig. 2. Comparative analysis of the results of calculating the Hildebrant coefficient (%)

Due to the fact, that in the majority of those examined, eutonia was determined, reflecting the balance of autonomic regulatory mechanisms, in a certain part of athletes the parasympathetic department performs its function more intensively than the sympathetic department, which is apparently due to the specifics of training and competitive loads.

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At a further stage of the examination, a study of dermographism was carried out by color and duration. When conducting a comparative analysis, it was found that in athletes of group I, dermographism, normal in time, was observed in 74.3% of cases, in 9.1% it disappeared quickly, and in 16.6% it disappeared slowly. While in group II, time-normal dermographism was detected in 68.4% of gymnasts and a larger percentage of athletes with inert dermographism - 22.7%. Rapidly disappearing dermographism was observed in 8.9% of athletes (Figure 3).

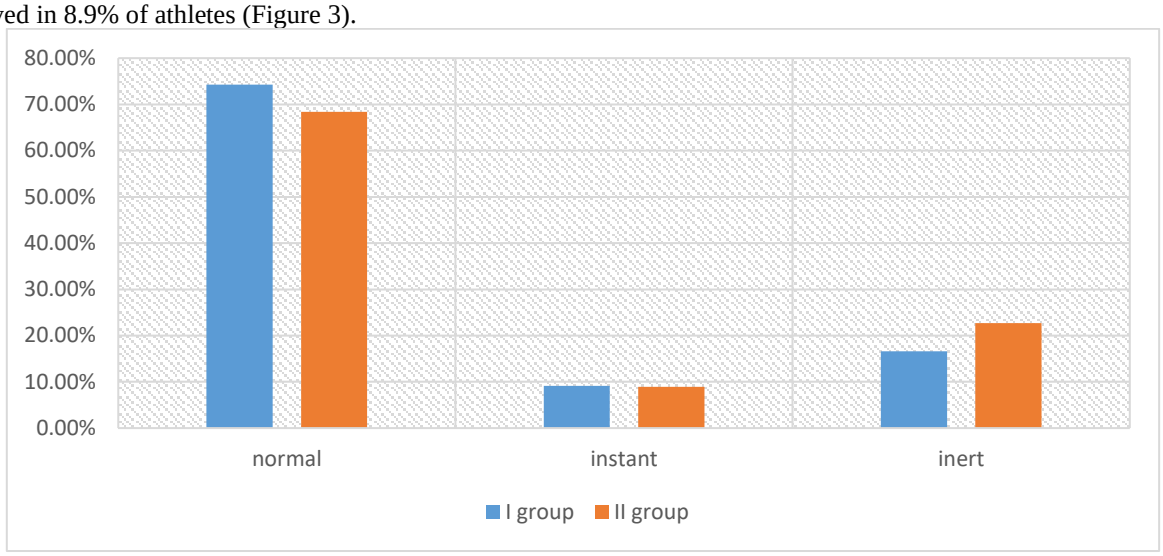


Fig.3. Comparative analysis of the duration of dermographism (%)

When studying the color of dermographism, 8.3% of group I athletes had white dermographism, 75.0% had a transitional shade between pink and red, and 16.7% had diffuse red dermographism. In group II, white dermographism was observed in 10.6% of athletes, color from pink to red - in 63.8%, diffuse red dermographism - in 25.5% (Figure 4).

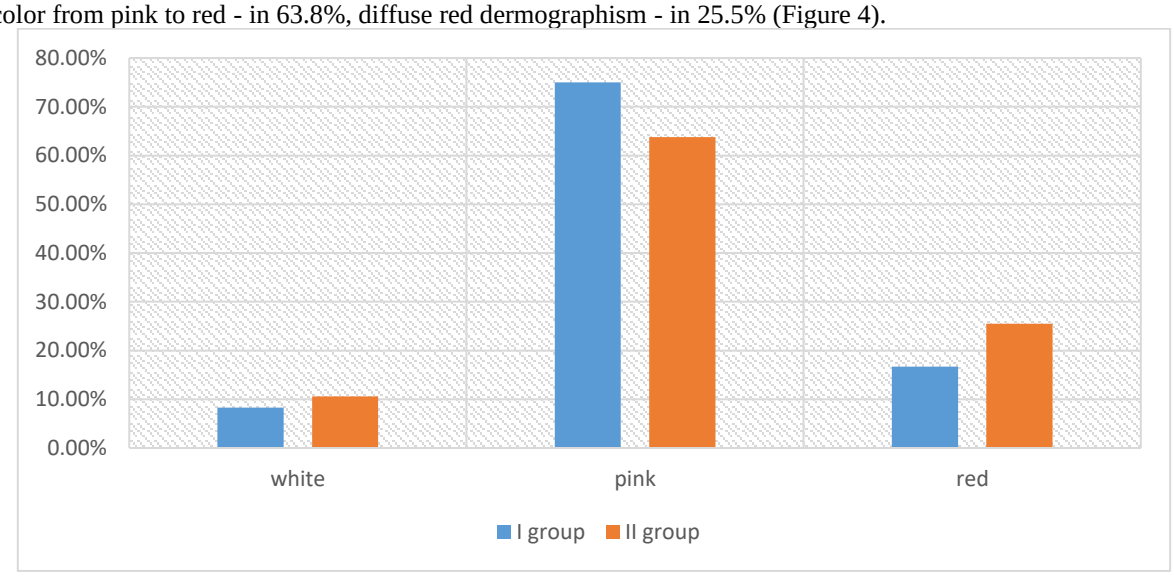


Fig.4. Comparative analysis of dermographism color (%)

Thus, when studying the duration and color of dermographism stripes in athletes involved in sports gymnastics, it was found that in the group of highly qualified athletes, a third of the athletes had a disturbed functional state of the neurovascular system of the skin with a predominance of the parasympathetic component.

CONCLUSION

Thus, a comprehensive study of the functional state of the autonomic nervous system showed that the higher the athlete's qualifications, the higher the increase in the activity of adaptation mechanisms and the activity of the parasympathetic regulation link.

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OPPORTUNITIES AND CHALLENGES OF THE DIGITAL WORLD OF MULTIMODAL INTERVENTIONAL BREAST RADIOLOGY (REVIEW)

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ANNOTATION

The article presents the evolution of the introduction of digital technologies into the system of oncological screening, multimodal technologies of interventional radiology, statistical data on the growth of malignant neoplasms of the breast in the world and Russia, shows the advantages of digitalization of radiation diagnostics, interdisciplinary integration with systems biology "omics" technologies, contributing to the development of a new direction " radiogenomics", and also pointed out the existing problems of introducing the latest technologies of interventional radiology, the need to train a multimodal specialist.

KEYWORDS. *multimodal approach , diagnosis, breast cancer , ultrasound*

Relevance. Breast cancer (BC) is the most common oncological pathology in women both in Russia and throughout the world. In 2018, more than 70 thousand new cases of breast cancer were diagnosed in Russia and, despite modern treatment methods, 22.3 thousand Russian women died from the progression of the disease [6, 1 2]. The introduction of mammography screening programs in a number of European countries and the USA played an important role in reducing mortality from breast cancer. Screening, due to the detection of the disease at an early, potentially curable stage, has reduced mortality from breast cancer in countries with a developed screening system by 15-25% [10, 13, 14]. Tumors detected as part of mammographic screening for breast cancer are the most difficult in terms of preoperative differential diagnosis, since they do not have clinical manifestations and are most often represented by early forms of the disease (non-invasive cancer and invasive carcinomas up to 1.0 cm in size) [13].

Mammography (MMG) is the only method for correct screening of breast cancer and the leading method for diagnosing early forms of breast cancer, including the detection of carcinomas in situ and invasive tumors of minimal size. Digital mammography uniquely combines the diagnostic value of analog predecessors and the capabilities of digital technologies, and the use of the BIRADS formalized image assessment system makes it possible to standardize the analysis of the data obtained and provide the radiologist with the correct further tactics for treating patients [1, 9, 1 0].

An undeniable advantage of MMG is the ability to detect microcalcifications, which are often the only radiological sign of early breast cancer. The detection of intermediate and malignant microcalcifications even in the absence of a tumor node suggests the presence of early breast cancer [8, 9]. Unlike MMG, ultrasound diagnostics (US) does not have sufficient resolution for tumors less than 1.0 cm; Ultrasound diagnostic capabilities do not allow visualization of early forms of breast cancer, manifested in the form of accumulation of microcalcifications, local stringy restructuring of the structure, as well as damage to the ducts of the mammary gland [4, 9].

At the end of the 90s, with the advent of the ultrasound elastography method, which is based on the high sensitivity of the shear acoustic properties of tissues to their pathophysiological state, qualitative and quantitative criteria for sonoelastography were developed to diagnose non-palpable formations [4, 7].

Magnetic resonance imaging (MRI) has entered the practice of examination for breast cancer relatively recently. The advantage of this method is the high resolution and contrast of displaying soft tissue elements, non-invasiveness, and the ability to obtain images in any arbitrary plane without mechanical movements. In order to increase the information content of the MRI method, contrast enhancement is used, with which the sensitivity in diagnosing breast cancer is 94%, specificity is 96.7% [7, 8].

Despite the presence in the arsenal of oncologists of such modern methods for diagnosing the disease as MMG, ultrasound and MRI of the mammary glands, the sensitivity of these methods for different biological subtypes of breast cancer has not been sufficiently studied, precise differential diagnostic criteria for preoperative assessment of the invasiveness of the tumor process have not been

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established, which is very relevant and timely for the development of a modern personalized approach [10, 11, 12]. In addition, the greatest diagnostic difficulties arise when identifying early forms of breast cancer, when the diagnosis is established on the basis of minimal signs of the disease, such as the presence of microcalcifications, changes in the structure of breast tissue and changes inside the ducts. Isolation and systematization of radiological signs characteristic of microcarcinomas will increase the frequency of detection of early forms of the disease at the preclinical stage, achieve maximum treatment efficiency with minimal financial investments,

which seems to be a very important task for practical healthcare [8, 9]. Thus, the study of radiological characteristics of early forms of breast cancer, their relationship with clinical and biological characteristics is an urgent problem and requires research on sufficient clinical material.

PURPOSE OF THE STUDY

To show the capabilities of modern digital radiation non-invasive and invasive technologies, as well as the need for interdisciplinary integration and training of multimodal specialists for early detection and determination of the breast cancer phenotype, which increases the efficiency of choosing adequate treatment tactics aimed at increasing the duration and quality of life of patients

MATERIALS AND METHODS

Literary data on the development of digital radiation methods for diagnosing breast diseases, including interventional radiology technologies, are presented. New data is also presented on the direction of “radiogenomics”, which was born through the interdisciplinary integration of radiological digital systems, interventional technologies and high-tech systems biology.

RESULTS

The review presents the development of equipment and radiation methods for the early detection of breast diseases, based on technical progress, including the active introduction of digitalization and informatization in medicine. New artificial intelligence models act as a doctor's assistant during screening. The advantages of various options for interventional radiology technologies in cancer screening to improve the accuracy of pathomorphological diagnosis and determine the phenotype of tumors are shown. The latest data are presented on the feasibility of interdisciplinary integration of “computer vision” based on medical imaging features with the capabilities of systems biology in determining the tumor phenotype with a correlation reliability of 71%.

CONCLUSION

The undoubted advantages of digitalization and new opportunities of interventional radiology in identifying the earliest forms of diseases in an interdisciplinary format open up the prospect of highly accurate diagnostics and an adequate choice of organ-saving treatment tactics. The training of a multimodal specialist - radiation diagnostician - diagnostic radiologist and interventional radiologist, proficient in a wide range of radiation diagnostic methods, including invasive interventions, requires correction of organizational forms of work, new educational programs not only in the specialty, but also in the basics of digitalization, which will ensure rational and effective use of modern achievements of science and technology.

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MULTIMODAL APPROACH TO BREAST CANCER DIAGNOSIS: CLINICAL OBSERVATIONS

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ANNOTATION

Modern comprehensive diagnostics and high-quality morphological diagnosis are important conditions for developing an optimal treatment algorithm for suspected recurrence of breast cancer. Our own clinical example shows the importance of a multimodal approach to the differential diagnosis of secondary tumor lesions. Thanks to modern clinical and radiological diagnostics, interventional technologies, high-quality morphological analysis and close interaction of all members of the multidisciplinary team, it was possible to verify a non-tumor lesion (sarcoidosis) in a patient with suspected relapse of breast cancer and plan the correct treatment tactics.

KEYWORDS : *multimodal approach , diagnosis, breast cancer , ultrasound .*

INTRODUCTION

Historically, breast cancer (BC) was viewed as a single disease. The development of science initially made it possible to identify hormone-dependent tumors as a separate group based on the expression of steroid hormone receptors: estrogen (ER) and progesterone (PgR), the presence of which indicates a relatively favorable prognosis and the potential sensitivity of the tumor to endocrine therapy [1,5] .

Then they proved the diagnostic and prognostic significance of determining the expression of the oncogene human epidermal growth factor (HER2 – human epidermal growth factor receptor 2), increased expression of which is associated with an unfavorable prognosis and an increased risk of disease relapse [7] .

Many authors also note the importance of determining cell proliferation markers, among which the first place is occupied by the Ki-67 antigen, which is expressed in all phases of the mitotic cycle and is an independent prognostic factor that determines the likelihood of relapse, overall and disease-free survival [1, 2].

The sources of breast cancer are 3 cell lines: cells of the luminal (inner) lining of the milk ducts, myoepithelial cells of the ducts and alveolar cells that synthesize milk proteins [8,9] .

Based on taking into account the listed factors, namely the production of estrogen and progesterone receptors in the tumor, the HER2 protein and the rate of cell division, the following subtypes of breast cancer are currently distinguished [3]: luminal A, luminal B, HER2 positive, triple negative.

Luminal subtype A includes tumors that produce estrogen and/or progesterone receptors and develop from the inner layers of the ducts and lobules of the mammary gland, do not produce HER2 and have a Ki-67 index of less than 20%.

Luminal subtype B includes tumors that produce estrogen and/or progesterone receptors and develop from the inner layers of the ducts and lobules of the mammary gland; these tumors can be either HER2 negative or positive, the Ki-67 index is more than 20% [10] .

HER2 positive tumors include tumors that do not produce estrogen and progesterone receptors, but produce large amounts of the HER2 protein [3]/

The triple negative subtype includes tumors in which there is no production of estrogen and progesterone receptors and no overexpression of the HER2 protein is detected.

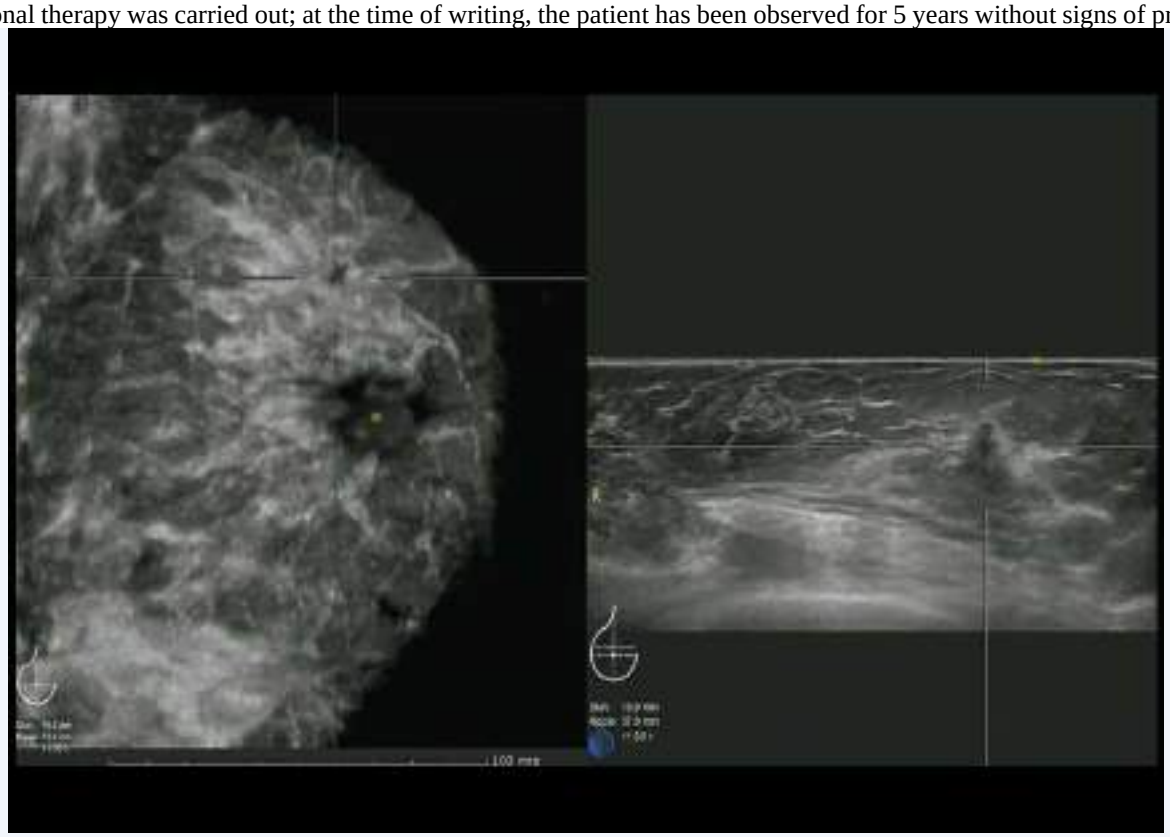
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The triple negative subtype of breast cancer is characterized by a high proliferative index with average values of more than 40%, the largest size of tumor nodes, low life expectancy, and a higher risk of developing hematogenous organ metastases, in particular to the lungs and liver. In 10% of patients with triple negative breast cancer, a BRCA1 (Breast Cancer Antigen 1) mutation is detected, while 80% of patients with a BRCA1 mutation belong to the triple negative subtype [4].

Ultrasound (US), X-ray mammography (X-ray mammography), and magnetic resonance mammography (MR-MG) images vary among tumor types.'

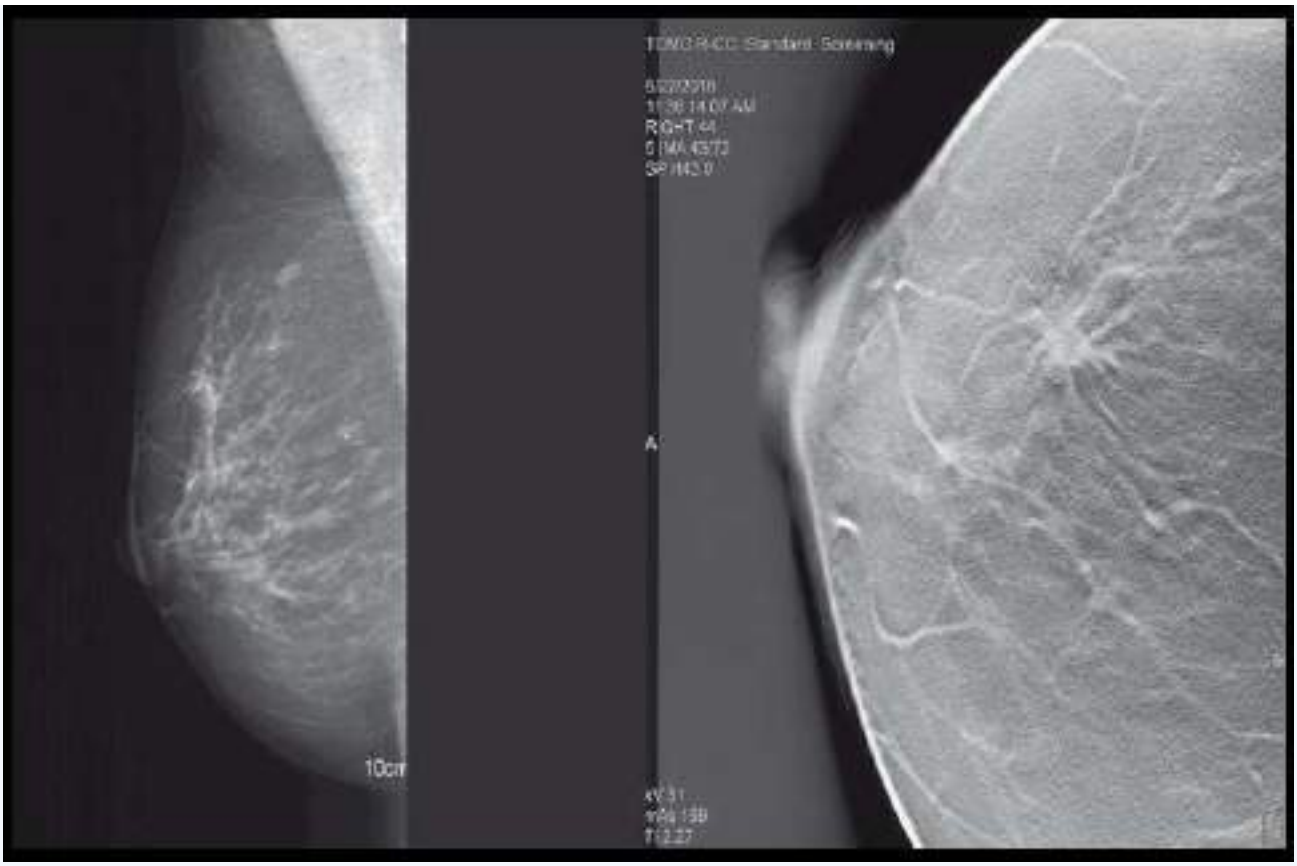
Clinical observation 1

Patient M., 39 years old. Ultrasound in the automatic breast volume scanning mode (ABVS – automatic breast volume scanning) (Fig. 1) in the right mammary gland at 12.30 on the conventional dial, 41 mm from the nipple at a depth of 16 mm, visualizes a formation of reduced echogenicity, vertically located, with a fuzzy contour, size about 0.6 cm, with an acoustic shadow, with an increase in the echogenicity of the surrounding tissues (desmoplasia zone), in the coronal projection during three-dimensional reconstruction, a radiant contour is noted. Conclusion: suspicion of cancer of the right breast BI-RADS 4. The patient was sent to MG with tomosynthesis (Fig. 2), according to the results of which an irregularly shaped node with an indistinct stringy contour measuring 1.0 x 0.8 cm was visualized in the upper outer quadrant, except In addition, at the border of the internal quadrants two more formations with stringy contours up to 0.4 cm are noted, and medially there is another similar area measuring 0.6 x 0.3 cm. MR-MG confirmed multicentric tumor growth: in areas of pathological vascularization, accumulation graphs contrast agent show peak enhancement in the first 2 minutes of contrast, followed by rapid clearance of the contrast. Conclusion: stage I right breast cancer (luminal A, ER+, PgR+, HER2 negative, Ki-67 15%). A combined treatment including radical resection, radiation therapy, and hormonal therapy was carried out; at the time of writing, the patient has been observed for 5 years without signs of progression.



Rice. 1. Ultrasound of the right breast of patient M, in ABVS mode (coronal and horizontal sections).

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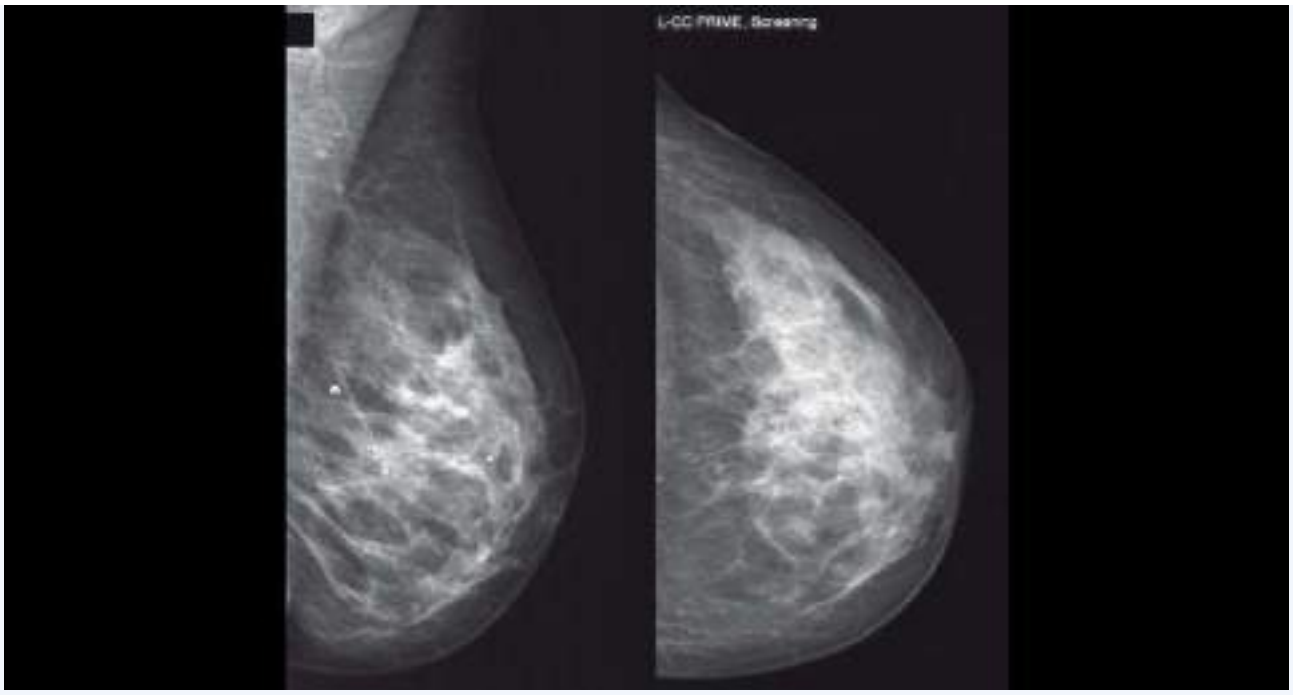
Rice. 2. MG and tomosynthesis of the right breast of patient M.

Thus, in this patient, a small tumor node was visualized equally well both with ABVS ultrasound and with MG. The tomosynthesis mode confirms the need for morphological verification.

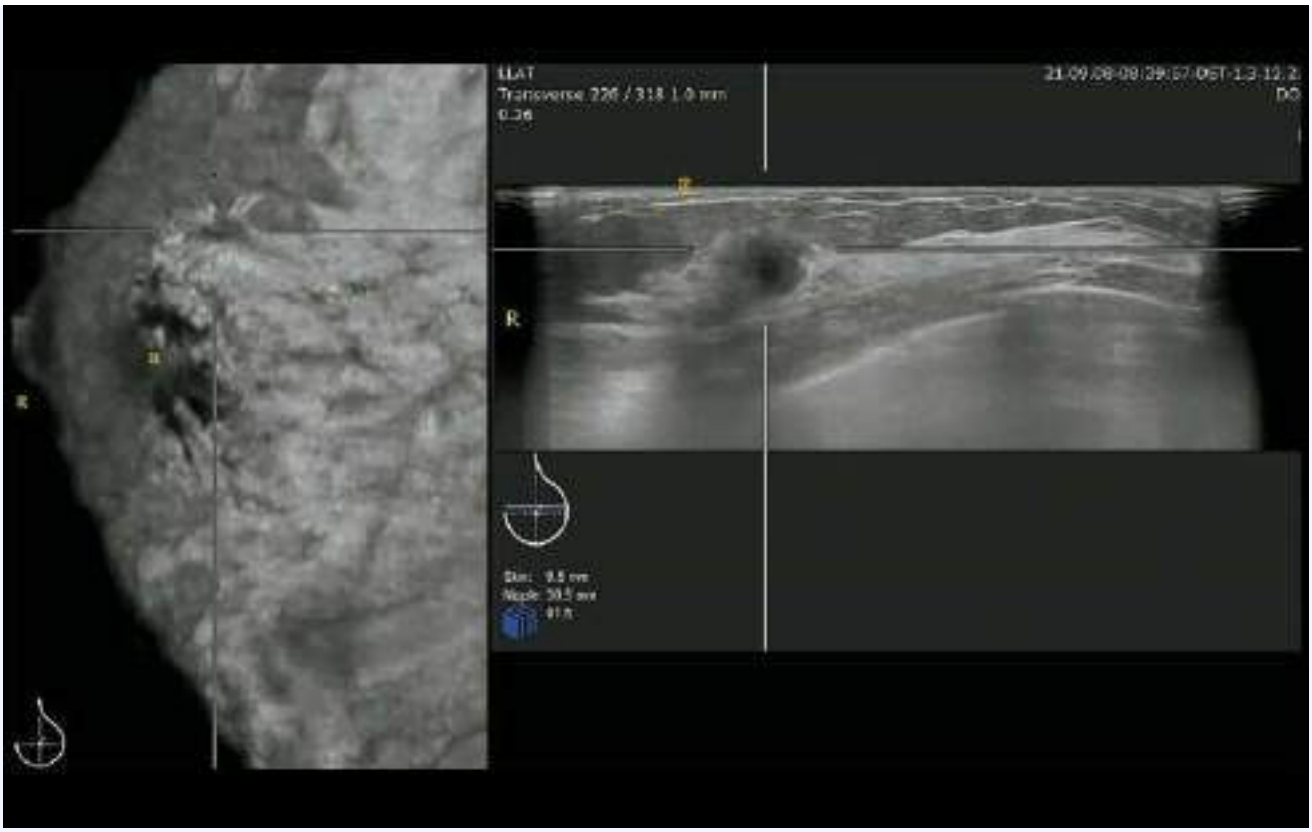
Clinical observation 2

Patient T., 41 years old. In MG (Fig. 3), a dense background of glandular tissue is noted in the upper outer quadrants of both mammary glands, which requires clarification. With ABVS in the left mammary gland (Fig. 4), at 1 o'clock on the conventional dial, 31 mm from the nipple at a depth of 10 mm, a hypoechoic formation measuring 1.0 x 0.9 cm with an indistinct, radiant contour in the coronal projection, vertical orientation, with a weak acoustic shadow, with color Doppler mapping (CDC) - with single vessels of the arterial spectrum, in the elastography mode it is colored as hard, and the zone of increased rigidity goes beyond the boundaries of the formation in the gray scale; in the pulse wave mode, the speed of the shear wave is not determined (is beyond the limits of sensitivity techniques). In addition to the formation described above, several more hypoechoic areas are visualized in the coronal section at the border of the outer and at the border of the lower quadrants. Conclusion: ultrasound picture of the tumor of the left mammary gland BI-RADS 4. To clarify the nature of the changes at the border of the outer and at the border of the lower quadrants, tomosynthesis was performed, in which (Fig. 5) in the left mammary gland on sections 23–24 against the background of adenosis in the upper outer quadrant the presence of a nodular formation measuring 1.0 cm was confirmed and another area of deformation of the pattern of the glandular-fibrous complex, suspicious for a tumor nodule, was identified. To exclude multicentricity of the tumor, MR-MG was performed (Fig. 6), which revealed contrast enhancement of only one node. A core biopsy revealed invasive lobular cancer of the left breast of the 2nd degree of malignancy, luminal B, HER2 negative, Ki-67 54%.

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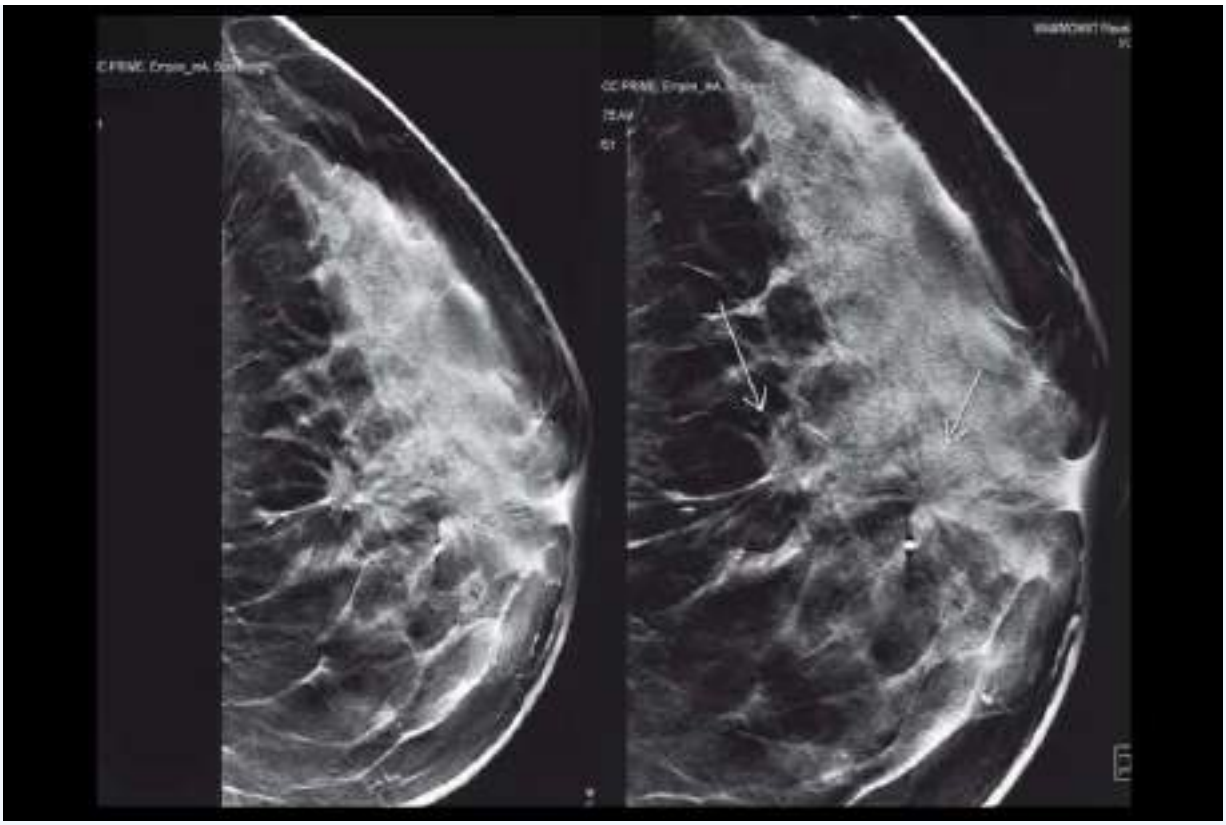


Rice. 3. MG of the left breast of patient T, dense background.

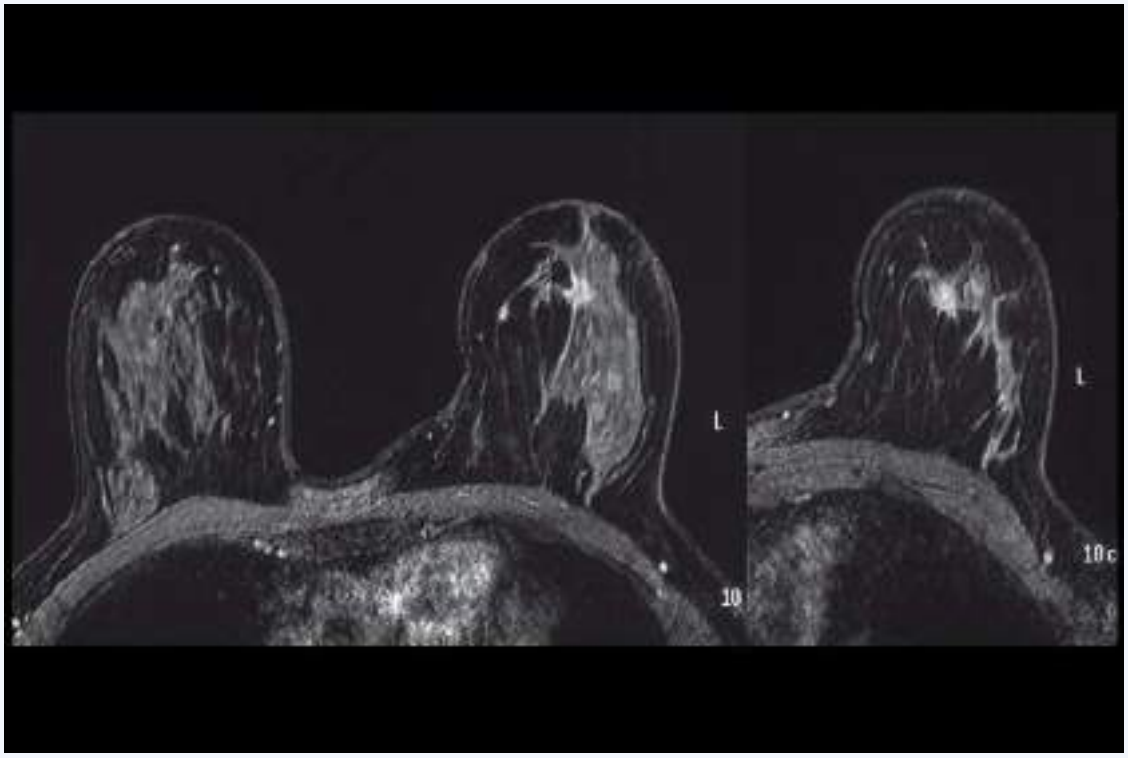


Rice. 4. Ultrasound of the left breast of patient T. ABVS mode, coronal and horizontal projections.

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Rice. 5. Tomosynthesis of the left breast of patient T.



Rice. 6. MR-MG of patient T.

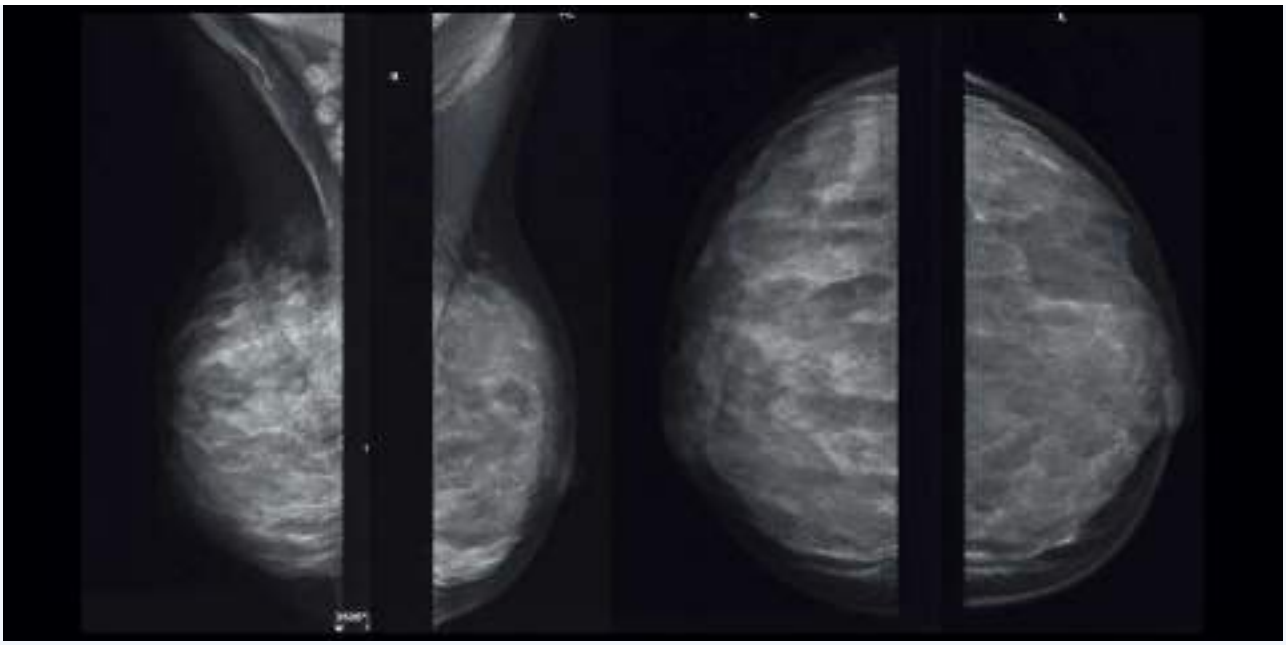
In this observation, the MG is uninformative due to the dense background, ultrasound in the ABVS, Color Doppler and elastography modes demonstrates characteristic symptoms of a malignant neoplasm (acoustic shadow, radiance of the

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contour, presence of blood flow, high stiffness), but does not exclude the presence of other foci of neoplasia, tomosynthesis strengthens the suspicion MR-MG helps to dot the "I" on the multicentricity of the tumor. A combined treatment including radical resection, radiation therapy, and hormonal therapy was performed; the patient was observed for 2 years without signs of progression.

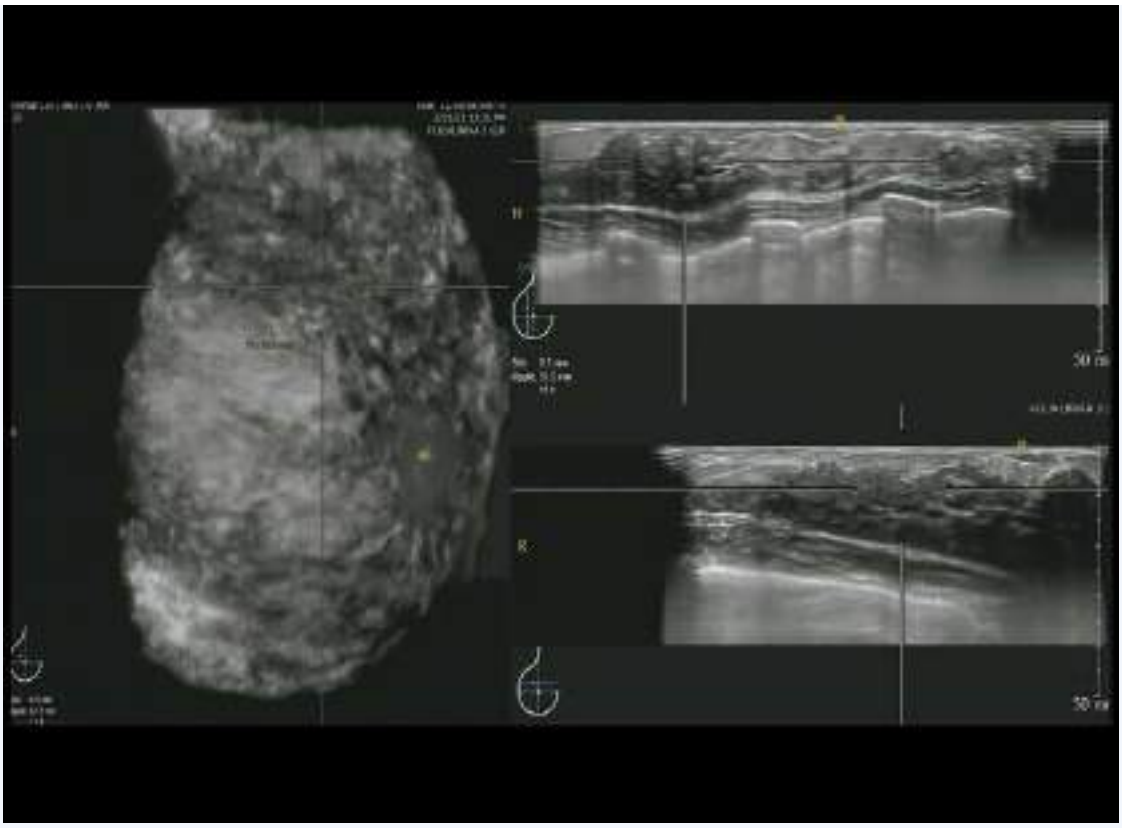
Clinical observation 4

Patient Sh., 41 years old. She noticed a formation in the right mammary gland herself 6 months after the injury, noted rapid growth over 2 months, had a history of childbirth 2 years ago, and did not breastfeed. Upon palpation in the upper quadrants of the right mammary gland, a dense tuberous formation up to 10.0 cm in size is determined. On mammograms (Fig. 7): a dense background, well-defined glandular tissue, the structure of the entire mammary gland tissue is compacted, lobulated, with areas of maximum density in the central sector and in the upper outer quadrants, a round formation measuring 0.7 x 0.5 cm (cyst?) is visualized in the right mammary gland. With ABVS (Fig. 8), in the right breast in the upper quadrants, corresponding to the zone of palpable compaction, a thickened layer of the glandular-fibrous complex (19 mm versus 11 mm) of reduced echogenicity, measuring up to 10.0 x 5.0 cm, is visualized compared to the contralateral side , without an acoustic shadow, in the coronal projection during three-dimensional reconstruction the contour is unclear, without radiance, in the compression elastography mode it is mapped neutrally, no areas of pathological stiffness were identified. At the border of the outer quadrants there is a 0.6 cm cyst. Conclusion: the ultrasound picture may correspond to the nodular form of fibrocystic mastopathy of the right breast BI-RADS 3.

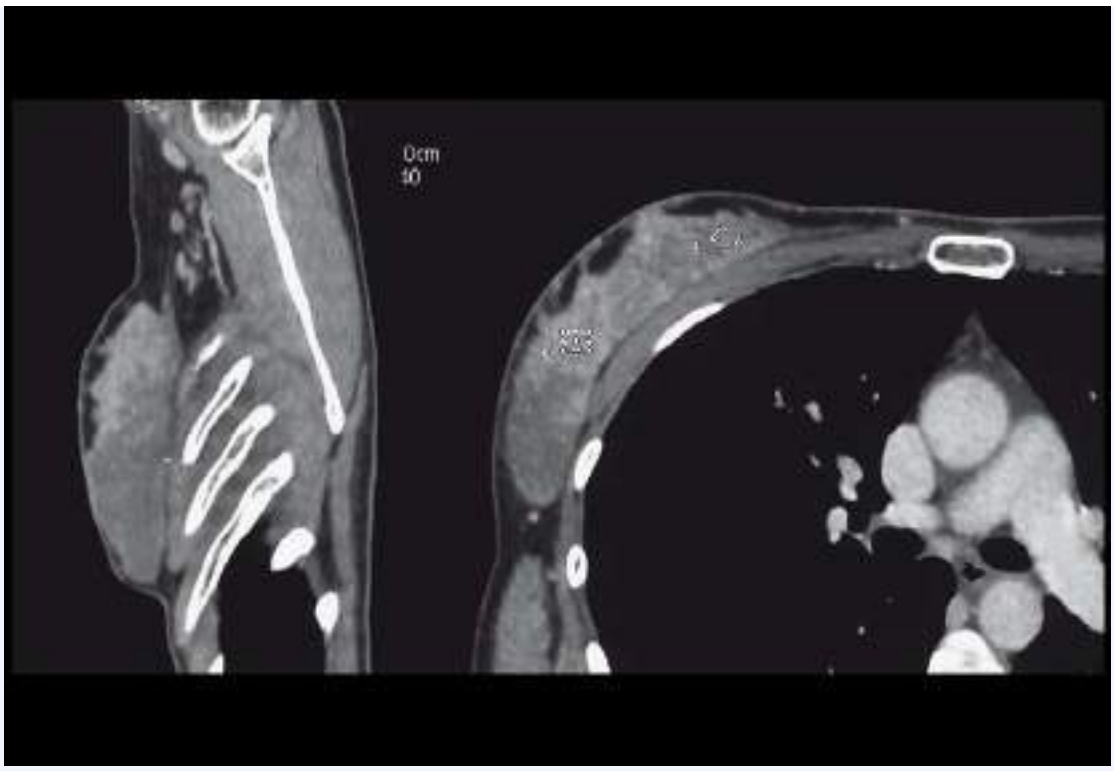


Rice. 7. MG of patient Sh.

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Rice. 8. Ultrasound of the right breast of patient Sh. ABVS mode, sagittal, vertical and horizontal sections.



Rice. 9. CT scan of the chest organs of patient Sh.

According to the results of core biopsy: invasive ductal carcinoma of the right breast in situ (HER2 positive +++, ER0, PgR0, Ki-67 25%). According to the preoperative examination program, a CT scan of the abdominal cavity, pelvis and chest with intravenous

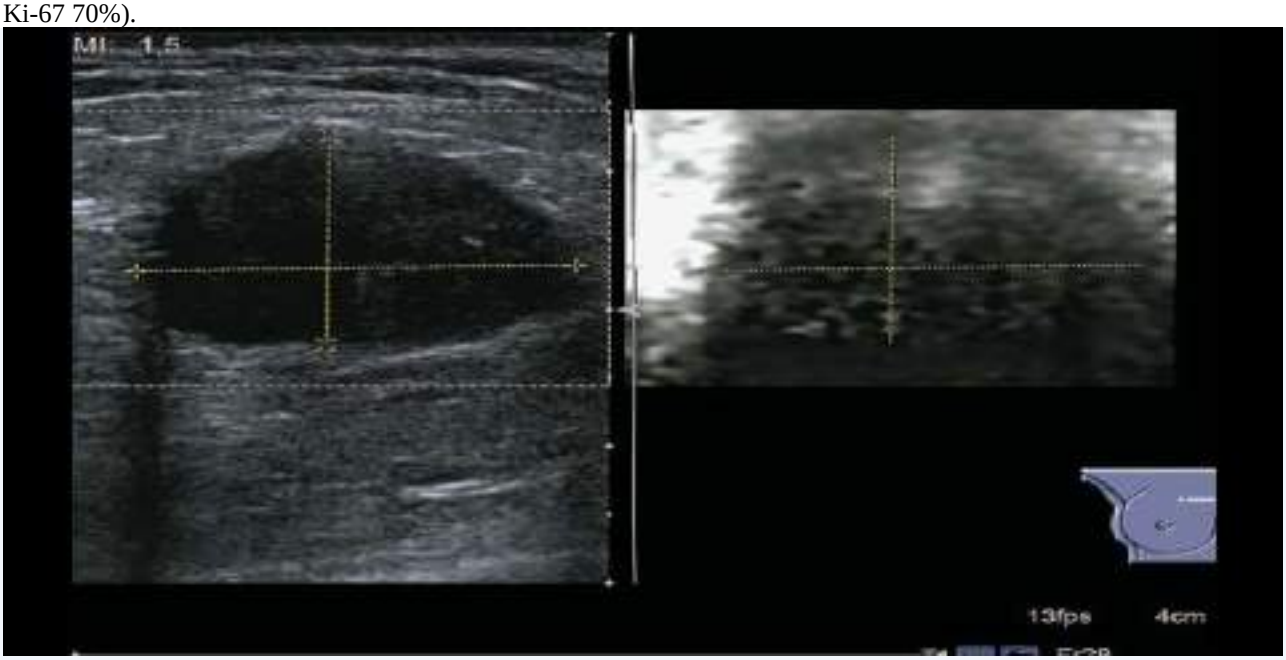
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contrast was performed (Fig. 9), in which about half of the volume of the right mammary gland is occupied by a zone of contrast enhancement of glandular tissue, characteristic of a malignant process. Subcutaneous radical mastectomy with simultaneous endoprosthetics, chemoradiotherapy, targeted treatment was performed; at the time of writing, the patient has been observed for 2 years without signs of progression.

In this observation, neither the mammographic nor the ultrasound picture (including in the ABVS, Color Doppler and Elastography modes) raised suspicions about an oncological process; the key role in prescribing a core biopsy was played by the dissonance between the palpation picture (stony density) and the absence of any visual signs. And only CT, which is not a standard technique in the diagnosis of breast cancer, made it possible to see the boundaries of the pathological process and retrospectively re-evaluate the ABVS data.

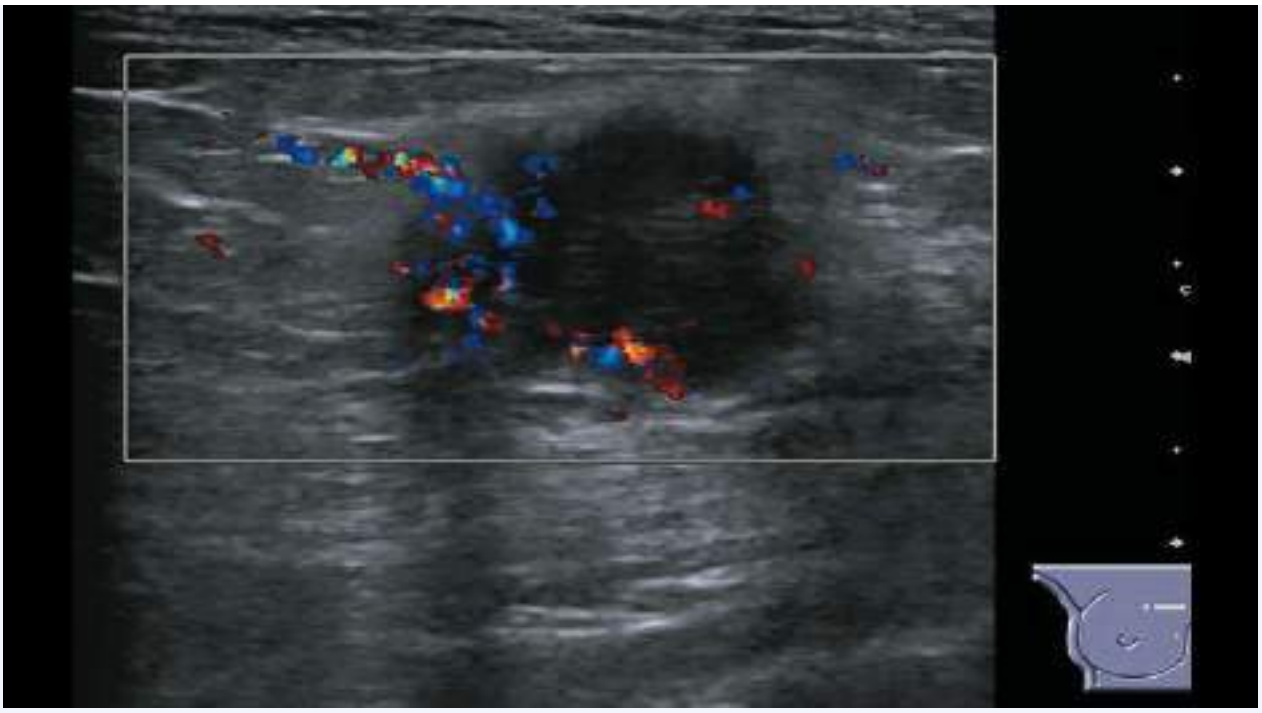
Clinical observation 4

Patient Ch., 49 years old. Ultrasound with elastography (Fig. 10) in the right mammary gland in the upper inner quadrant, corresponding to the palpable compaction, visualizes a formation of reduced echogenicity, heterogeneous, with an even contour, dimensions 2.1 x 1.5 cm, with lateral shadows. In compression elastography mode, it is mapped as a rigid structure, the zone of increased rigidity practically does not extend beyond the boundaries of the formation in the gray scale, the shear wave speed is 3.74 m/s. With CDK (Fig. 11), pronounced chaotic vascularization of the formation is noted. In ABVS (Fig. 12), in the coronal projection during three-dimensional reconstruction, the contour is clear, jagged, without radiance; from the formation towards the nipple, a hyperechoic cord with scattered small anechoic inclusions up to 0.2 cm is visualized; displacement by the formation of fibers of the pectoralis major muscle is visible. Conclusion: ultrasound picture of the formation of the right mammary gland BI-RADS 4. During tomosynthesis (Fig. 13) in the upper inner quadrant near the chest wall, a round-shaped compaction measuring 2.4 x 2.5 cm is visualized, along the anterioinferior contour an area of heaviness measuring 0.8 is visible x 0.9 cm, anterior to which a zone of different-sized polygonal microcalcifications is visualized against the background of cystically dilated ducts. Conclusion: formation of the right breast BI-RADS 4. With MR-MG (Fig. 14), the formation accumulates the contrast agent inhomogeneously, more intensely along the periphery, the formation is closely adjacent to the right pectoralis major muscle, deforming it. In addition, areas of accumulation of the contrast agent anterior to the formation along the ducts are noted - type 2 of accumulation of the contrast agent. Conclusion based on the results of core biopsy: cancer of the right breast (BI-RADS 5) triple negative (ER0, PR0, HER2 0, Ki-67 70%).

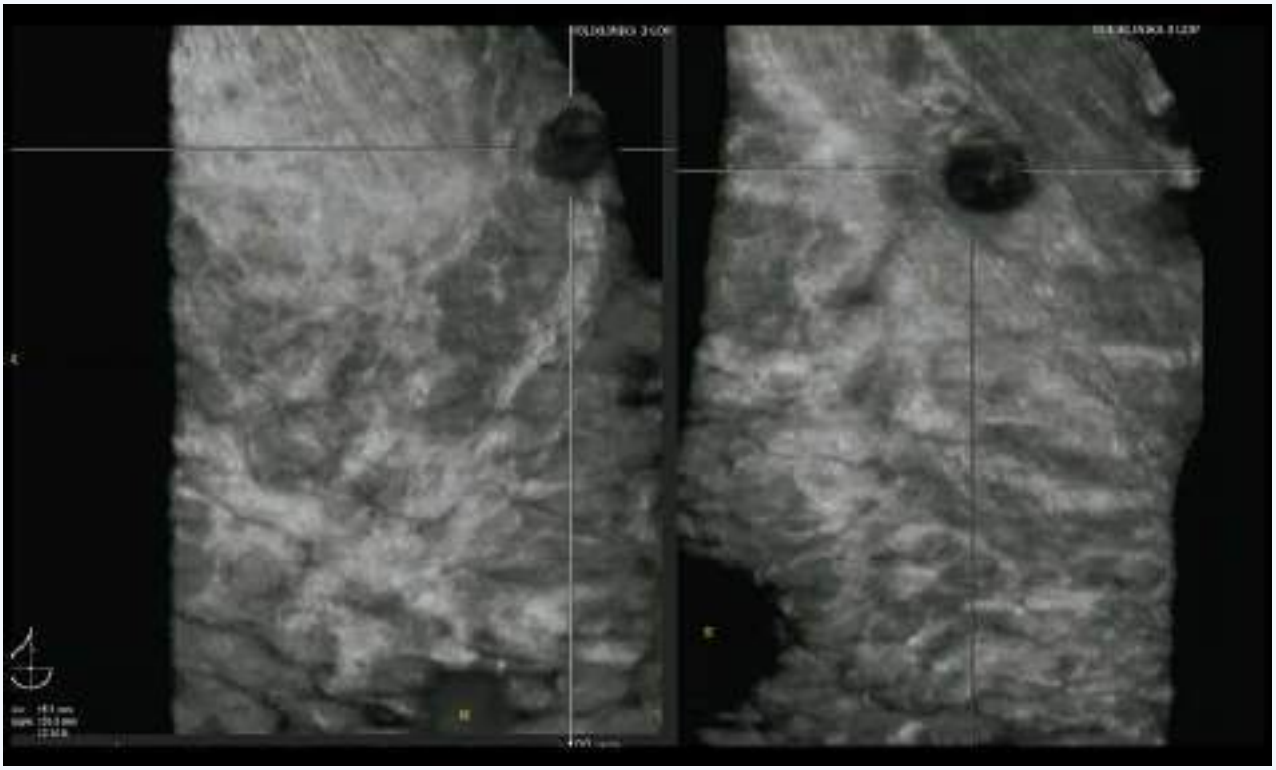


Rice. 10. Ultrasound of patient Ch. Compression elastography mode.

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Rice. 11. Ultrasound of patient Ch. Color flow mode.

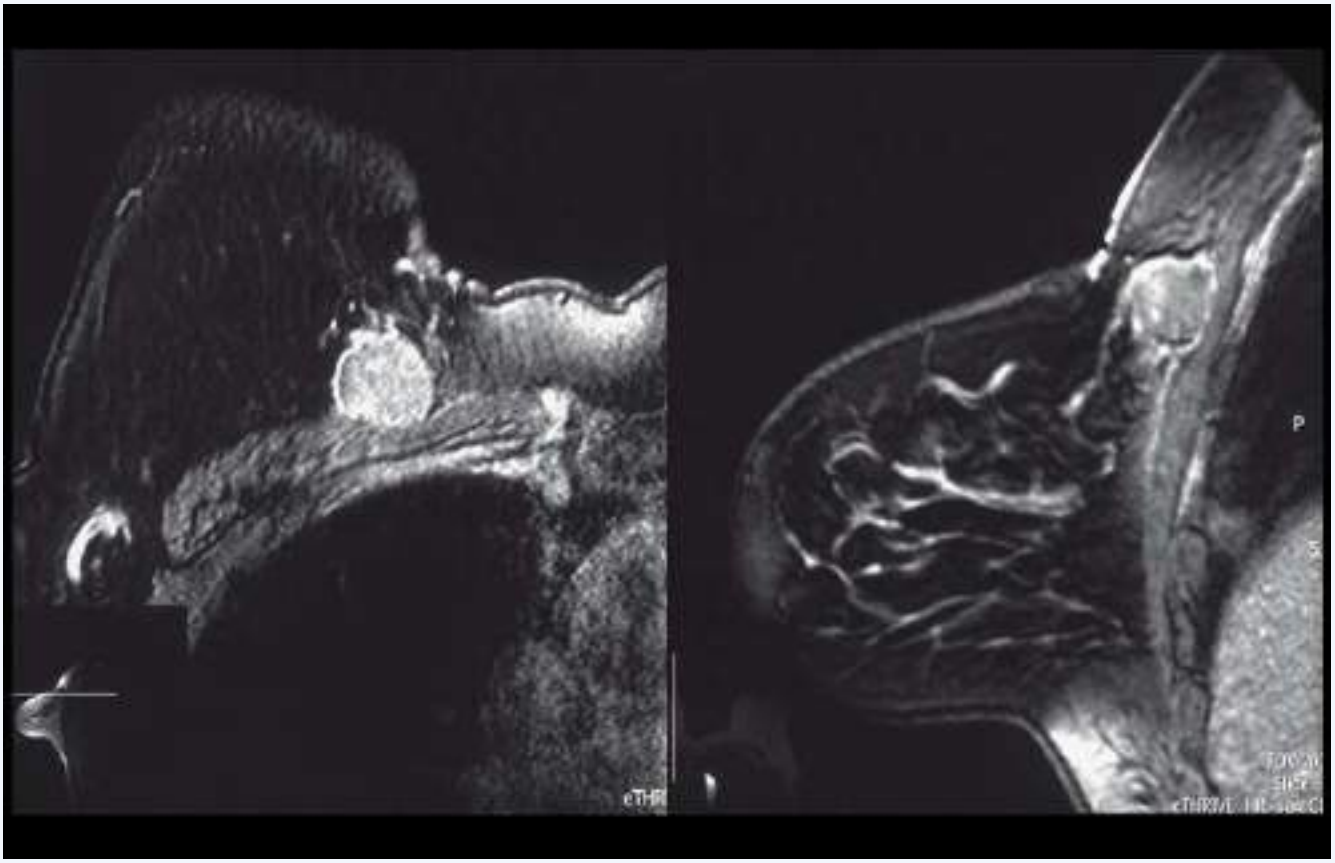


Rice. 12. Ultrasound of patient Ch. ABVS mode (superior projection, the nipple is visualized along the lower edge of the image and superomedial projection, the nipple is visualized in the lower left corner of the image).

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Rice. 13. Tomosynthesis of patient Ch.



Rice. 14. MR-MG with contrast enhancement of patient Ch.

In the presented observation, the ultrasound picture in the gray scale and in elastography mode was more typical for fibroadenoma, however, the presence of chaotic vascularization in CDK, jagged contour in ABVS, the presence of a heaviness area and

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microcalcifications in tomosynthesis made us suspect cancer, which was confirmed by contrast-enhanced MR-MG and core biopsy results.

CONCLUSION

Thus, breast cancer has many faces not only in terms of immunohistochemical parameters, but also in terms of visual characteristics. In this regard, a multimodal approach to its diagnosis using informative innovative technologies, such as elastography and ABVS with ultrasound, tomosynthesis with MG and contrast contrast with MRI is very important. In each specific case, additional imaging methods provide important diagnostic information, forcing the expansion of indications for morphological examination and, ultimately, reducing the time for diagnosis.

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A STUDY OF PROMOTIONAL SCHEMES AND ITS IMPACT ON CUSTOMER SATISFACTION WITH REFERENCE TO RETAIL OUTLETS OF SELECTED BRANDS

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ABSTRACT

The purpose of the study is to examine the impact of promotional schemes of various selected retail outlets and customer satisfaction. In order to explore the impact of sales promotion schemes such as advertise, publicity, personnel selling and sales promotion. The study was based on convenient sampling method and data for the study has been collected by using questionnaire method. The findings of the study indicate that among all the promotional tools advertise, publicity and sales promotion are significantly related with customer satisfaction. However, personnel selling has not been found significantly with customer satisfaction.

INTRODUCTION

The present scenario of the competition customer satisfaction has become the great challenge to each and every business organization. However, customer satisfaction is important for customer as well as organization. There are number of variables who may directly and indirectly influence customer satisfaction. Among all the variables sales promotion is playing most important role regarding satisfaction of the customer. On the other hand customer satisfaction is more complex and most important for each and every retailer. Customer satisfaction is a term used in the entire activities of marketing in order to measure how the product and services meets with customer expectation. Thus measuring of customer satisfaction provides the indication regarding success of organization at the market place. While on the other hand promotional schemes is used to refers the combination of different kinds of promotional tools used by the organization in order to increase sale and attract more and more customers. The present study is related with impact of sales promotion schemes on customer satisfaction regarding retail outlets of selected brands. In order to explore the impact of sales promotion scheme on customer satisfaction. A study includes four important promotional tools such as advertise, publicity, personnel selling and sales promotion.

REVIEW OF LITERATURE

Satnam Obeja (2014), has been conducted a research study to explore the relationship between sales promotion myth and customer satisfaction with reference to shopping mall in Indore. The objective of the study is to investigate how the sales promotion mix impact the satisfaction level of customer. The study was based on primary data and sample of the study has been collected from 175reatil outlets of different malls of Indore city. The data has been collected by using structure questionnaire method. The findings of the study suggested that among all the sales promotion schemes personnel selling and adverting played a most important role regarding customer satisfaction. However, study also indicates that satisfaction level of customer was differing according to their experience with different retailer.

Mihalj Bakator (2018), has been conducted a research study to explore the impact of promotional activities on customer satisfaction. The purpose of the study to examine how and why the promotion schemes influence the level of customer satisfaction. On the other hand the purpose of the study is to determine the effectiveness of promotional scheme to increase the customer satisfaction. The study was based on primary data which has been collected from the 466 peoples. The findings of the study explore that promotional schemes have a significant impact on the customer purchase intension. Furthermore, study also conclude that promotional schemes impact the customer according to the product and services.

Anselmsson Johan (2006), has been conducted a research study to explore the conceptualization of shopping mall satisfaction. The study was based on filed survey and survey was conducted among the peoples in Sweden city. In order to collect the sample study were adopted simple random sampling technique. The findings of the study indicates that customer satisfaction regarding shopping centre can be influence with emotional reaction and their past experience with service provider. Furthermore, study indicates that customer interaction with shopping centre has been involved a variety of activities with respect to promotional scheme as well as customer satisfaction.

Bromel Rosemary Dear et.al., (2007), has been conducted a research study to explore the customer satisfaction with respect to various shopping mall. The purpose of the study to examine those customers who were never respond by their self-regarding

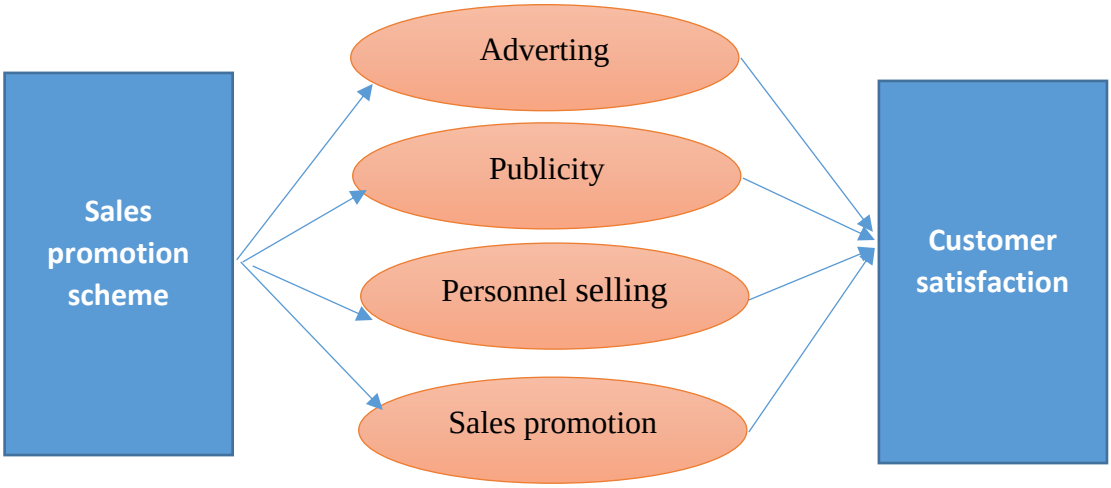
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shopping experience about shopping mall and super market. The data for the study has been collected by using survey analysis among the people. Findings of the study indicates that level of customer satisfaction is highly influence with the experience of people regarding promotional schemes of shopping mall.

OBJECTIVE OF THE STUDY

1. To study the relationship between advertising and customer satisfaction regarding retail outlet of selected brand.
2. To study the relationship between publicity and customer satisfaction regarding retail outlet of selected brand.
3. To study the relationship between personnel selling and customer satisfaction regarding retail outlet of selected brand.
4. To study the relationship between sales promotion and customer satisfaction regarding retail outlet of selected brand.

RESEARCH FRAMEWORK



HYPOTHESIS OF THE STUDY

H_{a1}: Adverting has a significant impact on customer satisfaction regarding retail outlet of selected outlet.
H_{01}: Adverting has no significant impact on customer satisfaction regarding retail outlet of selected outlet.
H_{a2}: Publicity has a significant impact on customer satisfaction regarding retail outlet of selected outlet.
H_{02}: Publicity has no significant impact on customer satisfaction regarding retail outlet of selected outlet.
H_{a3}: Personnel selling has a significant impact on customer satisfaction regarding retail outlet of selected outlet.
H_{03}: Personnel selling has no significant impact on customer satisfaction regarding retail outlet of selected outlet.
H_{a4}: Sales promotion has a significant impact on customer satisfaction regarding retail outlet of selected outlet.
H_{04}: Sales promotion has no significant impact on customer satisfaction regarding retail outlet of selected outlet.

SAMPLE SIZE AND DESIGN

The sample size and design for the study is descriptive and imperial in nature and primary and secondary data has been used. The purpose of the sample design is to find out the impact of sales promotion mix on the satisfaction level of customers. The final questionnaire has been distributed among the 200 respondent of different retail outlets located in DB city shopping mall. However, 151 respondents have positively filled the questionnaire and participated the survey. Hence the final sample size of the study is 151.

SAMPLING METHOD

Convenient sampling method has been adopted to collect the sample among the entire population.

DATA COLLECTION

The study was based on primary and secondary data. However, primary data has been collected by using questionnaire method and secondary data has been collected from the various published research paper etc.

MEASUREMENT TOOLS

Five point Likert scales has been used for scaling and measurement of data such as 05 strongly disagree to 01 strongly agree.

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TOOLS FOR DATA ANALYSIS

In order to test the hypothesis coefficient analysis has been done with the help of SPSS.

TESTING OF HYPOTHESIS

First Hypothesis Testing

H_{a1}: Adverting has a significant impact on customer satisfaction regarding retail outlet of selected outlet.
H_{01}: Adverting has no significant impact on customer satisfaction regarding retail outlet of selected outlet.

Table: 1 Relationship between Adverting and customer satisfaction

Hypothesis	Independent variables	β	Standard Error	t	Sig.	Result
H_{a1}	**Adverting**	**0.212**	**0.094**	**8.722**	**0.001**	**Significant at 5% level**
H_{01}						
Dependant Variable: Customer satisfaction						

Interpretation: Table 1 explore the impact of sales promotions schemes on customer satisfaction with respect to advertising. The coefficient analysis disclose that the value of β is **0.212** and calculated score t is **8.722** which is significant at 5% level of significance. The above result is evident to rejection of null hypothesis and accepted alternative hypothesis.

Second Hypothesis Testing

H_{a2}: Publicity has a significant impact on customer satisfaction regarding retail outlet of selected outlet.
H_{02}: Publicity has no significant impact on customer satisfaction regarding retail outlet of selected outlet.

Table: 2 Relationship between Publicity and customer satisfaction

Hypothesis	Independent variables	β	Standard Error	t	Sig.	Result
H_{a2}	Publicity	**1.012**	**0.184**	**4.982**	**0.029**	**Significant at 5% level**
H_{02}						
Dependant Variable: Customer satisfaction						

Interpretation: Table 2 explore the impact of sales promotions schemes on customer satisfaction with respect to Publicity. The coefficient analysis disclose that the value of β is **1.012** and calculated score t is **4.029** which is significant at 5% level of significance. The above result is evident to rejection of null hypothesis and accepted alternative hypothesis.

Third Hypothesis Testing

H_{a3}: Personnel selling has a significant impact on customer satisfaction regarding retail outlet of selected outlet.
H_{03}: Personnel selling has no significant impact on customer satisfaction regarding retail outlet of selected outlet.

Table: 3 Relationship between Personnel selling and customer satisfaction

Hypothesis	Independent variables	β	Standard Error	t	Sig.	Result
H_{a3}	**Personnel selling**	**0.092**	**0.121**	**5.92**	**0.078**	**Not Significant at 5% level**
H_{03}						
Dependant Variable: Customer satisfaction						

Interpretation: Table 3 explore the impact of sales promotions schemes on customer satisfaction with respect to Personnel selling. The coefficient analysis disclose that the value of β is **0.092** and calculated score t is **5.92** which is not significant at 5% level of significance. The above result is evident to accept of null hypothesis and rejected alternative hypothesis.

Fourth Hypothesis Testing

H_{a4}: Sales promotion has a significant impact on customer satisfaction regarding retail outlet of selected outlet.
H_{04}: Sales promotion has no significant impact on customer satisfaction regarding retail outlet of selected outlet.

Table: 4 Relationship between sales promotion and customer satisfaction

Hypothesis	Independent variables	β	Standard Error	t	Sig.	Result
H_{a4}	**Sales promotion**	**0.149**	**0.184**	**6.321**	**0.008**	**Significant at 5% level**
H_{04}						
Dependant Variable: Customer satisfaction						

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Interpretation: Table 4 explore the impact of sales promotions schemes on customer satisfaction with respect to Sales promotion. The coefficient analysis disclose that the value of β is **0.149** and calculated score t is **6.321** which is significant at 5% level of significance. The above result is evident to rejection of null hypothesis and accepted alternative hypothesis.

FINDINGS OF THE STUDY

The various findings of the study are as under:

1. Result of the hypothesis testing in table 1 indicates that advertising has been found best tool for sales promotion because it is relates with customer satisfaction. On the other hand it may be said that advertising of retail outlet is significant and positively related with customer satisfaction.
2. Result of the hypothesis testing in table 2 indicates that Publicity has been found best tool for sales promotion because it is relates with customer satisfaction. On the other hand it may be said that publicity of retail outlet is significant and positively related with customer satisfaction.
3. Result of the hypothesis testing in table 3 indicates that Personnel selling has not been found best tool for sales promotion because it is not relates with customer satisfaction. On the other hand it may be said that Personnel selling of retail outlet is not significant and negatively related with customer satisfaction.
4. Result of the hypothesis testing in table 4 indicates that Sales promotion has been found best tool for sales promotion because it is relates with customer satisfaction. On the other hand it may be said that sales promotion of retail outlet is significant and positively related with customer satisfaction.

CONCLUSION

The present study is related with effectiveness of sales promotion schemes and customer satisfaction regarding retail outlets of selected brands. The study explore that promotional schemes played a significant role and it is important for both customers and organizations. The data analysis has been done by using coefficient analysis at 95% level of confidence. Findings of the study clearly indicates that promotional schemes of various selected retail outlets has been found significantly related with customer satisfaction with respect to advertising, publicity and sales promotion. However, Personnel selling as a promotional tool is not significantly related to customer satisfaction.

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IMPROVEMENT OF METHODS FOR PREVENTION OF MUSCULOSKETAL PATHOLOGY IN CHILDREN PLAYING CHESS

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ABSTRACT

The article provides data on the properties and mechanism of action of Nordic walking. The positive effect of Nordic walking on the human body is based on mastering the correct technique when walking. While walking with poles, coordinated activity of the skeletal muscles of the trunk is carried out together with the upper and lower extremities, which will help prevent pathology of the musculoskeletal system.

KEY WORDS: *prevention, Nordic walking, children, chess. musculoskeletal system.*

Today, playing sports requires constant improvement of sportsmanship; the volume and number of training sessions are increasing. [1-3]. To achieve high results and gain championship, children are forced to study chess for a long time, most of the time is spent training on electronic devices [5-7]. In turn, being in a monotonous position for a long time during training, the weakest point is the musculoskeletal system (MSA). Under certain conditions, overloads and overstrains appear, which increase the risk of musculoskeletal diseases in athletes [2, 8-10]. However, there are practically no studies devoted to the study of the influence of sports on the musculoskeletal system of those involved in chess, and there is no information about the nature of the impact of the regular training process on the locomotor system. There is also no data on the possibilities of prevention and comprehensive rehabilitation of children with diseases of the spine and musculoskeletal system. All of the above requires searching for new and improving existing methods of prevention.

Nordic walking is a natural form of physical activity in the form of walking with special poles, in which a specific technique is performed [11]. According to many authors, this method is a promising and safe direction, which contributes not only to the restoration of lost function, but also to the prevention of diseases of the musculoskeletal system and the entire body as a whole [12,13].

Research conducted on the topic we are studying has shown that Nordic walking has a number of advantages: there are practically no contraindications; all physical qualities develop (strength, agility, endurance, coordination, etc.); activation and improvement of metabolic processes; involvement of 90% of muscle tissue in the training process; formation and correction of correct posture; increasing stress resistance; reducing anxiety and depression and improving mood [14-17]. The effectiveness of this type of health-improving physical activity has been proven for such problems as poor posture (stooping, scoliosis), osteochodrosis, myofascial syndrome, text neck syndrome, obesity, etc. [11,18,19].

Rhythmic repetitive movements during Nordic walking (Fig. 1.) help relieve tension in the muscles of the neck and shoulder girdle, strengthen the muscular corset of the cervicothoracic spine, while simultaneously reducing the static-dynamic load on the muscles and joints of the lower extremities, which in turn prevents the development of pathology musculoskeletal system. [12,13,20]

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Fig. 1. Nordic walking technique

In addition, given that this type of exercise is aerobic, tidal volume increases and ventilation of the lungs improves, the body is saturated with oxygen, as a result of which vascular spasm is eliminated, headaches stop, sleep is normalized, and the psycho-emotional state improves [13].

Nordic walking can be performed regardless of the time of year and weather conditions, provided all requirements are met. This requires special equipment and equipment - Scandinavian sticks. The length of the stick is adjusted individually depending on the patient's height (Fig. 2). [16]



Fig. 2 Corresponding length of sticks to the patient's height

The Nordic walking program is developed individually depending on age and degree of physical development, and the route, intensity and duration of training and type of exercise are determined. To achieve positive results, it is necessary to observe the basic principle of Nordic walking - involvement in the training process.

Nordic walking, like any other method of physical education, is divided into three periods: introductory, main and final, each of which has a specific effect on the body. [16, 22].

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Warm-up exercises (Fig. 3) have a physiological effect: increasing the dissociation of oxygen from hemoglobin and myoglobin, increasing blood circulation in muscles, ligaments and tendons, increasing the speed of transmission of nerve impulses and the sensitivity of nerve receptors, reducing pulmonary vascular resistance, accelerating metabolism; and specific: increasing the amount of oxygen delivered to the muscles, increasing elasticity, reducing susceptibility to injury, increasing the supply of energy substrates, improving coordination and reaction speed, increasing blood circulation in the lungs, increasing the efficiency of redox reactions in the body [16, 21].



Fig.3. An approximate set of warm-up exercises

In the main phase, the functional reserves of the cardiovascular system, respiratory system, and muscular system increase, which contributes to the overall fitness of the body and prevents the development of the pathological process. At the final stage of training, exercises help reduce venous congestion, reduce catecholamine levels in the blood, reduce delayed muscle pain and reduce recovery time [13,16].

Thus, the positive effect of Nordic walking on the human body is based on mastering the correct technique when walking. While walking with poles, coordinated activity of the skeletal muscles of the trunk is carried out together with the upper and lower extremities, which will help prevent pathology of the musculoskeletal system.

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DETERMINANTS OF CHILDHOOD OBESITY: A REGRESSION ANALYSIS OF SOCIOECONOMIC AND ENVIRONMENTAL FACTORS

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ABSTRACT
Childhood obesity is a complex public health issue with significant implications for long-term health outcomes and healthcare costs. This study investigates the determinants of childhood obesity, focusing on socioeconomic and environmental factors. Data were collected from 310 children and their families using a structured questionnaire from Jodhpur City. Socioeconomic variables included parental education level and household income, while environmental factors encompassed access to healthy food options and safe outdoor spaces for physical activity. Multiple regression analysis examined the relationship between these factors and childhood obesity, controlling for potential confounders. Results indicate that parental education level and household income were inversely associated with childhood obesity, suggesting that higher socioeconomic status may protect against obesity risk. Additionally, access to healthy food options in the neighborhood emerged as a significant predictor of childhood obesity, highlighting the importance of environmental factors in shaping dietary behaviors. These findings underscore the need for multifaceted interventions targeting socioeconomic disparities and ecological barriers to promote healthy weight among children. Effective strategies may include improving access to nutritious foods and creating supportive environments for community physical activity. Addressing the determinants of childhood obesity is crucial for mitigating its adverse health effects and reducing the burden on healthcare systems.

KEYWORDS: *Childhood Obesity, Public Health, Healthy Lifestyle, Socioeconomic Factors, Physical Activity*

INTRODUCTION
Childhood obesity has emerged as a profoundly critical public health concern on a global scale, with ramifications not only for individual health but also for the broader societal well-being. The condition, characterized by an excess of body fat relative to age- and sex-specific norms, is associated with a myriad of adverse health outcomes, including but not limited to cardiovascular disease, type 2 diabetes, and psychosocial challenges. Furthermore, the economic burden stemming from childhood obesity is substantial, encompassing direct healthcare costs, diminished productivity, and compromised quality of life.

Understanding the determinants of childhood obesity is paramount for the development and implementation of effective prevention and intervention strategies. While genetic predisposition undoubtedly plays a role, there is a growing recognition that environmental and socioeconomic factors exert significant influence on obesity risk among children. Socioeconomic disparities, typified by variations in income, education levels, and access to resources, are closely intertwined with disparities in obesity prevalence. Additionally, environmental factors, such as the availability of nutritious food options and opportunities for physical activity, profoundly shape dietary behaviors and patterns of energy expenditure, thereby contributing to obesity risk.

Despite the increasing recognition of the multifactorial nature of childhood obesity, significant gaps persist in our understanding of the specific socioeconomic and environmental determinants driving this epidemic. Moreover, existing research often tends to focus on individual risk factors in isolation, thereby potentially overlooking the intricate interplay between socioeconomic status, environmental contexts, and health behaviours.

This research endeavour aims to bridge these gaps by conducting a comprehensive investigation into the determinants of childhood obesity, with a specific emphasis on socioeconomic and environmental factors. By employing sophisticated regression analysis techniques to scrutinize primary data collected from a diverse cohort of children and their families, this study endeavours to elucidate the nuanced relationships between socioeconomic status, neighbourhood environments, and the risk of childhood obesity. The insights gleaned from this research endeavour have the potential to inform the development of targeted interventions aimed at curbing the prevalence of childhood obesity and fostering health equity across diverse populations.

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REVIEW OF LITERATURE

To identify the research gap, some relevant scholarly work was reviewed. Authors from India and some globally recognized works were incorporated to gain better insight into the topic. Some of them are as follows:

[1] Rupayun (2022) Children between the ages of two and six who were enrolled in Anganwadi Centres in Tufanganj I Block, District Cooch Behar, West Bengal, participated in a cross-sectional study. After obtaining their mothers' informed agreement, 221 children between the ages of 2 and 6 were chosen from 5 AWCs using a two-stage sample procedure and simple random sampling. We computed the proportions, adjusted odds ratio for risk variables, and 95% confidence interval for prevalence. The percentages of obesity and overweight were 11.3% and 22.2%, respectively. When the duration of exclusive breastfeeding was less than six months compared to more than six months [AOR=8.069, 95% CI = 1.778-36.624, P=0.007] and when the duration of continued breastfeeding was less than six months compared to more than six months [AOR=12.586, 95% CI = 5.196-30.486, P=<0.001], the proportion of combined overweight and obesity was significantly higher.

[2] Sangeeta (2023) A cross-sectional study involving 1050 students from several Belagavi schools was conducted between January and October 2019. Using the statistical programme for the social science version 22.0, the results utilised for comparison were based on multiple logistic regression analysis, Chi-square test, and descriptive statistics. All tests were conducted with a significance level of $P < 0.05$. The study's findings showed that the following factors were statistically significant or associated with overweight and obesity ($P < 0.05$): age, family history of diabetes, family history of hypertension, physical activity (running, swimming), number of hours spent using a mobile device each day, number of hours spent using a computer each day, and frequency of foods consumed by a child (fried food, bakery items, sweets, and fast food).

[3] M. Anitha (2013) The World Health Organization-designed Global School-based Student Health Survey questionnaire (adapted for India) was used in this cross-sectional study of teenage students enrolled in 30 randomly chosen secondary and upper secondary schools in Chennai city. 1842 teenagers enrolled in classes VIII through XII were selected at random for the research. 40.7% of the students in this survey reported eating fruit at least once a day, whereas 74.5% reported eating vegetables at least once a day. Approximately 20 percent of the pupils consumed fast food on four or seven days in the preceding week. Thirty-four percent of the pupils watched television for longer than two hours a day. Of the boys and girls, 22% and nearly 68%, respectively, did not engage in outdoor sports. Upon evaluating the students' physical activity patterns, it was found that 15.6% of them were sedentary, 43.4% engaged in minimal activity, and 41.0% engaged in physical activity that improved their health. 5.2% of the pupils were obese, while 6.2% of them were overweight.

[4] Anuradha (2013) Data was gathered from schoolchildren between the ages of 12 and 16 using an interviewer-administered technique. There were 2258 participants in the sample (1097 boys and 1161 girls). Body mass index (BMI) was used to classify overweight and obesity based on the most recent approach suggested by the Centres for Disease Control and Prevention in 2000. A validated and pre-tested questionnaire was used to gather data on social and environmental variables. Within the current sample, the percentage of males who were overweight or obese was 11.2%, whereas the percentage of girls who were overweight or obese was 10.3%. Parental literacy, family income, and the amount of time children sleep are all strongly correlated with overweight. Overweight was associated with a higher parental education level (Mother: 1.570; 95% CI: 1.048-2.354). Children's connection with weight gain was also increased by increases in family income (OR = 1.529; 95% CI: 1.089-2.148) and child sleep duration <7 hrs per day (OR = 2.006; 95% CI: 1.194-3.371).

[5] Goyal (2011) This study set out to identify the risk factors for obesity and overweight among affluent adolescents in the south Gujarati city of Surat.from July 2009 to April 2010,cross sectional.The participants ranged in age from 12 to 15 years old. A pre-made and pre-tested questionnaire was utilised to collect data regarding the participants' past food intake and physical activity levels.

Measurements of height, weight, and BMI were made. The BMI for age was used to measure overweight and obesity. According to the IAP Growth Monitoring Guidelines for Children from Birth to 18 Years, students with BMIs between the 85th and 95th percentiles of the reference population were classified as overweight, while those with BMIs between the 95th and 95th percentiles were classified as obese. 6.55% and 13.9% of people were overweight or obese overall (boys: 6.7% and 15.1%; girls: 6.4% and 13.35%). The multiple logistic regression analysis's final model revealed that watching television or playing video games, consuming junk food, snacks, and fizzy drinks, and engaging in little to no physical activity were significant risk factors for being overweight or obese. It was discovered that the percentage of obese and overweight adolescents in Surat City's affluent youth was 6.55% and 13.9%, respectively. Adolescents who engage in sedentary behaviours such as watching television or playing video games, and following a certain diet are more likely to become overweight or obese.

[6] Kumar (2011) A cross-sectional study conducted from March 2013 to January 2014 in seven rich private schools in Vijayawada that charged 420, 000 rupees year. The sample size consisted of 1721 kids, aged 12 to 15 years, who were chosen at random. The

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individuals' weight and height were recorded, and their body mass index was computed. A pre-tested and pre-designed questionnaire was used to evaluate the participants' food and exercise habits. An Excel spreadsheet was utilised to handle the data, and the odds ratio was employed to determine the strength of association. P o 0.05 variables were regarded as statistically significant risk variables and were analysed using multiple regression. Overweight and obesity were prevalent overall at 26.9% and 8.7%, respectively. 48.38% of the study participants were girls, with 11.2% being overweight and 3.4% being obese, while 50.6% of the participants were boys, with 15.7% being overweight and 5.4% being obese. The main risk factors are eating outside the home, eating while watching TV, snacking more frequently outside, not playing outdoor sports, travelling by car to school, extended school days, spending a lot of time on computers or TV, not exercising every day, having both parents work, receiving little physical education, and not having a playground. Overweight and obesity were reported to be prevalent overall at 26.9% and 8.7%, respectively. The primary risk factors included eating outside the home, eating while watching TV, snacking frequently outside, not playing outside games, having both parents work, using a car to get to school, spending more time there each day, not exercising, spending a lot of time on the computer or watching TV, getting less physical education each week, and not having a playground. It was discovered that the frequency of carbonated drinks, sleep during the day, and home snacking did not affect the prevalence of overweight and obesity.

[7] Namdev (2015) Over the course of 28 months, students at Bhopal's government and private schools who were enrolled in classes IX, X, XI, and XII participated in a cross-sectional descriptive study. Simple random sampling with multiple stages was employed. Data were gathered using anthropometric measures and a pretested, self-administered questionnaire with sociodemographic details. 46 (1.0%) and 256 (5.6%) of the students in the current study were obese. Higher SES students accounted for the highest percentage of obese pupils (2.5%), compared to lower and intermediate SES students. In general, it was discovered that girls and pupils attending private schools had higher rates of overweight and obesity. Children whose working mothers had greater education levels were more likely to have it.

RESEARCH OBJECTIVES

- To know the status of child obesity in Jodhpur
- To examine the socioeconomic and environmental factors of Childhood obesity

METHODOLOGY

STUDY DESIGN

This research adopts a cross-sectional study design to investigate the determinants of childhood obesity. Cross-sectional studies are particularly suitable for examining associations between various factors and obesity prevalence within a specific population at a single point in time.

SAMPLING STRATEGY

The study utilizes a stratified random sampling technique to ensure representation across different demographic groups. Stratification may be based on factors such as age, gender, and socioeconomic status to capture the diversity of the target population. Sample size calculation is conducted to ensure adequate statistical power for regression analysis.

DATA COLLECTION

Data are collected through structured interviews or surveys administered to children and their parents or guardians. The questionnaire includes validated measures of socioeconomic status, environmental factors, dietary habits, physical activity levels, and health outcomes. Anthropometric measurements, such as height, weight, and waist circumference, are also obtained to assess obesity status.

VARIABLES

Dependent Variable: Childhood obesity status, typically measured using Body Mass Index (BMI) percentile for age and sex.
Independent Variables: Socioeconomic factors (e.g., parental education level, household income), environmental factors (e.g., access to healthy food options, neighborhood safety), dietary habits (e.g., consumption of fruits and vegetables, fast food intake), physical activity levels (e.g., hours of sedentary behavior, participation in sports), and other relevant covariates.

REGRESSION ANALYSIS

Multiple regression analysis examines the relationships between independent variables and childhood obesity while controlling for potential confounding factors. Specifically, hierarchical regression may be used to assess the incremental contribution of socioeconomic and environmental factors to obesity risk after accounting for demographic characteristics and health behaviors. Regression diagnostics, including tests for multicollinearity and heteroscedasticity, are conducted to ensure the validity of the regression model.

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ETHICAL CONSIDERATIONS

Ethical approval is obtained from the relevant institutional review board (IRB) prior to data collection. Informed consent is obtained from participants, and measures are taken to ensure confidentiality and privacy. Participants are informed of their right to withdraw from the study at any time without penalty.

DATA ANALYSIS

Quantitative data are analyzed using statistical software such as SPSS or R. Descriptive statistics are computed to summarize the characteristics of the study sample. Regression coefficients, standard errors, and significance levels are reported to elucidate the associations between independent variables and childhood obesity. Subgroup analyses and sensitivity analyses may be conducted to explore potential effect modifications and assess the robustness of the findings.

LIMITATIONS

Potential limitations of the study, such as the cross-sectional design, self-report bias, and the inability to establish causality, are acknowledged. Strategies to mitigate these limitations, such as sensitivity analyses and validation of self-reported data against objective measures, are implemented where feasible.

IMPLICATIONS AND FUTURE DIRECTIONS

The implications of the findings for public health practice, policy development, and future research are discussed. Recommendations for targeted interventions to address socioeconomic and environmental determinants of childhood obesity are provided, along with suggestions for longitudinal studies to elucidate causal relationships and intervention effectiveness over time.

DEMOGRAPHIC PROFILE OF THE RESPONDENTS

310 respondents from Jodhpur participated in the survey, and the following are their demographic profiles. Due to the nature of the study, all data was collected for the children (7-18 years). Children aged 7-18 encompass a critical developmental period spanning late childhood through adolescence. This age range captures important physical, cognitive, and social transitions, during which diet, physical activity, and body image behaviors may undergo significant changes.

Table 1 Demographic Profile of Respondents

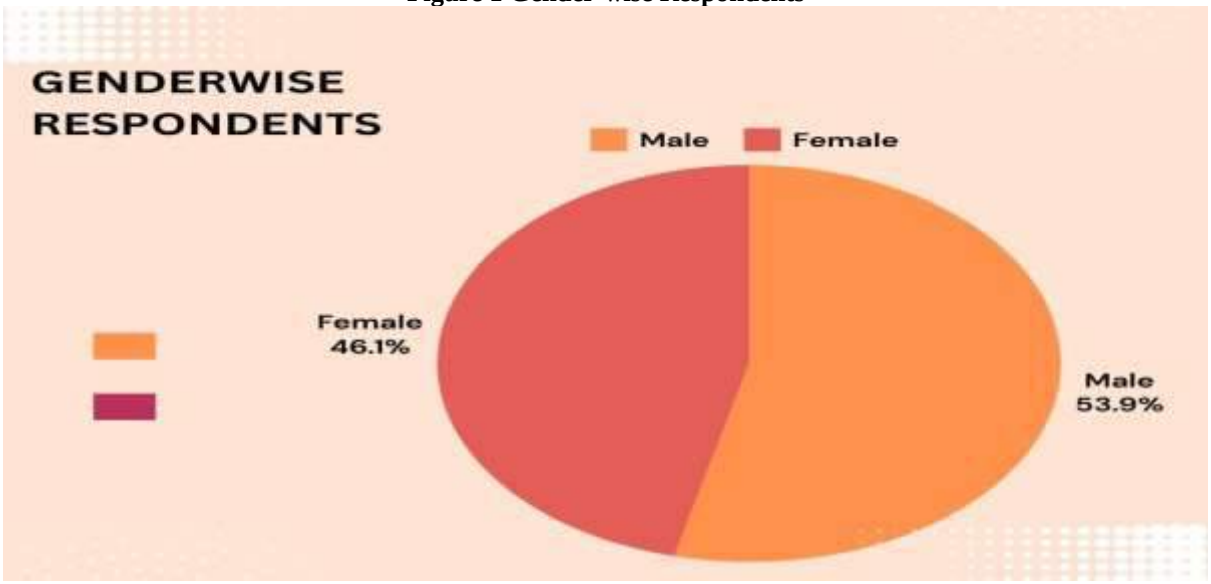
Gender	**N**	**%**
Male	167	53.87
Female	143	46.13
Total	310	100.00
Respondents Type	**N**	**%**
Children	151	48.71
Parents	104	33.55
paediatricians	25	8.06
dietitians	30	9.68
Total	310	100.00

Source : Survey Data

Out of 310 respondents, 167 were male, and 143 were female. Responses were also taken from various categories of respondents, including children, their parents, pediatricians, dietitians, etc.

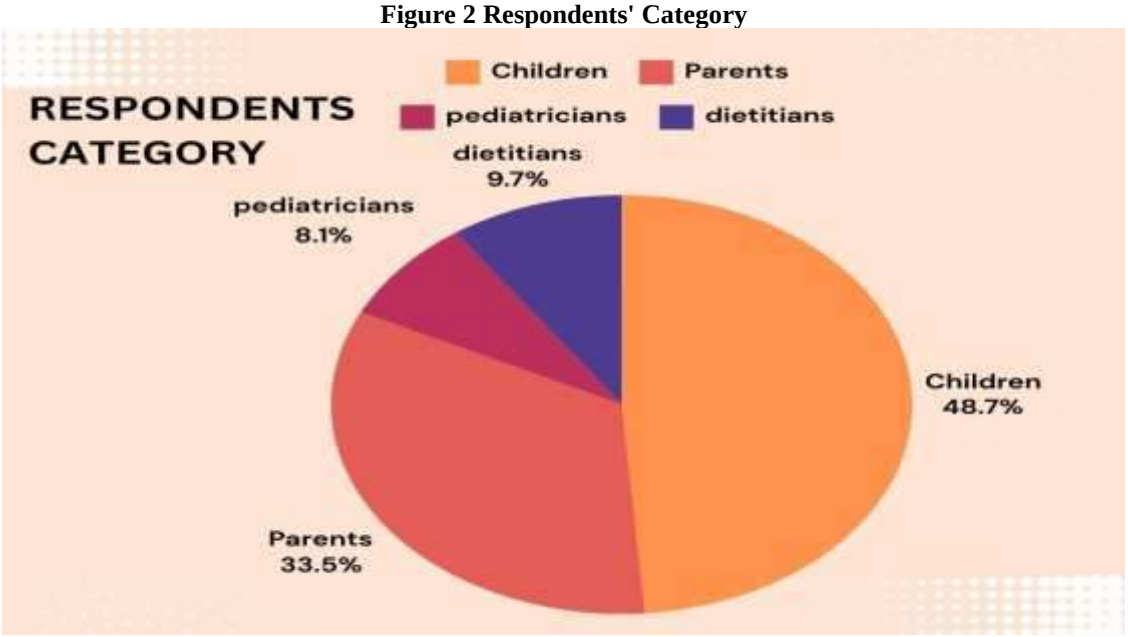
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Figure 1 Gender-wise Respondents



A total of 310 responses were collected for the survey, focusing exclusively on children. Of these, 151 responses were directly provided by children themselves, while an additional 104 responses were provided by parents on behalf of their children. Furthermore, insights from pediatricians and dietitians were sought to provide more detailed perspectives. It is important to clarify that all responses, including those from parents, paediatricians, and dietitians, pertained to children and their experiences. This comprehensive approach allowed for a holistic understanding of child obesity and the factors influencing it, with perspectives gathered from multiple stakeholders directly involved in children's health and well-being.

Figure 2 Respondents' Category



FACTORS AFFECTING CHILDHOOD OBESITY.

When data were gathered from respondents, the following responses were received.

Table 2 Child Obesity (measured in BMI)

BMI	N	%
19-25	40	12.90
25-30	67	21.61
30-35	120	38.70
>35	83	26.77
Total	310	100.00

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19-25 BMI range: 40 children in this category constitute approximately 12.90% of the total.
25-30 BMI range: There are 67 children in this category, which constitutes approximately 21.61% of the total.
30-35 BMI range: There are 120 children in this category, which constitutes approximately 38.70% of the total.
>35 BMI range: There are 83 children in this category, which constitutes approximately 26.77% of the total.
Overall, the table provides a breakdown of child obesity levels based on BMI ranges. It shows that the majority of children fall into the higher BMI categories, with the largest proportion falling into the 30-35 BMI range.

Table 4 Access to Park

Access to Park	N	%
Yes	135	43.54
No	175	57.46
Total	310	100.00

135 individuals (43.54%) have access to a park.
175 individuals (57.46%) do not have access to a park.

Table 5 Healthy food in Neighbourhood

Healthy food in the Neighbourhood	N	%
Yes	141	45.48
No	169	55.52
Total	310	100.00

141 individuals (45.48%) have access to healthy food options in their neighbourhood.
169 individuals (55.52%) do not have access to healthy food options in their neighbourhood.

Table 6 Household Income (INR)

Household Income	N	%
<200000	87	28.06
200001-400000	142	45.80
400001-600000	35	11.29
6000001-1000000	25	8.06
>1000000	21	6.77
Total	310	100.00

87 individuals (28.06%) have a household income of less than 200,000 INR.
142 individuals (45.80%) have a household income between 200,001 and 400,000 INR.
35 individuals (11.29%) have a household income between 400,001 and 600,000 INR.
25 individuals (8.06%) have a household income between 600,001 and 1,000,000 INR.
21 individuals (6.77%) have a household income greater than 1,000,000 INR.

Table 7 Parental Education Level

Parental Education Level	N	%
Illiterate	18	5.80
Up to Secondary	57	18.38
Up to Senior Secondary	81	26.12
UG	102	32.90
PG	43	13.87
Other	9	2.90
Total	310	100.00

18 individuals (5.80%) have parents who are illiterate.
57 individuals (18.38%) have parents with education up to secondary level.
81 individuals (26.12%) have parents with education up to senior secondary level.
102 individuals (32.90%) have parents with undergraduate education.
43 individuals (13.87%) have parents with postgraduate education.
9 individuals (2.90%) have parents with other educational backgrounds
RESULT AND DISCUSSION
Summary Statistics:
Multiple R: 0.704
R Square: 0.496

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Adjusted R Square: 0.490
Standard Error: 0.893
Observations: 310

ANOVA

Source	DF	SS	MS	F	Significance F
Regression	4	239.292	59.823	75.086	3.06E-44
Residual	305	243.002	0.797		
Total	309	482.294			

The regression model is significant ($p < 0.001$).

Coefficients

Variable	Coefficient	Standard Error	t-Stat	P-value	95% Lower Bound	95% Upper Bound
Intercept	8.764	1.787	4.904	<0.001	5.248	12.281
Parental Education Level	2.5	0.645	3.877	<0.001	1.232	3.768
Income	-0.25	0.631	-0.396	0.692	-1.492	0.992
Healthy Food in Neighborhood	0.488	0.081	6.014	<0.001	0.329	0.649
Access to Park	-0.163	0.046	-3.532	<0.001	-0.254	-0.072

Summary Statistics
Multiple R: The correlation coefficient indicates a moderately strong positive relationship between the independent variables and the dependent variable.
R Square: Approximately 49.6% of the variance in the dependent variable is explained by the independent variables in the model.
Adjusted R Square: This adjusted value accounts for the number of predictors in the model and is slightly lower than the R Square.
Standard Error: The standard deviation of the residuals is approximately 0.893, suggesting that, on average, observed values deviate from the regression line by this amount.
Observations: There are 310 data points in the analysis.

ANOVA
The regression model is statistically significant ($p < 0.001$), indicating that it explains a significant amount of variance in the dependent variable.
Coefficients:
Intercept: When all independent variables are zero, the expected value of the dependent variable is approximately 8.764.
Parental Education Level: There is a significant positive correlation between parental education level and the dependent variable, indicating that as parental education level increases, the dependent variable tends to increase.
Income: Income does not show a significant correlation with the dependent variable.
Healthy Food in Neighborhood: There is a significant positive correlation between the availability of healthy food in the neighborhood and the dependent variable, suggesting that as the availability of healthy food increases, the dependent variable tends to increase.
Access to Park: There is a significant negative correlation between access to parks and the dependent variable, indicating that as access to parks increases, the dependent variable tends to decrease.

CONCLUSION

In conclusion, the findings of this research shed light on the multifaceted nature of childhood obesity and highlight several significant factors influencing its prevalence. The analysis revealed a concerning trend wherein a substantial portion of children fell into higher BMI categories, with the majority falling into the 30-35 BMI range. Furthermore, disparities in access to resources were evident, with a significant proportion of children lacking access to parks and healthy food options in their neighborhoods.

The regression analysis unveiled crucial insights into the relationship between various factors and childhood obesity. Parental education level emerged as a significant predictor, with higher levels of parental education associated with lower levels of childhood obesity. Additionally, the availability of healthy food options in the neighborhood was positively correlated with lower levels of obesity, suggesting the importance of environmental factors in shaping dietary habits and health outcomes. Conversely, access to parks exhibited a negative correlation with childhood obesity, highlighting the potential role of physical activity opportunities in mitigating obesity risk among children.

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These findings underscore the importance of implementing comprehensive interventions that address the socio-economic and environmental determinants of childhood obesity. Efforts aimed at improving access to education, promoting healthy food environments, and enhancing opportunities for physical activity are crucial for combating the obesity epidemic among children. By adopting a multi-dimensional approach that addresses the root causes of obesity, policymakers, healthcare professionals, and communities can work together to create healthier environments and empower children to lead healthier lives.

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FORMULATION AND EVALUATION OF ANTIDIABETIC HERBAL CHOCOLATES CONTAINING GUAVA LEAVES AND AEGLE MARMELOS LEAVES

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ABSTRACT

The consumption of chocolate is enjoyed by people of all ages, yet health concerns such as obesity, high blood pressure, diabetes, and coronary artery disease persist. The aim of the present study was to formulate medicated chocolate containing herbal ingredients aimed at preventing diabetes and providing diabetic patients with a convenient chocolate option. Psidium guajava, also known as guava leaves, is rich in antioxidants and vitamins that aid in lowering blood sugar levels. Aegle marmelos, synonymous with Bael leaves, contains high levels of flavonoids and alkaloids, which also contribute to reducing blood sugar levels. The formulation of herbal chocolates included guava leaf powder, Bael leaf powder, dark chocolate, sucrose, coffee, cocoa butter, cardamom powder, and sodium benzoate. The prepared chocolate formulations were evaluated for parameters such as hardness, pH, general appearance, colour, texture, chemical composition, weight variation, melting point, and physical stability.

KEYWORDS: *Herbal chocolate, Guava leaves, Aegle Marmelose leaves, cocoa butter, Dark chocolate, Sodium Benzoate, Cardemom.*

INTRODUCTION

Diabetes is a chronic disease which caused by a metabolic disorder characterized by fast increasing of blood sugar level (high blood glucose).[1]Insulin, a hormone produced by the pancreas, plays a key role in regulating blood sugar levels by facilitating the uptake of glucose from the bloodstream into cells for energy production or storage.[2]

1.1 Types of Diabetes

1. **Type 1 Diabetes**: This results from the immune system mistakenly attacking and destroying insulin-producing beta cells in the pancreas. As a result, the body produces little to no insulin, leading to elevated blood sugar levels. Type 1 diabetes typically develops in children and young adults, requiring lifelong insulin therapy for management.[3]

2. **Type 2 Diabetes:** This is the most common form of diabetes, accounting for the majority of cases. It occurs when the body becomes resistant to insulin or gradually loses the ability to produce enough insulin to maintain normal blood sugar levels. Type 2 diabetes is often associated with lifestyle factors such as obesity, physical inactivity, and poor dietary habits. It can develop at any age, but it is more common in adults.

3. **Gestational Diabetes:** This type of diabetes occurs during pregnancy when the body cannot produce enough insulin to meet the increased demand. Gestational diabetes increases the risk of complications during pregnancy and childbirth, and women who develop it are at higher risk of developing type 2 diabetes later in life.[4]

4. **Other Specific Types:** There are other less common forms of diabetes, including genetic mutations affecting insulin production or action, diseases of the pancreas, drug-induced diabetes, and diabetes associated with certain medical conditions.[5

5. **Common symptoms of diabetes include**
   - Increased thirst and urination
   - Fatigue
   - Blurred vision

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- Unintentional weight loss
- Slow-healing wounds
- Tingling or numbness in the hands and feet
- Recurrent infections, particularly of the skin, gums, or urinary tract

Complications of diabetes can affect various organs and systems in the body, leading to serious health issues if left untreated or poorly managed. Some of the complications include:

- **Cardiovascular diseases:** Diabetes increases the risk of heart disease, stroke, and peripheral artery disease.
- **Nerve damage (neuropathy):** High blood sugar levels can damage the nerves, leading to pain, numbness, and weakness, particularly in the hands and feet.
- **Kidney damage (nephropathy):** Diabetes is a leading cause of kidney failure, requiring dialysis or kidney transplantation.
- **Eye damage (retinopathy):** Diabetes can cause damage to the blood vessels in the retina, leading to vision loss or blindness if untreated.
- **Foot complications:** Nerve damage and poor circulation can increase the risk of foot ulcers, infections, and eventual amputation.[6]

Management of diabetes typically involves a combination of lifestyle modifications, medication, and regular monitoring. Treatment goals aim to achieve and maintain optimal blood sugar levels, prevent or delay the onset of complications, and improve overall quality of life. Lifestyle interventions include adopting a healthy diet, engaging in regular physical activity, maintaining a healthy weight, and avoiding tobacco use.

Regular monitoring of blood sugar levels, blood pressure, cholesterol levels, and kidney function is essential for effective diabetes management. Self-management education and support programs can also help individuals with diabetes learn to effectively manage their condition and make informed decisions about their health.

Prevention strategies for type 2 diabetes include maintaining a healthy weight, being physically active, eating a balanced diet rich in fruits, vegetables, whole grains, and lean proteins, and avoiding excessive consumption of sugary beverages and processed foods. Early detection and treatment of prediabetes can also help prevent or delay the onset of type 2 diabetes.[7]

Overall, diabetes is a complex and challenging condition that requires comprehensive management strategies to prevent complications and optimize health outcomes. With proper education, support, and access to healthcare resources, individuals with diabetes can lead fulfilling and productive livers.[8]

In recent years, there has been a growing interest in developing food products that not only satisfy culinary cravings but also offer potential health benefits, especially for individuals managing chronic conditions like diabetes. One such innovative endeavor is the formulation and evaluation of an antidiabetic herbal chocolate. This comprehensive study delves into the intricate process of creating a chocolate blend infused with the therapeutic properties of guava leaves and Aegle marmelos leaves powder, along with the complementary flavours and functionalities of dark chocolate, saccharin, coffee, cocoa butter, cardamom, and sodium benzoate.

The selection of ingredients in this formulation is deliberate, aimed at achieving a harmonious balance between taste, texture, and health-promoting properties. Guava leaves and Aegle marmelos leaves powder are chosen for their well-documented antidiabetic effects, containing bioactive compounds such as polyphenols and flavonoids that have shown promise in regulating blood sugar levels and improving insulin sensitivity.[9]

Dark chocolate, with its rich cocoa content, is not only a source of indulgence but also a reservoir of antioxidants, which may help mitigate oxidative stress associated with diabetes. To maintain sweetness without adversely affecting blood glucose levels, saccharin, a non-nutritive sweetener, is incorporated into the formulation.

Coffee, another ubiquitous ingredient, adds depth of flavor and complexity to the chocolate blend while potentially offering additional benefits for individuals with diabetes. Studies have suggested that coffee consumption may be associated with a reduced risk of type 2 diabetes, attributed in part to its bioactive compounds such as chlorogenic acids and trigonelline, which may improve glucose metabolism and insulin sensitivity.[10]

Cocoa butter, derived from the cocoa bean, serves as the fat component of the chocolate, imparting a smooth and creamy texture while contributing beneficial fatty acids and antioxidants. Cardamom, a fragrant spice with a long history of medicinal use, lends its distinct aroma and flavor to the formulation, enhancing the sensory experience of the chocolate blend.

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To ensure the stability and shelf-life of the product, sodium benzoate, a commonly used preservative, is included in the formulation. Its antimicrobial properties help prevent microbial growth and spoilage, preserving the integrity of the herbal chocolate blend over time.[11] Through a rigorous evaluation process encompassing sensory analysis, stability testing, and assessment of antidiabetic efficacy, this study aims to validate the quality and effectiveness of the formulated chocolate blend. By marrying culinary creativity with evidence-based nutrition and medicinal science, this research endeavor seeks to offer a delectable and health-conscious option for individuals seeking diabetic-friendly indulgences.[12]

In recent years, there has been growing interest in developing food products that offer potential health benefits, particularly for individuals managing chronic conditions like diabetes. One such innovative endeavor is the formulation and evaluation of antidiabetic herbal chocolate. This study aims to create a chocolate blend infused with the therapeutic properties of guava leaves and Aegle marmelos leaves powder, along with complementary flavours and functionalities of dark chocolate, saccharin, coffee, cocoa butter, cardamom, and sodium benzoate.

These ingredients are selected for their potential antidiabetic effects and their ability to enhance the sensory characteristics of the chocolate blend. Through rigorous evaluation, including sensory analysis, stability testing, and assessment of antidiabetic efficacy, this research aims to validate the quality and effectiveness of the formulated chocolate blend as a diabetic-friendly indulgence.

OBJECTIVES

1) To formulate antidiabetic chocolate suitable for individuals of all ages affected by diabetes.
2) To regulate blood sugar levels and reduce the long-term risk of diabetes.
3) To reduce reliance on medicated drugs by providing an alternative antidiabetic option.
4) To create a chocolate blend incorporating guava leaves and Aegle marmelos leaves powder to leverage their antidiabetic properties.
5) To evaluate the sensory attributes of the herbal chocolate, including taste, aroma, texture, and appearance, to ensure consumer acceptability.
6) To optimize the formulation to achieve a balance between taste, health benefits, and product stability, ultimately providing a diabetic-friendly indulgence.
7) To overcome intake of medicated drugs to get antidiabetic activity.

Need of Work

- The formulation and evaluation of antidiabetic herbal chocolate incorporating guava leaves, Aegle marmelos leaves powder, dark chocolate, sucrose, coffee, cocoa butter, cardamom, and sodium benzoate is imperative to address the growing demand for innovative, health-conscious confectionery options.
- The diabetes prevalence on the rise globally, there is an urgent need for delicious yet blood sugar-friendly treats. By integrating antidiabetic herbs like guava leaves and Aegle marmelos leaves powder, alongside sucrose as a sugar substitute, this formulation offers a natural solution to blood sugar regulation.
- Additionally, the inclusion of dark chocolate provides antioxidant benefits, while coffee and cardamom enhance flavor and potentially offer further health advantages. Preserving product stability and safety is essential, hence the utilization of sodium benzoate as a preservative.

Application:-

1)Antidiabetic Herbal Chocolate : These can be marketed as a convenient snack option for individuals managing diabetes or those looking to regulate their blood sugar levels.[13]

2)Sugar-Free Chocolate Spread: This spread can be positioned as a guilt-free option for people looking to reduce their sugar intake. It can be used as a topping for toast, pancakes, or fruit, providing a sweet chocolate flavor without the added sugars.[14]

3) Nutritious Meal Replacement : These can be positioned as a convenient and balanced option for individuals managing diabetes as part of their dietary regimen. Packed with nutritious ingredients including dark chocolate, cocoa butter, herbal powders, and coffee, they provide a satisfying snack or meal replacement option while also supporting blood sugar control.[15]

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Drug Profile & Excipients Profile

1. **Guava Leaves:**



Fig . 1 :- Guava leaves

- **Biological name**:- Psidium Guajava
- **Family:-** Myrtaceae

Taxonomical Information:

- **Kingdom:** Plantae
- **Order**: Myrtales
- **Family:** Myrtaceae
- **Genus:** Psidium
- **Species:** Psidium Guajava [16]

- **Pharmacology:-**

Guava leaves (Psidii guajavae folium) are known for their various medicinal properties, including antispasmodic, cough sedative, anti-inflammatory, antidiarrheic, antihypertensive, antiobesity, and antidiabetic effects. Studies on animal models have also shown the potential of guava leaves isolates as antitumor, anticancer, and cytotoxic agents.[17]

Uses:

1. Control blood sugar levels.
2. Boost the immune system.
3. Improve skin health.
4. Help lower blood sugar levels by improving insulin production and sensitivity.

2. **Aegle Marmelos Leaves:**



Fig. 2 :- Aegle Marmelos leaves

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- **Common Name:** Bael, Bilwa
- **Biological Name:** Aegle Marmelos
- **Family:** Rutaceae

- **Taxonomical Information:**

- **Kingdom:** Plantae
- **Order**: Sapindales
- **Family:** Rutaceae
- **Species:** Aegle Marmelos
- **Class:** Dicotyledons
- **Genus:** Aegle correa [18]

Pharmacological Activity

Aegle marmelos leaves have been reported to possess various pharmacological activities. They are known for their hypoglycemic (blood sugar-lowering) properties, making them valuable in managing diabetes. Studies have shown that the dried powder of A. marmelos leaves lowers blood sugar levels in streptozotocin-induced diabetes rat models by boosting insulin secretion from pancreatic beta cells.[19]

Uses:

1) Blood sugar regulation :- Aegle Marmelose leaves are belived to have hypoglycemic properties , making them beneficial for individuals with diabetes or those looking to regulate blood sugar levels.[20]

2) Digestive Health:- The leaves are known for their digestive properties, aiding in digestion and relieving gastrointestinal issues such as constipation and indigestion.

3) Immune system support :- Aegle Marmelose leaves contain antioxidants and immune boosting compounds that may help strengthen the immune system and protect against infection.[21]

4) Anti inflammatory effects:- The leaves have anti inflammatory properties, which can help reduce inflammation in the body and alleviate related symptoms.[22]

Excipients Profile:-

3. Dark Chocolate:

Dark chocolate is rich in polyphenols, which possess antioxidant properties and may aid in regulating blood sugar levels.

4. Coffee:-

Coffee is used as a flavor enhancer and contains compounds such as chlorogenic acids and antioxidants that have been studied for their potential antidiabetic effects.

5. Cocoa Butter:

Cocoa butter serves as a solidifying agent in chocolate, contributing to its gloss, texture, and typical melting behaviour..

6. Sucrose:

Sucrose acts as a sweetening agent in the formulation.

7. Cardamom Powder:

Cardamom and its active constituents have been reported to control insulin secretion and help maintain normal blood sugar levels.

8. Sodium Benzoate:

Sodium benzoate is a preservative that inhibits the growth of bacteria, yeast, and mold in acidic foods and beverages, thereby extending their shelf life.

Materials and Equipment

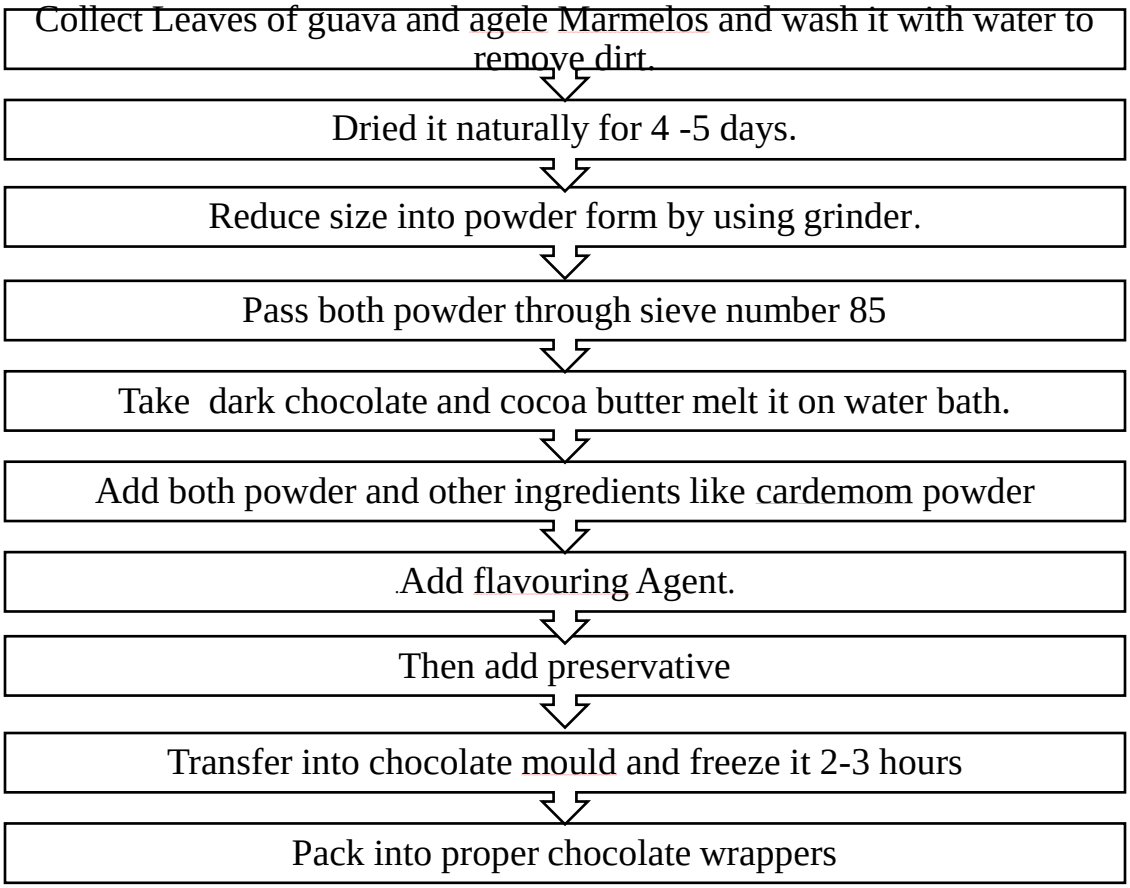
1. Mixing Bowls:- Used for blending and mixing the ingredients to prepare the chocolate formulation.
2. Measuring Instruments:- Weighing balance for accurately measuring ingredients.
3. Blender or Grinder:-Used to grind or blend ingredients such as guava leaves or Aegle Marmelos leaves (Bael) into powder form.
4. Heating Apparatus:- Water bath for melting the dark chocolate.
5. Stirring Rods or Spatulas:-Used for thorough mixing and homogenization of the formulation.
6. Refrigerator:-Used to freeze the chocolate formulation.
7. Chocolate Mould:- Used to give proper shape to the liquid chocolate before it sets.

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Experimental work:
Formulation of Dark Chocolate
Formula

Sr. No.	Ingredients	Quantity Taken			Category
		F1	F2	F3	
1	Guava Leaves Powder	2.5	2.5	2.5	Antidiabetic Agent
2	Aegle Marmelose leaves powder	2.5	2.5	2.5	Antidiabetic Agent
3	Dark chocolate	50	50	50	Antioxidant
4	Cocoa butter	2.5	2.8	03	Solidifying agent
5	Sucrose	2.4	2.4	2.4	Sweetening Agent
6	Cardemom powder	01	01	01	Flavouring Agent
7	Coffee	01	01	01	Flavouring Agent
8	Sodium Benzoate	0.05	0.05	0.05	Preservative

- **Steps/Methodology**



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Fig. 3:- Formulation of Chocolate

Evaluation Test

a. Physical Appearance:-

1. Colour: Observe the colour visually.

2. Texture: Evaluate the texture of the chocolate.

3. Mouth Feel: Place chocolate in the mouth and feel its texture.

4. Taste of Chocolate: Taste the chocolate.

5. Hardness: Perform a hardness test by pressing a specified dimensioned and loaded object (indentor) into the surface of the material being tested. The hardness is determined by measuring the depth of indentor penetration or by measuring the size of the impression left by an indentor.[23]

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6. pH: The pH formulation was determined using digital pH meter.



Fig. 4 :- pH Determination

b. Chemical Test

1. Test for Carbohydrate (Fehlings Test):- A solution containing equal quantities of Fehlings solution A and B was added and heated. The formation of a brick-red precipitate indicates the presence of carbohydrates.

2. Test for Protein (Biuret Test/General Test):- Chocolate formulation was mixed with 4% NaOH and a few drops of 1% copper sulphate solution. The formation of a violet color indicates the presence of protein.

3. Test for Amino Acids:- The test solution was heated, and 5% Ninhydrin solution was added. Boil for 10 minutes. The formation of a purple or bluish color indicates the presence of amino acids.[24]

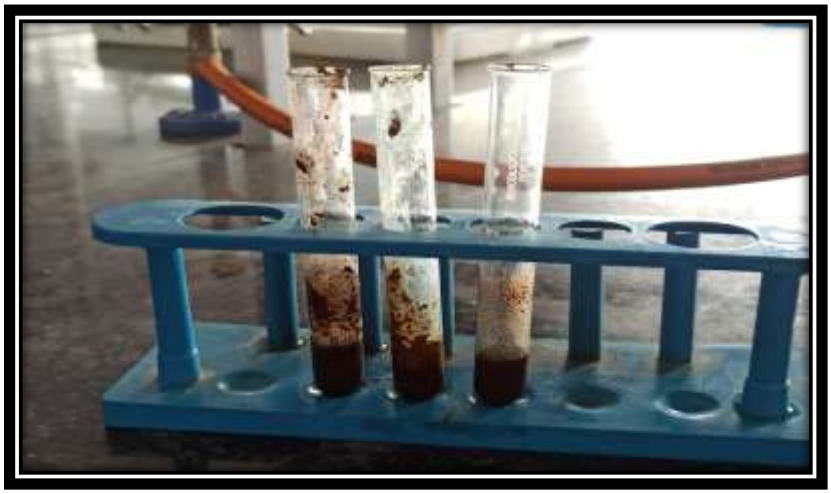


Fig. 5:- Chemical Test

c. Weight Variation:-

The weight of four chocolate recipes was weighed separately and collectively. The weight of all the chocolates was used to calculate the average weight. The average weight was then compared with the individual weights using the following formula to determine the percentage deviation.[25]

% Deviation = Individual Weight – Average Weight / Aver6 Weight ×100

d. Bloom Test

Fat Bloom Test:- The chocolate was heated to 40°C for 30 minutes and then cooled to 20°C. After being at 20°C for 8 hours, a test sample was checked to see if bloom had occurred or not.[25]

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Fig. 6 :-Observation from bloom test of chocolate

e. Physical Stability

To check physical stability, samples of chocolate were kept in closed containers for 1 month at 28°C. After 1 month, test samples of chocolate were observed for physical appearance and drug degradation.[26]

RESULTS & DISCUSSION

Sr.	Test	F1	F2	F3
1)	Colour	Dark Brown	Dark Brown	Dark Brown
2)	Texture	Smooth	Smooth	Smooth
3)	Taste	Sweet	Sweet	Sweet
4)	Consistency	Solid	Solid	Solid
5)	pH	6.8	6.4	6.5
6)	Stability	Stable	Stable	Stable
7)	Environmental impact assessment	Biodegradable	Biodegradable	Biodegradable
8)	Aroma test	Sweet and floral	Sweet and floral	Sweet and floral

1. Colour:- The chocolate formulations (F1, F2, and F3) exhibited a consistent dark brown colour, indicating uniformity in the chocolate preparation process.
2. Texture:-All formulations showed a smooth texture, suggesting proper blending and homogenization of ingredients.
3. Taste:- The chocolates were uniformly sweet in taste across all variations (F1, F2 and F3), indicating balanced sweetness levels.
4. Consistency:- The consistency of the chocolates was solid, indicating proper solidification during the cooling process.
5. pH: The pH values of the formulations were within a close range (6.4 to 6.8), indicating slight variation but overall stability in acidity levels.
6. Shelf Life Test: All formulations were tested for shelf life at room temperature, suggesting potential stability in storage conditions.
7. Environmental Impact Assessment:- The chocolates were found to be biodegradable, indicating their eco-friendly nature and minimal environmental impact.
8. Aroma Test:-The chocolates exhibited a sweet and floral aroma, enhancing the sensory experience for consumers.

CONCLUSION

Based on the study conducted, it can be concluded that the natural active constituents present in guava leaves powder and Aegle Marmelos leaves extract exhibit superior inhibition against diabetic activity compared to commercially available antidiabetic chocolate. Among the formulations tested, batch S3 emerged as the optimized batch, providing satisfactory sweetening properties, pH levels, and stability profile.

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The incorporation of herbal ingredients such as guava leaves powder and Aegle Marmelos leaves powder into the chocolate formulation proved successful, as these ingredients contain active constituents like flavonoids and phenolic compounds known for their antidiabetic properties. Additionally, the inclusion of dark chocolate in the formulation is beneficial for improving insulin sensitivity and regulating blood sugar levels, potentially reducing the risk of type 2 diabetes and improving glucose metabolism.

Furthermore, the dosage range of the herbal extracts used in the formulation ensures safe consumption without risking any side effects. Overall, the study highlights the potential of herbal chocolates enriched with guava leaves and Aegle Marmelos leaves extracts as a safe and effective option for managing diabetes. Further research and clinical trials may provide additional insights into their efficacy and long-term effects on diabetes management.

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DEVELOPMENT AND VALIDATION OF A HPLC METHODS FOR DETERMINATION OF DEXIBUPROFEN IN PHARMACEUTICAL PREPARATIONS

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ABSTRACT

This review presents the development and validation of a high-performance liquid chromatography (HPLC) method for the accurate determination of Dexibuprofen in pharmaceutical preparations. Dexibuprofen, the active enantiomer of ibuprofen, is known for its enhanced therapeutic efficacy and reduced adverse effects. The developed method involved the optimization of chromatographic conditions using a C18 column with a mobile phase composed of methanol and phosphate buffer at pH 3.0, pumped at a flow rate of 1.0 mL/min. Dexibuprofen was detected at a wavelength of 220 nm. The method was validated according to ICH guidelines for parameters including specificity, linearity, precision, accuracy, robustness, and system suitability. The method exhibited excellent linearity (R2 > 0.999) over the concentration range of 5-100 µg/mL with high precision and accuracy. The limit of detection (LOD) and limit of quantification (LOQ) were found to be 0.5 µg/mL and 1.0 µg/mL, respectively. The proposed method was successfully applied for the determination of Dexibuprofen in commercial pharmaceutical formulations, demonstrating its suitability for routine quality control analysis. Overall, the developed HPLC method offers a reliable and sensitive approach for the quantification of Dexibuprofen in pharmaceutical preparations, ensuring quality and consistency in drug formulations.

KEYWORDS: *Dexibuprofen, High-performance liquid chromatography (HPLC), Pharmaceutical preparations, Method development, Method validation, Quantification, C18 column, Methanol-phosphate buffer, Specificity, Linearity.*

INTRODUCTION

The accurate determination of drug content in pharmaceutical preparations is crucial for ensuring product quality, efficacy, and safety. High-performance liquid chromatography (HPLC) is a widely used analytical technique for the separation, identification, and quantification of chemical compounds in complex mixtures, including pharmaceutical formulations. In this context, the present research focuses on the development and validation of an HPLC method for the determination of Dexibuprofen in pharmaceutical preparations[1].

Principle of HPLC

High-performance liquid chromatography (HPLC) is a separation technique based on the principle of liquid chromatography, which involves the separation of components in a liquid mixture based on their differential interaction with a stationary phase and a mobile phase. In HPLC, a sample mixture is injected into a column packed with a stationary phase, and the components are separated as they travel through the column under pressure. The separation is achieved based on differences in polarity, size, charge, or affinity of the components for the stationary phase. Detection of separated components is typically performed using a detector, such as UV-Vis spectrophotometry, which measures the absorbance of the analytes at a specific wavelength.

Components of HPLC

1. Stationary Phase

- The stationary phase is a solid or liquid material packed into the column. It is typically composed of porous particles with a high surface area. Common stationary phases include silica, C18 (octadecylsilane), and other bonded phases tailored to specific analyte characteristics.[2]

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2. Mobile Phase
- The mobile phase is a liquid solvent or a mixture of solvents that carries the sample through the column. It is pumped through the system under high pressure to achieve efficient separation. The composition of the mobile phase can be varied to optimize separation conditions based on the analyte properties.

3. Pump
- The pump is responsible for delivering the mobile phase at a constant flow rate and pressure throughout the chromatographic analysis. It ensures reproducible separation conditions and efficient elution of analytes from the column.[3]

4. Injector
- The injector is used to introduce the sample into the HPLC system. It typically consists of a syringe or an autosampler that accurately delivers a predefined volume of sample into the column.[4]

5. Column
- The column is the heart of the HPLC system where the separation of components occurs. It is packed with the stationary phase and provides the surface area for interaction between the sample components and the stationary phase.

6. Detector
- The detector is used to monitor the eluent leaving the column and to quantify the separated components based on their characteristic signals. Common detectors include UV-Vis detectors, fluorescence detectors, and mass spectrometers.[5]

Types of HPLC
1. Reversed-Phase HPLC (RP-HPLC)
- In RP-HPLC, the stationary phase is nonpolar, such as C18, while the mobile phase is polar. This type of HPLC is widely used for the separation of hydrophobic analytes based on their hydrophobicity.

2. Normal-Phase HPLC
- In normal-phase HPLC, the stationary phase is polar, such as silica, while the mobile phase is nonpolar. This technique is suitable for separating polar compounds based on their polarity.[6]

3. Ion-Exchange Chromatography
- Ion-exchange chromatography involves the separation of charged analytes based on their interaction with a charged stationary phase. It is commonly used for the analysis of ions, peptides, and proteins.[7]

4. Size-Exclusion Chromatography (SEC)
- SEC separates analytes based on their size or molecular weight. Larger molecules elute faster through the column, while smaller molecules are retained longer.

5. Affinity Chromatography
- Affinity chromatography utilizes specific interactions, such as antigen-antibody or receptor-ligand interactions, for the separation of analytes. It is commonly used for the purification of biomolecules.[8]

For the article “Development and Validation of an HPLC Method for Determination of Dexibuprofen in Pharmaceutical Preparations,” the likely utilized type of HPLC is reversed-phase HPLC due to its suitability for separating hydrophobic compounds like Dexibuprofen.[9]

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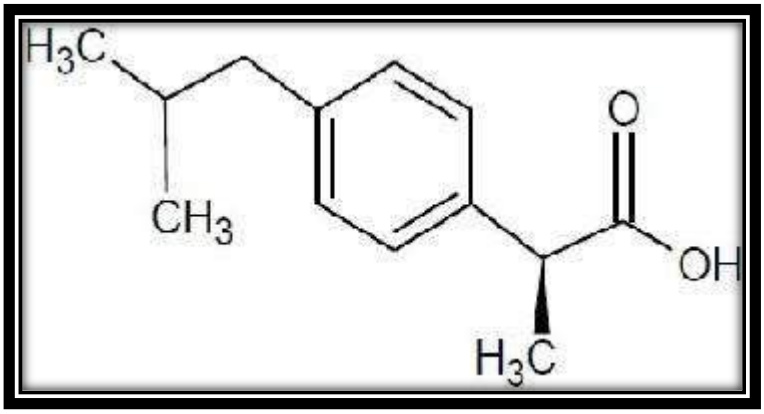


Fig: High Performance Liquid Chromatography (HPLC)

Dexibuprofen, the active enantiomer of ibuprofen, has gained attention in recent years due to its enhanced therapeutic profile compared to racemic ibuprofen. It exhibits potent anti-inflammatory, analgesic, and antipyretic properties, making it a valuable therapeutic agent in the management of various pain and inflammatory conditions. Despite its efficacy, accurate quantification of Dexibuprofen in pharmaceutical formulations is essential to ensure product quality, efficacy, and safety.[10]

High-performance liquid chromatography (HPLC) is widely employed for the determination of drug compounds due to its sensitivity, specificity, and reproducibility. In this context, the development and validation of an HPLC method for the quantification of Dexibuprofen in pharmaceutical preparations are crucial for routine quality control analysis.

Structure of Dexibuprofen



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Mechanism of Action of Dexibuprofen

Dexibuprofen exerts its pharmacological effects primarily through the inhibition of cyclooxygenase (COX) enzymes. COX enzymes are responsible for the conversion of arachidonic acid to prostaglandins, which are key mediators of pain, inflammation, and fever. By inhibiting COX enzymes, Dexibuprofen suppresses the synthesis of prostaglandins, thereby alleviating pain, reducing inflammation, and lowering fever.[11]

Moreover, Dexibuprofen is known to exhibit stereoselective pharmacological activity, with the S(+) enantiomer being more potent than the R(-) enantiomer. This stereoselectivity contributes to its improved therapeutic efficacy and reduced adverse effects compared to racemic ibuprofen.[12]

Overall, a comprehensive understanding of the mechanism of action of Dexibuprofen underscores its importance as a therapeutic agent and emphasizes the need for accurate quantification methods to ensure its efficacy and safety in pharmaceutical formulations.[12]

Experimental Details

1. Chemicals and Reagents:

- Dexibuprofen reference standard
- Methanol (HPLC grade)
- Phosphate buffer solution (pH 3.0)
- Acetonitrile (HPLC grade)
- Water (HPLC grade)
- Pharmaceutical formulations containing Dexibuprofen

2. Instrumentation

- High-performance liquid chromatography (HPLC) system equipped with:
  - C18 column (150 mm × 4.6 mm, 5 µm particle size)
  - UV detector set at 220 nm
  - Binary pump
  - Auto sampler
  - Column oven
  - Degasser
- Analytical balance
- pH meter
- Sonicator

3. Analytical Conditions

- Mobile phase: Methanol-phosphate buffer solution (pH 3.0) (50:50, v/v)
- Flow rate: 1.0 mL/min
- Injection volume: 20 µL
- Column temperature: 25°C
- Detection wavelength: 220 nm
- Run time: 10 minutes

4. Preparation of Standard Solution

- A stock solution of Dexibuprofen (1000 µg/mL) was prepared by dissolving an appropriate amount of Dexibuprofen reference standard in methanol.
- Working standard solutions were prepared by diluting the stock solution with methanol to obtain concentrations ranging from 5 to 100 µg/mL.[13]
- HPLC Method For the calibration curve, accurately weighed 100.0 mg of DI was transferred to a 100 mL volumetric flask and dissolved in a mixture of water and methanol of the ratio 1 : 1 v/v. From this solution, other solutions with concentrations of 10.0, 20.0, 30.0, 40.0, 50.0, and 60.0 µg mL−1 were obtained by diluting adequate amounts in triplicate.[14]

5. Preparation of Sample Solution

- Pharmaceutical formulations containing Dexibuprofen were accurately weighed and dissolved in methanol.
- The solution was sonicated for 15 minutes to ensure complete dissolution.

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- The solution was then filtered through a 0.45 µm membrane filter prior to HPLC analysis.
- HPLC Method Twenty tablets, each containing 200.0, 300.0, and 400.0 mg of DI were weighed and finely powdered; a quantity of powder equivalent to 20.0, 30.0 and 40.0 mg of DI was weighed and transferred to a sintered glass crucible. To this 5.0 mL of 1.0 mg mL−1 solution of ibuprofen was added and the drugs were extracted with three quantities, each of 20 mL of mixture of methanol and water (1 : 1 v/v). The combined extracts were made up to 100 mL with mobile phase, and further dilutions were made to get a concentration of 20.0, 30.0, and 40.0 µg/mL of dexibuprofen, 50.0 µg/mL of Ibuprofen as internal standard, and this solution was used for the estimation.[15]

6. Method Validation

- Specificity: Assess the ability of the method to accurately quantify Dexibuprofen in the presence of other formulation excipients.
- Linearity: Evaluate the linearity of the calibration curve over the concentration range of 5-100 µg/mL .
- Precision: Determine the intra-day and inter-day precision by analyzing replicate injections of Dexibuprofen standard solutions.
- Accuracy: Assess the accuracy of the method by determining the recovery of Dexibuprofen from spiked samples.
- Robustness: Evaluate the robustness of the method by introducing small deliberate variations in chromatographic conditions.
- System suitability: Assess the suitability of the HPLC system by evaluating parameters such as retention time, peak symmetry, and resolution.
- The objective of method validation is to demonstrate that the method is suitable for its intended purpose as it is stated in ICH guidelines []. The method was validated for linearity, precision (repeatability and intermediate precision), accuracy specificity, short-term stability, and system suitability. Standard plots were constructed with six concentrations in the range of 10–60 µg mL−1 prepared in triplicates to test linearity. The ratio of peak area signal of DI to that of IS was plotted against the corresponding concentration to obtain the calibration graph. The linearity was evaluated by linear regression analysis that was calculated by the least square regression method. The precision of the assay was studied with respect to both repeatability an' intermediate precision. Repeatability was calculated from six replicate injections of freshly prepared DI solution in the same equipment at a concentration 50 µg mL−1 of the intended test concentration value on the same day. The experiment was repeated by assaying freshly prepared solution at the same concentration additionally on two consecutive days to determine intermediate precision. Peak area ratio of DI to that of IS was determined and precision was reported as % R.S.D. Method accuracy was tested (% recovery and % R.S.D. of individual measurements) by analysing samples of DI at three different levels in pure solutions using three preparations for each level. The results were expressed as the percentage of DI recovered in the samples. Specificity was assessed by comparing the chromatograms obtained from sample of pharmaceutical preparation and standard solution with those obtained from excipients which take part in the commercial tablets and verifying the absence of interferences. Sample solution short-term stability was tested at ambient temperature (20 ± 1°C) for three days. In order to confirm the stability of both standard solutions at 100% level and tablets sample solutions, both solutions protected from light were reinjected after 24 and 48 h at ambient temperature and compared with freshly prepared solutions. A system suitability test was performed by six replicate injections of the standard solution at a concentration of 50 µg mL−1 verifying IS/DI resolution >2, % R.S.D. of peak area ratios of DI to that of IS ±2%, % R.S.D. of each peak retention time ±2%.

Limit of Detection (LOD) and Limit of Quantitation (LOQ)

- Describe the determination of LOD and LOQ using appropriate methods (e.g., signal-to-noise ratio, standard deviation of the response, etc.).
- Present the calculated LOD and LOQ values.
- Discuss the significance of these limits in the context of dexibuprofen analysis.

Application to Pharmaceutical Formulations

The developed and validated HPLC method for the determination of Dexibuprofen in pharmaceutical preparations holds significant applications in various areas:

1. Quality Control in Pharmaceutical Industry:
   - The method can be employed for routine quality control analysis of Dexibuprofen-containing pharmaceutical formulations, ensuring compliance with regulatory standards and specifications.[16]

2. Formulation Development:
   - Pharmaceutical scientists can utilize the method during the formulation development process to accurately determine the Dexibuprofen content and optimize formulation compositions for enhanced efficacy and stability.

3. Stability Studies:
   - The method can be utilized in stability studies to assess the degradation kinetics of Dexibuprofen in different formulations under various storage conditions, aiding in the determination of shelf-life and storage recommendations.

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4. Bioequivalence Studies:
- In bioequivalence studies, the method can be employed to compare the pharmacokinetic profiles of generic Dexibuprofen formulations with reference formulations, ensuring therapeutic equivalence.[17]

5. Research and Development:
- Researchers can utilize the method for studying the pharmacokinetics, pharmacodynamics, and metabolism of Dexibuprofen in preclinical and clinical studies, contributing to the advancement of drug research and development.[18]

6. Pharmacovigilance:
- Regulatory agencies and pharmaceutical companies can utilize the method for post-marketing surveillance to monitor the Dexibuprofen content in marketed products and detect any deviations from specifications, ensuring patient safety.

- Describe the analysis of dexibuprofen in various pharmaceutical formulations (e.g., tablets, capsules) using the developed and validated HPLC method.
- Present the results, including the mean dexibuprofen content and percent label claim.
- Discuss the applicability and suitability of the method for routine quality control analysis of dexibuprofen formulations.

Recent Advancements

1. Advanced HPLC Systems: Recent advancements in HPLC technology have led to the development of high-throughput and ultra-high-performance liquid chromatography (UHPLC) systems. These systems offer improved resolution, sensitivity, and speed of analysis, allowing for faster and more efficient determination of Dexibuprofen in pharmaceutical preparations.[19]
2. Column Chemistry: Novel stationary phases and column chemistries have been developed to enhance the separation efficiency and selectivity of HPLC methods. For example, advancements in superficially porous particle (SPP) columns and monolithic columns have shown promise in improving chromatographic performance and reducing analysis time.[20]
3. Hyphenated Techniques: The integration of HPLC with other analytical techniques, such as mass spectrometry (LC-MS) and nuclear magnetic resonance (LC-NMR), has enabled comprehensive characterization and structural elucidation of Dexibuprofen and its metabolites. These hyphenated techniques offer enhanced sensitivity, specificity, and information content for pharmaceutical analysis[21].
4. Green Analytical Chemistry: There is a growing emphasis on developing environmentally friendly HPLC methods that minimize solvent consumption, waste generation, and energy consumption. Green chromatography techniques, such as supercritical fluid chromatography (SFC) and microscale HPLC, are gaining traction for their sustainability and efficiency.

Future Prospects

1. Miniaturization and Automation: The future of HPLC methods for Dexibuprofen determination lies in miniaturization and automation. Microscale HPLC systems and lab-on-a-chip technologies are expected to become more prevalent, offering rapid analysis, reduced sample and solvent consumption, and increased portability for on-site testing.[22]
2. High-Resolution Separation Techniques: Advances in high-resolution separation techniques, such as ultra-high-resolution liquid chromatography (UHRLC) and comprehensive two-dimensional liquid chromatography (LCxLC), hold promise for improving the separation efficiency and resolving power of HPLC methods for complex pharmaceutical matrices.[23]
3. Multidimensional Chromatography: Multidimensional chromatography approaches, including heart-cutting and comprehensive 2D-LC, enable the separation of complex mixtures with enhanced peak capacity and selectivity. These techniques offer opportunities for in-depth characterization and analysis of Dexibuprofen in pharmaceutical formulations.
4. Integration with Artificial Intelligence (AI): The integration of HPLC methods with artificial intelligence (AI) and machine learning algorithms enables automated method development, optimization, and data analysis. AI-driven chromatography systems can enhance method robustness, accuracy, and efficiency, paving the way for intelligent analytical workflows in pharmaceutical analysis.
5. Application in Personalized Medicine: HPLC methods for Dexibuprofen determination may play a role in personalized medicine approaches, where individual patient responses to drug therapy are considered. Tailored HPLC methods can facilitate pharmacokinetic studies, therapeutic drug monitoring, and dose optimization strategies for Dexibuprofen-based treatments.[24]

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Results and Inferences

1. Validation Method:
   - The developed HPLC method for the determination of Dexibuprofen in pharmaceutical preparations was validated according to ICH guidelines.
   - The validation parameters included specificity, linearity, precision, accuracy, robustness, and system suitability.

2. Precision:
   - The method demonstrated excellent precision, with low %RSD values for both intra-day and inter-day analyses of Dexibuprofen standard solutions.
   - The %RSD values were within the acceptable limits, indicating the repeatability and reproducibility of the method.

3. Accuracy:
   - The accuracy of the method was assessed by determining the recovery of Dexibuprofen from spiked samples.
   - The recovery studies showed satisfactory results, with %recoveries close to 100% for Dexibuprofen in pharmaceutical formulations, indicating the method's accuracy.

4. Specificity:
   - The specificity of the method was evaluated by analyzing Dexibuprofen in the presence of other formulation excipients.
   - Chromatograms obtained from spiked samples demonstrated distinct peaks corresponding to Dexibuprofen, indicating the specificity of the method.

5. Stability:
   - The stability of Dexibuprofen in pharmaceutical formulations was evaluated under various storage conditions.
   - The results indicated that Dexibuprofen remained stable over the studied storage period, with minimal degradation observed.

6. System Suitability:
   - System suitability tests were performed to assess the performance of the HPLC system.
   - Parameters such as retention time, peak symmetry, and resolution were evaluated and found to be within acceptable limits, ensuring the suitability of the system for Dexibuprofen analysis.

7. Assay of Tablet:
   - The developed HPLC method was successfully applied for the quantification of Dexibuprofen in commercial tablet formulations.
   - The assay results showed that the Dexibuprofen content in the tablets was within the labeled claim, confirming the reliability and applicability of the method for routine quality control analysis.

Conclusion

In conclusion, the present study successfully developed and validated a high-performance liquid chromatography (HPLC) method for the determination of Dexibuprofen in pharmaceutical preparations. The method exhibited excellent specificity, linearity, precision, accuracy, robustness, and system suitability, meeting the requirements set forth by international guidelines, including ICH guidelines.

The validated HPLC method demonstrated Its reliability and applicability for the accurate quantification of Dexibuprofen in various pharmaceutical formulations. The method was successfully applied for the assay of Dexibuprofen tablets, showing that the Dexibuprofen content in the tablets was within the labeled claim, confirming the method's suitability for routine quality control analysis in the pharmaceutical industry.

Overall, the developed HPLC method offers a robust and sensitive approach for the determination of Dexibuprofen, providing pharmaceutical manufacturers with a valuable tool for ensuring the quality, efficacy, and safety of Dexibuprofen-containing products. Future studies may focus on further optimization of the method and its application in broader pharmaceutical formulations to enhance its utility and versatility in pharmaceutical analysis.

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CLASSIFICATION OF TYPES OF PRIMARY GLAUCOMA BASED ON HIGH-FREQUENCY IMMERSION ULTRASOUND BIOMICROSCOPY DATA

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ANNOTATION
The diagnostic method (UBM) - ultrasound biomicroscopy is the most informative and easily used for diagnosing and determining the method of surgical treatment for each patient individually. Ultrasound biomicroscopy makes it possible to visualize with micron precision in real time the main structures of the iridociliary zone: the iris, ciliary body, posterior chamber, lens, fibers of the zonule of zinc involved in the formation of intraocular blocks, and to identify the specifics of changes in their topographic relationship depending on the leading component of the blockade corner.
KEYWORDS. *Ultrasound biomicroscopy, primary angle - closure glaucoma , diagnosis , treatment.*

RELEVANCE

Today, the method of medical imaging, High-frequency immersion ultrasound biomicroscopy **(** UBM study) is an objective and most informative way to study the state of the anterior segment and the outflow pathways of intraocular fluid (IOH) in primary glaucoma. The process of formation of the intraocular fluid outflow tract is prolonged over time, which is a prerequisite for monitoring the state of the intraocular fluid outflow tract in various forms of primary glaucoma [3].

As clinical observations show, assessing the adequacy of the formed outflow tracts of the intraocular fluid in primary angle-closure glaucoma (PACG), especially after fistulizing antiglaucoma interventions, is important, but complex, for ophthalmologists [6].

In the currently known classifications based on biomicroscopic examination, the key role belongs to the isolated characteristics of the anterior segment of the eyeball in glaucoma. TO use V clinical practice Moorfields Bleb Grading Sistem [1.6], Indiana Bleb Appearance Grading Scale [8], Wiersburg Bleb Classification [7.9] are recommended . Despite elements of standardization, these assessment systems are not without subjectivity and do not have clear criteria between normal and pathological. None of the proposed schemes provides for a comprehensive simultaneous analysis of the internal fistula, the intrascleral part of the drainage system of the eye and the filtration cushion after surgical treatment.

Purpose of the study is to develop classification ultrabiomicroscopic differential diagnostic criteria for the normal and pathological state of the eyeball in types of PACG.

MATERIALS AND METHODS

250 patients were observed. All patients were diagnosed with primary glaucoma. Of these, 102 patients (40.8%) had primary OAG and 148 (59.2%) had angle-closure glaucoma. Among patients with PACG with pupillary block - 103 patients (183 eyes), creeping variety - 16 patients (32 eyes), flat iris - 18 (36 eyes) and iridolenticular block 11 (22 eyes). In all cases, the glaucomatous process was drug-resistant. The age of the patients ranged from 48 to 69 years (average 61.09). The stages of the glaucomatous process were distributed as follows: 1 (initial) - 49 patients (average age 57.6), II (advanced) - 65 patients (average 59.7), III (advanced) - 24 patients (average 62. 3), IV (terminal) – 10 patients (average 64.8).

All studies and manipulations were performed in accordance with the World Medical Association Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects.

RESULTS AND DISCUSSION

Based on the results of UBM studies, we propose to carry out a comparative analysis and determine the most significant indicators of UBM research for types of PACG.
Based on this, we propose the following UBM classification scheme:

According to the depth of the anterior chamber, in mm: deep – more than 3.1 mm;
average depth from 2.5mm to 3.0mm (typical for OAG);

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flickering - from 1.6 mm to 2.2 mm (characteristic of PAH with a flat iris and a “creeping” variety);
very small – from 0.9mm to 1.5mm (typical for PGR with pupillary block); absent – 0.5 mm or less (typical for PAOG with an iridolenticular block).

According to the width of the UPC, degrees: from 12.0 and more - wide (OUG);
From 8.0 to 12.0 – narrow (ZUG with a flat iris and a “creeping” variety);
From 5.9 to 7.9 – very narrow (typical for PGR with pupillary block);
Less than 5.8 – the UPC is closed (typical of the UG with an iridolens block).

According to the position of the ciliary body
Anterior position - the distance “trabecula – ciliary body” is less than 0.49.
Average position - distance “trabecula-ciliary body” from 0.63 to 0.69;
Posterior position - distance “trabecula – ciliary body” 0.70 or more;

According to the shape and depth of the rear chamber:
Triangular Deep - from 0.58 or more (typical for PGR with pupillary block);
Triangular Average - from 0.50 to 0.58 (typical for OAG); triangular small – from 0.34 to 0.49 (typical for PGR with a flat iris);
Arcuate Very Small - 0.30 or less (characteristic of “creeping” glaucoma).

According to the degree of structural damage to the anterior segment (iris atrophy) and iridociliary zone according to the thickness of the iris:

I degree – characterized by thinning of the iris (from 0.32 to 0.35), a decrease in the “trabecula-iris” distance (from 0.12 to 0.16), anterior position of the ciliary body, a tight fit of the iris to the lens (the “iris-iris” distance lens" from 0.25 to 0.31).

II degree – characterized by thinning of the iris (from 0.28 to 0.31), a decrease in the “trabecula-iris” distance (from 0.08 to 0.11), anterior position of the ciliary body, a tight fit of the iris to the lens (the “iris-iris” distance lens" from 0.19 to 0.24), partial destruction of the pigment border of the pupil, increased pigmentation of the trabecular zone in the open part of the UPC.

III degree of damage - characterized by thinning of the iris (from 0.18 to 0.29), a decrease in the “trabecula-iris” distance (from 0.03 to 0.07), anterior position of the ciliary body, uneven tight fit of the iris to the lens in segments (“iris-lens” distance from 0.13 to 0.18), the absence of a pigment border, the appearance of pronounced focal atrophy of the iris, shallow or very shallow depth of the anterior chamber and lack of access to the APC.

CONCLUSION

Thus, our proposed classification of UBM studies for primary glaucoma can be useful in the early diagnosis of PACG and determining treatment tactics. It is of particular importance when choosing a surgical method for antiglaucomatous surgery.

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COCOA BUTTER, CORN STARCH AND SODIUM BICARBONATE INFUSED ROLL-ON DEODORANT: A NOVEL APPROACH TO ODOR CONTROL

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ABSTRACT
Deodorant Roll-on is a topical preparation containing antibacterial from natural ingredients that is used to reduce armpit odor caused by the bacterium Staphylococcus epidermidis. The odor of armpit is caused by microbial biotransformation of odourless secretion into volatile odorous molecules Staphylococcus epidermidis and coryne bacterium Species feeds on sweat excreting bad smell. Deodorant products inhibit the growth and activity of bacteria that degrade the apocrine gland in the armpit deodorants. Despite their effective antibacterial properties, common antibacterial agents such as increase risk of Alzheimer's disease and contact dermatitis. This research study was carried out by opting the Cocoa butter, Coconut Oil, Sodium bicarbonate, corn starch, Lavender oil, Clove oil ,castor oil and mogra oil. Lavender oil are reported to possess antibacterial activity. Deodorant roll-on were prepared and characterized for physical observation. PH measurement, spreadability, viscosity, drying time, Stability, homogeneity test, skin irritation test.The physicochemical evalution was obtained.
KEYWORDS: *Deodorant, Antibacterial, Corn starch, Sodium bicarbonate, Staphylococcus epidermidis, Deodorant Roll-on stick.*

1. INTRODUCTION

Sweat glands emission is without anyone else unscented, and armpit rottenness is brought about by the microbial biotransformation of the scentless discharge into unpredictable musty molecules.[1] Nowadays, in most antiperspirant items, antibacterial specialists, for example, quaternary ammonium mixes like triclosan, aluminum salts, and sweet-smelling scent covering operators are used.Most conventional antiperspirants rely on aluminum compounds, like aluminum trichlorohydrex gly, which plug the sweat ducts, and stop sweat coming to the skin's surface.[2] Crystal deodorants are a popular alternative to conventional deodorants and antiperspirants.In topical countries, Deodorant are common Cosmetic Products used by bacterial growth and bacterial breakdown of perspiration in Special areas of the body.[3] Deodorants may contain perfume fragrances or natural essential oils intended to mask the odor of perspiration. The popular roll-on deodorant is a leave-on liquid deodorant contains in a glass bottle or plastic bottle with a revolving ball dispenser as an applicator for applying the deodorants on skin to affect body odor. Inasmuch as two types of products, antiperspirants and deodorants, are used daily in armpits by a large number of people (perhaps as many as 90% of people in the US, according to Benohanian, 2001), armpits represent an interesting context in which to explore the general phenomenon of how human behavior and product use influence skin microbes.[4] Deodorant is one of cosmetic preparations that consist materials or mixtures of materials that can be used to eliminate or reduce body odor as a result from excessive sweating and decomposition of sweat by bacteria.[5] One of them is deodorant either in powder and roll-on from that used to adsorb excessive sweats in the body that interfere daily activity and lower confidence.

1.1. Sweat glands and their Functions

Eccrine, apocrine, and apoeccrine glands

Skin is a part of the human integumentary system which forms the outermost layer of the human body. Skin is the largest organ in the body which provides a mechanical barrier, protecting the body from the external environment.[6] In addition, skin also contributed to both endocrine and exocrine functions of the human body. Examples of an exocrine function of the skin are secretion of sebum and sweat fluid.[7] There are three main compartments of human skin, epidermis, dermis, and the subcutaneous fascia. Sweat glands are skin

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appendages found at the dermis compartment of the human skin.[8] An early morphological study in 1917 showed that there are two types of sweat glands, eccrine and apocrine sweat glands (illustrated in Figure 1).

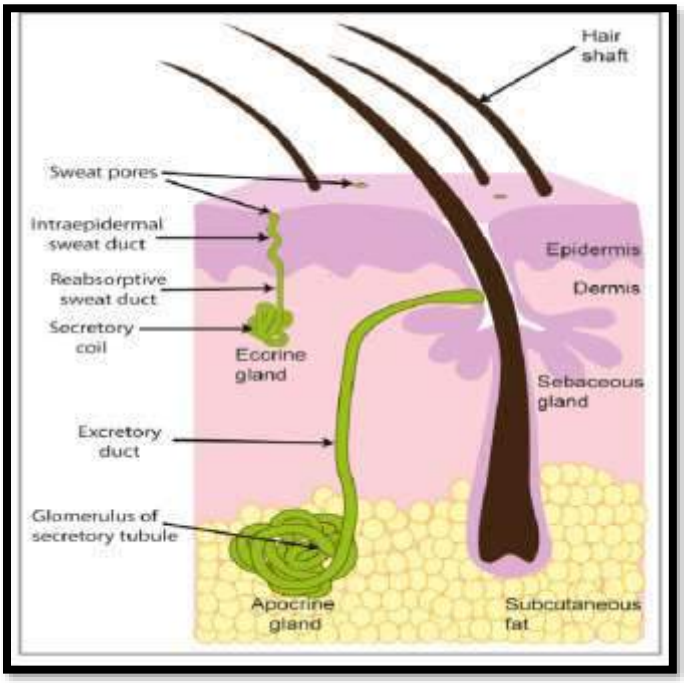


Fig.1: Structure of skin

- **Eccrine sweat glands:** Eccrine glands are often referred to as the small gland variety, but are by far the most ubiquitous type of sweat gland . Humans have ~2–4 million eccrine sweat glands in total and are found on both glabrous (palms, soles) and non-glabrous (hairy) skin . Gland density is not uniform across the body surface area.[9] In fact, most of the variability in regional and whole-body sweating rate within and between individuals is due to differences in sweat secretion rate per gland, rather than the total number of active sweat glands .this is the most effective means of thermoregulation in humans. Eccrine sweat glands also participate in ion and nitrogenous waste excretion. In response to emotional or thermal stimuli, sweat glands can produce at least 500 mL to 750 mL in a day.[10]

- **Apocrine sweat glands**

Apocrine glands, which are associated with a hair follicle, are located mainly in the axillae, perineal, and scalp regions. The apocrine gland secretes lipids, steroids and cholesterol.[11] There are 2 main types of secretory glands: exocrine glands and endocrine glands. Exocrine glands remain connected with the surface epithelium and secrete their products through ducts. They are subclassified as merocrine (or eccrine), apocrine, and holocrin.[12] Although the exact function of apocrine glands varies depending on the gland's location, apocrine glands are believed to be an evolutionary remnant of an odorous organ of animals. For example, the scent glands of the skunk are modified apocrine-type structures.

- **Apoeccrine sweat glands**:Apoeccrine glands are described as having a seven-fold higher sweat secretion rate than eccrine glands. They are developed during puberty from an eccrine-like precursor and contributed up to 45% of sweat glands found in the axillary region.

1.2. The Mode Of Action Of Available Deodorant In Market

Perspiration itself is almost odourless. Most of the odour that accompanies perspiration is caused by the action of bacteria. Deodorants reduce this odour in one of three ways.

(A) Deodorants that kill or inactivate bacteria contain antiseptic substances, such as alcohol, formaldehyde, and boric acid. Chlorine compounds, e.g. hypochlorite and chlorhexidine, work by killing bacteria which may be responsible for the odour.

B) Deodorants that mask perspiration odor contain perfumes. Essential oils and such disinfectants as carbolic acid simply mask the odour, making it less offensive.

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(C) Relying on the use of antimicrobial agents to inhibit the growth of body odour-forming microbiome.[13]

1.3. Advantages of Natural deodorant over Synthetic:

1)Natural deodorant is the modern trend in the field of beauty and fashion.[14]
2) Deodorant products that are free form parabens, aluminium , alcohol and artificial preservatives, are getting very talk about with in the market due to the rising demands for safe, Natural material and organic products.
3) Antibacterial agents such as quaternary ammonium compounds like triclosan,aluminum salt and aromatic odor-masking agent are now found in deodorant materials.
4) Antibacterial agents have been found to be effective against skin bacteria are irritants or sensitizers.

1.4. Characteristics Of antiperspirant & deodorants

1) It shouldn't irritate the skin.
2) It needs to be safe and non-toxic.
3) Easy to apply and sticks well to the skin.
4) Covers up body odour with a nice scent.
5) Shouldn't ruin clothes.
6) Soaks up sweat or stops smelly bacteria from growing.[15,16,17]

1.5. Application

1)The application of the formulated deodorant roll-on in cocoa butter,corn starch and sodium coconut oil extends beyond mere cosmetic enhancement, offering multifaceted benefits for skin care and freshness.
2) Cocoa butter, corn starch, Lavender oil and coconut oil, the key ingredients in the formulation, each contribute unique therapeutic properties that target various skin concerns.
3)Cocoa butter is known for its antioxidant and clove oil anti-inflammatory properties, which help to combat free radical damage and soothe irritation. Additionally, coconut oil delivers essential hydration and nourishment, leaving the skin soft, smooth, and radiant.
4)The subsequent sections of this research article will delve into the detailed formulation process, evaluation methods, and scientific findings to provide a comprehensive understanding of the Control body odor applications and benefits in skincare.[18]

2. OBJECTIVE

1) To prevent or mask body odour caused by bacterial breakdown of perspiration.
2)To evaluates allergic contact dermatitis from a widely used Antibacterial deodorant.
3) To Develope a product that effectively neutralizes body odor for extended periods.
4) To Incorporate ingredients with antibacterial properties to inhibit the growth of odor-causing bacteria.
5) To Formulate a product that soothes and moisturizes the skin to prevent irritation and dryness commonly associated with deodorant use.
6) To Ensure the formulation provides long-lasting protection against odor and bacterial growth throughout the day.

3. NEED OF THIS PRODUCT

1) Responding to the increasing consumer preference for natural and organic products, this formulation incorporates ingredients like coconut oil, cocoa butter, and essential oils to meet market demands.
2) There's a need to create a deodorant that effectively neutralizes body odor while also providing long-lasting freshness (effective odour control).
3) In response to concerns about hygiene and bacterial growth, there's a need for a deodorant that offers antibacterial properties to maintain cleanliness and prevent unpleasant odors.
4) Many consumers seek products that are gentle on the skin, so there's a need to develop a deodorant roll-on that contains soothing ingredients like coconut oil and lavender oil to minimize irritation and discomfort.
5)With the inclusion of ingredients like sodium bicarbonate and corn starch, there's an opportunity to innovate in the deodorant market and differentiate this product from others by offering unique benefits such as moisture absorption and odor Control.

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4. DRUG PROFILE & EXCIPIENTS PROFILE

4.1. Cocoa butter



fig.2: Cocoa butter

Sr.No.	Attributes	Details
1	Synonyms	Theobroma oil, cacao butter, cocao beans, semina theo-bromatis.
2	Biological Source	Theobroma cacao Linn.
3	Family	Sterculiaceae
4	Chemical Constituents	Glycerides of stearic (34%), palmitic (25%), oleic (37%) acids, linoleic acids and arachidic acid.[19]

Uses

- Cocoa butter is used in cosmetics and can be found in various skin creams, hair conditioners, and moisturizers.
- Nourishes and protects the underarm skin.
- They are Antioxidant property of cocoa clears the dead cells of the skin to give the body a fresh.

4.2.Corn starch



Fig.3. Corn starch

Sr.No.	Attributes	Details
1	Synonyms	Corn flour, amylacea,maize starch
2	Biological Source	Endosperm of the kernel.
3	Family	Poaceae
4	Chemical Constituents	Amylopectin, amylose, Chemical formula C27H48O20.

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Uses

- Excellent absorbent qualities of corn starch help you stay dry all day by absorbing moisture and perspiration.[20]
- Additionally, it stops the development of microorganisms that generate body odour. By entirely absorbing an offensive odour and removing it from the system, cornstarch also aids in odour neutralisation.
- corn starch has a calming effects on the skin making it suitable for individuals with sensitive or irritated skin.

4. 3. Sodium bicarbonate

Synonym: Beaking soda

Source: Sodium bicarbonate is a white solid that is crystalline but often appears as a fine powder. It has a slightly salty, alkaline taste resembling that of washing soda (sodium carbonate).

Uses:

- It is used as a disinfectant and it is also act as Natural antibacterial agents.
- It is used to protect armpits from bad smell and irritation.[21]
- It is use in odor prevention odourizer

4.4.Coconut Oil



Fig. 4: Coconut Oil

Sr.No.	Attributes	Details
1	Synonyms	Coconut oil, coconut butter, copra oil.
2	Biological Source	Endosperm of coconut, Cocos nucifera L.
3	Family	Palmae
4	Chemical Constituents	Caprylic acid, 2%; capric acid, 50–80%; lauric acid, 3%; and myristic acid about 1%.[22]

Uses

- It is useful as a nonaqueous medium for the oral administration of some medicaments.
- The combat odor-causing bacteria and provides a pleasant, subtle scent
  smelling clean and reduce bacteria.

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4.5. Castor oil



Fig.5: Castor oil

Sr.No.	Attributes	Details
1	Synonyms	Castor bean oil, castor oil seed, oleum ricini, ricinus oil, oil of Palma christi, cold-drawn castor oil.
2	Biological Source	Seeds of Ricinus communis Linn.
3	Family	Euphorbiaceae
4	Chemical Constituents	Ricinoleic acid[23], isoricinoleic, stearic, and dihydroxy stearic acids, vitamin E.

Uses

- castor oil, is a monounsaturated fatty acid that can help lock moisturize into your skin
- It's an ingredient in some moisturizers, cosmetics and deodorants. But that doesn't mean you should use pure castor oil on its own as a skin care product.

4.6. Lavender Oil



Fig.6. Lavender Oil

Sr.No.	Attributes	Details
1	Synonyms	Lavender
2	Biological Source	Flowers of Lavandula angustifolia by steam distillation
3	Family	Lamiaceae
4	Chemical Constituents	Linalool, linalyl acetate, terpinen-4-ol, and ocimene.[24]

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Uses

- This essential oil gets rid of body odor and fights bacteria the essential oil is effective at reducing anxiety and skin problems.
- This essential oil's scent degrades compounds in your sweat and keeps you Smelling fresh all day.

4. 7. Clove oil



Fig.7:Clove oil

Sr.No.	Attributes	Details
1	Synonyms	Clove buds, Clove flowers.
2	Biological Source	Flower buds of Eugenia caryophyllus Thumb.
3	Family	Myrtaceae
4	Chemical Constituents	Eugenol[25], acetyl eugenol, gallotannic acid,α- and β-caryophyllenes, methyl furfural, gum, resin, and fibre.

Uses

- Deodorants cover up the smell of body odor, usually with fragrances.
- Antiperspirants stop or dry up perspiration or sweat.
- They do this by temporarily blocking the pores where sweat comes from.

4.8. Mogra oil



Fig.8: Mogra oil

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Sr.No.	Attributes	Details
1	Synonyms	Jasmin flower
2	Biological Source	Ripe seeds of Hydnocarpus kurzii warb; Hydnocarpus weghtiana and Hydnocarpus anthelmintica.
3	Family	Oleaceae
4	Chemical Constituents	Benzle acetate, Methyl benzoate, methyl Sali-cytate, Benzyle benzoatesalicylic acid , Jasminine.

Uses

-Mogra essential oil is useful for wound healing, moisturizing, and nourishing the skin.
-Mogra water has soothing ingredients that can support irritated, itchy, dry skin and even prevent acne outbreaks and pleasant smell.
-Jasmine essential oil has been known to reduce stress & anxiety, increase energy levels, clear headaches, and even promote better sleep.

4.9. Formaldehyde

Formaldehyde-releasing agents are sometimes used as preservatives in antimicrobial deodorants to prevent bacterial growth and extend the product's shelf life. However, due to potential health concerns, some companies are moving towards alternative preservatives.

5. MATERIALS AND EQUIPMENT

1. Mixing bowls: For mixing the ingredients to prepare the deodorant Roll -on formulation.
2.**Measuring instruments**: weighing balance for accurate measurement of ingredients.
3.Corn starch into powder form.
4.Heating apparatus: Such as a water bath or microwave, for melting and liquefying cocoa butter and coconut oil if needed.
5.Stirring rods or spatulas: For thorough mixing and homogenization of the formulation.
6.pH meter: To monitor and adjust the pH of the deodorant roll-on formulation, ensuring optimal stability and skin compatibility.
7.Sterile containers: To store the prepared antibacterial deodorant roll on formulation, maintaining hygiene and preventing contamination.
8.Packaging materials: such as transfer the deodorant solution in glass container for storage and distribution.

- **Formula**

Table no.1: Formulation

Sr. No	Ingredients	Category	Quantity Taken
1)	Cocoa butter	Antioxidant	3 gn
2)	Corn starch	Decrease sweat, odor and absorb Perspiration	4 gm
3)	Sodium bicarbonate	Antibacterial agents	2 gm
4)	Coconut oil	Moisturizer and odor-fighting	8 ml
5)	Castor oil	Hydration	2 drops
6)	Lavender oil	Fragrance, antimicrobial	2 ml
7)	Clove oil	Anti-inflammatory	1 ml
8)	Mogra oil	Fragrance	2 ml
9)	Formaldehyde	Preservative	2 drops

Steps

1) Firstly collect all the required Ingredients and weigh it
2) Take a small bowl mix of Sodium bicarbonate With corn starch.
3) Then add cocoa butter and Coconut Oil melted in China dish in water bath.
4) After melted cocoa butter in corn starch and Sodium bicarbonate add in mix coconut oil.
5) mix properly with continous Stirring.
6) Then add other oil like clove oil , Castor oil land our choice in any fragrance add like Lavender oil and mogra oil.Mix well properly.
7) Then add formaldehyde as a Preservative in antimicrobial deodorant to prevent bacterial growth.
8)Transfer the Deodorant solution in a suitable container.

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9) Pack and labelled it into air tight container.

6. EVALUATION TEST

Evaluation Parameters for deodorant roll-on formulation:

6.1**. Physical evaluation:**

Sr.No.	Physical Parameters	Observation
1	Colour	Light Yellow
2	Consistency	Semi solid
3	Odour	Pleasant

6.2.Determination of pH:

The pH of formulation was determined using digital PH paper.

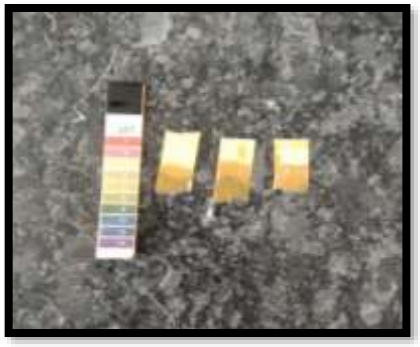


Fig.9: Determination of pH

6.3.Spreadability

For determination of Spreadability excess of sample was applied in between two glass slides and was compressed to uniform thickness by placing 25 gm. of weight in pan. The time required to separate two slides, i.e. time in which upper glass slide moves over lower plate was taken as a measure of Spreadability.

Formula -

$S = m \times 1/t$,

Where,

S - Spreadability

m - Weight tied to upper slide

1 - Length moved on glass slide

t - Time taken

6.4.Viscosity :

Viscosity is a statement of resistance of a liquid to flow, the higher the viscosity the greater the resistance .[26] Viscosity was measured using a Brookfield viscometer with spindle 2 in RPM 100. The result of deodorant roll form viscosity was 0.651 Pa.s (651 cps) with plastic flow properties since the preparation was included in the non-newton liquid. The viscosity of the non-newton liquid with the plastic flow properties of the deodorant preparation has a range between 0.25584 and 3.19452 Pa.s (255.84-3194.52 cps). The higher the viscous the dosage will be, the more dilute.

6.5. Drying time test

The drying time test is carried out by observing the time it takes for the preparation to dry, i.e. the time from which deodorant roll-on begin to be applied to the skin until a dry layer is completely formed. The requirement for the mongering dosage time is 9-10 min.[27] Where deodorant drying time rolls on for 10 s which dries faster because It alcohol container.

6.6. Stability test:

Stability test was carried out at room temperature (25oC) and 45oC for two weeks. The samples were observed for sweating, and solution deformation phase separation. When the solution was out of shape or oil droplet could be seen on the surface of the deodorant roll-on the system indicated stable and vice versa. Colour no change of the formulations were also observed.[28]

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6.7. Homogeneity test:
The homogeneity of powder deodorant is more homogeneous than roll- on deodorant because of its separated if it is kept at room temperature during the 1st week until the four week during storage, while after heating with water bath at 80°C gives homogenous preparation. The homogeneity test aims to see whether the active substance has been evenly distributed into the base or all ingredients are mixed homogeneously.

6.8. Skin Irritation test:
Allergies to deodorants and antiperspirants are a form of contact dermatitis. Often these allergies are caused by fragrances, but other chemicals in the product can also cause them. If you have a deodorant allergy, you may find that hypoallergenic or natural products keep you from reacting

7. RESULT

Table no.2: Evaluation tests result

Sr.No	Test	Formulation
1)	Colour	Light yellow
2)	Odour	Pleasant
3)	Consistency	Semisolid
4)	pH	6.3
5)	Spreadability	Easily spreadable
6)	Viscosity	0.651 pa.s(651cps)
7)	Drying time	9-10 min (10s)
8)	Stability	Stable
9)	Homogeneity	Homo
10)	Skin Irritation	No irritation

The Deodorant roll-on was formulated by Using cocoa butter corn starch and Sodium bicarbonate .The formulation were light yellow in colour. The formulations were shiny, on application to the skin formulation work to stop the development of bacteria that cause odour on the skin.To help cover up smell and cooling effect. The consistency and homogeneity of formulation were good. The result of this study showed formulation had semisolid consistency. The formulation were found homogenous, easily Spreadability and the normal pH is 4.5 to 6.8.
The Evalution Parameters are in the normal range, so considering this formulation is more effective than Other Marketed deodorant.

Conclusion
Topical antibacterial herbal deodorant roll-on formulation was prepared by using cocoa butter corn starch, and sodium bicarbonate as the main drug, which was already known to have Antioxidant, Anti-inflammatory Antimicrobial, antibacterial and Antiperspirant activity and a deodorant roll-on Stick is a type of personal care product intended to help reduce sweating and body odour.Thus,this deodorant roll-on stick formulation could be the safe and efficacious remedy for treating this dermatological disorders and could be safe alternative to synthetic Antibacterial, Antiperspirant deodorant roll-on .The Preparation was found to be stable. It showed good spreadability, the Preparation helps to prevent odor,producing bacteria from growing and keep smelling fresh.

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EXPLORING THE MOLECULAR AFFINITIES OF BENZIMIDAZOL: A MOLECULAR DOCKING STUDY

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ABSTRACT

Benzimidazole derivatives have garnered significant attention in medicinal chemistry due to their diverse pharmacological activities. In this project, molecular docking simulations were conducted to explore the binding affinities and interactions of benzimidazole derivatives with target proteins implicated in various diseases. The study employed computational techniques to predict the binding modes of benzimidazole derivatives against selected protein targets, including enzymes, receptors, and transporters. Through molecular docking analysis, key interactions such as hydrogen bonding, hydrophobic interactions, and π-π stacking were elucidated, providing insights into the structural requirements for favorable binding. The results of this study contribute to the understanding of the molecular mechanisms underlying the biological activities of benzimidazole derivatives, thereby facilitating rational drug design and optimization efforts in the development of novel therapeutic agents. This project focuses on the molecular docking investigation of benzimidazole with the protein target 1kzn. Utilizing computational techniques, the study aims to elucidate the potential binding affinity and interaction patterns between benzimidazole and the specified protein target. By analyzing the docking results, insights into the molecular recognition and binding mechanisms of y with protein 1kzn were obtained. This research provides valuable information for understanding the pharmacological relevance of benzimidazole derivatives and aids in rational drug design strategies targeting protein 1kzn for therapeutic interventions.

INTRODUCTION

Benzimidazole and its derivatives represent a class of compounds with remarkable pharmacological potential, attracting considerable interest in drug discovery and development efforts. The unique structural features of benzimidazole, characterized by a bicyclic heterocyclic ring system, offer a versatile scaffold for the design of bioactive molecules targeting diverse biological pathways. This introduction sets the context for exploring the molecular docking of benzimidazole and its derivatives, highlighting their significance in medicinal chemistry research. Benzimidazole compounds have garnered attention across various therapeutic areas, including anticancer, antiviral, antibacterial, antifungal, antiparasitic, and anti-inflammatory applications. This broad spectrum of pharmacological activities stems from the ability of benzimidazole derivatives to interact with specific molecular targets within biological systems. By modulating the function of enzymes, receptors, ion channels, and transporters, benzimidazole-based agents exert their therapeutic effects through intricate molecular mechanisms. The process of molecular docking serves as a valuable computational tool in rational drug design, facilitating the prediction of ligand-receptor interactions and the exploration of binding modes at the atomic level. Through molecular docking simulations, researchers can assess the binding affinity and orientation of small molecules, such as benzimidazole derivatives, within the binding sites of target proteins. This predictive approach enables the identification of potential lead compounds and optimization of their pharmacological properties prior to experimental validation. In this project, the focus is on elucidating the molecular interactions between benzimidazole and selected protein targets using molecular docking techniques. By employing state-of-the-art computational methods, the aim is to uncover the structural basis of benzimidazole binding to specific protein targets implicated in disease pathways. Understanding the molecular recognition patterns and key intermolecular interactions will provide valuable insights into the pharmacological mechanisms underlying the bioactivity of benzimidazole derivatives. The outcome of this project holds significant implications for drug discovery and development efforts, offering opportunities to design novel benzimidazole-based therapeutics with enhanced potency, selectivity, and pharmacokinetic profiles. By leveraging computational modeling approaches, researchers can expedite the identification and optimization of lead compounds, ultimately advancing the discovery of innovative

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treatments for various human diseases. In summary, the molecular docking of benzimidazole represents a promising avenue for exploring its pharmacological potential and elucidating its molecular interactions with target proteins. Through interdisciplinary research efforts combining computational and experimental approaches, this project aims to contribute to the development of next-generation benzimidazole-based therapeutics with clinical relevance and therapeutic efficacy.[1]

MOLECULAR DOCKING

In the meadow of molecular modeling, docking is a technique which predict the prefer direction of one molecule to a second when jump to each other to form a steady compound . Information of the chosen direction in rotate may be worn to expect the strength of involvement or binding affinity linking two molecules with each, for example, score function.

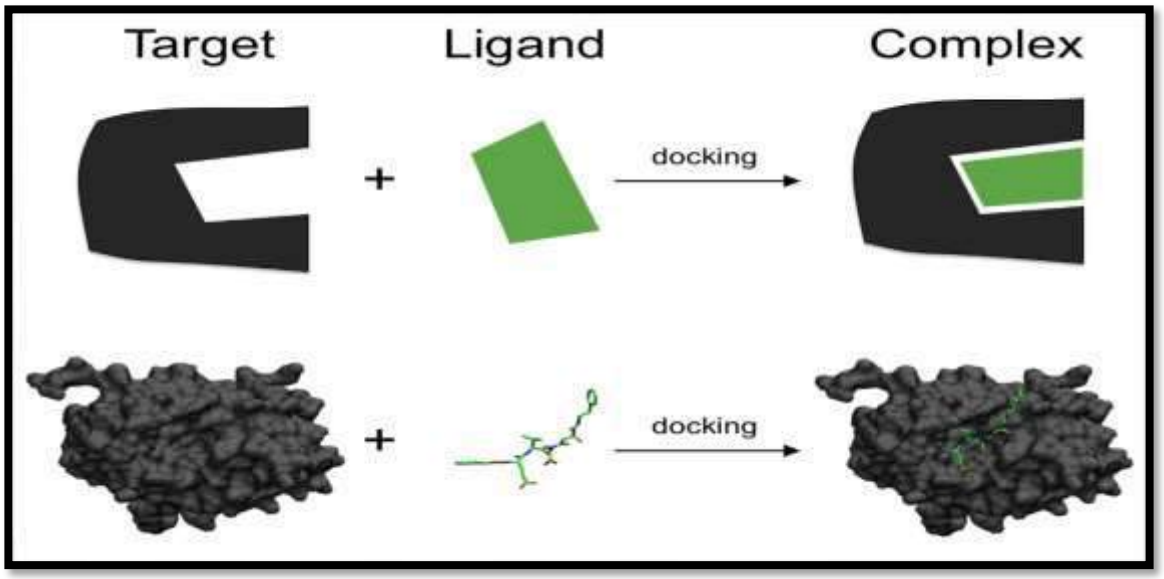


Figure 1 porotine ligand complex

Fig. no 1. Schematic diagram of docking a undersized molecule ligand (green) to a protein target (black) produce a steady compound
The relations between physically appropriate molecules such as proteins, peptides, nucleic acids, carbohydrates, and lipids play a central role in signal transduction. Furthermore, therelative orientation of the two interact associates may involve the type of signal formed (e.g., agonist antagonism).Therefore, docking is helpful for predict both the potency and type of signal produced. Molecular docking is one of the majority generally used technique in structure-based drug design, due to its capability to forecast the binding-conformation of small molecule ligands to the suitable target binding site.[2] Characterization of the binding performance plays a significant role in rational plan of drugs as well as to explain fundamental biochemical process. The aim of molecular docking is to accomplish an optimized conformation for both the protein and ligand and fundamental direction between protein and ligand so that the free energy of the generally method is minimized. Molecular recognition plays a key role in promote elementary bimolecular proceedings such as enzyme substrate, drug-protein and drug-nucleic acid interactions . Detailed appreciative of the universal principles that administrate the nature of the connections (van der Waals, hydrogen bonding, electrostatic) involving the ligands and their protein or nucleic acid targets may afford a framework for designing the most wanted potency and specificity of potential drug leads for a given therapeutic target . Practical application of this information requires structural data for the goal of significance and a progression for evaluating candidate ligand . A variety of computational docking methods are accessible.[3]

TYPES OF DOCKING

1. Rigid docking
2. Flexible docking

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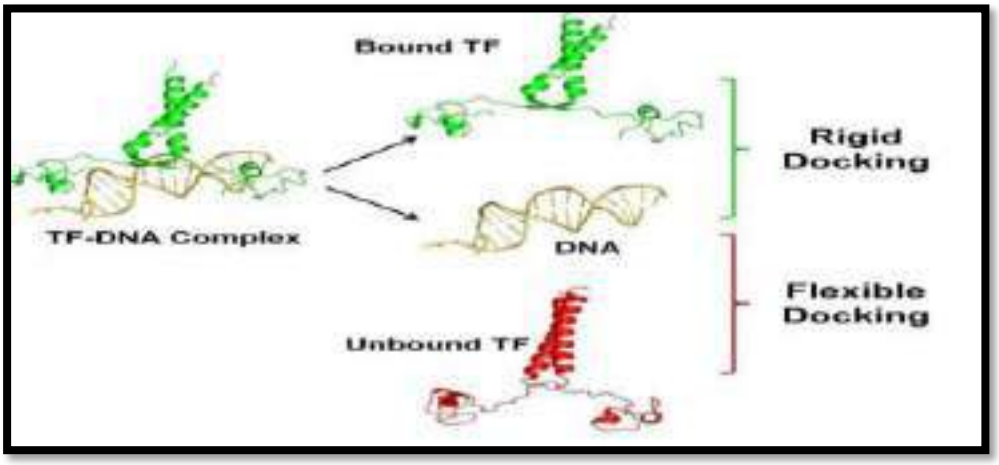
2.1 Rigid Docking

If we think that the molecules are rigid, then we are looking for a conversion in 3D space of one of the molecules which bring it to an most favorable fit with the other molecules in provisions of a scoring function. Conformation of the ligand may be generating in the absence of receptor or in the occurrence of receptor binding activity.[4]

2.2 Flexible Docking

The molecule flexibility then in adding to transformation, our aspire to locate the confirmations of the receptor and the ligand molecules, as they emerge in complex.[5]

Figure 1 .DOCKING TYPES



MECHANISM OF DOCKING

1.To achieve a docking screen, the first Obligation is an organization of the protein Of attention. Typically the structure has Been unwavering using a biophysical Method such as x-ray crystallography, or Less often, NMR spectroscopy. This protein organization and a folder of ligands serve As input to a docking agenda.

2. The Success of a docking program Depends on two mechanisms such as Search algorithm and scoring function. The Investigate space consists of all Possible Orientations and conformations of the Protein Paired with ligand [comple]. With near Computing possessions, it is Impossible to Comprehensively discover the investigate Space this would enumerate all potential Distortion of each molecule and all Probable rotational and translational Orientations of the ligand relation to the Protein at an agreed level of granularity.

3. Most docking program in use account for Bendable ligand, and numerous are Attempting to model a flexible protein Receptor.[5]

4. Molecular Docking is the procedure in Which the intermolecular announcement Between 2 molecules was studied in In-Silica. In this improvement, the Macromolecule is the protein receptor. The Small particle is the Ligand.[6]

5. Molecule which can be acted as an Inhibitor. [7]

Major Steps Involved in Mechanics of Molecular Docking

So, the Docking process involves the following Steps:

Step I – preparation of protein

Three dimensional structure of the Protein must be retrieve from Protein data bank (PDB); later the retrieve structure should be pre-processed. This should admit amputation of the water molecules from the cavity, stabilize the charges, substantial the missing residue, production the side chains etc. according to the parameter available.[8]

Step II – active site prediction

After the preparation of protein, the active site of protein must be predicted. The receptor strength possesses lots of active sites merely the one of the concern should be chosen out. Generally the water molecules and hetero atoms are unconcerned if present.[9]

Step III – preparation of ligand

Ligand can be retrieve from numerous databases Such as ZINC, Pub Chem. Or can be sketched

Apply Chem. Sketch tool. While picking out the Ligand, the LIPINSKY'S RULE OF 5 should be Utilizing. Lipinski rule of 5 assist in discriminating Among non-drug like and drug like. The computer Aided drug design and detection (CADDD) Method. It promises high possibility of Achievement or failure due to drug likeness for Molecules remaining by with 2 or more than of The complying rules. For choice of a ligand allow To the

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Lipinsky'srule

(1) A lesser amount of five hydrogen bond Donors
(2) A lesser amount of ten hydrogen bondAcceptors
(3) Molecular mass less than 500 Da
(4) High lipophilicity (expressed as Log not Over 5)
(5) Molar refractivity should be between 40-130.

Step IV Docking: Ligand is docked alongside the protein And the interactions are analyzed.

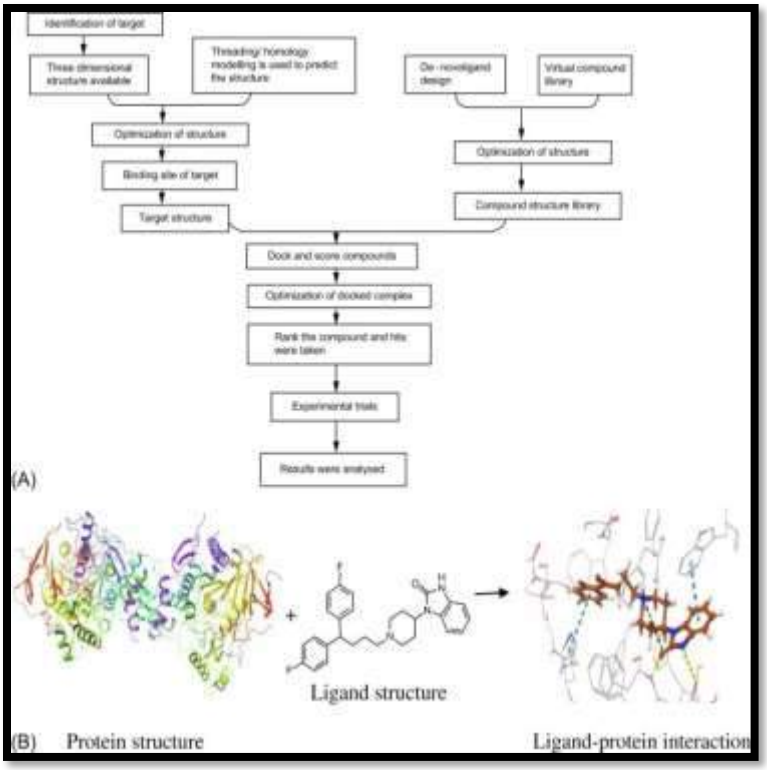


Figure 2 .DOCKING STEPS

Molecular Docking Tools:

In the present work following tooles have been used to carry out the lecular docking of proposed compound.

Tools	Keyfeatures
1.Auto dock tool 1.5.7	3D molecule visualisation, addition of hydrogen, partial atomic charge assignment, grid box setup, result analysis.
2.Pymol	1.To visualize different kinds of moleculessuch as proteins, compounds, or molecules. 2. Save high-quality images in PNG format.
3.Pubchem	1. Served as a central data repository for the NIH's Molecular Libraries Program (MLP) 2. Mostly high-throughput screening (HTS) data from NIH's MLP and other HTS projects. 3.Also contains screening data submitted by data contributors.
4.ResearchCollaboratoryforStructuralBioinformatics (RCSB)	1. The Research Collaboratory for Structural Bioinformatics Protein Data Bank (RCSB PDB)

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	2. Information about 3D Dimensional
5.Proteinsplus	1. They are used in Binding site detection 2D interaction diagrams
6. Discovery Studio Visualizer(BIOVIA)	visualization tool for viewing, sharing, and analyzing protein and modeling data.

Table 1TOOLS FOR MOLECULAR DOCKING

Auto Docking tool

This tutorial will introduce you to docking using the Auto Dock suite of programs. We will use a Graphical User Interface called Auto Dock Tools, or ADT, that helps a user Easily set up the two molecules for docking, launches the external number crunching jobs in Auto Dock, and when the dockings are completed also lets the user interactively visualize the docking results in 3D.

Application of Auto Dock tool

1. Auto Dock is a molecular modeling simulation software. It is particularly effective for Protein-ligand docking.
2. Auto Dock is one of the most cited docking software applications in the research Community.
3. Auto Dock software consists of two programs, Auto Grid and among them, Auto Grid is mainly responsible for the calculation of relevant energy in the grid, while Auto Dock is responsible for conformation search and evaluation.
4. Auto Dock runs on Linux, Mac OS X, SGI IRIX and Microsoft Windows. It is available as a package on several Linux distributions, including Debian, Fedora, and Arch Linux.
5. Auto Dock includes but is not limited to, the following applications: X-ray Crystallography, structure-based drug design, lead compound optimization, virtual Screening, combinatorial library design, protein-protein docking, and chemical Mechanism studies.

Ligand preparation steps

1.Draw your ligands using a Java applet, upload a single ligand file or multiple ligands.
2. Draw chemical structures by Marvin Sketch, a Java based program with a constantly Growing list of editing features and a number of templates to make molecule drawing simpler.
3. Upload a ligand in MDL MOL, SYBYL MOL2, PDB, HYPERCHEM HIN or SMILES Format.
4.Upload multiple ligands in SDF format you can set various parameters during the Simulation such as desired PH, structure optimization and partial charge calculations using. Molecular mechanics or semi empirical quantum chemical methods.
5. Set up rotatable bonds and atom types automatically or modify manuallyDownload the attached files in several file formats including mol, pdb, mol2 and pdbqt. Organize your ligands into self-defined folder.[10]

Molecular Docking for Benzimidazol & Clorobiocin

- **Drug information of Benzimidazol:**
  - Benzimidazole is a heterocyclic organic compound with the molecular formula C7H6N2. It consists of a bicyclic ring system containing benzene and imidazole rings fused together. Benzimidazole and its derivatives have diverse pharmacological properties and are used in the development of various drugs. Some pharmacological actions are anti paracitic,Antineoplastic, Antiviral, Antihelminthic Agent, Antifungal Agent ,Proton Pump Inhibitor etc.[11]

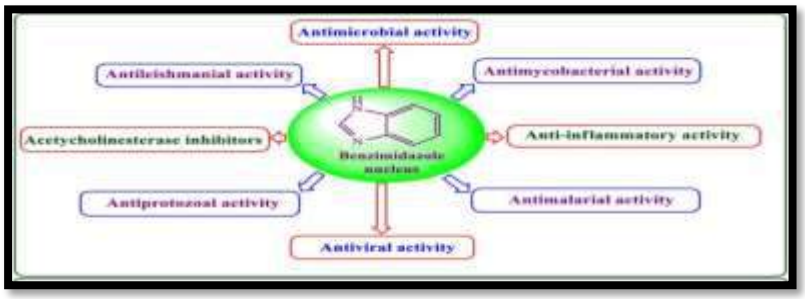


Figure 4 USES OF BENZIMIDAZOL WITH STRUCTURE

- Molecular Wight Approximately 118.14g/mol
- **Drug information Clorobiocin:** Clorobiocin is a potent antibiotic derived from Streptomyces roseochromogenes. It belongs to the aminocoumarin class of antibiotics and is structurally similar to novobiocin. Clorobiocin inhibits bacterial DNA gyrase, which is essential for bacterial DNA replication, thus exerting its antibacterial effects. It has shown activity against a wide

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range of Gram-positive and some Gram-negative bacteria. However, its clinical use has been limited due to its toxicity profile and thavailability of alternative antibiotics.



Figure 3 3D IMAGE OF PDB ID 1KZN

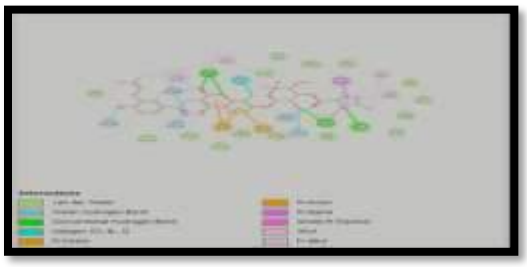


Figure 4 2D IMAGE OF PDB ID 1KZN

RECEPTOR AND LIGAND PROFILE:
PDB DOI: https://doi.org/10.2210/pdb1KZN/pdb
Classification: ISOMERASE
Organism(s): Escherichia coli
Expression System: Escherichia coli
Receptor name: E. coli 24kDa Domain in Complex with CLOROBIOCIN

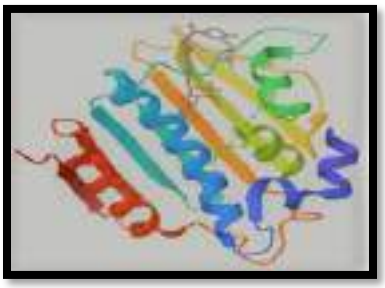


Figure 5: E. coli 24kDa Domain in Complex with CLOROBIOCIN

- **Method:** X-RAY DIFFRACTION
- **Resolution:** 2.30 Å
- **R-Value Free:** 0.267
- **R value work:0.289**

Ligand profile



Pubchem CID:5798
Drug name:Benzimidazol
Classification : heterocyclic aromatic organic compound
Molecular formula: $C_7H_6N_2$
IUPAC Name:1*H*-benzimidazole

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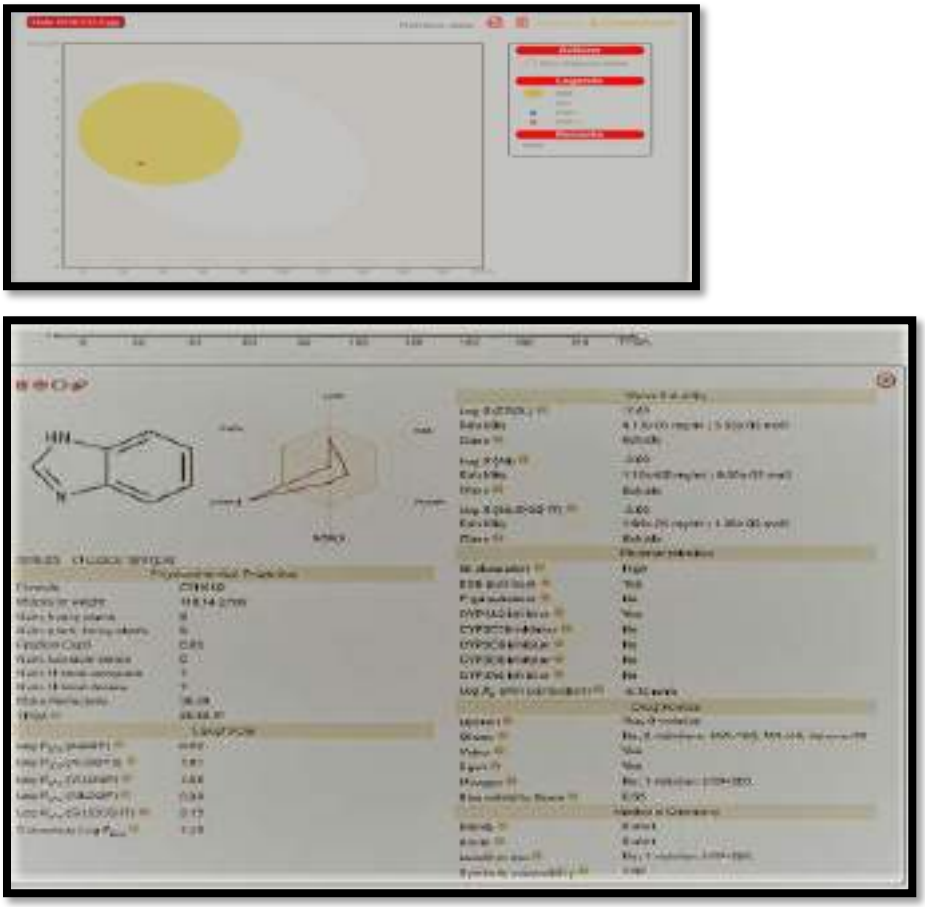


Figure no 6. SWISSADME

METHODS

Autodock vina

Autodock vina is An open supply application for doing molecular docking .it became designed and Carried out via Way of means of Dr.oleg trot in the molecular Graphics Lab at The scripps Research Institute. Autodock vina notably improves the common accuracy of the binding mode predictions as compared to Autodock .jidging via way of means of the checks at the education set utilized in autodock development.

Target preparation

For the docking purpose, receptor preparation is essential step. Receptor –ligand complex formation is required for the pharmacological activity. For this study purpose the receptor which is E. coli 24kDa Domain in Complex with CLOROBIOCIN selected from litreture survy. By the inhibition action on this given receptor may prevent the progress of disease.[12]

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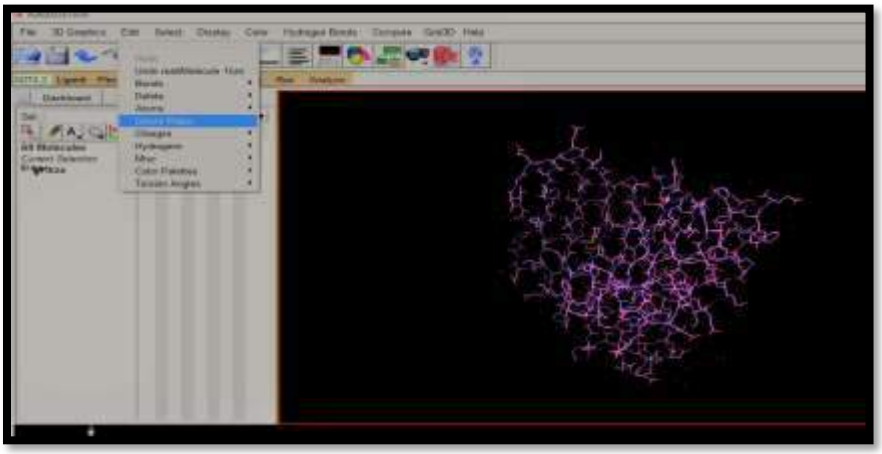
Figure 7 .RCSB database with PDB- ID -1kzn

For the docking study the receptor should be in PDBQT formats, so that can be converted by following steps by using Autodock tools.

A) Protine preparation

1.Open the PDB format of receptor 1kzn in Auto dock Vina by clicking vina by clicking 'file In subsection read molecule.

2. Go to Edit & Deleting Water molecule, select from string as shown in fig:



Figureno. 8. delete water molecule in Autodock vina

3) Then go to select & click on select from string and add Hetatm as show in Fig:

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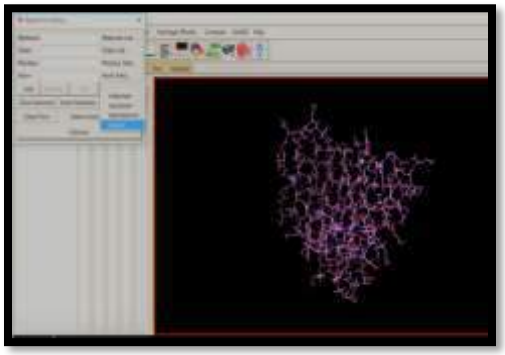


Figure 9.Add hetam

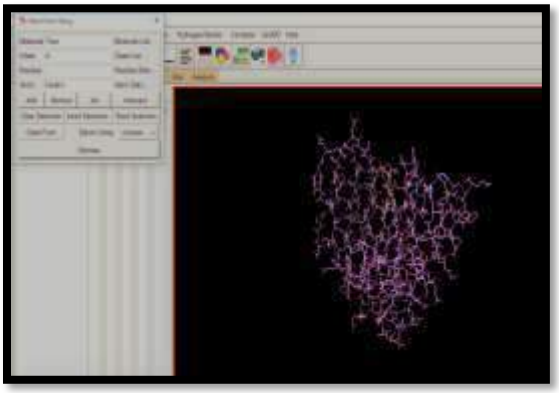


Figure no. 11 select from string

4) Then go to edit and click on Delete Selected Atoms as shown in Fig:

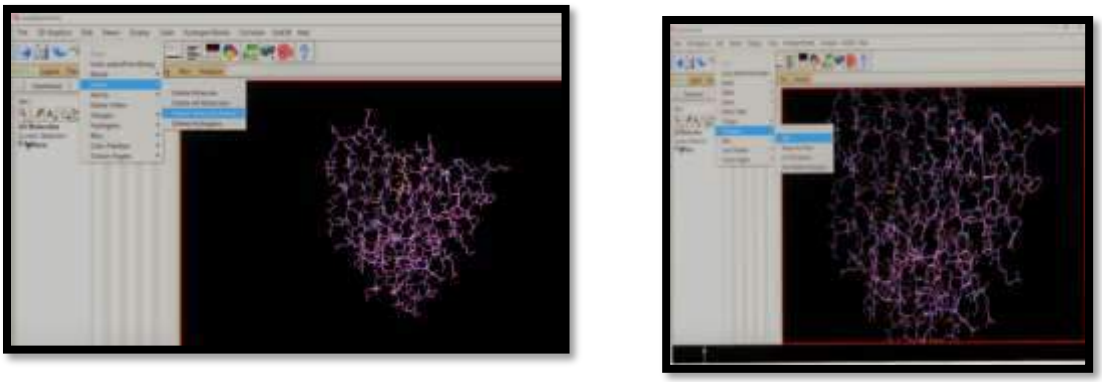


Figure 10..delete selected atoms

5)Then go to edit and click on "add hydrogen (polar only) as show in Fig:

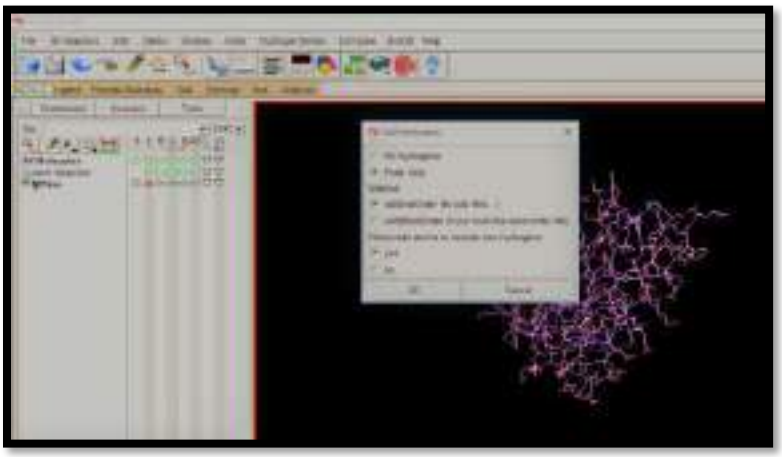


Figure 11.add hydrogen polar only

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6) Then go to edit and “add kollman charges” as shown in fig:

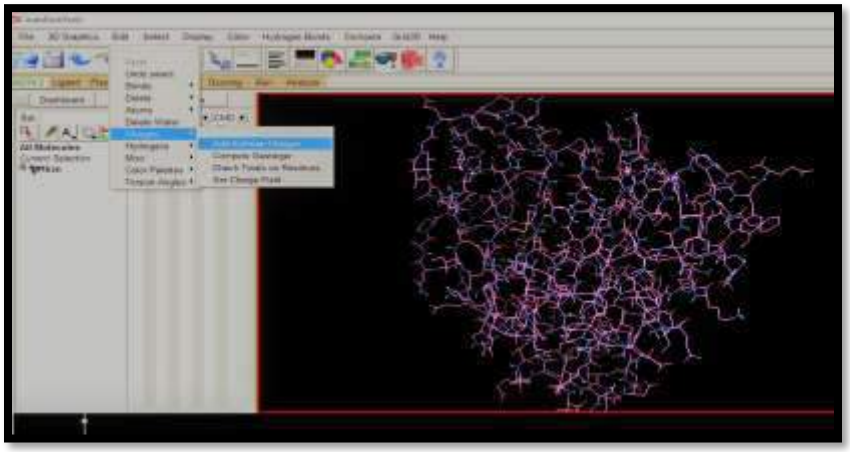


Figure 12.Add kollam charges

7) Then go to edit and click on atoms chose “Assign AD4 type”.as shown in the fig

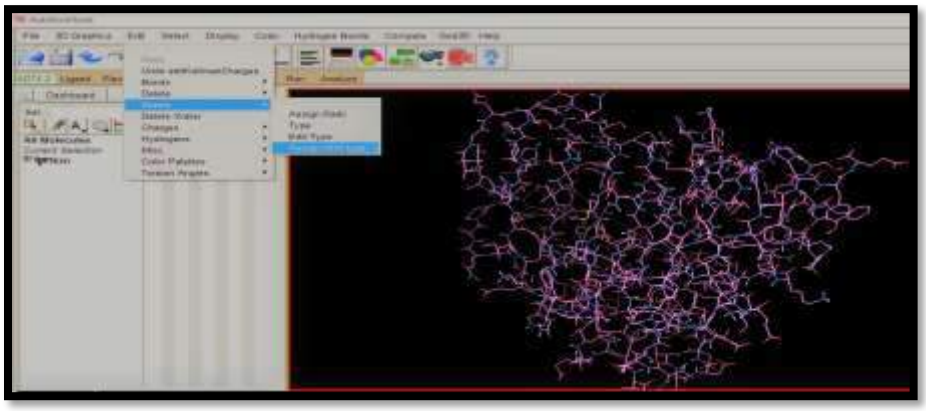


Figure 13.Assing AD4 type

8) Then go to the file section and save bottom then select PDBQT format to save select the END and add molecule, as shown in Fig:

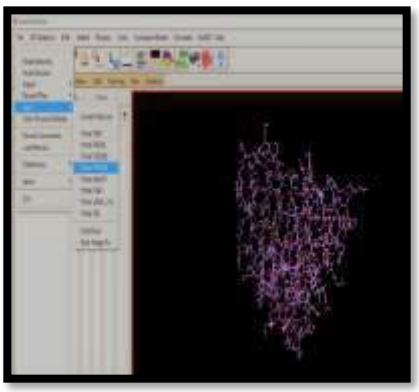


Figure 17.select PDBQT Formate.

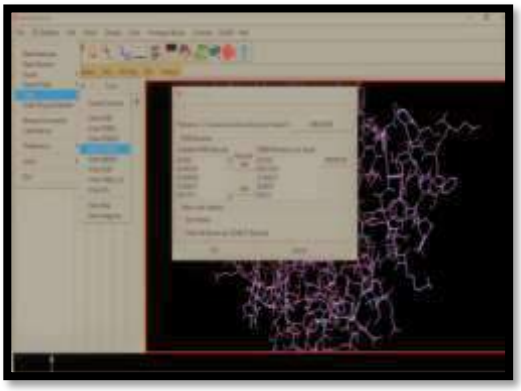


Figure 14.select END &save

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B)Ligand preparation

1.Click the ligand section then choose input add click on the open option.as shown in fig:

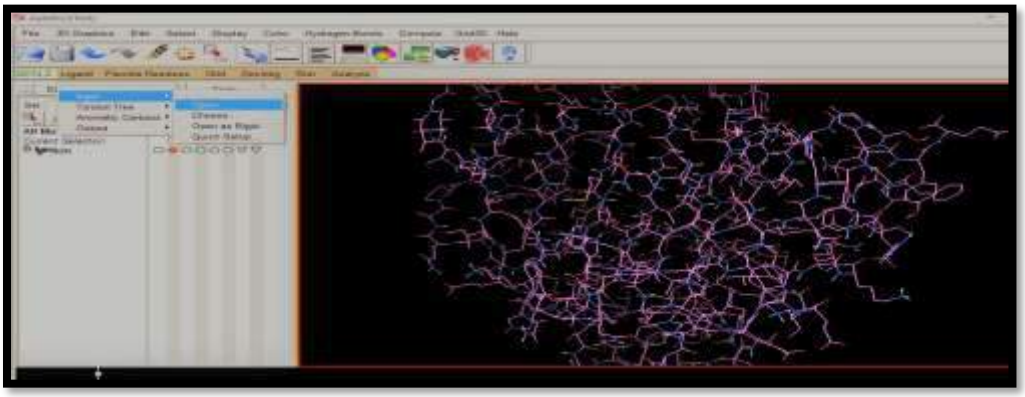
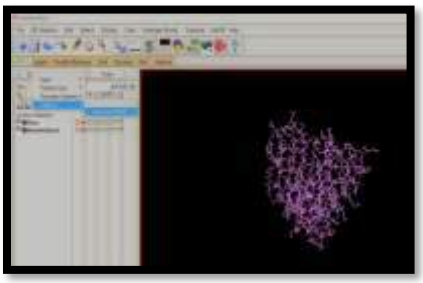


Figure 15.choose input add & open

2)After loading the molecule click the on-torsion tree under the same ligand section and click on choose root then detect root as shown in fig.



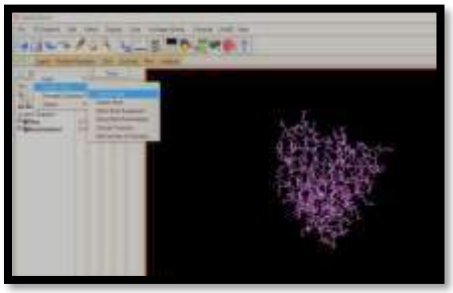


Figure 16.torsion tree choose root **Figure 17.detect root**

3.Then go to the output option and save it in PDBQT format.

C) Grid generation

1.Open PDBQT of 1kzn receptor which is saved in an earlier step. Then the grid and choose And choose a receptor as a macromolecule. Then select the 1kzn receptor molecule and click No for reserve change as shown in fig:



Figure no 22 : choose receptor as macromolecule.

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2.Then click on Set map types and choose ligand as shown in fig .

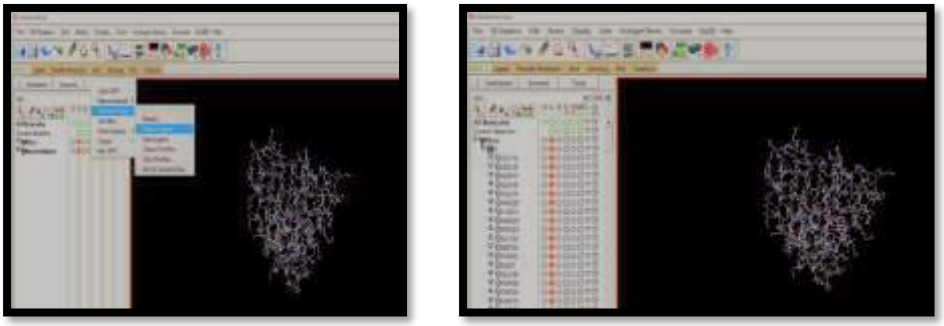


Fig 23. Set map types & choose ligand

3.Then in the grid section, click on the grid box as shown in Fig:

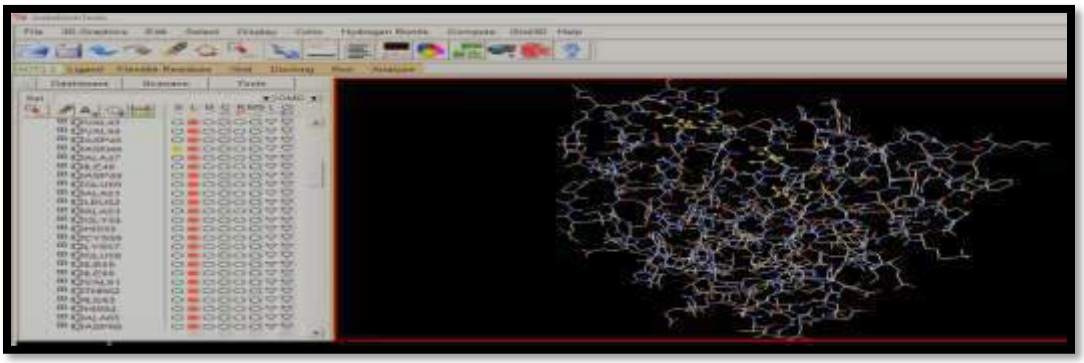


Fig 24. grid section

4.Then click on the grid box Adjust the grid box using the grid box coordinates so that the Receptor molecule is enclosed within the box then click the button in the grid option and Select “output grid dimension file” as shown in Fig:

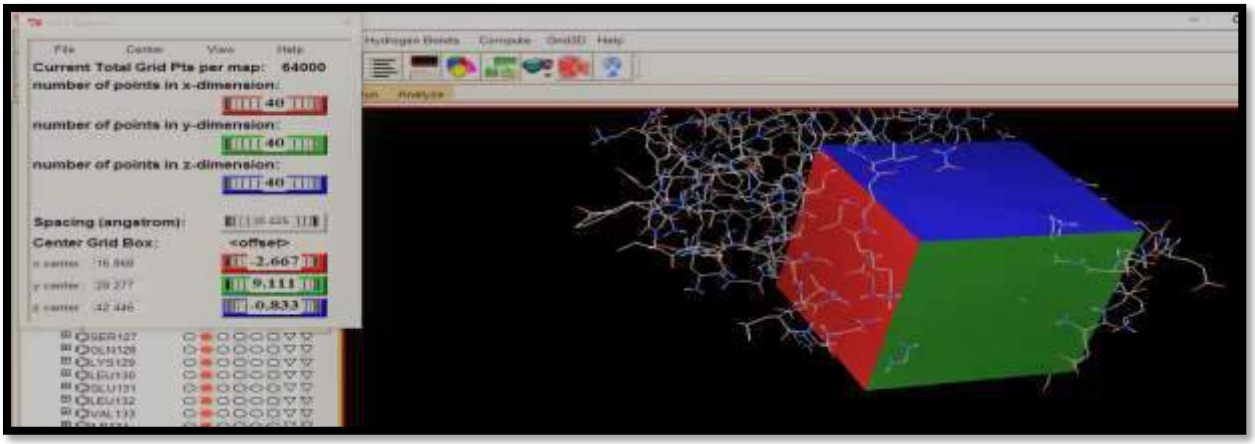


Figure 25 : output grid dimension file

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D) Config file:

1) Open a new document file and enter the configuration details of the grid box, receptor name, ligand name, energy range and exhaustiveness as given in picture not as shown in Fig:

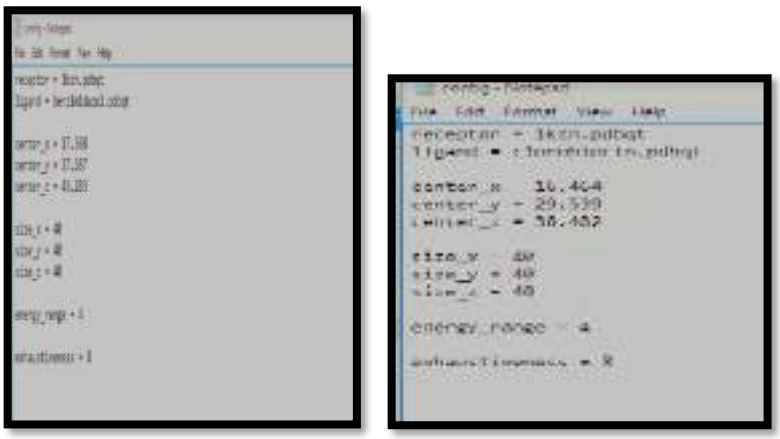


Fig.no 26: Config File of test & standard drug

E) Command Prompt:

1) Search for command prompt in your laptop or computer

.2) Then enter, followed by 'cd' Paste the folder location in which all require are present them press enter as shown in Fig:

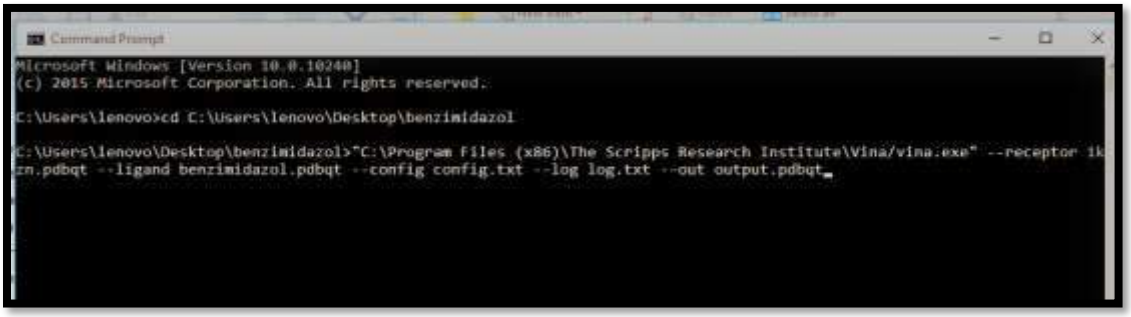


Fig no.27 Command Prompt

3) Then run docking vina copy address "vina search-receptor 1kzn,, pdbqt –ligand benzimidazol.pdbqt – configconfig .txt-log log .txt-out output.pdbqt as shown in Fig:

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4) After that it will take some time and give us the result of docking as shown in Fig:

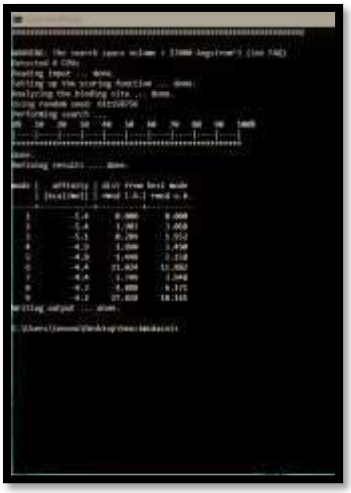




Figure no 28 .result of test drug **Figure no 29. Result of standard drug**

5) Then Output file of the result will automatically save in the command folder, which can be Read by using notepad.

Result Docking

Docking Result of Benzimidazol

The result of test drug Benzimidazol and their target microorganism, PDB ID binding energy and standard drug like Clorobiocin for comparative study have been summarised as below table by autodockvina tool

Sr.no	Target Name	Microorganism Name	PDB ID	Binding energy of Test drug	Binding energy of Standard Drug
1	DNA gyrase inhibitors	Escherichia Coli	1KZN	-5.4	-7.9

For Visualization of Docking result

1 For the visualization of result we use " Discovery Studio BIOVIA"Terminal look like as shown in the fig.

2 open out file obtained from Docking by click on file section. Then delete all poses bye clicking on it eexcept best pose which will be 1 in all cases.



Fig. No 30.Terminal of Discovery Studio BIOVIA

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3.Now go to file section and open 1KZN receptor PDBQT file in new terminal of biovia software. From this terminal copy receptor & paste it in ligand terminal.



Fig no. 31. Complex of ligand with receptor with suitable pose

4.After define receptor & ligand from the complex, then click on “ligand receptor complex” .



Fig no. 32.ligand interaction option

5.In Show ‘receptor ligand interaction in 3d diagram, click on show, 3D Diagram'. Where you will get image of amino acids attached to ligand in 3D formate.

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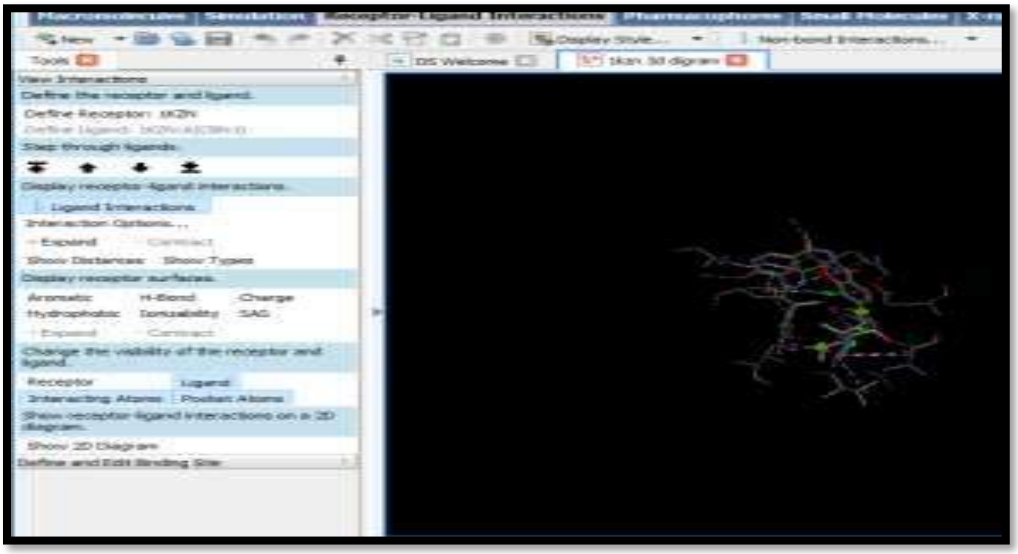


Fig no. 33. 3D image of ligand & receptor complex

6.In Show receptor ligand interaction in 2D Diagram, click on show 2D diagram'.where you will get image of amino acids attached to ligand in 2D formate.

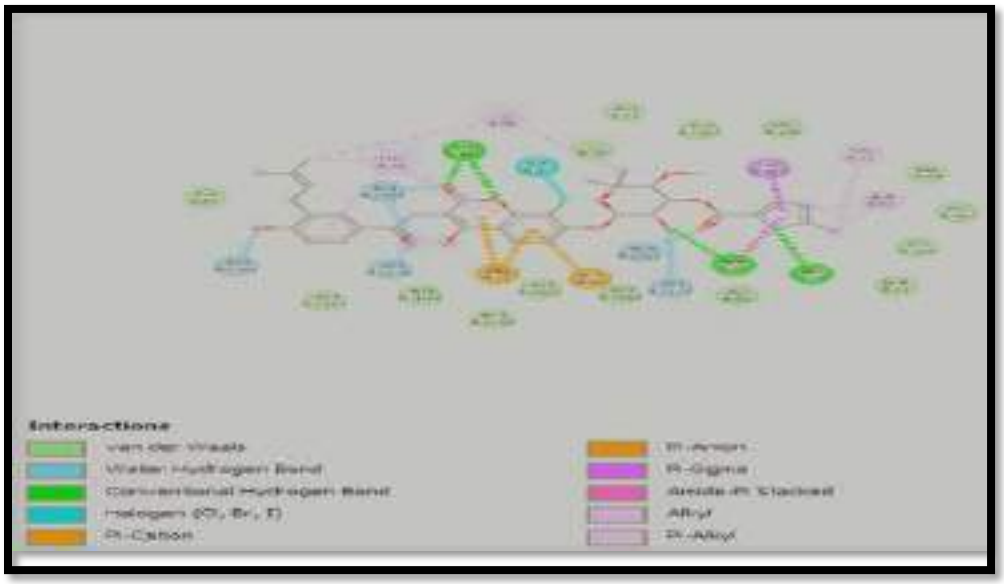


Fig no. 34 2D image of ligand & receptor complex

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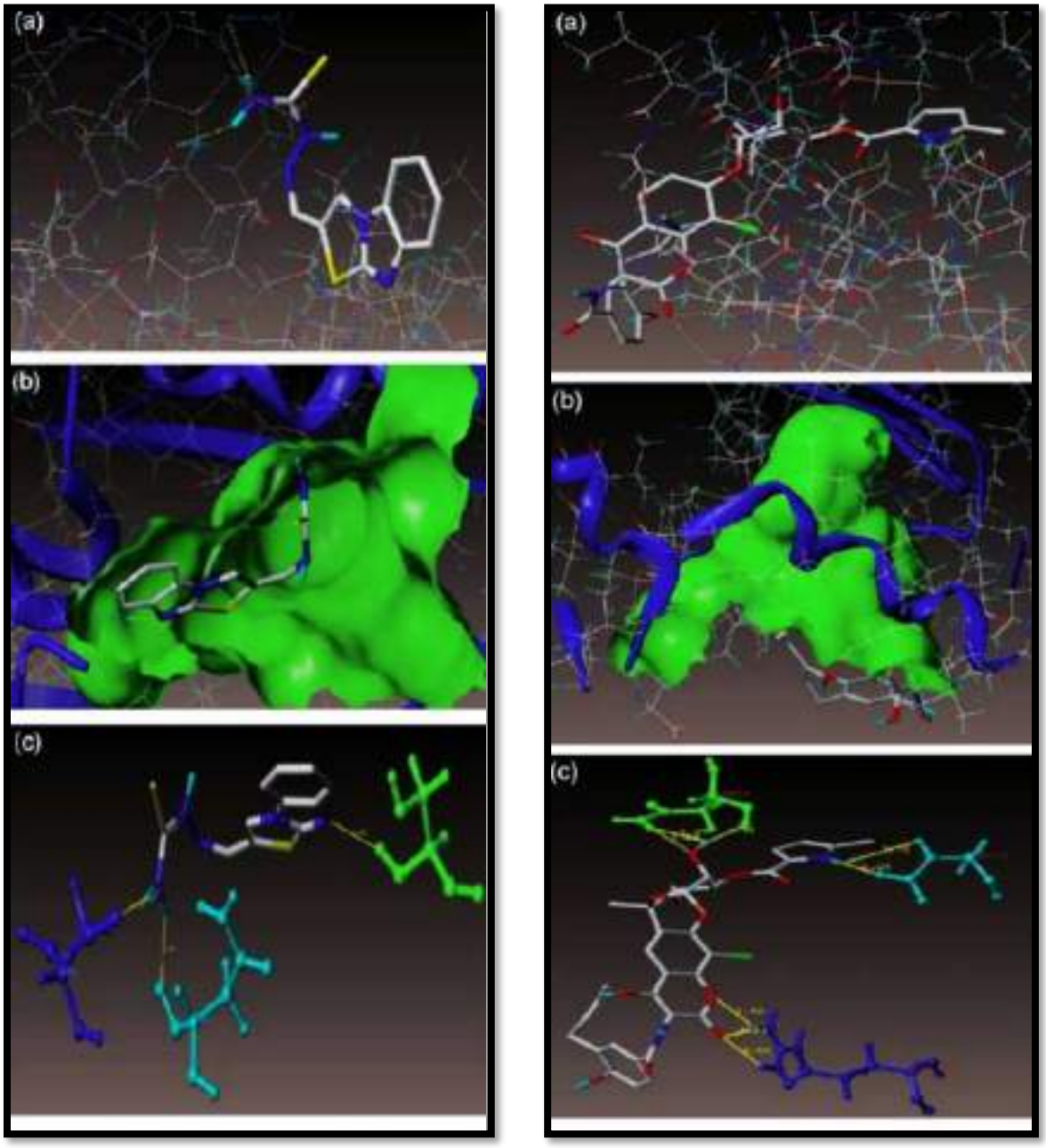


Figure no. :35 Interaction of compound at binding site of enzyme & Docked view of clorobiocin(std drug) at active site of enzyme PDB ID:1KZN respectively

DISCUSSION

Molecular docking studies have been performed on Benzimidazol and clorobiocin to understand their binding mechanisms and potential interactions with target proteins Beyond its pharmaceutical importance, benzimidazole demonstrates its versatility across diverse domains, including materials science and awide spectrum of pharmacological applications, encompassing antiviral, antifungal, antioxidant, and anticancer properties..Clorobiocin is aminocoumarin antibacterial that inhibits the enzyme DNA gyrase.Molecular docking of benzimidazole and clorobiocin sounds like an interesting project! Molecular docking is a powerful tool used in drug discovery

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to predict the binding interactions between a small molecule (like benzimidazole) and a target protein (perhaps an enzyme inhibited by clorobiocin). Here are some points we could discuss:Purpose of the Study: Docking Protocol: Describe your docking protocol. How are you preparing the protein (e.g., adding missing atoms, charges, etc.)? What parameters are you using for the docking simulations?Analysis of Results: How will you analyze the docking results? Are you focusing on binding affinities, specific interactions, or binding poses? Visualization tools like PyMOL or Chimera can be helpful.Significance and Implications: What are the potential implications of your findings? Could they guide future drug design efforts or provide insights into structure-activity relationships? Challenges and Limitations: Have you encountered any challenges during the project? Docking studies can be sensitive to parameters like grid size, scoring functions, and ligand flexibility:

CONCLUSION

The conclusion of a molecular docking study involving benzimidazole and clorobiocin would typically summarize the findings and implications of the study. Here's a sample conclusion based on potential outcomes: "The molecular docking study of benzimidazole and clorobiocin revealed promising interactions between these compounds, suggesting potential binding at specific target sites. Clorobiocin demonstrated favorable binding affinity with key residues in the active site of the target protein, indicating its potential as a competitive inhibitor. Benzimidazole also exhibited notable interactions, albeit with differing binding modes. These findings suggest a basis for further exploration of these compounds as potential leads for drug development targeting specific biological pathways. "In summary, molecular docking can be a useful tool for understanding the potential interactions between mefenamic acid and ampicillin with target proteins, which can provide insights into their mechanisms of action and potential therapeutic applications**.**

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THE PREVALENCE OF SPECIAL NEEDS CHILDREN IN TWO SELECTED LOCAL GOVERNMENTS IN KADUNA STATE, NIGERIA

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Dr Ipadeola Hamid Mairo

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ABSTRACT

It is imperative that all children must be educated irrespective of their disability. This can only be possible if their disability is identified early enough for proper intervention. The identification of learners with special needs can help limit future academic challenges and also provide the opportunity for the right kind intervention hence, this study sought to determine the existence of learners with Special Educational Needs in two selected Local Government (LG) of Kaduna State which are Kaduna North and Kaduna South. The study was guided by three objectives; first to identify the existence of different categories of Special Need learners in regular public primary schools. Secondly, to ascertain the percentage of each category of learners with Special needs in public primary schools and finally, to determine the gender distribution of the different categories of identified learners with Special Needs in regular public primary schools in Kaduna state. A simple random sampling method was used to select a sample of forty one (41) schools was selected from seventy seven (77) public primary schools of both Kaduna North and Kaduna South LG. The instruments for data collection comprise of a checklist and an open ended questionnaire; both instruments were pilot-tested. The data gathered was inputted into Statistical Package for Social Sciences (SPSS) Version 27 and analyzed using descriptive statistic. The data revealed that eight (8) categories of learners with special needs were identified in public primary schools in Kaduna North and Kaduna South. The study also discovered a higher percentage of learners with learning Disabilities in all schools in both LG, also the gender distribution of learners with special needs revealed that more boys have one form of disability or the other. The study therefore recommended that the state Government should employ specialists to manage these learners and augment this by training regular teachers.

KEYWORDS: *learners, special needs, public schools, identification, gender*

INTRODUCTION

The term "special Needs" generally refers to children who have significantly deviated from what is considered normal because of the loss of function or impairment that limits their functional ability makes them unable to do normal everyday tasks by themselves, therefore requiring support. According to Ofuani in Tauna (2021), children with special needs are those "who have long-term physical, mental, intellectual or sensory impairment which in interaction with various barriers may interfere with their full and effective participation in society on an equal basis with others". Individuals with special needs are also those adults and children with significant deficits, who are impaired and go through life with disability (Nkwoagba, 2020). In the recent National Policy on Education (NPE, 2014), they have been captured to include persons with visual impairment, hearing impairment, intellectual disabilities, physical and health impairment, emotional and behavioral disorders, learning disabilities, multiple disabilities and the gifted and talented. The purpose and objectives of NPE include equalizing educational opportunities for all children, to provide adequate education for all children and young people with disability so that they can contribute to national development (NPE, 2014). In addition to the NPE is the Sustainable Development Goals (SDG) agenda for 2030. One of the SDG is to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (UN, 2015). Persons with special needs fall into the category of the 'all' specified in this SDG. However, their insignificant population that is supposed to be an added advantage to them is not. They are disadvantaged in terms of accessing education, training and employment (United Nations, 2012). The inclusion of persons with Special Educational Needs (SEN) in education and access to other opportunities provides the avenue for them to adequately function in their capacities.

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Special education is the education designed to meet the educational needs of people with Special Educational Needs (SEN) in order to make them useful and also contribute to national development. Special schools have been responsible for providing special education in order to address specific needs. In Kaduna state, there is one Special Education school owned by the State government that is supposed to cater for the educational needs of the vast majority of children with SEN but is unlikely to. The other special schools are private, owned by individuals which may not be accessible because of the cost. The possibility of exploring other options is most unlikely, which may include enrolling them in regular public schools. An alternative to special education is a special unit or special classroom committed to the education of persons with special needs within a regular school where other children receive instruction (Hayes, Dombrowski, Shefcyk & Bulart, 2018). The special needs children receive instruction by a trained special educator or teacher. Teaching and learning instructions are carried out using different methods, depending on the type of special need and the degree or level of malfunction. Individualized Education Programme (IEP) is designed for the purpose of meeting the educational need of an individual.

The education of children with SEN has gone through reforms, from special education to integration and then mainstreaming. The latest is the inclusive philosophy which brings 'all' children together in the same environment to learn and meet the same academic standard (Johnson, 2012). Inclusive education was accepted as a new policy of education in Nigeria, however, its implementation has been challenging as the philosophy is not widely practiced. The inclusive education policy have given rise to the piloting of some schools in Kaduna state that are termed or called inclusive schools; a few out of the so many schools in Kaduna State. Although a step in the right direction, only a fraction of persons with special Needs are likely to be a part of this programme. The implementation of inclusive education is still farfetched in Kaduna State and it is unlikely that the special schools in the state can cater for the educational needs of the persons with SEN. It is also most likely that some of these learners with SEN end up enrolling in public schools for proximity and other reasons. Some of them could have passed unnoticed and attend regular schools. Identification of learning difficulties is therefore crucial before intervention.

Identification in early years is important because it is key to the development of children in the different aspects of life; social, emotional, physical, cognitive and otherwise. There must be identification of educational needs before any tangible intervention and support can be achieved. Ukute & Atukum (2016) asserts that when special needs are identified early, there is a greater chance that the intervention planned for them will be successful. While some children are easily identified because of the nature of their disability or hospital history (a child with Down's syndrome), others are not because their learning difficulties are not visible (Hayes, et al (2018)). Lack of identification of children with SNE could impede their success in school and is likely to earn them a tag or label as "dullards" in the classroom. Children are likely to fail in school because they could have special needs that have not been identified and therefore no intervention for it. Regular teachers may or may not be aware that such children exist in their classroom. Teachers may be unable to identify and handle such cases if they come across it. Therefore the need for this study which will attempt to bridge any existing dearth. The Universal Basic Education (UBE) was introduced in Nigeria in 1999. The aim of the programme was to provide free Universal Basic Education for all children. The system is structured into 3 different stages. The first is the Lower Basic (LB) from primary 1 – 3, the second is referred to as the Middle Basic (MB) from primary 4 – 6, and the third stage is the first three years of junior secondary school (JSS) known as the Upper Basic (UB) (Eleke&Chuwang, 2020). The lower and middle basic stages are the focus of this study because it is the first stage of school, the foundation of learning, where children are either made or marred.

The assumption that persons with Special Needs attend special schools only for their education is highly unlikely. Those in urban areas are likely to have more advantage over those in the rural areas as they may have more access to schools and other facilities. The aim of this research therefore is to identify children with SEN in government primary schools and also determine the category of special needs they have that requires intervention. The data collected and analyzed from this research will indicate the statistic of special needs learners in regular classroom, as well as the areas where teachers need to improve upon. The needs assessment will necessitate the need for model development to ascertain its impact in the academic achievements of children with special needs in lower and middle basic primary schools in Kaduna state.

STATEMENT OF THE PROBLEM

The education of persons with Special Needs has gone through series of reforms, from Special education to the current philosophy - inclusive education. These reforms like the establishment of policies and frameworks is an attempt by government, professionals and stakeholder to provide the best or most conducive system of education for persons with Special Needs. This however is beneficial to children who have been identified to have one form of Special Need or the other. There are children in regular public primary schools whose disability may not be glaring therefore pass unnoticed. Learners with special needs are likely to face difficulties and labeling on account of challenges they encounter which the regular teacher has no knowledge of. The identification of learners with special needs can help limit future academic challenges and also provide the opportunity for the right kind intervention. It therefore becomes pertinent

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to identify learners who may have some special educational needs in our lower basic and middle basic primary schools with a view to ameliorate their challenges and pave way for better academic excellence not just at the foundation level but throughout their academic endeavors.

RESEARCH OBJECTIVES

1. To identify the different categories of Special Need learners in regular public primary schools in Kaduna State.
2. To ascertain the percentage of learners with Special needs in public primary schools from Kaduna North and Kaduna South.
3. To determine the gender distribution of learners with Special needs in regular public primary schools in Kaduna state.

RESEARCH QUESTIONS

1. What are the different categories of Special Need learners in regular public primary schools in Kaduna State?
2. What is the percentage of learners with special needs in public primary from Kaduna North and Kaduna south local government?
3. What is the total number of male and female learners with Special Needs in regular public primary schools in Kaduna state?

METHODOLOGY

The study employed the survey method to identify the pupils with special needs in public primary schools in the Kaduna South and Kaduna North Local Government Areas. The population of this study was seventy seven (77) public primary schools which include all public primary schools in both local governments with 36 in Kaduna South and 41 in Kaduna North. Purposive sampling technique was employed to select these two (2) Local Government Areas (LGAs) from Kaduna central senatorial district. Also, Simple random sampling was used to select forty one (41) schools representing above fifty three percent (53%) from the total number of schools in Kaduna North (21) and Kaduna South Local Government (20). All the forty (41) schools and arms of primary 1 – 6 were included in the samples.

INSTRUMENTS

This research used two instruments, namely, open- ended questionnaire and checklist.

VALIDITY AND RELIABILITY

The instruments were scrutinized by a professional in special needs education to determine its appropriateness with the purpose of the study. The instrument was pilot tested and test re-test approach was used to establish the reliability of the questionnaire and checklist.

PROCEDURE FOR DATA COLLECTION AND ANALYSIS

A letter was written to SUBEB (see attached), seeking for permission to conduct the research in the selected school. Approval was given and the data collection lasted for three months. Upon the ethical approval from SUBEB (see attached), the researchers with the help of three research assistants visited each school. First point of call was the head master's office to signify our intentions and to ask him few questions. Each researcher took one arm, say primary one (1) and moved from 1a to 1b and so on until the whole arms were exhausted. Upon entering the class, the class teacher is told about the research and the researcher moved across the classroom to identify and record the pupils observed to be a pupil with special need. The six researchers picked one arm in order to facilitate the collection of data. The data generated was analyzed using descriptive statistics.

RESULTS

Table 1: Categories of Learners with Special Needs Based on Local Governments

Local Govt	Learning Disability	Visual Impairment	Hearing Impairment	Speech Impairment	Intellectual Impairment	Physically Challenged	Health Imp.	Multiple Disabilities	Total
Kaduna North	**33**	**22**	**6**	**1**	**7**	**21**	**5**	**11**	**106**
Kaduna South	**52**	**28**	**9**	**3**	**7**	**9**	**5**	**7**	**120**
Total	**85**	**50**	**15**	**4**	**14**	**30**	**10**	**18**	**216**

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From table 1 above , it shows that a total of 216 (two hundred and sixteen) learners were identified from both local governments to have special needs ranging from learning disabilities, hearing impairment, visual impairment to others (speech impairment, intellectual impairment, physically challenged learners, learners with health impairment as well as those with multiple disabilities). The table shows that 85 learners had learning disability, 50 had Visual Impairment and 30 learners showed characteristics of intellectual impairment. Learners who had multiple disabilities were identified to be 18 whereas 15 of them experience Hearing problems. 10 others were observed to show health impairment which was mostly Psychological Problems. The least observed category based on the study was Speech Impairment with only 4 learners. The table also clearly shows that a higher number of learners in Kaduna South (120) have been identified to have special needs as compared to Kaduna North (106). This may be an indication that the rate of admission of pupils with special needs into public schools in Kaduna North is low which could mean that either the pupils are denied entry into the schools, or the admission requirements are too stringent and these learners cannot meet the criteria for admission or there is possibly stigmatization of the learners with special needs which can eventually lead to the drop out of learners from school.

Table 2: Distribution of learners showing special needs learners based on gender (girls)

Condition	Learning Disability	Hearing Impairment	Visual Impairment	Total
Kaduna South	**22**	**2**	**16**	**40**
Kaduna North	**14**	**4**	**5**	**23**
Total	**36**	**6**	**21**	**63**

The study also identified learners with special needs based on gender. Table 2 shows that in Kaduna South 22 girls have learning disabilities, 2 have hearing impairment while 16 other females have visual impairment. In Kaduna North, 14 girls have learning disabilities, 5 of them have visual impairment while 4 have hearing impairment. This means that in Kaduna South 40 learners with special needs were girls while 23 was recorded in Kaduna North.

Table 3:Distribution of learners showing special needs learners based on gender (boys)

Condition	Learning Disability	Hearing Impairment	Visual Impairment	Total
Kaduna South	**30**	**7**	**12**	**49**
Kaduna North	**19**	**2**	**17**	**38**
Total	**49**	**9**	**19**	**87**

Table 3 above shows the distribution of boys who have special needs. In Kaduna South 30 boys have learning disabilities, 12 were identified to have visual impairment while 7 other male pupils have hearing impairment. In Kaduna North a lesser number of boys (2) have hearing impairment, 17 have visual impairment and 19 boys have learning disabilities.

SUMMARY OF FINDINGS

Based on the data collected and analyzed, the following are the major findings:

1. The learners with special needs found in regular primary schools in Kaduna state were in the following categories: Learning disability, Visual Impairment, Hearing impairment, Intellectual impairment, Speech impairment, physically challenged, Health and multiple disabilities.
2. Kaduna South local Government area has more learners with special needs compared to those in Kaduna North.
3. There was a high prevalence of pupils with learning disability in both LGAs.
4. The gender distribution of learners with special needs revealed that more boys in both local government areas have one form of disability or the other.
5. Majority of learners with special needs in regular primary school have mild form of disability.
6. It was discovered that special need learners enrolled into the public primary school in both local governments were less than 1% of the total population. This calls for concern. Therefore, efforts should be made to ensure more learners with Special Educational Needs are enrolled to demonstrate the inclusive nature of schools in Kaduna state.

CONCLUSION

Based on the findings of the study, it was concluded that Kaduna state has learners in regular primary school with different categories of disabilities. Learning disability is a more prevalent disability while Kaduna South has more learners with special need. Male learners had the most disability.

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RECOMMENDATIONS

Following the findings of this study, these recommendations were made.

- There should be more special needs educators as well as support workers deployed to these two local government areas.
- SUBEB should embark on regular training of its teaching staff with emphasis on identification of learners with special needs
- The state government should support parents of learners with special needs to assist in identification as well as enrollment of such learners in the regular primary schools as a way of entrenching the spirit of inclusive education in the state.
- Regular awareness campaign about learners with special needs should be undertaken in all local government educational areas of the state.
- Special incentives should be given to parents of children with special educational needs who willingly enrolled their wards or children in inclusive settings to serve as encouragement to other parents.

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REVIEWING THE DESIGN AND IDENTIFICATION TECHNIQUES OF MICROSPHERES

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ABSTRACT
The distribution mechanism for microparticles is acknowledged as dependable. a method for precisely delivering the medication to the intended location. The medication should be administered at a rate and concentration that maximizes therapeutic efficacy while minimizing negative effects to a specific target site. Microspheres are spherical particles that are empty and have a diameter of less than 200 mm. Microspheres are a free-flowing powder made of both synthetic and natural polymers. They may have a medicine with controlled release. The most crucial components of pharmacological drug delivery are polymers. These days, a wide variety of polymers with various characteristics are accessible for usage in many pharmaceutical applications. Both natural and synthetic polymers are used in the creation of microspheres. Acrolein, polyanhydrides, lactides, glycosides, and methyl methacrylate are examples of synthetic polymers. Albumin, gelatin, collagen, agarose, chitosan, and carrageenin are examples of natural polymers. The free-flowing powders known as microspheres are made of artificial polymers and proteins with a particle size distribution of 1 to 1000 micrometers. There are various ways to create microspheres, however the method of preparation varies depending on the medication. The polymers utilized and the necessary duration of action. Micromeritic qualities, including particle size and shape, swelling index, tapped density, and drug loading efficiency, are the metrics used to evaluate microspheres. In the upcoming days, we will discover the microspheres in innovative medication delivery by mixing several additional scenarios. With regard to disease cell sorting diagnostics, gene and genetic materials, safe, targeted, and efficient in vivo delivery, as well as supplements that enhance a microscopic understanding of a sick organ.
KEYWORDS: *Microparticle, Drug delivery system, microspheres, Synthetic polymers.*

INTRODUCTION

Delivery methods utilizing microparticles are acknowledged as a dependable way to precisely administer medication to the intended location. Drug delivery has grown in significance mostly as a result of increased knowledge of the challenges posed by traditional drug delivery methods. A medicinal chemical can be delivered to the target place in a number of ways using controlled or continuous release techniques (1). One method is the use of polymers in the development of microparticulate drug delivery systems through the microencapsulation technique, which produces uniformly sized, spherical microscopic particles or microspheres with a diameter of 1 to 1000 µm by enclosing or enveloping a solid, liquid, or gaseous active ingredient (core material) with a polymeric material. If dosages could be maintained for controlled release, the benefits to patients would be increased. The medication should be administered at a rate and concentration that maximizes therapeutic efficacy while minimizing negative effects to a specific target site. The size of a microsphere is less than 200 mm, and they are spherical, empty particles. Microspheres are particles that may flow freely and are made of either synthetic or natural polymers (2). They could be a controlled release medication. By allowing the medicine to be localised at the site of action and extending its release, homogenous monolithic particles called microspheres enhance patient care. Natural polymer-based microsphere carrier systems have garnered significant interest in recent years due to their potential for long-term medication delivery. These days, dosage formulations with target-specificity and controllable release rates have a significant influence on the creation of innovative drug delivery systems. Recently, there has been a lot of interest in innovative dosage forms that can target the active drug molecule to a specific spot and manage the release rate. A well-crafted controlled drug delivery system can improve a particular medicine's therapeutic efficacy and solve many of the issues with traditional therapy. In order to achieve optimal therapeutic efficacy, the drug must be delivered to the target tissue in the ideal amount during the appropriate time frame, resulting in low toxicity and negligible side effects. There are several methods for getting a medicinal drug to the intended location in a sustained controlled release trend. Using microspheres as drug carriers is one such method. Microspheres can be characterized as a structure composed of

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one or more miscible polymers in which drug particles are scattered at the molecular or macroscopic level. Alternatively, they can be defined as monolithic spheres or therapeutic agent distributed throughout the matrix either as a molecular dispersion of particles (3).

BENEFITS

1. Microspheres have a long-lasting and consistent therapeutic impact.
2. enhances patient compliance by lowering the frequency of dosing.
3. Because of their tiny size and spherical shape, they may be injected into the body.
4. Increased drug use will increase bioavailability and decrease the frequency or severity of side effects.
5. The shape of the microsphere permits controlled variability in medication release and breakdown.

LIMITATION

Some of the disadvantages were found to be as follows

1. The modified release from the formulations.
2. The release rate of the controlled release dosage form may vary from a variety of factors like food and the rate of transit though gut.
3. Differences in the release rate from one dose to another.
4. Controlled release formulations generally contain a higher drug load and thus any loss of integrity of the release characteristics of the dosage form may lead to potential toxicity.
5. Dosage forms of this kind should not be crushed or chewed

Materials

For the creation of microspheres, a variety of materials both biodegradable and non-biodegradable have been studied. These materials comprise modified natural compounds as well as polymers derived from both synthetic and natural sources. Methyl methacrylate, acrolein, lactide, glycoside, and related copolymers, ethylene vinyl acetate copolymer, polyanhydrides, etc. are examples of synthetic polymers used as carrier materials. The natural polymers starch, collagen, albumin, gelatin, and carrageenan are employed for this purpose (4).

Microspheres used usually are polymers. They classified into two types:

1. Synthetic Polymers:

a. non-biodegradable polymers.

E.g., Poly methyl methacrylate (PMMA), Acrolein, Glycidyl methacrylate Epoxy polymers

b. Biodegradable polymers

E.g., Lactides, Glycosides & their copolymers 3 Poly alkyl cyano acrylates Poly anhydrides

2. Natural Polymers can be obtained from different sources like proteins, carbohydrates, and chemically modified carbohydrates.

Proteins: Albumin, Gelatin and Collagen

Carbohydrates: Agarose, carrageenan, Chitosan, Starch

Chemically modified carbohydrates: Poly dextran, poly starch

TYPES OF MICROSPHERES

1. Bio adhesive microspheres

Adhesion is defined as the drug's capacity to cling to a membrane by means of the sticky characteristic of water-soluble polymers. The term "bio adhesion" refers to the attachment of a drug delivery device to a mucosal membrane, such as the buccal, ocular, nasal, or rectal. Because these specific microspheres stay at the application site for a longer amount of time, they come into close contact with the absorption site and enhance the therapeutic impact (5).

2. Floating microspheres

Floating types float in the stomach without slowing down the rate at which food is discharged since their bulk density is lower than that of gastric fluid. The medicine is released gradually at the intended pace if the stomach content is floating in the system, increasing gastric residency and causing fluctuations in plasma concentration. It also reduces the possibility of dose dumping and striking. Another strategy is to produce a long-lasting therapeutic effect, which reduces the frequency of dose (6)

3. Magnetic microspheres

This type of medication delivery method is essential since it precisely addresses the illness's location. A smaller amount of a magnetically targeted medication can replace a larger amount of the drug that is freely circulating. Magnetic carriers react magnetically to a magnetic field when they are combined with chitosan, dextran, and other materials into magnetic microspheres. There are two types of magnetic microspheres: therapeutic and diagnostic (7).

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4. Polymeric microspheres

The different types of polymeric microspheres can be classified as follows and they are biodegradable polymeric microspheres and synthetic polymeric microspheres.

A. Biodegradable polymeric Microspheres

The idea behind using natural polymers like starch is that they are biodegradable, biocompatible, and naturally sticky. Biodegradable polymers have a high degree of swelling property with aqueous medium, which causes gel formation and extends the residence period when in contact with mucous membranes. The polymer concentration and the sustained release pattern regulate the drug's release rate and extent. The primary disadvantage of biodegradable microspheres in clinical usage is its complex drug loading efficiency, which makes it challenging to regulate drug release (8).

B. Synthetic polymeric microspheres

Synthetic polymeric microspheres have shown great promise in clinical applications, where they are utilized as embolic particles, bulking agents, fillers, drug delivery vehicles, and other applications. They are also safe and biocompatible. However, the primary drawback of these microspheres is their propensity to disperse from the injection site, which increases the risk of embolism and additional organ damage (9).

5. Radioactive microspheres

Radiological immobilization When microspheres of the size of 10–30 nm are encountered, they tap into the first capillary bed because they are larger than capillaries. In order to treat all these problems, radioactive microspheres are injected into the arteries that flow to the tumors of interest. This allows for a high radiation dose to be delivered to the targeted area without causing harm to the normal surrounding tissues. Unlike medicine delivery systems, it operates from a radioisotope-typical distance rather than releasing radioactivity from microspheres. The various types of radioactive microspheres include emitters, ß emitters, and α-emitters (10).

METHODS OF PREPARATION

1. Single emulsion technique

The single emulsion method is used to create the microparticulate carriers of natural polymers, such as proteins and carbohydrates. After being dissolved or dispersed in an aqueous media, the natural polymers are then distributed in a non-aqueous medium, such as oil. The process of cross-linking scattered globules is done in the second step of preparation. There are two ways to accomplish cross-linking: using heat or chemical cross-linking agents like formaldehyde, glutaraldehyde, diacid chloride, etc (11).

2. Hot Melt Microencapsulation

This approach was initially used to manufacture microspheres of polyanhydride copolymer of poly bis (p-carboxy phenoxy) propane anhydride with sebacic acid19. This method involves melting the polymer first, then continuously mixing in the solid drug particles. To obtain a stabilized emulsion, the produced mixture is next heated to a temperature over the polymer's melting point while being continuously stirred and suspended in a non-miscible solvent, such as silicone oil. The resulting emulsion is chilled to solidify the polymer particles, and then petroleum ether is used to filter and wash the microspheres **(12).**

3. Complex Coacervation

The basic idea behind this technique is that, given the right circumstances, mixing solutions of two hydrophilic colloids would separate the liquid precipitate. This process involves dissolving the immiscible polymer in an appropriate vehicle to prepare the coating material phase, and dispersing the core material in a coating polymer solution while stirring continuously. One of the phase separation techniques—that is, adjusting the polymer solution's temperature, adjusting the medium's pH, adding a salt, an incompatible polymer, or a nonsolvent—was used to achieve microencapsulation. Another method involved inducing a polymer-polymer interaction. To create a self-sustaining microsphere, the coating is often toughened using thermal cross-linking procedures. (13).

4. Double Emulsion Method

The most popular technique for microencapsulation was initially presented by Ogawa Y et al. in 1988 (20). To obtain the primary water-in-oil emulsion, this process involves adding an aqueous solution of the medication and polymer to the organic phase while vigorously stirring. To create the various emulsions (w/o/w), this emulsion was then added to a large volume of water containing an emulsifier such as polyvinyl alcohol or polyvinylpyrrolidone, while being stirred continuously until the majority of the organic solvent evaporated and solid microspheres were left behind. After that, the microspheres are dried and cleaned (14).

5. Spray Drying

The polymer is first dissolved in an appropriate volatile organic solvent, such as acetone or dichloromethane, before being sprayed dried. After that, the medication is homogenised at a fast speed and distributed throughout the polymer solution in its solid state. A hot air stream is then used to atomize this dispersion. As a result of atomization, tiny droplets or fine mists are formed, and when the solvent instantly evaporates, microspheres with sizes between one and one hundred micrometres are created. A cyclone separator is used to separate microparticles from hot air, and vacuum drying is used to eliminate any solvent residue. The process's ability to function under aseptic circumstances is one of its main advantages; it moves quickly, which results in the formation of porous micro particles (15).

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6. Solvent Evaporation

The operations are performed within a liquid production apparatus. A volatile solvent that is immiscible with the liquid production vehicle phase is used to disseminate the microcapsule coating. In the coating polymer solution, a core material to be microencapsulated is dissolved or distributed. To create the right size microcapsule, the core material mixture is agitated and distributed throughout the liquid manufacturing vehicle phase. After the combination is heated, if needed, to evaporate the solvent, the polymer shrinks around the core and becomes dispersed in the polymer solution. Matrix-type microcapsules are generated if the core material dissolves in the covering polymer solution. Either water soluble or water in soluble materials could make up the main components (16).

7. Polymerization techniques

The polymerization techniques conventionally used for the preparation of the microspheres are mainly classified as:

I. Normal polymerization

II. Interfacial polymerization.

Both are carried out in liquid phase.

Normal polymerization

Several methods, including bulk, suspension, precipitation, emulsion, and micellar polymerization processes, are used to carry it out. To start polymerization in bulk, a monomer or combination of monomers combined with an initiator or catalyst is often heated. The resulting polymer can be shaped into microspheres. During the polymerization process, drugs may be loaded. Bead or pearl polymerization is another name for suspension polymerization. In this case, the monomer or mixture of monomers is heated while dispersing as droplets in an ongoing aqueous phase. Other additives and an initiator might also be included in the droplets. Because the initiator is present in the aqueous phase and diffuses to the micelle surface subsequently, emulsion polymerization differs from suspension polymerization (17).

Interfacial polymerization

In order to create a polymer film that effectively envelops the dispersed phase, it entails the interaction of different monomers at the interface between the two immiscible liquid phases.

DRUG LOADING IN MICROSPHERE

There are two main ways to load the medications into the microspheres: either during the microsphere preparation process or after the microsphere preparation process by incubating them with the drug solution. There are three possible ways to load the active ingredients: chemical bonding, surface absorption, and physical trapping. Maximum drug loading in microspheres was discovered to be possible when the drug was added during the preparation process, although many other process variables, such as the presence of additives, the preparation method, the polymerization heat, the degree of agitation, etc., may also have an impact. After the microspheres are prepared, they can be incubated with a high concentration of the drug in an appropriate solvent to accomplish drug loading. Here, the medicine may be incorporated into the microspheres by absorption through the microspheres' surface or by penetrating or diffusing through their pores. Following the solvent's removal, the drug-loaded microsphere is left behind (18).

Evaluation of Microspheres

- **Particle size analyzer**
  In order to prevent microsphere aggregation, 50 mg of microspheres are suspended in 5 mL of distilled water with 2% w/v of tween 80. The aforementioned suspension is then sonicated in a water bath, and the particle size is expressed as volume mean diameter in micrometers (19).
- **Entrapment efficiency**
  5mg of medication-containing microspheres are crushed, dissolved in distilled water for 3 hours with the aid of an ultrasonic stirrer, filtered, and then subjected to UV-Visible spectroscopic analysis. The ratio of real drug content to theoretical drug content is known as entrapment efficiency (20).
  % Entrapment = Actual content/Theoretical content x 100
- **Scanning electron microscopy (SEM)**
  The SEM method determines surface morphology. Using double-sided sticky tape, the microcapsules are directly placed on the SEM sample slab, covered with gold film at low pressure, and examined. (21).
- **Swelling index**
  The characterization of sodium alginate microspheres is done using this method. Alginate microspheres (100 mg) are placed in a wire basket and stored on top of a different solution (100 mL), such as distilled water or a buffer solution of pH (1.2, 4.5,

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7.4), while swelling is permitted at 37 °C. Therefore, by periodically measuring weight and soaking with filter paper, variations in weight variance between the initial weight of microspheres and weight owing to swelling are measured (22).

- **Optical microscopy**
  Using an optical microscope, this technique measures the size of the particles (Meizer OPTIK) measured under 450x (10x eye piece and 45x objective), and the results show that there are 100 particles (23).
- **Thermal analysis**
  Thermal analysis of microcapsule and its component can be done by using
  Differential scanning calorimetry (DSC)
  Thermo gravimetric analysis (TGA)
  Differential thermometric analysis (DTA)
  Accurately the sample is weighed and heated on alumina pan at constant rate of 10oc/min under nitrogen flow of 40 ml/min.
- **Stability studies**
  Stability Studies are done by placing the microspheres in screw capped glass container and storing them at following conditions.
  1. Ambient humid condition
  2. Room temperature (27+/-2 ℃)
  3. Oven temperature (40+/-2 ℃)
  4. Refrigerator (5 0+/-8 ℃).

  It was carried out of for 60 days and the drug content of the microsphere is analyzed.
- **Isoelectric point**
  An instrument called a micro electrophoresis is used to measure the electrophoretic mobility of microspheres in order to identify their isoelectric point. The time of particle travel across 1 mm is used to calculate the mean velocity at various Ph values, which range from 3 to 10. This information can be used to calculate the particle's electrical mobility. The surface contained charge, ionizable behavior, or ion absorption nature of the microspheres can all be related to the electrophoretic mobility (24).
- **Angle of repose**
  The funnel method was used to determine the microspheres' angle of repose (q). The microspheres were transferred via a vertically adjustable funnel, allowing for the creation of a maximum cone height. The angle of repose and the radius of the heap were computed.
  $\tan \theta = h/r$
  Where h is the height of the granules above the flat surface, θ is the angle of repose, and r is the radius of the circle the granule heap forms.

- **Density determination**
  A multivolume pycnometer can be used to determine the microspheres' density. The multi volume pyrometer is filled with a precisely weighed sample that is placed in a cup. The chamber is filled with constant pressure helium, which is then allowed to expand. The pressure inside the chamber drops as a result of this expansion. There are two sequential pressure reduction readings recorded, each at a different initial pressure. The volume and subsequently the density of the microsphere carrier are calculated from two pressure readings (25).
- **Bulk density**
  It is the blend's mass to bulk volume ratio. Powder was added to a measuring cylinder, and the volume the powder occupied was measured.
  Microsphere mass divided by bulk volume equals bulk density.
  Tapped density
  It is the ratio of mass of the blend to tapped volume. It was measured by digital tap densitometer by measuring the volume occupied by powder after 100 standard tapping.
  Tapped density=mass of microspheres/volume of microspheres after tapping
- **Carr's (compressibility) index**
  The following equation was used to calculate the microparticles' compressibility index (C.I.) or Carr's index value.
  100% compressibility is equal to Tapped density minus Bulk density. tapped-out density
  A powder that often results in good flow characteristics has a score below 15%, whereas a number above 25% indicates poor flowability (26).

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Application of Microspheres

I. I. stomach retentive floating microspheres are particularly helpful in reducing the main negative effects of stomach irritation; for example, NSAID floating microspheres, such as indomethacin, are good for rheumatoid arthritis patients.

II. Because this system can stay in the stomach for extended periods of time, the medication can be released gradually. These technologies thereby solve the issue of the short gastric residence time that arises when using an oral controlled release formulation.

III. These systems provide an easy way of maintaining constant blood level with an ease of administration and better patient compliance.

IV. Recently, intertumoral and local drug delivery techniques have gained popularity as a potentially effective cancer therapeutic modality. Polymer films were created to deliver paclitaxel at the tumor's location in a therapeutically appropriate concentration. Transparent and flexible films with a 31% (w/w) loading capacity for paclitaxel were possible. The study found that the casting approach produced polymer films containing paclitaxel's with good loading efficiencies while maintaining the chemical integrity of the molecule throughout preparation.

V. Polymer is a unique material for the construction of ocular drug delivery vehicles because of its favorable biological behavior, which includes bio adhesive, permeability-enhancing capabilities, and intriguing physio-chemical qualities. Polymer hydro gels are more aesthetically pleasing than solid or semisolid formulations when it comes to ocular distribution, such as ointments or suspensions, because of their elastic qualities. Ophthalmic chitosan gels increase precorneal drug residence durations, indicating a reduction in drug removal by the lachrymal flow, and better adherence to the mucin that coats the corneal surface of the eye and the conjunctiva. Furthermore, the improvement of its penetration results in a more focused effect and permits the use of lower drug dosages.

VI. Clotrimazole, an imidazole derivative, is embedded in a polymer that has been changed by adding thioglycolic acid to its core amino groups. This polymer is commonly used to treat mycotic infections of the genitourinary tract. The polymer's mucoadhesive qualities are significantly enhanced by the addition of thiol groups, and this is observed to lengthen the vaginal mucosa tissue polymer's residence period.

VII. It has been shown that chitosan can both prevent excessive scar formation and hasten wound healing to provide a skin surface that is cosmetically acceptable. In dentistry, chitosan is also used as a tampon after extreme therapy for maxillary sinusitis and as a bandage for mucous lesions in the mouth. It is being researched for use as a periodontal surgical absorbent membrane. With its diverse range of biological activities, chitosan is promoted as a nutritious meal that can help treat and/or alleviate several illnesses, such as hepatitis, diabetes, cancer, and arthritis.

CONCLUSION

Ionotropic gelation-produced microspheres show promise as a possible stomach retention strategy. In the future, by fusing different approaches, microspheres will play a major role in novel drug delivery, specifically in the areas of diseased cell sorting, diagnostics, gene & genetic materials, safe, targeted, and efficient in vivo delivery, and supplements as tiny replicas of the body's diseased organs and tissues.

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DESIGN, DEVELOPMENT AND EVALUATION OF FLOATING MICROSPHERES OF FUROSEMIDE BY MIXED SOLVENCY CONCEPT

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ABSTRACT
Furosemide, a potent loop diuretic, is used in the treatment of edema of hepatic, cardiac, pulmonary and renal failures and in chronic hypertension. The dose related adverse effects have been observed and the treatment with conventional tablets produced short period of maximum diuresis, which is inconvenient to the patients. The objective of present work is to develop a controlled release multiparticulate dosage form of the drug by the use of solvent evaporation technique and to explore the concept of mixed solvency. The aim is to enhance the solubility of furosemide in ethyl acetate and to make ethyl acetate a strong solvent for emulsification solvent evaporation process by the use of solubilizers and limit the use of toxic organic solvents since ethyl acetate is safer (class 3 solvent) than those generally employed for microsphere production i.e. methylene chloride (class 2 solvent). The aim to explore possibility of using ethyl acetate: petroleum ether as a combination of solvents to prepare hollow floating microspheres replacing dichloromethane: ethanol combination which is reported to produce hollow microspheres.

KEYWORDS- *Furosemide, renal failures, chronic hypertension, Floating microspheres, Mixed Solvency.*

INTRODUCTION

It has long been recognized that before an orally administered drug becomes available for absorption at specific sites within the GI tract, it must be dissolved in the GI fluid. Since both the dissolution rate and the maximum amount of a drug that can be dissolved are dictated by the solubility of the drug in the medium, aqueous solubility of a drug could be regarded as a key factor responsible for low oral bioa- vailability of poorly water-soluble drugs, thereby limiting their therapeutic potential. To achieve and maintain the drug concentration in the body within the therapeutic range required for a medication, it is often necessary to take conventional drug delivery system several times a day. This yields an undesirable 'seesaw' drug level in the body. A number of advancements have been made recently in the development of new techniques for drug delivery. These techniques are capable of regulating the rate of drug delivery, sustaining the duration of therapeutic action, and/or targeting the delivery of drug to a specific tissue.

FLOATING DRUG DELIVERY- Floating drug delivery systems are classified depending on the use of two formulation variables: effervescent and non-effervescent systems.

1. Effervescent Floating Dosage Forms-

a. **Volatile liquid containing systems:** - The GRT of a drug delivery system can be sustained by incorporating an inflatable chamber which contains a liquid e.g. ether, cyclopentane that gasifies at body temperature to cause the inflatation of the chamber in the stomach. The device may also consist of a bioerodible plug made up of PVA, polyethylene, etc. that gradually dissolves causing the inflatable chamber to release gas and collapse after a predetermined time to permit the spontaneous ejection of the inflatable systems from the stomach.

b. **Gas-generating Systems:** - The effervescent reactions between carbonate/ bicarbonate salts and citric/tartaric acid liberates CO_2 in this delivery system, which gets entrapped in the gelled hydrocolloid layer of the systems thus decreasing its specific gravity and making it to float. These systems contain matrices prepared with swellable polymers like methocel, polysaccharides like chitosan. Other reported approaches and materials that have been reported are highly swellable hydrocolloids and light mineral oils, a mixture of sodium alginate and sodium bicarbonate, multiple unit floating pills etc.

2. Non-effervescent Floating Dosage Forms-

a. **Colloidal gel barrier system:**- These types of systems contain drug with gel forming hydrocolloids which allow them to remain buoyant on the stomach content. This system incorporates a high level of one or more gel- forming highly soluble cellulose

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type hydrocolloid as HPC, HEC, HPMC, polysaccharides and matrix-forming polymers such as polycarbophil, polyacrylate and polystyrene.

b. **Microporous compartment system: -** In this technology a drug reservoir is encapsulated inside a microporous compartment with pores along its top and bottom walls. The peripheral walls of the drug reservoir compartment are completely sealed. This sealing prevents any direct contact of gastric surface with the undissolved drug. The floatation chamber containing entrapped air allows the delivery system to float over the gastric content, in the stomach. Gastric fluid enters through an aperture, dissolves the drug and carries the dissolved drug for continuous transport across the intestine for absorption.

c. **Alginate beads:** - To develop multi-unit floating dosage forms, the freeze- dried calcium alginate has been used. Spherical beads can be prepared by the precipitation of calcium alginate by dropping sodium alginate solution into aqueous solution of calcium chloride.

d. **Hollow microspheres /Microballons:** - A novel emulsion solvent diffusion method has been used to prepare hollow microspheres loaded with drug in their outer polymer shelf. The ethanol/dichloromethane solution of the drug and an enteric acrylic polymer are poured into an agitated solution of poly vinyl alcohol (PVA). The gas phase is generated in the dispersed polymer droplet by the evaporation of dichloromethane formed in the internal cavity of microsphere of the polymer and drug.

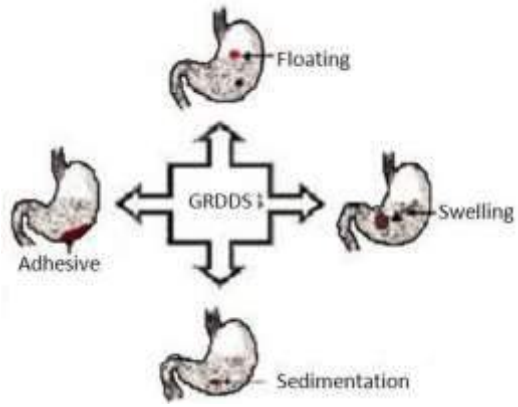


Fig 1. Techniques of GRDDS

Material and methods

Furosemide is benzoic-sulphonamide-furan. It is a diuretic with fast onset and short duration that is used for edema, hypertension and chronic renal insufficiency.

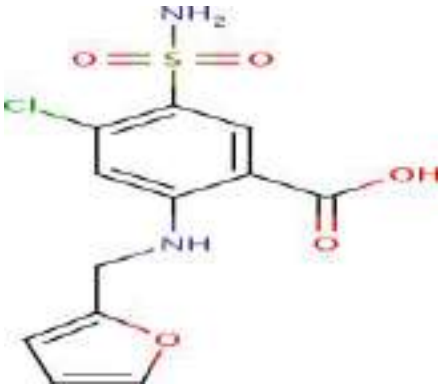


Fig 2: Chemical structure of furosemide

IUPAC name: 4-chloro-2-(furan-2-ylmethylamino)-5-sulfamoylbenzoic acid.

3. Characterization of drug

1. MELTING POINT- The melting point of drug was determined by open capillary method. The capillary filled with drug powder was placed in Thiel's tube containing liquid paraffin. The tube was heated and the melting point of the drug powder was noted. The melting point range of furosemide drug sample was found to be 206-208°C.

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2. INFRARED STUDY OF FUROSEMIDE

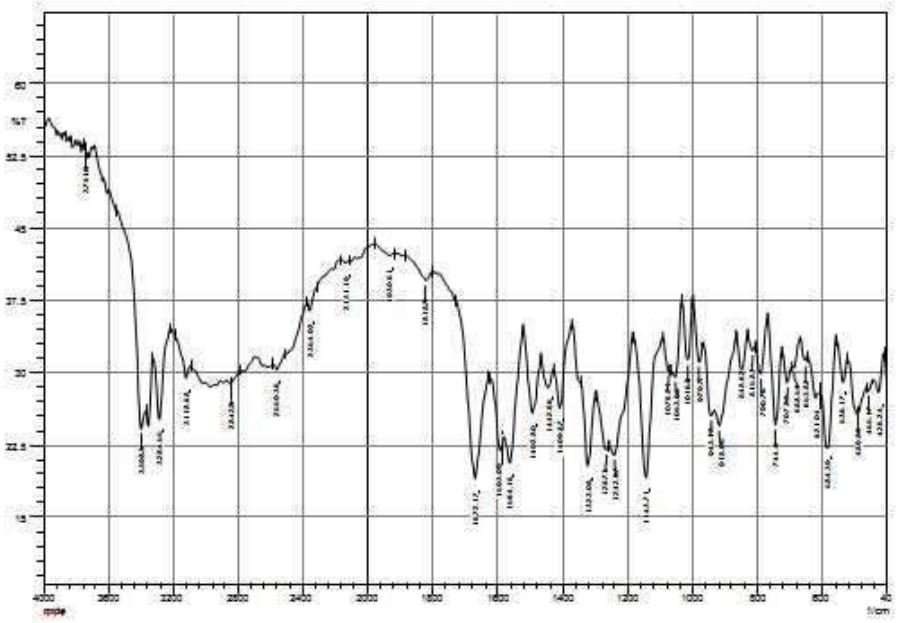


Fig 3: FTIR spectrum of furosemide

Interpretation of FTIR spectra*:* The principal peaks of furosemide were obtained at wave numbers: 3398.34 cm^{-1} (3500-3200 cm^{-1}) corresponds to NH_2 stretching vibration of Ar-$NHCH_2$, 3284.55 cm^{-1} (3500-3200 cm^{-1}) corresponds to stretching vibration of SO_2NH_2, 1672.17 cm^{-1} (1700-1500 cm^{-1}) corresponds to bending vibration of amino group, 1564.16 cm^{-1} (1700-1500 cm^{-1}) corresponds to asymmetric stretching vibration of carboxyl group, 1323.08 cm^{-1} corresponds to asymmetric stretching vibration of sulfonyl group.

3. UV SPECTRA OF FUROSEMIDE IN DEMINERALIZED WATER-

Twenty five mg of furosemide was weighed accurately and dissolved in 20 ml of methanol and volume was made upto 25 ml with methanol to prepare stock solution of 1000 µg/ml. This stock solution was suitably diluted with demineralized water to give solution of 20 µg/ml. The prepared solution was scanned and the UV spectra so obtained is shown in fig.

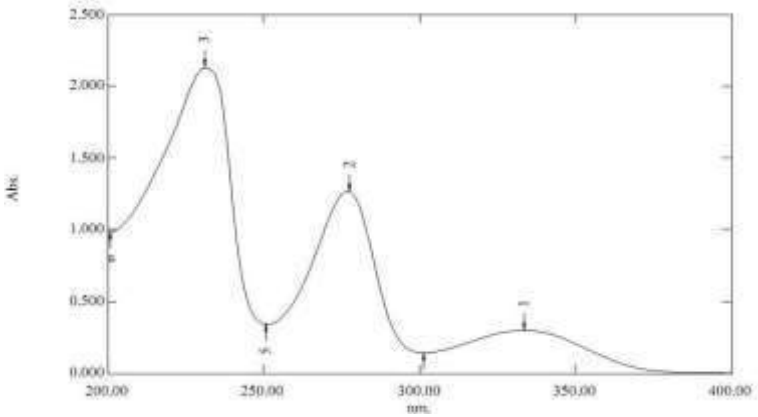


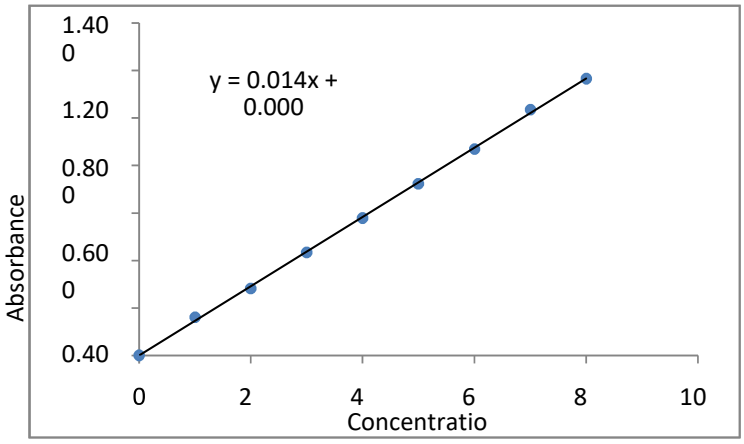
Fig 4: UV spectrum of furosemide in demineralized water

Calibration Curve of Furosemide In Demineralized Water- Twenty five mg of furosemide was weighed accurately and dissolved in about 20 ml of methanol and volume was made upto 25 ml with methanol to prepare stock solution of 1000 µg/ml. Appropriate dilutions were made with D.M. water so as to obtain a series of solutions in the concentration range of 10–80 µg/ml. The absorbances of these dilutions were measured on a double beam UV/Visible spectrophotometer (Shimadzu® 160A) at 333.3 nm against

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respective reagent blanks. The absorbance data obtained for various concentrations was subjected to linear regression analysis. The observations are recorded in the table1: Absorbance data for calibration curve of furosemide in D. M. water

S.No	Concentration (µg/ml)	Absorbance (at 333.3 nm)
1	0	0.000
2	10	0.162
3	20	0.283
4	30	0.435
5	40	0.578
6	50	0.724
7	60	0.870
8	70	1.036
9	80	1.165



DRUG-EXCIPIENT INTERACTION STUDY- This study was performed to determine any physical change in the drug when kept in contact with polymer under different storage condition for one month. Drug and polymer were mixed in 1:1 ratio and divided into three parts. These parts were sealed in vials and kept under different conditions. Two vials of each sample were kept at room temperature, in the oven at 40ºC and in refrigerator for one month period. After every fifteen days for one month, the vials were withdrawn and any change in physical appearance and color of the contents was observed. The observations are recorded in table

Table 6.7: Physical interaction studies of drug with excipients

S.No	Drug+Excipient	Initial observation	Final observation after one month		
			Room temperature	Refrigerator (2-8°C)	40°C
1	Furosemide + Eudragit RSPO	White powder	NC	NC	NC

PREPARATION OF MICROSPHERES- Emulsification solvent evaporation method was employed for preparation of microspheres of furosemide. Weighed amount of polymer Eudragit RSPO was dissolved in ethyl acetate. Drug was added to it and mixed with help of vortex, and resultant dispersion of drug was dissolved completely by addition of fixed amount of PEG 200 to it. To it, petroleum ether was added and again shaken with the help of vortex. The internal phase was then added in a stream, at once to external phase in a 250 ml long beaker containing demineralized water with PVA as stabilizer, while stirring using a mechanical lab stirrer (Remi, Mumbai). Stirring was continued for 2 h at room temperature until no detectable smell of ethyl acetate remained and microspheres were formed. Demineralized water was added to it to dilute the contents and the formed microspheres were filtered through Whatman grade 5 filter paper under vacuum using Buchner funnel. The residue was washed 3 times with 30 ml portions of demineralized water. The

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product was first kept at room temperature for 24 hours and then subjected to drying in oven at 65ºC to evaporate petroleum ether completely. The pores are formed inside microspheres due to removal of petroleum ether.

OPTIMIZATION OF EXTERNAL PHASE VOLUME-Because of high solubility of ethyl acetate in water, when internal phase was emulsified in demineralized water, polymer precipitates were formed. The volume of external phase, rather the ratio of internal: external phase volume played an important role in formation of microspheres. The inferences are as per table 7.2. Also, for efficient homogenization, based upon the beaker dimensions and position of blades of stirrer, external phase volume plays an important role.

Table 3 Effect of internal phase volume on microsphere formation

Sr No	Internal phase External Phase	Interference
1	1:4	Due to very less external phase, sufficient homogenization could not be obtained.
2	1:6	Optimum for microspheres, no precipitation or sticking
3	1:10	Sudden extraction of ethyl acetate into external phase, sticky clumps of polymer formed.

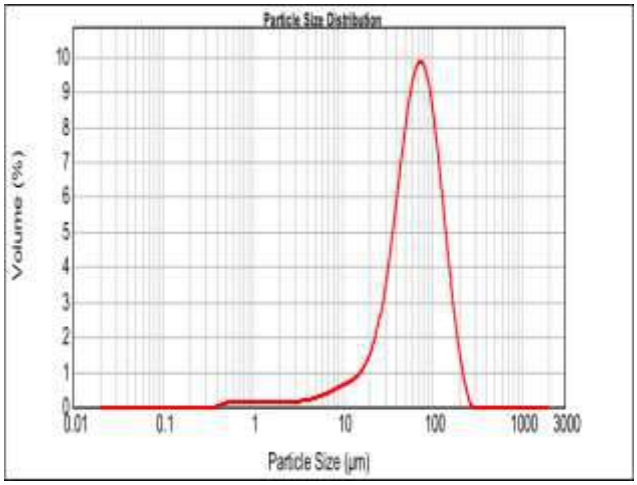
CHARACTERIZATION OF MICROSPHERES

ENCAPSULATION EFFICIENCY: Fifteen mg of drug loaded microspheres were accurately weighed and dissolved in 10 ml of methanol, sonicated for 15 min and then diluted five times with methanol. It was analysed at 341 nm on a double beam UV/Visible spectrophotometer (Shimadzu 160A). The percentage encapsulation efficiency was calculated as:

%Encapsulation Efficiency = (Actual drug loading/Theoretical drug loading) X 100

PARTICLE SIZE:- Particle size distribution of optimized batch of furosemide microsheres

Figure: 6 Particle size distribution of optimized batch of furosemide microsheres



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SURFACE MORPHOLOGY

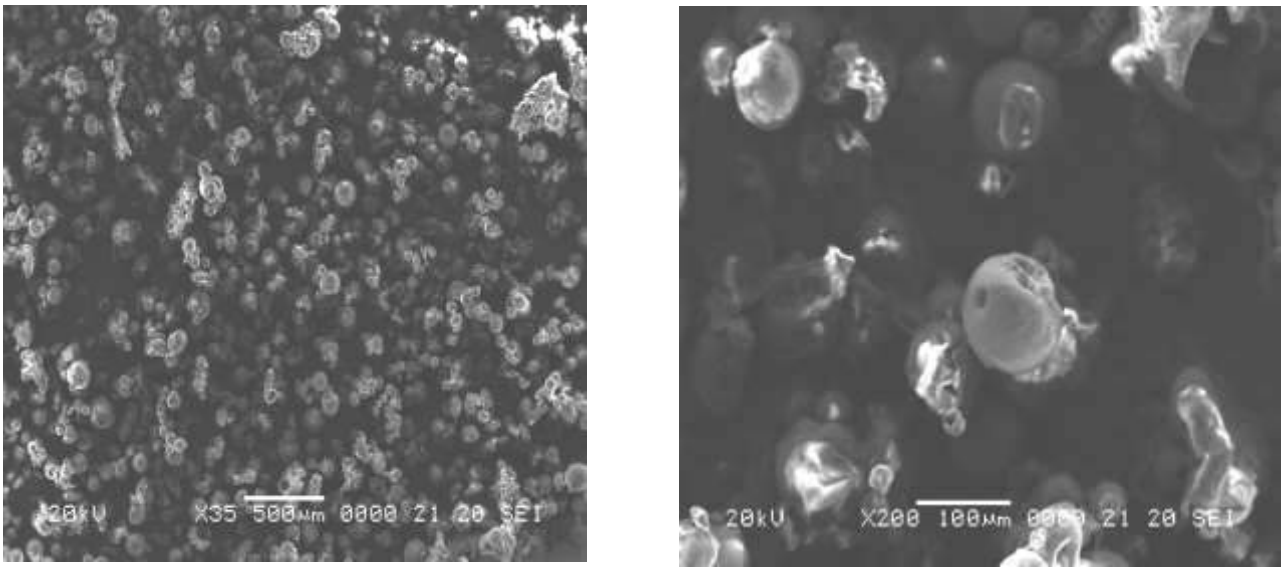


Fig: 7 Surface photographs of microspheres of furosemide, (a) at 200X and (b) at 35X

IN VITRO DRUG RELEASE:- Microspheres of furosemide were tested for their dissolution rate using U.S.P. XXIV (type II) dissolution test apparatus (Model TDT6P, Electrolab Mumbai, India) with paddle to rotate at 50 r.p.m. Nine hundred ml of 0.1 N HCl was taken as dissolution medium with temperature of 37±0.5°C. For maintaining sink conditions, a solubilizer was needed. Polysorbate 20 was added in dissolution medium to provide sink condition. Table 7.4 shows solubility of furosemide at different concentrations of polysorbate 20 in 0.1 N HCl needed for sink condition. At definite time intervals, 5 ml of the samples were withdrawn and were analyzed for drug content. Withdrawn samples were replaced with fresh dissolution media and calculations for the amount of drug were done using respective regression equation.

Table 4: Determination of polysorbate 20 concentration for sink condition

S.No.	Concentration of polysorbate 20 (% v/v)	Solubility of furosemide (% w/v)	Minimum volume required for 3 times the sink conditions (ml)
1	0	0.001778	13497.49
2	1	0.009783	2453.33
3	1.5	0.015955	1504.26
4	2	0.026913	891.76

PREPARATION OF PRE-OPTIMIZATION BATCHES:- Based on the literature, it was decided to first evaluate the effect of polymer to drug ratio or drug loading on microsphere properties. So based on literature studies, drug loading were shown to be varying from 10% to 30% of polymer. For the pre-optimization batches, internal phase volume was fixed to 8 ml based on studies reported in section7.7 and external phase volume to 50 ml. Drug amount was taken as 200 mg and amount of porogen was kept constant to 1.8 ml.

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Table 5 Pre-optimization batches based on drug to polymer ratio

Batch code	Drug: Polymer	Drug loading (%w/w of polymer)
P_1	1:10	10
P_2	1:5	20
P_3	1:3.3	30

EVALUATION OF PRE-OPTIMIZATION BATCHES:- Based on above formula, microspheres were prepared as per procedure mentioned previously. The batches were evaluated for their drug encapsulation efficiency and in vitro drug release. For in vitro release studies, a quantity of microspheres equivalent to 40 mg of furosemide was taken. The results are shown as per table 6 and table 7.

Table 6 Encapsulation efficiency of pre-optimization batches

Batch code	% Encapsulation efficiency
P_1	101.3
P_2	92.4
P_3	69.7

Table 7 In vitro release profile of pre-optimization batches

Time (hr)	% Cumulative release of drug from batches		
	P_1	P_2	P_3
0.5	11.87	26.15	35.50
2	26.82	47.76	61.73
3	32.82	58.45	71.42
4	36.72	63.67	76.69
6	37.99	67.09	80.37

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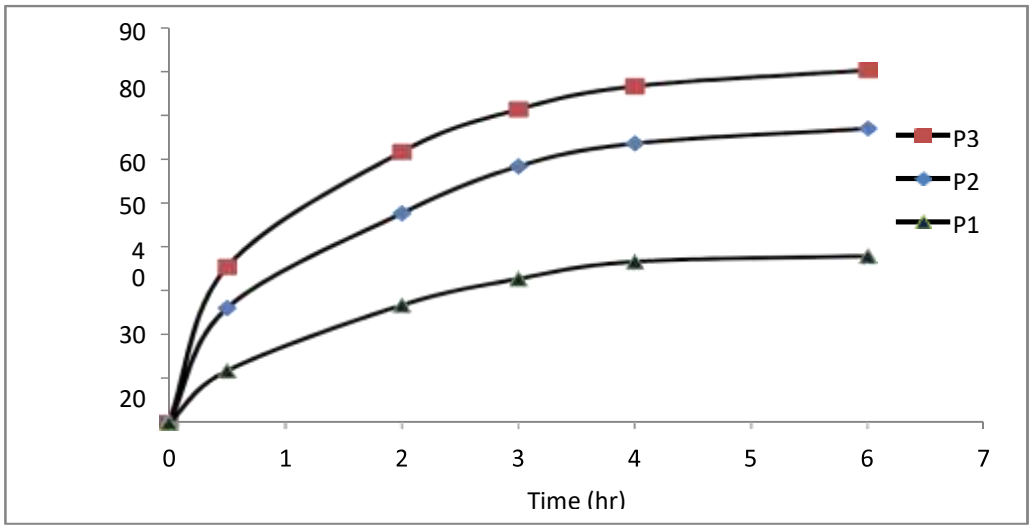


Fig. 8. In vitro release profile of pre-optimization batches

PREPARATION OF OPTIMIZATION BATCHES:- The Box-Behnken design with two center points provided a total of fourteen trial batches as per table 8 The microspheres of trial batches were prepared by the similar procedure which was described in section 7.7.1. The amount of drug was kept constant to 200 mg/batch and the volumes of internal phase and external phase were decided to be 8 ml and 50ml, respectively. The amount of PEG 200 required to solubilise the drug is as per table 9

Table no 8:- Box-Behnken experimental plan for optimization of microspheres:-

Formulation code	Independent variables		
	A: Polymer amount (mg)	B: Concentration of PVA (% w/v)	C:Percpen volume (ml)
FOB-1	800	0.2	1.8
FOB-2	1200	0.2	1.8
FOB-3	800	0.8	1.8
FOB-4	1200	0.8	1.8
FOB-5	800	0.5	1.5
FOB-6	1200	0.5	1.5
FOB-7	800	0.5	2.1
FOB-8	1200	0.5	2.1
FOB-9	1000	0.2	1.5
FOB-10	1000	0.8	1.5
FOB-11	1000	0.2	2.1
FOB-12	1000	0.8	2.1
FOB-13	1000	0.5	1.8
FOB-14	1000	0.5	1.8

Table no 9 Amount of PEG 200 required to dissolve drug in the polymer solution of ethyl acetate:

S. No.	Polymer amount (mg)	Amount of PEG 200 required (mg)
1	800	200
2	1000	120
3	1200	40

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EVALUATION OF OPTIMIZATION BATCHES:- The prepared microspheres optimization batches were evaluated for following parameters: particle size, encapsulation efficiency, floating nature and in-vitro drug release profile. The results of these evaluations are reported in table Cumulative percent release of optimization batches of furosemide microspheres

Formulation code	Percent cumulative release after					
	0.5 hr	2 hr	4 hr	6 hr	8 hr	12 hr
FOB-1	41.68	70.19	84.25	88.33	91.36	92.36
FOB-2	28.93	52.47	69.70	78.37	83.48	86.42
FOB-3	52.10	75.98	85.05	91.33	92.82	94.39
FOB-4	32.26	55.11	72.28	79.62	84.67	86.69
FOB-5	48.06	74.12	86.01	89.95	91.44	93.14
FOB-6	35.38	59.10	72.82	79.24	84.49	88.14
FOB-7	42.75	68.56	83.11	87.11	89.58	92.26
FOB-8	28.15	48.86	67.41	76.42	82.72	85.58
FOB-9	42.25	62.47	79.53	85.14	89.86	91.77
FOB-10	45.16	63.12	79.77	85.02	90.45	92.43
FOB-11	37.36	56.70	71.68	81.07	85.35	89.35
FOB-12	38.64	60.39	78.79	84.97	88.34	90.31
FOB-13	39.84	59.76	78.80	84.97	88.41	90.31
FOB-14	39.20	61.67	79.94	85.13	88.00	89.69

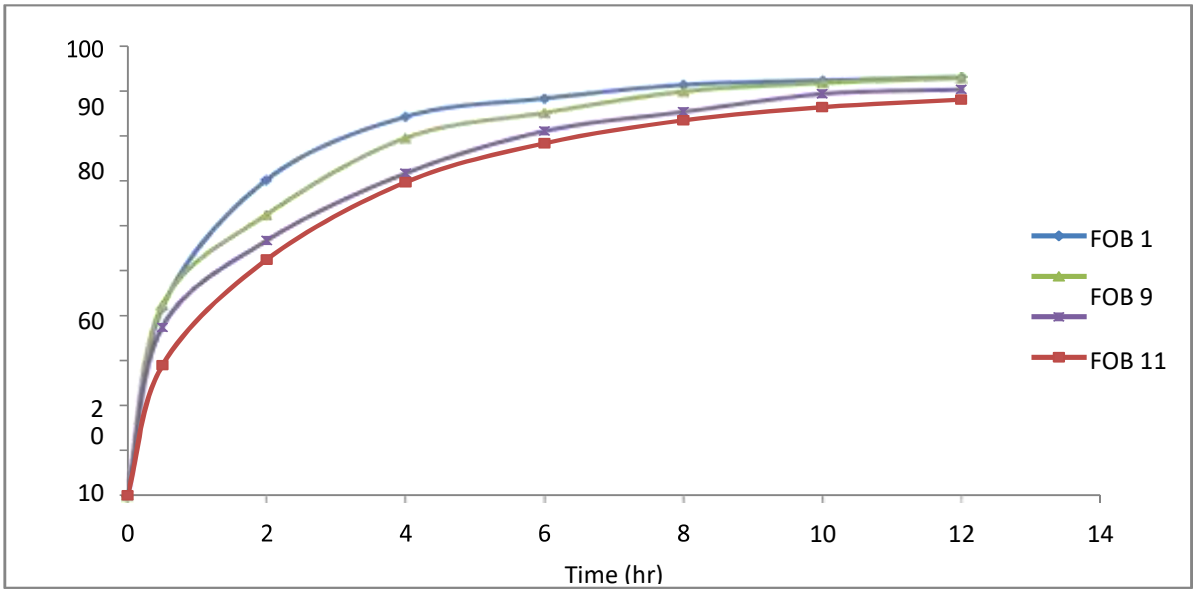


Fig 9 Cumulative % drug release v/s time plot of furosemide microspheres (optimization batches 1, 2, 9 and 11)

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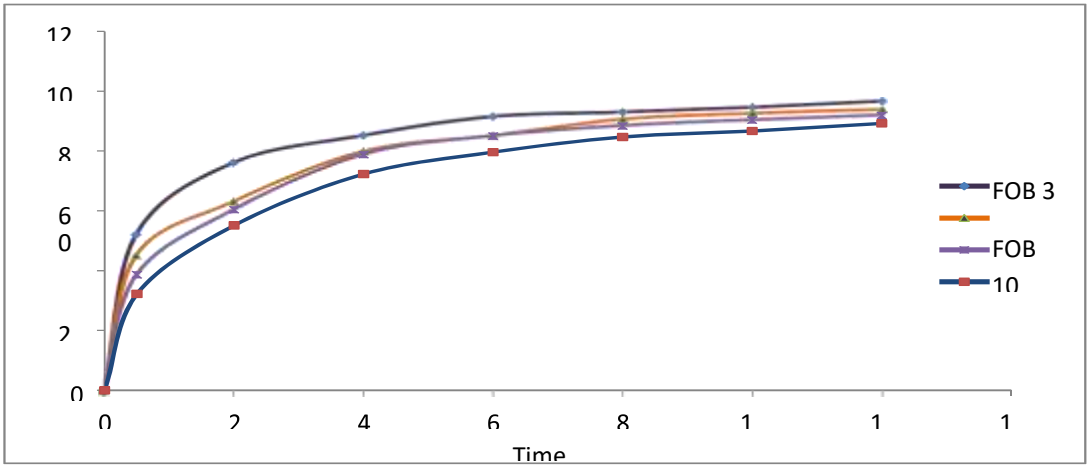


Fig 10 Cumulative % drug release v/s time plot of furosemide microspheres (optimization batches 3, 4, 10 and 12)

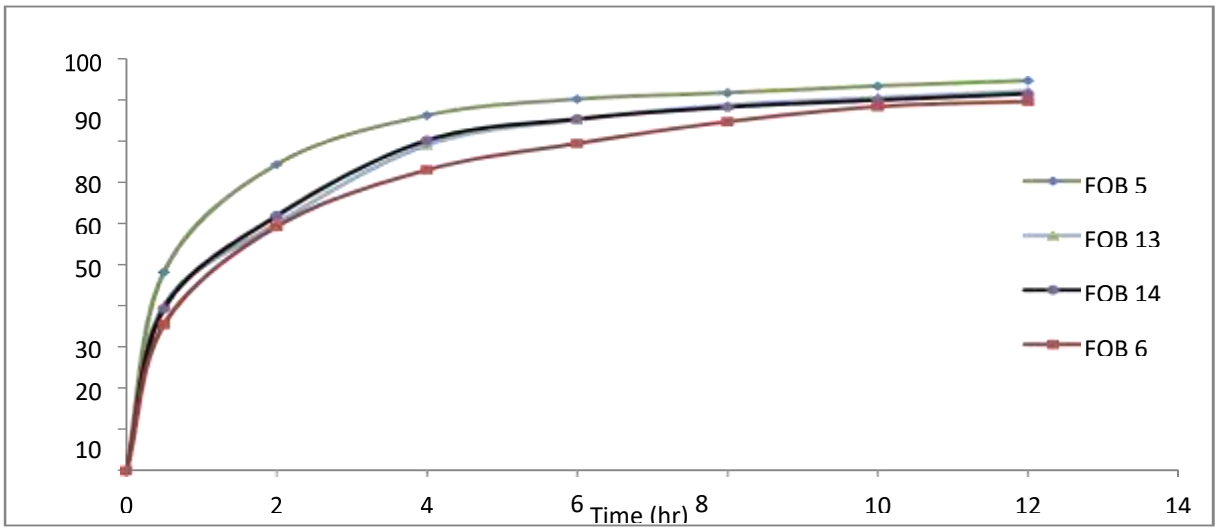


Fig 11 Cumulative % drug release v/s time plot of furosemide microspheres (optimization batches 7 and 8)

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Formulation code	Independent variables			Response variables			
	A: Polymer amount (mg)	B: Concentration of PVA (% w/v)	C:Porogen volume (ml)	% floating after 8 hrs	% Encapsulation efficiency	Mean size (µm)	% Cumulative release after 8 hr
FOB-1	800	0.2	1.8	43.2	93.6	88	91.3
FOB-2	1200	0.2	1.8	72.2	99.1	124	88.0
FOB-3	800	0.8	1.8	39.5	94.2	58	92.8
FOB-4	1200	0.8	1.8	65.4	98.9	73	84.6
FOB-5	800	0.5	1.5	56.2	93.0	72	91.4
FOB-6	1200	0.5	1.5	61.1	98.4	97	84.5
FOB-7	800	0.5	2.1	52.8	93.6	72	89.5
FOB-8	1200	0.5	2.1	81.6	98.7	106	82.7
FOB-9	1000	0.2	1.5	48.2	96.3	103	89.8
FOB-10	1000	0.8	1.5	45.9	96.1	76	90.5
FOB-11	1000	0.2	2.1	65.7	96.1	107	85.3
FOB-12	1000	0.8	2.1	62.8	95.6	80	88.3
FOB-13	1000	0.5	1.8	56.2	95.0	86	88.4
FOB-14	1000	0.5	1.8	55.1	95.2	85	88.0

Table no 10 Evaluation of optimization batches of furosemide microspheres

X-RAY DIFFRACTION STUDIES-

The solid drug powder, eudragit RSPO and microspheres were analyzed for crystal arrangement and its crystalline nature by the virtue of diffraction pattern analyzed by Powder X-ray diffractometer (Bruker) at power: 4 KW, source: Cu K-α and wavelength: 1.5418 A˚. The X-ray diffractograms are shown from fig

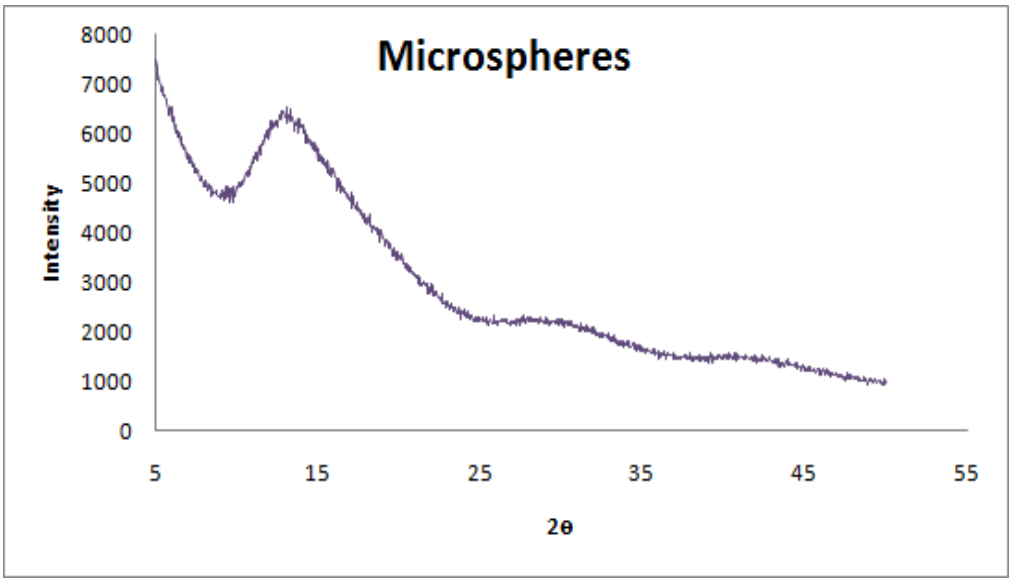


Fig 12 X-ray diffractogram of furosemide microspheres

EVALUATION OF OPTIMIZED FUROSEMIDE MICROSPHERES- Evaluation of optimized furosemide microspheres was carried out and results are recorded in table.

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Table 11 : Comparison of results predicted by software and those observed

Response Variable	Value predicted	Value obtained
% Floating after 8 hr	72.36 %	73.32
% Encapsulation efficiency	97.8 %	96.8%
Mean size	82.26 µm	66.97 µm
% Cumulative release after 8 hr	84.9%	85.3%

The microspheres were also characterized for their micromeritic properties. Four gm of microspheres were weighed and using 50 ml graduated measuring cylinder, tapped density, bulk density, compressibility index and Hausner's ratio were determined. Similarly, using 4 gm of microspheres and a glass funnel, angle of repose was determined. The results are recorded in table.

Table 12 : Micromeritic properties of optimized batch of microspheres

Formulation	Parameters				
	Bulk density (g/cc)	Tapped density (g/cc)	Compressibi -lity index (%)	Hausner's ratio	Angle of Repose
Optimized Batch	0.32	0.36	11.11	1.12	27.4°

The micromeritic properties of microspheres lied within range of values which indicated powder with good flow propereties.

IN VITRO RELEASE PROFILE OF FUROSEMIDE OPTIMIZED MICROSPHERES-

In vitro release from microspheres was studied by the same procedure mentioned in section 7.8.4. The percent cumulative release obtained was plotted against time. The % cumulative release data from microspheres is as per table 7.19 and release profile is shown in fig13

Table no 13 Percent cumulative release of drug from optimized microspheres

Time (hr)	0.5	2	4	6	8	10	12
% cumulative drug released	29.64	51.13	70.40	81.63	85.34	86.72	88.26

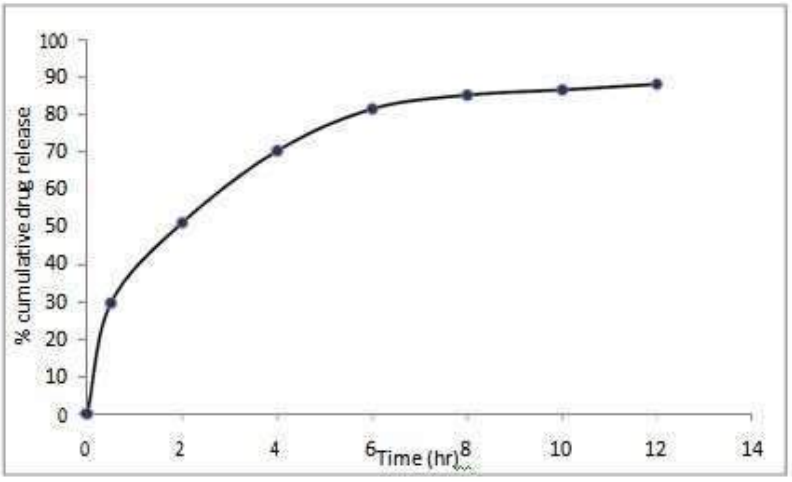


Fig 13 Cumulative % drug release v/s time plot of furosemide optimized microspheres

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STABILITY STUDIES- Furosemide microspheres (pre-optimization batch P_2) were kept at different storage conditions. Test samples were kept at room temperature and at 40ºC. Percent encapsulation efficiency of the formulation was determined initially which was found to be 92.4%. The samples were withdrawn at different time intervals and the drug contents were determined. The percent drug remaining is reported in table 7.20. The controlled release furosemide microspheres were found to be stable at the different storage condition for one month period.

Table 14: Stability data of furosemide microspheres

Condition	% Encapsulation efficiency after		
	7 days	15 days	30 days
Room Temperature	92.35	92.22	92.09
40°C	92.18	92.09	91.89

Summary & Conclusion- The main objective of present study was to explore mixed solvency concept in preparation of floating microspheres of furosemide using emulsification solvent evaporation method.

Microspheres were prepared by emulsification solvent evaporation method. Ethyl acetate was used as internal phase, eudragit RSPO as release rate controlling and matrix forming polymer, polyvinyl alcohol as emulsifier, PEG 200 was used as cosolvent to dissolve drug completely in internal phase and petroleum ether was used as porogen to form pores inside microspheres. Pre optimization studies were carried out to determine process parameters affecting microsphere formation. The factors studied were drug loading, internal phase volume, stirring speed and amount of porogen. Microspheres with drug loading 20% gave better release profile than with 10% and 30%.

Based on results of pre-optimization, optimization studies were performed using Design Expert 8.0.3 version (Stat-Ease Inc., Minneapolis, USA). Box-Behnken design with fourteen trial batches was used for optimization. Independent variables were selected based on results of pre-optimization study viz. polymer amount, amount of porogen and concentration of stabilizer. Response variables were selected as per desired characteristics of microsphers like % floating, encapsulation efficiency, mean size and % release after 8 hrs. The response variables of optimization batches were analysed statistically and response surface plots were generated. The software was made to generate a set of independent variables based on desired response variables with desirability of 0.764.

The optimized batch was evaluated using scanning electron microscopy, X-ray diffraction, and DSC. The results suggest complete encapsulation and miscibility of furosemide within the polymer.

The release data obtained from the dissolution study of the optimized validation batches were analyzed with respect to first order model, Higuchi model, Korsmeyer-Peppas model, and zero order models. It was found that the release data showed best fit in Higuchi model.

The stability study of microsphere formulation was performed for one month under different storage conditions. The developed formulation was found to be stable under the conditions of room temperature and 40ºC for one month stability study duration.

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A STUDY SHOWING THE IMPORTANCE OF PERSONAL FINANCIAL MANAGEMENT STRATEGIES FOR AN INDIVIDUAL FOR OVERALL FINANCIAL WELLBEING

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ABSTRACT

Personal financial management (PFM) is essential for individuals and families to achieve financial stability and meet their goals. This research highlights the different facts of PFM, including budgeting, saving, investing, debt management, retirement planning, and more. Drawing from extensive literature, it examines the dynamics of financial behaviour, the role of financial education, technological advancements, and socioeconomic factors influencing PFM. The research involves data collection from 102 participants, offering insights into financial behaviour, preferences, and attitudes. Discoveries unveil areas for enhancement in savings allocation, emergency preparedness, seeking professional advice, and retirement planning. Additionally, the study presents the "50/30/20 rule" as a practical framework for managing finances effectively. Overall, the study emphasizes the significance of comprehensive PFM strategies tailored to individual circumstances for long-term financial well-being.

KEYWORDS: *Personal financial management, PFM, budgeting, saving, investing, debt management, retirement planning, financial behaviour, financial education, socioeconomic factors, 50/30/20 rule.*

1. INTRODUCTION

Personal financial management (PFM) involves effectively managing individual or family finances to achieve financial goals and ensure well-being through informed decisions on earning, spending, saving, and investing money. Key components include budgeting, income management, saving, debt management, investing, insurance, retirement planning, tax planning, and goal setting. Research objectives encompass understanding financial behaviour, identifying influencing factors, assessing financial literacy, analysing debt management, investigating saving and investment behaviour, evaluating retirement planning, examining financial stress, assessing financial education programs, exploring technology's role, and developing best practices and policy implications. The scope includes various financial activities tailored to individual circumstances, emphasizing financial well-being, and addressing short and long-term goals. Effective PFM involves assessing financial situations, setting goals, creating budgets, monitoring spending, building emergency funds, managing debt, saving, and investing, planning for retirement, reviewing, and adjusting plans, protecting finances, continuing education, and seeking professional advice. By means of this procedure, majority of individuals can establish a comprehensive PFM plan aligned with their goals, promoting stability, and enhancing overall well-being.

Objectives of my study

- To understand the challenges faced by earning individuals while planning for their future savings and debt management.
- Understand and educate the financial literacy among individuals.
- Educate the importance and effectiveness of 5:3:2 in Personal Financial Management.

Scope:

The main scope of this study about personal financial management for an individual encompasses a broad spectrum of activities and decisions aimed at achieving financial goals and ensuring overall financial well-being and post-retirement planning.

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2. LITERATURE REVIEW

Paper Title and Year	Authors	Objectives	Observations
"Nudge: Improve Decisions About Health, Wealth, and Happiness" by Thaler and Sunstein (2008)	Thaler and Sunstein	Emphasize psychological factors and prospect theory in financial decisions.	Psychological factors play a significant role in shaping financial decisions, affecting behaviours such as spending, saving, and investing.
"Judgment under Uncertainty: Heuristics and Biases" by Tversky and Kahneman (1974)	Tversky and Kahneman	Explore the role of psychological biases in decision-making.	Psychological biases influence financial decision-making, leading to deviations from rational economic models.
"Effective Budgeting and Saving Strategies" by Gaurav and Jha (2017)	Gaurav and Jha	Highlight the significance of budgeting and saving in personal financial management.	Budgeting and saving are crucial components of PFM, contributing to financial stability and long-term security.
"Behavioural Economics and Its Applications" by Brown and Taylor (2014)	Brown and Taylor	Discuss applications of behavioural economics principles in personal finance.	Behavioural economics principles can inform strategies to improve financial decision-making, such as nudges and choice architecture.
"Debt Management Strategies for Financial Stability" by Dynan et al. (2012)	Dynan et al.	Advocate responsible borrowing and repayment strategies.	Effective debt management is essential for financial stability, requiring comprehensive budgeting and prioritized repayments.
"Financial Literacy and Its Implications" by Monticone (2010)	Monticone	Discuss the importance of financial literacy in personal finance.	Financial literacy is crucial for making informed financial decisions, addressing challenges of financial illiteracy, and promoting economic well-being.
"Financial Management Tools and Apps" by Chen and Volpe (1998)	Chen and Volpe	Explore technological advancements in personal financial management.	Technological tools and apps facilitate financial management, providing convenience and accessibility to users.
"The Role of Socioeconomic Factors in Financial Behaviour" by Duflo and Saez (2003)	Duflo and Saez	Investigate how socioeconomic factors influence financial behaviours and outcomes.	Socioeconomic factors such as income, education, and employment status significantly impact financial behaviours, highlighting the need for tailored interventions.
"Financial Education Programs and Their Impact" by Hira and Mugenda (1999)	Hira and Mugenda	Assess the effectiveness of financial education programs.	Financial education programs play a crucial role in improving financial literacy and empowering individuals to make informed financial decisions.
"Assessing Financial Literacy Levels" by Hanna et al. (2012)	Hanna et al.	Evaluate financial literacy levels across demographic groups and geographical contexts.	Financial literacy levels vary across different demographics and regions, underscoring the importance of targeted interventions and education programs.

3. METHODOLOGY

In the research methodology concerning personal financial management, a systematic approach was taken to ensure the accuracy and relevance of the data collected. It commenced with the formulation of clear research objectives and identification of specific topics to be explored, laying the groundwork for a focused investigation. A sample size of 102 individuals was determined through different sampling techniques like random, stratified, or convenience sampling, aiming to capture a representative cross-section of the population. Surveys were selected as the primary data collection method due to their effectiveness in gathering comprehensive information. A meticulously designed survey instrument was crafted, encompassing key aspects such as income, expenses, savings, investments, debt, and financial goals, ensuring a holistic understanding of participants' financial behaviours. Prior to survey administration, a pilot test was conducted to refine the survey instrument and address any potential issues or ambiguities. Data collection was then carried out through online surveys, maintaining participant confidentiality and adhering to ethical standards. Post-collection, a rigorous process of data cleaning, coding, and analysis was undertaken, employing appropriate statistical techniques including descriptive and inferential statistics to extract meaningful insights. These findings were subsequently interpreted to identify pertinent trends and insights into personal financial management practices. Based on these interpretations, recommendations were formulated to address identified gaps and enhance financial literacy and well-being among individuals, policymakers, and financial institutions. Overall, the research methodology was characterized by its structured approach, meticulous attention to detail, and commitment to generating actionable insights for informed decision-making in the realm of personal finance.

4. DATA ANALYSIS AND INTERTATION

The analysis of data from 102 respondents provides valuable insights into various aspects of personal financial management. It reveals that a significant majority (67.5%) prioritize savings and investment, indicating commendable financial

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responsibility and forward-thinking behaviour. However, a notable portion (23.9%) only prioritize these aspects occasionally, suggesting room for improvement in consistency. Moreover, 10.4% do not prioritize savings and investment at all, indicating a need for adopting more proactive financial habits.

Regarding investment vehicles, while mutual funds and real estate are popular choices, a substantial percentage (50.7%) opt for "Others," showcasing diverse preferences and strategies. Allocation of monthly income towards savings varies, with a considerable portion (44.8%) saving less than 20%, underscoring the role of improving saving habits. Additionally, the data reveals mixed levels of comfort with emergency savings and a need for more proactive retirement planning. Access to professional financial advice appears limited, indicating a potential gap in financial education. Overall, the findings emphasize the significance of consistent saving, diversified investment strategies, and proactive financial planning to ensure long-term financial stability and security.

5. 50:30:20 THEORY

The "50/30/20 rule" in personal finance, popularized by Elizabeth Warren and Amelia Warren Tyagi in their book "All Your Worth: The Ultimate Lifetime Money Plan" from 2005, offers a straightforward framework for managing finances effectively. It suggests allocating 50% of income towards needs, covering essential expenses like housing, utilities, groceries, transportation, healthcare, and minimum debt payments; 30% towards wants, encompassing discretionary spending on non-essential items such as dining out, entertainment, and travel; and 20% towards savings and debt repayment, including contributions to savings accounts, retirement funds, emergency funds, investment accounts, and paying off debts beyond minimum payments. While adaptable to individual circumstances, this rule promotes financial balance, prioritizing spending based on essential needs, discretionary wants, and long-term savings goals, fostering informed financial decision-making and stability.

6. FINDINGS, SUGGESTION AND CONCLUSIONS

The data collected from 102 samples offers insights into the financial behaviours, preferences, and attitudes of the surveyed individuals. Notably, a significant proportion allocate less than 20% of their monthly income towards savings (44.8%), indicating potential challenges in building substantial financial reserves. While some prioritize savings more aggressively, with 6.9% saving 40% of their income, there is room for increased savings discipline overall.

Regarding investment vehicles, a majority opt for "Others" (50.7%), showcasing diverse investment strategies beyond traditional options like stocks and real estate. Despite the majority reviewing their budgets monthly (67.2%), a notable portion only do so yearly (19.4%), potentially missing opportunities for proactive financial planning. While many respondents feel comfortable with their emergency savings (38.8%), a significant portion (13.4%) feel less secure, highlighting the need for continued focus on building adequate emergency funds. Moreover, there's mixed behaviour regarding seeking professional financial advice, with a sizable percentage doing so only occasionally (44.8%) or never (32.8%). Similarly, many lack a clear retirement plan (50.6%), indicating a need for more proactive retirement savings strategies.

Overall, while individuals demonstrate consistent budgeting habits and a willingness to explore diverse investment options, there's room for improvement in savings allocation, emergency preparedness, seeking professional advice, and retirement planning, highlighting the significance of a comprehensive approach to personal financial management for achieving long-term financial security and goals.

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A STUDY ON THE IMPACT OF VISUAL MERCHANDISING AMONG WOMENCUSTOMERS WITHSPECIAL REFERENCE TO TIRUPUR CITY

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ABSTRACT
After agriculture, retail is the second largest employer in India. On the other hand, since e- marketing accounts for the majority of the market share, all retail stores should use some strategy to attract consumers. Visual merchandising is one strategy that encourages customers to spend valuable time and feel good about their purchases. Visual merchandisingis the practice of displaying and marketing products to increase sales and make it easier to find the right things. This article examines the buying behaviour of women based on how a product is presented in a window display and with mannequins or a questionnaire. It providesempirical evidence on the relationship between women's spontaneous purchases, product decisions, and visual marketing.
KEYWORDS: *Visual Merchandising, Customer buying behavior, Retail Sector, Sales, WomenCustomers*

INTRODUCTION

The retail sector has a major impact on our country's economy. Retail, which is the lastplacein the distribution channel of goods and services, is not only an integral part of our economicstructure but also shapes our way of life. Retail is the largest private industry in theworld. Visual merchandising is the look and feel of a brand's retail store. The experience a customergets when they visit a store is visual merchandising. Visual merchandising today is not onlylimited to the floor window display. It covers all necessities to capture the attention of the customers by all means from the store to the location of each product inside the store. Capturing attention and awakening the sense of providing the customers with a wonderful buyingexperience, bringing them back to the store next time, making them loyal customers,and making more sales are the major concerns of effective visual merchandising. Visual merchandising can also be called a "silent salesperson". Extensive and dynamic visual merchandising has a massive impact on customers entering the store. We visit several shopsand stores, but thereare only a few stores that catch our attention and the shopping experiencein these stores is worth remembering. What do these stores do differently? The answer is that they understand the art of visual merchandising.

REVIEW OF LITERATURE

Vinamra Jain, Ashok Sharma, and Pradeep Narwal (2012) [1], present a study about women'sdecision-making behaviour towards apparel based on how they are displayed in windows administered mannequins or in form. It offers empirical results - the relationship between women's impulse buying, product decision-making, and visual appeal of apparel display. The study has undergone a structured questionnaire survey and an independent test has beenused for hypothesis testing to show how strongly visual merchandising influences the behavior of women in Delhi. Makhal A. B. (2015) [2], found that there is an interaction or relationship between the type of shopper and the visual merchandising elements. The estimated marginal means for both fixed factors confirm the same. The Posteriori test revelsthat in terms of score, shoppers have givenmaximum importance to set 3 elements - music,aroma, aisle space, store cleanliness, lighting followed by set 2 elements - flooring, instore signage and set 1 element covers wall colour / texture and exterior.

Anuja Agdayemaver, Mahesh Kumar (2017) [3], studies focus on the influence of visual merchandising on consumer buying choice according to store attributes. There are many players entering into organized format by analyzing the impact of various dimension of music,window display, price tags at Reliance fresh stores at Jaipur. Ashish Pandey, Dr. Avjeet Kaur (2017) [4], study focuses on the basic and certain crucial building blocks of retailmarketing as a discipline. The study has undergone flexible research. As a result, the study concludes that there are several tools of marketing and promotionthat a retailer uses in India,namely brand retailing, store ambience, image branding, pricing, e-marketing. On the other hand, for unorganized retailers, the biggest tool of marketing has been the store location, providing credit facility.

Ravish Verma, Dr. Manish Gupta, Megha Bakshi (2020) [5], presented a study about differentelements of visual merchandising, strategies of visual merchandising. It is all about creatinga novelty in store through some creative steps which will change the behaviour of the personcoming to store for shopping. Either it is a small store or big retail store, creating an ambianceand good atmosphere for customer is must and can achieve us the creative imagination of people working in store. It is flexible research.

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The study has found that there is a direct relation between people's small and what they smell and it further leads to 40% conditioning of their mood when the fragrance is very pleasant.

METHODOLOGY USED

A structured questionnaire was designed and used to collect primary and secondary data. The questionnaire consists of different kinds of questions such as open and cross-questions according to probability sampling. A Convenience sampling technique was adopted. The sample size selected for this research is 205 respondents. The two methods of data collectionare used in this study. One is primary data, which is usedin the form of a questionnaire for collecting the data directly from the women customers and the other one is secondary data which is used for reviewing the past literature related to this study. They are collected from magazines, journals, news, internet. The Data Analysis is done using Percentage analysis and Chi-Square analysis.

ELEMENTS OF VISUAL MERCHANDISING

The basic elements of the Visual Merchandising are:

1. Colour: Colour is the most important element of visual display in a store. Additionally, colour can helpevoke specific emotions. Colours help retailers create apleasant atmosphere that promotes sales. In other words, bright colours such as orange and red are commonly used to attract the eye and excite customers, while some luxury brands use dull colours to suggest sophistication.We can also use coloursto make different products stand out. For example, we can place a product in a neutralshade in front of a bold background to draw attention.



2. Landscaping / Window Display: Landscaping is an essential technique for capturingthe interest of shoppers. This strategy involves promoting products as "core offerings" to make them stand out. Landscaping gives retailers creative freedom as they can work with three dimensions: lateral, longitudinal, vertical.



3. Light: Lighting brings the colors of our store to life and highlights the features of our products. For example, we can install spotlights to illuminate keyattributes and increasesales.

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4. Space: Space is an essential element of visual merchandising because we can use it toconnect or separate items. Pay attention to positive and negative space when planningstore layouts, or read about the benefits of space management to make the most of our



space. Positive space is the fixed position of an item, while negative space describesthe open space around it.

5. Marking: Imagine visiting a store and finding that all the salespeople are busy and thecustomer can't find the product he wants to buy. He will most likely leave the store witha bad impression of customerservice. In other words, keeping customers waiting will lead to lost sales and unhappy customers. However, we can strategically use store signage to direct customers to their preferred sections or consider using wait time signage.



6. Storytelling: Retailers can use the art of storytelling to evoke positive emotions in customers. In other words,people love stories. In a world of rapidly shrinking attentionspans, good stories are an essential part of marketing.

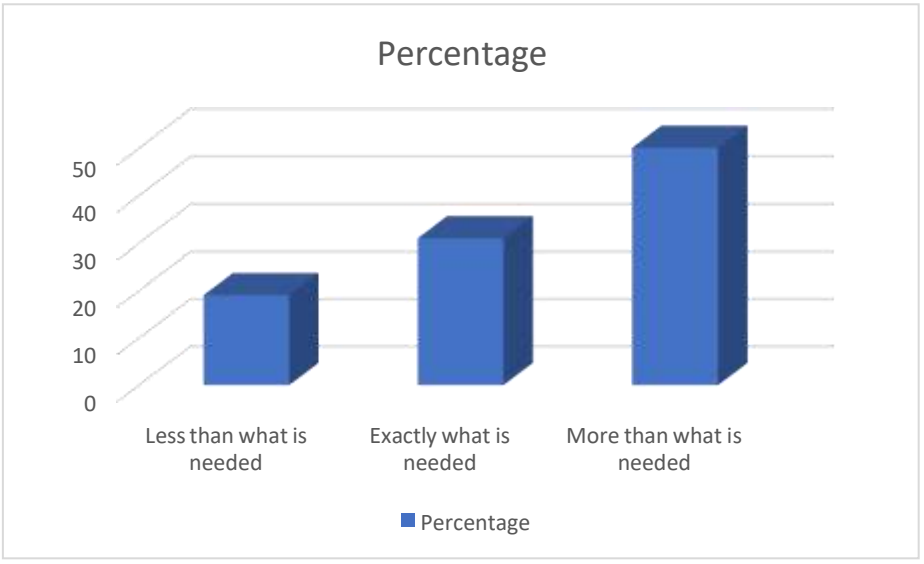
ANALYSIS AND INTERPRETATIONS

The research shows that 11.7 percent of the respondent visit retail store once for a week,25.6 percent of respondent visit retail store once in 2 months, 41.9 percent of the respondentvisit store retail store only during special occasion, 17.9 percent of the respondent visit storeonly during offers whereas 2.9 percent of the respondent visit for some other time when necessary.

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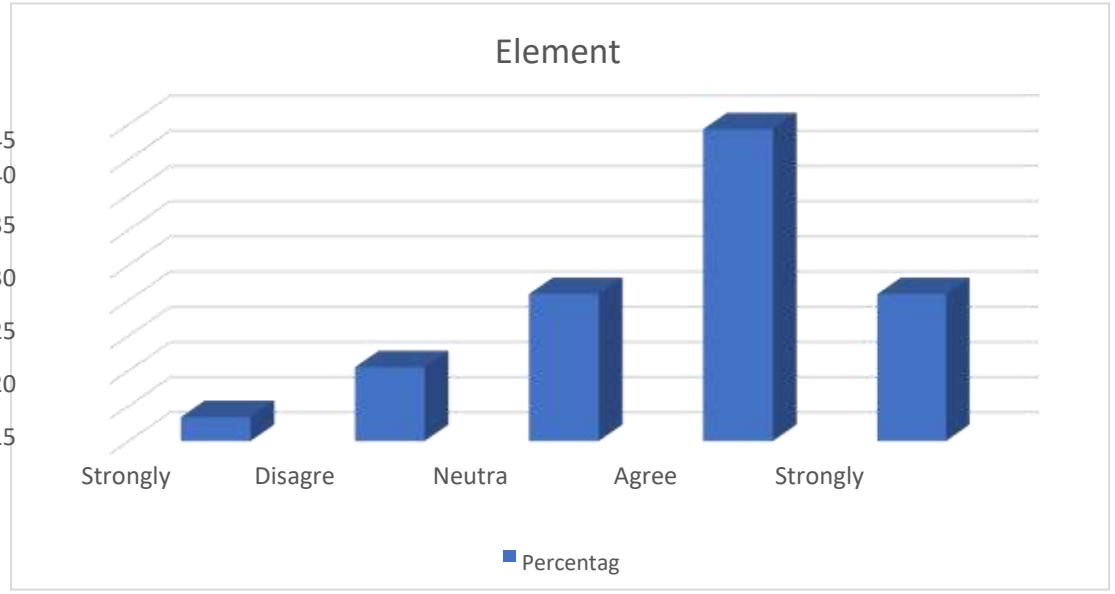
The analysis reveals 19 percent of total respondents purchasing behavior remains less than what is actually needed, 31 percent of the respondent gets exactly what is needed, whereas 50 percent of the respondent purchase more than what is needed due to Visual Merchandising.

Purchasing behavior of the respondents



The study shows that 1.4 percent of respondents strongly disagreed that store image enhancesthem, 2.9 percent disagree, 39 percent are neutral, 45 percent agreed that store image enhancespurchasing behavior, 11.7 percent strongly agreed to that. The study concluded thatmajoritysay 45 percent of the respondents agree that store image is one of the main reasons toincreasetheir shopping time and budget.

3.4 percent of respondents strongly disagreed that good lighting, appropriate music played provokes respondent to spend more time inside the store. 10.5 percent disagree, 20.9 percent are neutral, 44.3 percent agreed ,20.9 percent strongly agreed. The study concludedthat majority say 44.3 percent of the respondents good lighting, appropriate music played provokes respondent to spend more time inside the store.



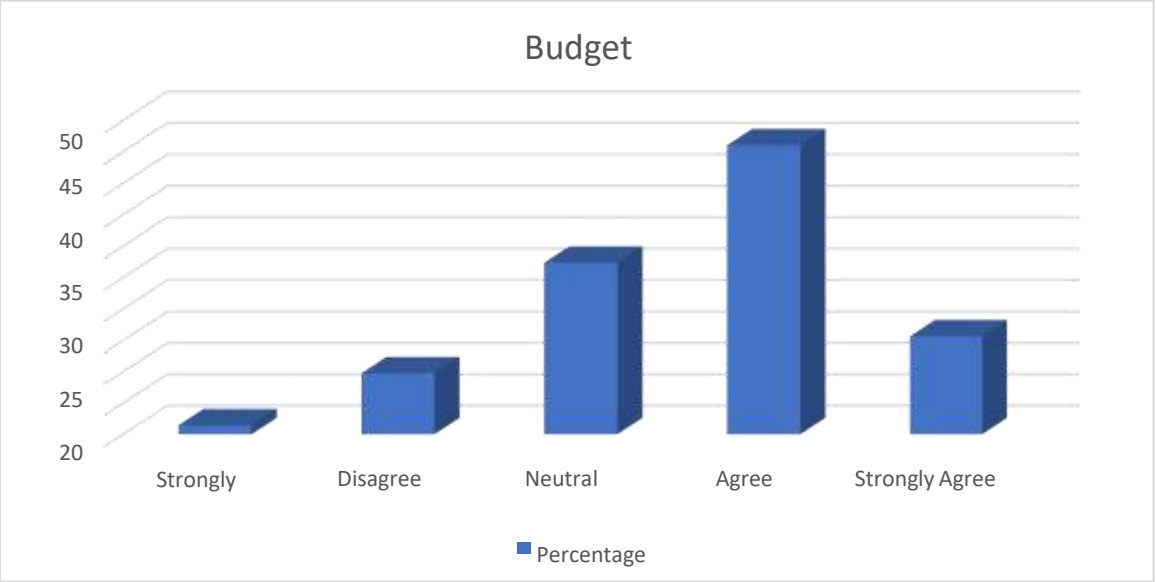
Good lighting, appropriate music played provokes respondent to spend more time inside thestore

The study shows that only 1.4 percent of respondents strongly disagreed that visualmerchandising doesn't increase their planned budget, 9.7 percent disagree, 27.3percent are

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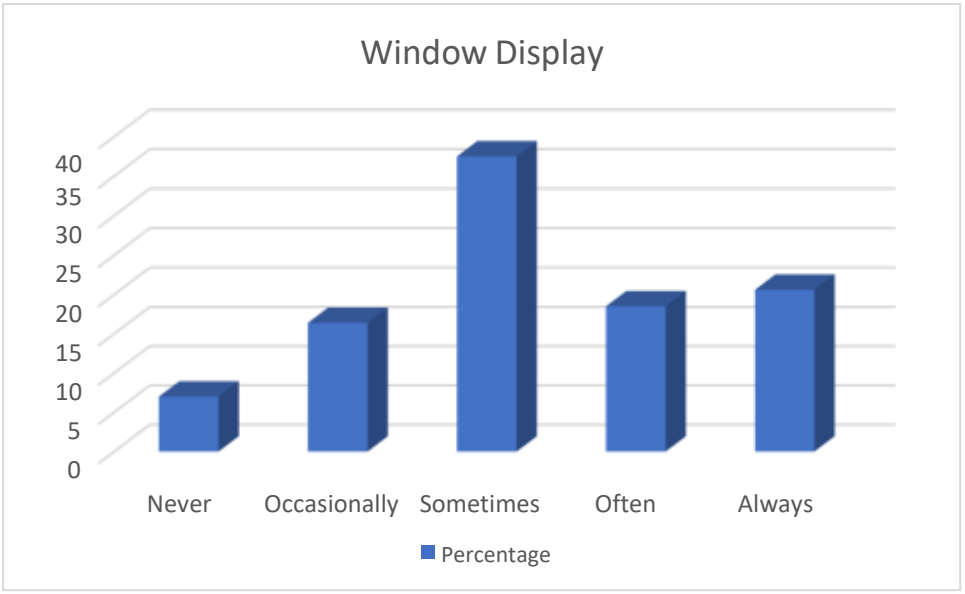
neutral, 46 percent agreed, 15.6 percent strongly agreed. The study concluded that majoritysay 46 percent of the respondents agrees that store image and other features are the main reason to increase their shopping time and budget.

Increases planned budget



The analysis shows that 7 percent of respondents never tend to enter a store when they are attracted by an eye catchy window display, 16.4 percent of them occasionally enter, 37.5 percent of them enter sometimes by an eye catchy window display,18.5 percent often entersthe store by seeing an eye catchy window display, 20.6 percent always used to enter thestoreby seeing an eye catchy window display. The study concluded that majority say 37.5 percentof the respondents sometimes agree that window display attracts the customer to step into the store.

Window display



The study shows 13.5 percent of respondents never tend to enter a store whenthere aren'tgood fragrances and good environment, 17.6 percent of them occasionally enter, 38.5

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percent of them enter sometimes,14.4 percent often enters the store, 16% percent always used to enter the store only when there is good environment. The study concluded that majority say 38.5 percent of the respondents some times agrees that good fragrance / environment intends the respondent to stay more longer time.

7.3 percent of respondents never tend to enter a store by seeing front view of the store, 16 percent of them occasionally enter, 37.5 percent of them entersometimes,18.5 percent oftenenters the store, 20.7 percent always enter the store by seeing itsfront view. The study concluded that majority say 37.5 percent of the respondents sometimesagrees that Storefronts(sign board, offer, seasonal boards, unique spots…) intends the respondent to stay more longer time.

Other findings of the Study are:

- Most (37.2 percent) of the respondent shops at departmental stores.
- Most (41.9 percent) of the respondents visit stores only during occasions.
- Majority (50 percent) of the respondents agree that visual merchandising provokes them to purchase them more than their need.
- Most (48 percent) of the respondents are aware of the term visual merchandising.
- Majority (49.7 percent) of the respondent's decision-making stays neutral during shopping.
- Majority (50.4 percent) of the respondents agrees that new style or design on display attracts or tends to visit the store, is the main reason to increase their shopping time and budget.
- Most (46 percent) of the respondents agrees that store image and other featuresare the main reason to increase their shopping time and budget.
- Majority (51.7 percent) of the respondents agrees that poor or bad lighting or music inside the store sometimes disappoint the customers.
- Majority (50 percent) of the respondents sometimes agrees that Interesting promotional offer (less price, buy 1 & get 1), does tends the respondent.
- Majority (46.5 percent) of the respondents sometimes agrees that sales like clearance sales etc. attracts the customer to step into the store.
- Most (32 percent) of the respondents are attracted to food product and their display in retail outlet attracts them the most.
- Most (44.3 percent) of the respondents ranks 3 for live music to be played in the store.
- Majority (44 percent) of the respondents ranks 2 for refreshment area to be in the store.
- Most (40 percent) of the respondents ranks 2 for a comfortable seating area tobeplaced in the store.
- Most (38 percent) of the respondents rank 3 for artificial grass paths to be placed in the store.
- Most (37 percent) of the respondents rank 3 for artwork for sale on the wall tobe placed in the store to attract customers.
- Most (39 percent) of the respondents rank 3 for posters to be placed in the store.
- Most (65.8 percent) of the respondents agree that product appearance encourages the sale.
- The majority (55 percent) of the respondents strongly agrees that crowded areas, orwith less or no enough space between racks disappoint them during shopping.

SUGGESTIONS

- Most of the women purchase products considering the brand's promotions. Hence theadvertising needs to be focused on women's merchandise and the display in the storeshould also contain women's utility products and accessories.
- The branded retail outlets need to improve their lighting. The stores should continuously reinforce the usage of in-store form/mannequin displays. Proper signage, banners, flags, and balloons, Merchandise displays should contain all the details of the product and should create attractive and eye-catching window displaysproviding information regarding new products, fashion trends, coordination tips, andfunctions of signs to create favorable shopping environments.
- Impulse buying behavior through visual merchandising is more common among middle-aged people. Marketers need to find the right blend and taste for those customers and should position them accordingly.
- Bonus cards need to be given to the customers and when special offers are announcedit needs to be communicated to them. Refreshments need to be given to the customers.

CONCLUSION

Visual Merchandising is a silent salesperson, as its tools, do not speak but convey their salesmessage through visual appeal. To fulfill the changing expectations of today's customers, retailers need to place greater emphasis on the

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presentation of merchandise. Retailers have to understand the importance of shoppers' expectations and provide the right environment to lure them. Since a lot of retailers have started adopting this concept, one should be innovativeenough in visual merchandising to achieve better results. From small players to big ones, all are actively involved in the activities of promoting by presentations in their outletincluding eye-catching windows, product displays, attractive sales; and clearance signs in combinationwith color, lights, smell, and sound. It was known from the research that visual merchandising has a direct relation with sales performance. An outlet should be designed insuch a waythat it results in an inviting appearance that makes the customer especially womenfeel comfortable and eager to buy.

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FORMULATION AND EVALUATION OF HERBAL COUGH SYRUP

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ABSTRACT

One of the most general problems among adults and children are cold, flu and their symptoms such as coughs and sore throaty. In such instances, we find that most people turn to certain medications for temporary relax that sometimes do not meet the prescribed health and safekeeping guidelines. The treatment of these acute infections and their underlying symptoms is one area where the use of certain herbal remedies are still remains common today. Herbal drugs play an important role in the management of it.(1) Currently available therapies for cough include cough suppressants which gives temporary fast relief but no longer has effective without any side effect but herbal expectorant and antitussives given better longer relief with minimal side effect. Many plants category known in people medicine of different civilization used for treatment of respiratory complaints such as cough, pneumonia and expectoration as well as in common cold also. Nowadays many pharmaceutical companies investing for research of improved efficacy of herbal medicines while considering the increasing interest of most of the population of world towards the Ayurveda formulations.(2)

KEYWORDS: *Cough, Antitussive, Expectorant, Herbal medicine, Herbal formulations.*

INTRODUCTION

Tulsi leaves are used to treat skin problems like acne, blackheads and premature ageing. Tulsi is used to treat insect bites. Tulsi is also used to treat heart disease and fever. Tulsi is also used to treat respiratory problems. Tulsi is used to cure fever, common cold and sore throat, headaches and kidney stones. Tulsi is rich in Vitamin C and zinc. It thus acts as a natural immunity booster and keeps infections at bay. It has immense anti-bacterial, anti-viral and anti-fungal properties which protect us from a variety of infections. Herb is a plant that is valued for flavour, scent, medicinal or other qualities. Herbs are used in cooking, as medicines, and for spiritual purposes. Herbs have a variety of uses including culinary, medicinal, or in some cases even spiritual usage. General usage differs between culinary herbs and medicinal herbs. Among the plants known for medicinal value, the plants of genus Ocimum belonging to family Labiatae are very important for their therapeutic potentials Ocimum sanctum L. Ocimum sanctum L. known as 'Tulsi' in Hindi and 'Holy Basil' in English, is an erect softy hairy aromatic herb or under shrub found throughout India. Tulsi is commonly cultivated in gardens. Tulsi is used as expectorant and diaphoretic. Boch root is also used as an expectorant. Pudinasar stops irritation of the throat. Madhu acts as a demulcent and gives soothing effects to the irritated throat. (5)

OBJECTIVES

- Various herbal sources are used in treatment of common cold or cough like sore throats, coughs, cold, and bronchitis.
- These acute infections can be treated by using some common herbal medicine, as the continuous use of chemicals may harm our body as well as produces resistance which leads to ineffective treatment in chronic infections.
- The literature survey gives better idea on applications of herbal plants in treatment of common colds is an attempt to collect the information regarding herbal medicines used in the treatment of these cough for benefit of society.
- Along with herbal treatment the science behind its mode of action in particular disease or disorder is discussed. (4)
- From the literature we can promote the use of herbal formulations for acute infection like cough and common cold which give better and longer effect without or minimal side effects and also avoid habit formation.

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REVIEW OF LITERATURE

SR.NO	TITLE	AUTHOR	WORKDONE
1)	A review of precious species of clove with multiple use (Cortés-Rojas et al., 2014)(Cortés-Rojas et al., 2014)	Diego Francisco Cortés-Rojas	This work is a review documenting the main studies reporting the biological activities of clove (*S. aromaticum*) and eugenol.
2)	Ginger on Human Health: A Comprehensive Systematic Review of 109 Randomized Controlled Trials	Nguyen hoang Anhg, Sun Jo kim	Ginger (*Zingiber officinale* Roscoe), a well-known herbaceous plant, has been widely used as a flavouring agent and herbal medicine for centuries. Furthermore, the consumption of the ginger rhizome is a typical traditional remedy to relieve common health problems, including pain, nausea, and vomiting
3)	A review paper on a Tulsi plant (ocimum sanctum L) 2020	Lopamudra Sethi	We directed a complete writing audit of human examinations that gave an account of a clinical result after ingestion of Tulsi. All investigations detailed ideal clinical results without any examinations revealing.
4)	Honey and Health: A Review of Recent Clinical Research	Saeed Samarghandian, Tahereh Farkhondeh, and Fariborz Samini	Studies revealed that the medicinal effect of honey may be due to of its antibacterial, anti-inflammatory, apoptotic, and antioxidant properties.
5)	A review of Tulsi plant & their chemical constituents 2012	D.J Garkalet.al (2012)	An aggregate of 24 examinations were distinguished that announced restorative consequences for metabolic disarranges, cardiovascular malady, resistance, and neurocognition. All investigations detailed ideal clinical results without any examinations revealing any noteworthy antagonistic occasions. The explored examinations strengthen customary uses and propose Tulsi. Herbs are well known as they are used for the same purpose.
6)	Garlic: a review of potential therapeutic effects	Leyla Bayan,1 Peir Hossain Koulivand,1 and Ali Gorji1,2*	Recently, studies were carried out to known its effect on the cancer cell lines. Many studies have shown its effects not only on carcinomas, but also on the cardiovascular system and immune system [6]

MATERIAL AND METHOD

Sr.no	Materials	Categories
1	Tulsi	Anti-bacterial and antifungal
2	Ginger	Antioxidants
3	Honey	Antibacterial, Antimicrobial
4	Clove	Anti-inflammatory
5	Ethanol	Ethyl alcohol

GLASSWARES

1. Beaker
2. Measuring Cylinder
3. Buchner funnel
4. Round bottom flask
5. Dropper
6. Filter paper
7. Glass rod
8. Burette stand
9. Condenser
10. Soxhlet Apparatus

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INSTRUMENTS
1. Weighing Balance
2. Heating mantle

Details information about Tulsi
Biological Name: Holy Basil
Biological source: The fresh and dried leaves of the ocimum sanctum linn.
Family: Lamiacae
Kingdom: Plantae
Chemical constituents: Eugenol, carvacrol, linalool and flavonoids.
Uses: Anti- tussive



Details information about Ginger
Scientific Name: Zingiber Officinale
Biological source: It consist of rhizomes of Zingiber officinale and dried in the sun.
Family: Zingibareceae
Kingdom: Plantae
Chemical constituents: phenolic and terrine compounds
Uses: It helps to symptoms of cold and sore throat.



Details information about Clove
Scientific Name: Syzygium Aromaticum
Biological source: Dried flower buds of Syzygium aromaticum.
Family: Myrtaceae
Kingdom: Plantae
Chemical constituents: acetyl eugenol, alpha and beta caryophyllene.
Uses: It is used to treat sore throat, and cough.

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Details information about Honey
Common Name: Honey bee
Scientific Name: Arthropoda
Biological source: Honey is produced by both honey bees and stingless bees.
Family: Apidae
Kingdom: Animalia
Chemical constituents: glucose, fructose, and Maltese
Uses: Reduce night time coughing and improve sleep.



Mechanism of Action

Stimulation of mhecano chemoreceptor

↓

Afferent impulses of cough center (medulla)

↓

Efferent impulses of via parasympathetic and motor nerves lunges

↓

Increased contraction of diagrammatical abdominal and cough

Types of Cough
1) Productive Cough
Which is mostly acute in nature and often caused by bacterial or viral or fungal infection.it is also called as an effective cough and wet cough, since its impressive ejection secretions, mucous or alien material from the respiratory tract. This cough not be suppressed, treatment is followed to eliminate mucus. Productive cough is unhealthy in post operative patients, e.g., after eye surgery (Karlsson, J.A.1996). [10]

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2) Non-productive

Cough as name indicates it won't bring any secretions or mucous from the lungs. It is a dry, irritating cough without mucus. , this type of cough is acrid in nature and caused by dry aggravation or dust or smoke or smoke , or due to swelling and mild secretion in the resolving stage of illness it is most common symptom in asthma It may be also due to weakness of the muscles of respiration, thick sticky mucus and in diseases of the eye-lash which helps mucous transportation in the airway. (Bennett and Brown, 2003 [11]

Procedure

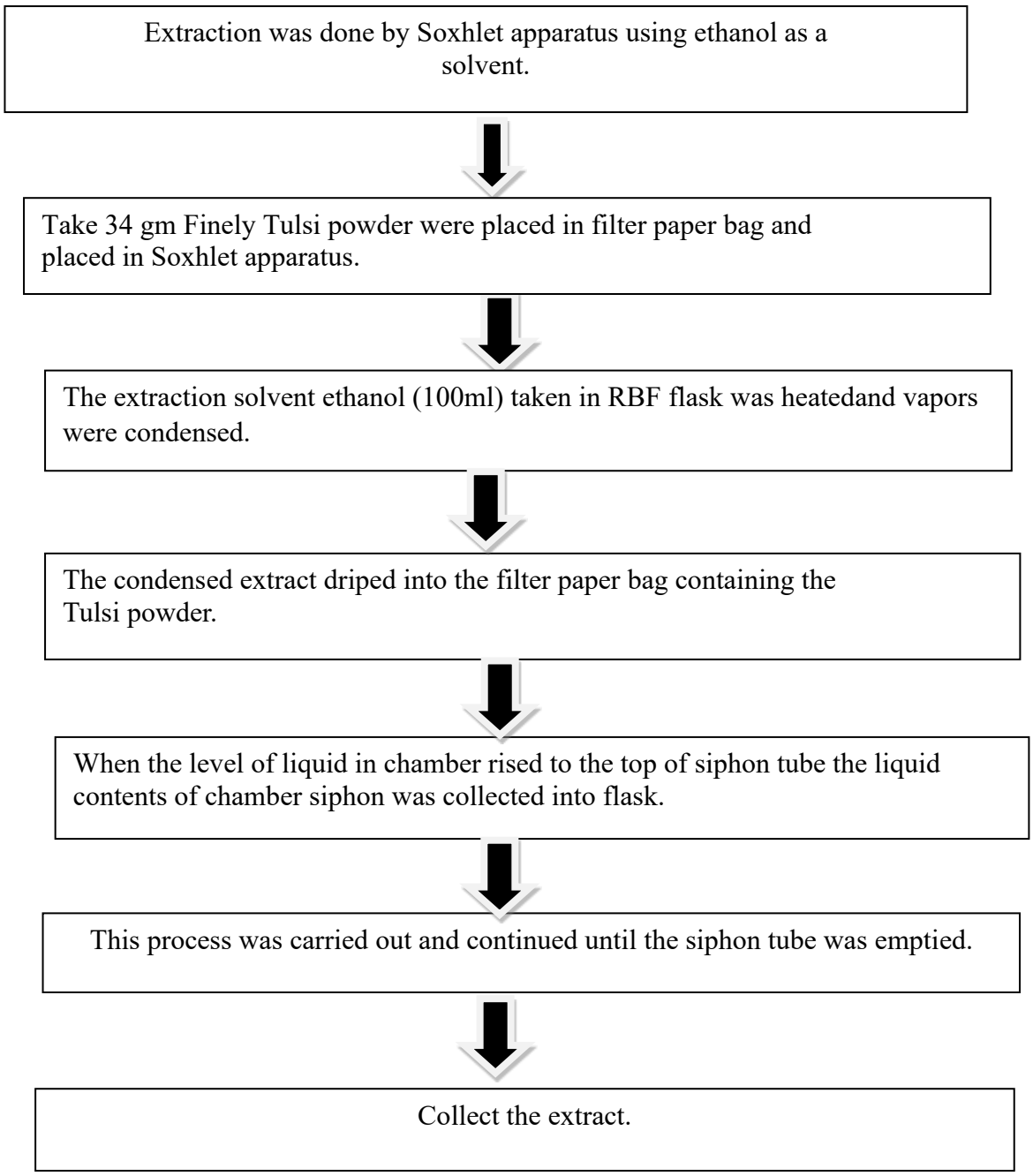


Fig- Extraction process[12]

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Fig.: Soxhlet Apparatus

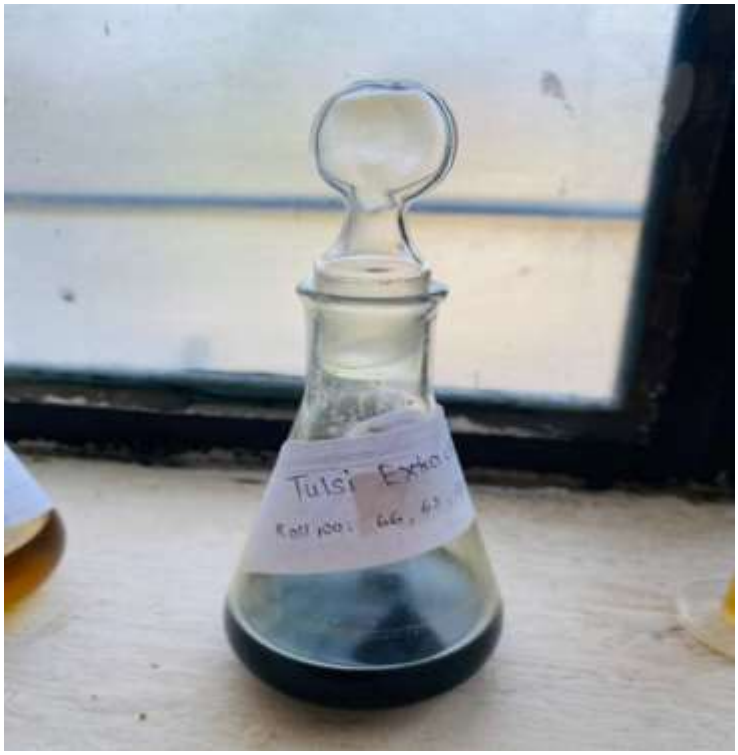


Fig.: Tulsi Liquid Extraction

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Formula

Sr no.	Drugs	Quantity	Uses
1	Tulsi	40%	Anti- tussive
3	Ginger	25%	cold or sore throat.
4	Clove	10%l	Helps to reduce Cold sinusitis
5	Honey	25%	Reduce night time coughing

PROCEDURE

Step 1: Take Round bottom flask add 10 ml Tulsi liquid extract into them
Step 2: Add 20 ml mixture of Ginger and Clove liquid extract and boil them
Step 3: Add 10 ml Honey into them
Step 4: Make solution perfectly soluble and into container



Fig.: Ginger & Clove Extraction

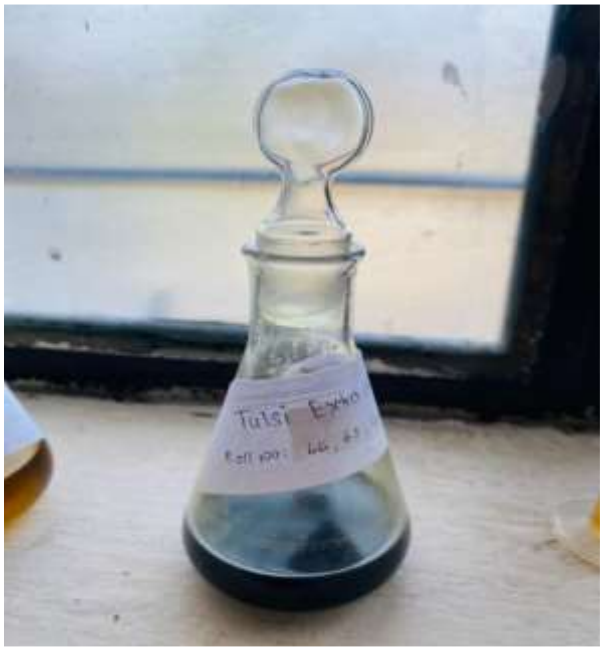


Fig.: Tulsi Extraction

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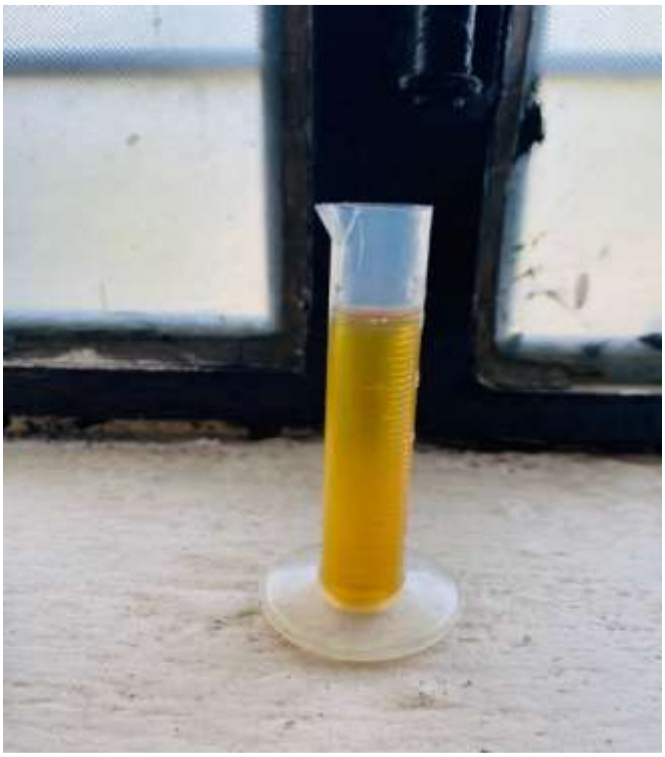


Fig.: Honey[2]

EVAULATION TEST

1. pH Meter:

With the help of pH meter, the pH Tulsi Extraction of Cough Syrup can be detected.
pH=6.62

2. Visual Inspection

It as an inspection of an asset made using only the naked eye. The green solution is detected in visual inspection. To verify the product is free of any foreign particles.

3. Physical Characteristics

Color: Natural Green
Odor: Strong aroma and an astringent.
Taste: Bitter Flaver

4. Detection of foreign particles

Foreign particles were detected with the help of white & black background instrument.
There are no any foreign particles in the syrup.

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Fig : Clarity Test Appratus

Result

Extraction of Chemical Constituents from Tulsi & Their Formulation for Cough Syrup was prepared and evaluated. The test methods described in this project are presented as example of suitable formulation of cough syrup. A collection of recommended herbal medicine for assessing the Expectorant Activity & also content of herbal materials, intended to assist national laboratories engaged in pharmaceutical evaluation tests. The publication includes expectorant activities of herbal medicines. It includes the detail description of the preparation & formulation of expectorant by using Tulsi. The mostly herbal expectorant medicine is Tulsi, ginger, clove, honey etc. We also study the evaluation tests of cough syrup. In the evaluation test its physical characteristics, visual inspection, pH of cough syrup was described.

SUMMARY AND CONCLUSION

As many peoples occur cough, some time the coughing person undergo various other diseases. The various Herbal medicines are there are Tulsi, Ginger, Honey and Clove. The Herbal Cough Syrup show less side effect &fatly recovered the cough. The various evaluation test was examined to Tulsi cough syrup. The World- wide in the world mostly cough is normal disorder. The various Herbal medicines are used in herbal cough syrup. The Herbal medicines are showing the less side effects as compared to synthetic cough syrup. The simple formulation of cough syrup is very effective to treat cough. The various Evaluation of Herbal Cough Syrup also examined and detected.

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UDC 349.6

BASIC METHODS OF TEACHING ECOLOGY IN HIGHER EDUCATIONAL INSTITUTIONS

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ANNOTATION
The article discusses the main methods of teaching ecology in higher educa-tional institutions. The concept of "teaching method" is the methods of joint ac-tivity of the teacher and students aimed at solving learning problems.
KEY WORDS: *education, theory, methodology, science, activity, students, envi-ronmental education, task.*

In the modern world, environmental problems affect all spheres of people's lives: science and production, politics and economics, energy, urban planning, healthcare and education [1].

Ecology is a unique phenomenon in modern science and is a complex system of interrelated sciences.
The negative impact of humans on the Earth's ecosystem has led to global climate change and environmental degradation. The United Nations Educational, Scientific and Cultural Organization (UNESCO) notes that to ensure future global changes in the quality of life of society, it is necessary to increase public awareness of the environment. Environmental education can help people understand how their actions affect the environment and how this can be minimized [6].

The upbringing of students and their environmental education are priorities of the state educational policy of the Republic of Uzbekistan. In order to increase the environmental literacy of the growing young generation, the formation and development of environmental consciousness and environmental culture, the effective organization of the process of environmental education and upbringing, the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan, dated May 27, 2019 No. 434 "On approval of the concept for the development of environmental education in the Republic of Uzbekistan[1]".

Ecology has a significant impact on the education system as a whole; the theory and methodology of teaching ecology are closely related to environmental science [4,5].

Ecology forms the content of environmental education, and methods of environmental research are largely reflected in the educational and research activities of students in higher educational institutions.

Environmental education, using teaching methods, is designed to help students learn environmental issues and participate in problem solving to improve the environment. As a result, students will develop the competence to make informed and responsible decisions.

The concept of "teaching method" is the methods of joint activity of the teacher and students aimed at solving learning problems.

Method (from the Greek methodos - path, method) is a set of techniques and operations of cognition and transformation of reality; as well as ways to achieve results in knowledge and practice [2,3].

The following methods are used in teaching ecology in higher educational institutions:
- verbal methods;
- visual methods;
- practical methods;
- problem-based learning methods [2,3].

[1] *Resolution of the Cabinet of Ministers of the Republic of Uzbekistan, dated May 27, 2019 No. 434 "On approval of the concept for the development of environmental education in the Republic of Uzbekistan ".*

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Teaching methods ensure the assimilation of all components of the content of environmental education, contribute to the development and education of the student's personality.

The classification of methods has theoretical and practical significance, as it serves as the basis for selecting methods and assessing their effectiveness in the learning process [4,5].

- In teaching ecology in higher educational institutions, various teaching methods are used, for example:
- methods that contribute to the assimilation of educational material, consolidation and improvement of acquired knowledge;
- methods for explaining new material by the teacher;
- methods of independent work of students;
- methods that form knowledge and skills, creative activity, consolidation and testing of knowledge;
- explanatory and illustrative methods; reproductive; problem presentation, heuristic, search; research;
- methods that stimulate learning motivation;
- methods of organizing and implementing educational activities and operations;
- methods of control and self-control of students;
- verbal, practical, visual methods [4,5].

Verbal teaching methods in higher education mainly include lecture, explanation and conversation. And visual methods include demonstration of experiments and visual aids, display of environmental objects, presentations of multimedia tools and viewing of films and videos.

In practical classes on ecology, an environmental atlas can be used as visual material to show the location of environmental objects or phenomena. You can also organize the environmental atlas differently by asking students to draw up an environmental characteristic of a separate district, city or region using a standard plan. Based on work with an environmental atlas, it is possible to stimulate students' creativity.

Practical teaching methods include students' work on studying an object during practical and laboratory work in an ecology lesson, and when performing independent tasks on excursions.

When using the explanatory-illustrative method, the teacher communicates ready-made information using various means, and students perceive this information, realize it and record it in their memory. At the same time, students listen, watch, read, and observe. Reproduction and repetition of a method of activity or information on the instructions of the teacher are the main features of this method.

With the search method of teaching, during the search and selection of educational information, students apply knowledge and skills to solve new problems and present the results obtained.

Research teaching methods perform important educational functions: they support the comprehension of knowledge, the prompt and flexible application of it by students, and allow them to form the experience of creative activity [4,5].

Thus, the effectiveness of the choice of methods is determined by many factors, but one of the most important is the teacher's methodological literacy. The most important skill of a teacher is manifested in the ability to choose effective teaching methods, combine them, develop and improve them in the educational process in ecology.

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CONSTITUTION AND ITS IMPORTANT CHARACTERISTICS

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ABSTRACT
In this article, based on the principles and rules sealed in our constitution , a complete and effective legislation and legal framework has been created in our country , in a word, our basic law has laid the foundation for our transition to the path of building a social-legal state, it is said that the qualities and characteristics of the Constitution of the Republic of Uzbekistan testify to its immense influence, importance and value , that it is a legal expression of independence and a legal guarantee of our great future .
KEY WORDS: *constitution, its features, rules, legislation and legal framework, social legal state, qualities and characteristics of the constitution, authority, importance and value of the constitution.*

In the preamble of the Constitution, which is the most sacred law for the people of our country, it is stated that showing commitment to social justice is the highest quality of our people, and conducting a fair social policy is the essence of our state. The Constitution of the Republic of Uzbekistan appeared as the legal basis of the independence of our country, as a firm expression of the will of the people. It was created as a direct result of independence. The Constitution is "an important step in the process of establishing a new Uzbekistan... the main foundation for the formation of the legislative and legal basis of our sovereign state."

Declaring the will of our people to the whole world, the constitution aims to restore the Uzbek statehood on modern educational foundations, to live peacefully and to strengthen peace by all measures, to deepen democracy, to be faithful to the ideas of human rights and state sovereignty, a just and legal state. announced that it is to build, ensure civil peace and national unity.

The Constitution of Uzbekistan legislates the political nature of our country, its social, economic and political system, the democratic foundations of governance, the guarantees of civil rights and freedoms, and the foundations of our moral values.

The essence, socio-political and legal nature of our basic law is clearly reflected in its following main features:
1. The Constitution of Uzbekistan is literally a truly democratic constitution. It is a document that embodies universal, universal values tested in history. In addition, it was created based on the constitutional experience of the most developed, developed countries[1].
2. Regarding the rights and freedoms of citizens, our Constitution incorporates all the main ideas and provisions of the Universal Declaration of Human Rights. "State bodies and officials, - it is stated in Article 2 of our Basic Law, - are responsible to society and citizens." This means that the rights and interests of citizens prevail and they are guaranteed at the constitutional level. A person, his life, will, honor and dignity and other rights and freedoms are sacred and are protected by the state;
3 . The Constitution of the Republic of Uzbekistan is the real legal foundation for the establishment of a democratic legal state and a free civil society. The main principles and signs of the legal state, in particular, the constitution and the supremacy of the law, the principles of democracy and social justice, are strengthened in it. All regulatory legal documents are based on the constitution and law; and laws, in turn, are required to conform to the constitution. All are equal before the law. No one is exempt from the obligation to obey the law;
4 . The Constitution serves to transition to a market economy, to settle private property relations. It reinforces the idea and rules that reflect the equality of different forms of ownership, freedom of economic activity and entrepreneurship. Private property, like other forms of property, is inviolable and protected by the state.
5. Institutions of multi-partyism and political pluralism are strengthened in the constitution. It should strengthen the diversity of opinions - pluralism, multi-partyism, ensure the protection of the democratic principles of state building with the help of appropriate legal norms, prevent the emergence of leadership in society, maintain civil peace, political stability, inter-ethnic harmony and harmony. serves. Also, while giving citizens the right to form public associations and social movements, the Basic Law opposes undemocratic and inhuman actions aimed at creating discord in society, escalating inter-ethnic conflicts, and promoting war and violence. The democratic procedures enshrined in the Constitution are aimed at helping to realize universal values, guaranteeing the rights and freedoms of citizens, preventing damage to society, the state, and citizens [2]. Social life develops on the basis of diversity of political institutions, ideologies and opinions. It is not allowed for any political party to become a monopoly, and the ideology of any party to rise to the level of the state ideology. Political parties operate on the basis of the Constitution and laws, observing the rules and requirements of parliamentary democracy;

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6. The Constitution determines the state's fair and democratic attitude towards religion. The right to freedom of conscience is guaranteed to everyone, and the freedom of religious beliefs and activities of religious organizations is legalized. Everyone has the right to believe in whatever religion they want or not to believe in any religion. The inadmissibility of forced indoctrination of religious beliefs was recognized at the constitutional level. The state is separated from religious organizations and does not interfere in their activities and internal affairs in accordance with the law. All religions in Uzbekistan are equal before the law, they cooperate and compromise on the basis of religious tolerance.
7 . Another important aspect of the Constitution is that it reinforces one of the democratic rules discovered by the genius of mankind - the principle of separation of powers. On this basis, a rational constitutional mechanism for the mutual cooperation of the legislative, executive and judicial branches of state power was formed.
8. Constitutional institutions that have been introduced in recent years and have proven themselves after passing the tests of life have found their expression in the Basic Law. These are: the institution of the presidency and the republican form of state administration that was decided on this ground, as well as the introduction of the head of the executive power in the regions - regions, districts, cities - the institution of governorship; the system of self-government bodies of citizens in the country, including the creation of a constitutional legal basis for the formation of neighborhoods, etc. The constitution reflected the national characteristics of Uzbek statehood in a broad and reasonable way. This was the case even when the Uzbek language was given the status of the state language, in addition, the terms of administrative-territorial units (the Supreme Council, the Cabinet of Ministers, governorship, elders) were also expressed in the names of regions, districts, villages and villages.
9. The definition of the constitution is very clear, analytical conceptual meaning is distinguished by the clarity of expressions. The Constitution of the Republic of Uzbekistan "Commitment to the ideals of human rights and state independence, awareness of the high responsibility to current and future generations, reliance on the historical experience of Uzbek statehood, respect for democracy and legality, recognition of internationally recognized rules of international law , aimed at such noble goals as ensuring decent living of the citizens of Uzbekistan, building a humane legal society, and finally, guaranteeing civil peace and national unity"[3].
1 0 . The Constitution was developed in accordance with the principles and rules of international law recognized by the world community. Uzbekistan enters international relations as an equal subject of international law. The foreign policy of the Republic of Uzbekistan is based on the sovereign equality of states, non-use of force or threat of use of force, inviolability of borders, resolution of disputes by peaceful political means, non-interference in the internal affairs of other states, and adherence to other generally recognized norms of international law.
11. The Constitution was created on the basis of extensive reliance on the experience of world constitutionalism and enjoying its positive aspects. At the same time, his remarkable achievement is that our Basic Law was able to combine the rich historical, national and spiritual values of the Uzbek people with the experience of advanced constitutional studies of the world. This document, from the general content to a simple clause, reflects the national thinking and holy Islamic values formed during the time of our grandfather Khoja Ahmed Yassavi, the great Amir Temur. Great qualities such as justice, truth, faith, nobility, tolerance, bravery, generosity, which are the priority in the hearts of the people of this ancient land, have received a worthy place in this blessed document [4].
1 2 . The Constitution determines the existence of a sovereign state - the Republic of Karakalpakstan within Uzbekistan and its constitutional and legal status. The sovereignty of Karakalpakstan is protected by the Republic of Uzbekistan. Mutual relations between the Republic of Uzbekistan and the Republic of Karakalpakstan are regulated by contracts and agreements concluded between them within the framework of the Constitution of Uzbekistan.

The immeasurable importance and historical role of our Constitution, which cannot be measured or evaluated by anything, is manifested in the following characteristics and qualities:

First of all, we see that the legal foundation necessary for the creation of national statehood and its socio-political system, which is completely new for us, and for the formation of a political and economic system based on democratic principles, is defined by our Basic Law.

Second, Human Rights are universal incorporating the principle provisions of the Declaration and other main international documents, our Constitution strengthened the primacy of human rights and interests, its freedoms over the interests of the state, defined the creation of decent living conditions for our people as its main goal, and announced the principles of social justice.

Thirdly, our Constitution established the rule of law, its equality for all citizens, as well as the legal principle of the division of state power into legislative, executive and judicial powers, their independence, to strengthen their development as an independent branch of power, is the main decisive condition of a democratic state. created a legal basis aimed at forming an effective mechanism of mutual restraint and balance of interests between existing authorities.

Fourthly, our Constitution created a legal framework for the formation and development of diverse civil society institutions, the free operation of political parties, the formation and development of a multi-party system, confirmed the main principles and mechanisms of the electoral system, freedom of election, the self-determination of our people. strengthened the guarantees of freedom of

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expression, the right of every person to elect and be elected to representative bodies of power, and the right of citizens to participate in the management of state and community affairs.

Fifth, embodying the idea of national independence and the best aspects of universal values, our Constitution will ensure the restoration of our national traditions, our mother tongue, the priceless values and cultural heritage of our people, the spiritual development of a person and the all-round harmony created the necessary conditions for its development.

Sixth, our Constitution strengthened the foundations of our national, multi-sector economy, established the priority of private property, created the conditions for a decisive transition from an unjustified, completely failed centralized administrative-distributive system to a free market economy.

Seventh, the formation and effective functioning of the system of national security and defense bodies in our Basic Law, an equal subject of the international relations of our country, which independently determines its internal and external policy based on the highest interests of our state, our people, the well-being and security of our country defined the legal basis of its status as

Based on the principles and rules sealed in our constitution, a complete and effective legislation and legal framework was created in our country. In a word, our Basic Law laid the foundation for our transition to the path of building a social-legal state.

The above-mentioned qualities and characteristics of the Constitution of the Republic of Uzbekistan testify to its immense influence, weight and dignity, it is a legal expression of independence and a legal guarantee of our great future.

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EXACT QUANTITY EXPRESSING LEXEMAS IN "DEVONU LUG'OTI-T-TURK"

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ABSTRACT
Analysis of language units used to express exact quantity in ancient Turkic languages, especially in the language of the 11th century.
KEY WORDS: *concrete quantity, abstract quantity, number, semantics, noun, adjective, pronoun, adjective, Old Turkic language.*

During the centuries-old development of the Uzbek language, its morphological construction has also developed and improved: as a result of the emergence of new grammatical forms, a group of forms that have been in active use since ancient times lost their status, and some over the years, it fell out of use, the grammatical forms used side by side began to differ in terms of function; some grammatical forms changed and improved. According to written sources, the development of the morphological construction of the Uzbek language can be divided into three major stages:

The period until the end of the XIV century. This period is the eve of the formation of the old Uzbek literary language, and there are a lot of functional forms used side by side, the widespread use of ancient forms, dialectal or forms belonging to other Turkic languages are in widespread use. is explained by such circumstances as.

It includes the period from the end of the XIV century to the second half of the XIX century. During this period, the old Uzbek literary language was formed, and its grammatical structure was apparently regulated to a certain extent.

It started from the second half of the 19th century. During this period, the press was created and newspapers, magazines and books were published in Uzbek language. This, in turn, created the ground for the literary language and colloquial language to become closer and the literary language, in particular, its morphological structure, to be enriched at the expense of the colloquial language.

M. Koshghari compared the Turkic languages at all levels and divided the Turkic languages into two groups based on their common and different aspects:
1. Turks (Chigil, Kashgar, Arghu, Barsagon, Uyghur)
2. Languages of the Oghuz and Kipchak tribes
In this process, the scientist always takes the languages of the Turks as a basis for comparison, and compares them to the languages of the Oghuz and Kipchak tribes. In particular, phonetically, "y" at the beginning of a word is replaced by "zero" or "j" in Oghuz and Kipchak, and "m" at the beginning of a word in Turks is replaced by "b" in Oghuz and Kypchak. is brought. In particular, from our observations in the process of studying the quantitative units used in the work, it can be said that the scientist also differentiated and compared the quantitative units used in the language of that time by levels.

Humanity has been interested in determining the amount of things in the surrounding environment and has tried to do so since ancient times. Numbers are used to quantify things. In the history of Turkic languages, the origin of counting began with the person himself. Rather, a person named the numbers by counting his fingers. If we pay attention, the origin of the numbers up to ten, their basic, dictionary meaning is connected with the name, position or position of the fingers. For example, a number is attached to the thumb (in the vernacular language, bashmaldaq). Two after it (the first finger after the thumb); üč - so called because it is located at the very end of the hand, etc. This opinion will be confirmed if the name of the numbers up to ten is studied etymologically. This phenomenon indicates that the origin of the numeral system in Turkic languages, and most importantly, the historical roots of Turkic languages are rooted in the early times of human society, the time of the emergence of the language. So, our words that are part of the number system are a legacy left to us from the time when the first people started learning to count. In the period of the ancient Turkic language, the number system was improved and became a complete system. There is no "zero" in ancient Turkic, because "zero" is a non-existent number. Counting starts from "one". When a person is born, one year is counted, and the time in the mother's womb is added. A year later, he turned two years old, and by this time he was getting younger. The number one is the speaker, that is, "I" (myself, the place I stand on, or the thing I hold). "Men" is bi in Old Turkic language. This word is also preserved in the composition of the auxiliary birü~berü. -rü is a suffix of the conjugation of departure, berü means "toward me" and is called beri in the modern Uzbek literary language. For example: beri kel, köpdän beri. Bi in bir is the speaker ("I"). So, the count begins

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with the speaker himself. In the current Uzbek literary language, there is no construction of numbers. In the old Turkic language, there is a construction in numbers. It is also possible to restore their morpheme composition. For example: the root of iki is ilki (ilki>ilki>iki. Modern Uzb.: iki). In ancient Turkic, il means "front". "Race" is also il, its antonym is tör. İl also has the meaning of "pole, direction": il means "East", because the East is in front in the thought of the ancient Turks. -ki is a relative suffix, and the first one means "previous, initial, former". But logically it is "after the speaker". Therefore, it is the second in order. A number of other numbers have also been made. The number "twenty" is formed from two: iki-r-mi>yiki-r-mi>twenty. The number fifty is derived from the word el (finger): fifty means "five tens". Or: altï-mïš>altmïš, yeti-miš>yetmiš. So, the suffix -mïš, -miš turns one into ten. We will give another example of the formation of numbers: sekiz on>säksän ("eight ten"), nine on>toqsan ("nine ten"). The number nine is derived from the word odd. The word taq means "to satisfy; payment; means silence. Chogishtirin, the modern words tokhta (<toq-ta), köhli toq, karnï toq, and toqlï also come from the same root.

Chogishtirin, the modern words tokhta (<toq-ta), köhli toq, karnï toq, and toqlï also come from the same root. The number nine is so called because it is the final unit (i.e., the last unit) and means "stopped, completed", -(u)z is a formative suffix. Or the origin of the number "hundred" is connected to "hundred" ("surface, surface"). It is named so because it is at the end of the tens, on the surface. The meaning of "face of a person" is also the same. So, the numbers säkiz (<säk-iz), nine (<toq-uz), thirty (<ot-uz) are made with the suffix -z; The numbers altmïš (<altï-mïš) and yetmiš (<yeti-miš) are formed with the suffix -mïš, -miš.

F. Safarov, a linguist, says: "Taking into account that the number word group is a special lexical tool for expressing a pure and precise quantity, it takes a place in the center of the number-quantity microfield."

In ancient Turkic languages, there were semantic types of number, like in modern Uzbek language, and these numbers were distinguished by their own characteristics in terms of expression methods and forms. Views on the naming and use of numbers and numbers are described in M. Koshgari's work "Devonu lug'oti-t-turk". the word number itself is also explained separately, with examples: san - number, number. How many sheep are there?

The author describes the names of numbers in detail, based on examples trt - four. trt yrmaq - four coins. This means four numbers in total. says that it is more correct to write with "wow" in twrt style. aj - three. אט ירמאק– three coins (DLT.I.71b).

M. Koshgari, along with the names of numbers, also gave information about how this number appeared and its composition. The numbers eighty and ninety were formed by adding ten to the numbers eight and nine, and the forms eighty and ninety were formed in later periods. The forms of eight and nine are used in written monuments in the ancient Turkic language. This is explained in the work "Devonu Lug'oti-t-Turk" as follows:
skswn- eighty. asli skyzạwn - eight ten. Two words combined to form one word (DLT.I.410b). Nine is ten, two words were later joined.

M. Koshgari also gave valuable information about the types of meanings of numbers. In the ancient Turkic languages, the meanings of numbers were formed by adding various suffixes to the stem of the number. An ordinal number is formed by adding the additions -th, -th, -th to the countable number. We can see from the examples in the old written sources that in Turkic languages, at first, the ordinal numbers were formed without the vowel [i] at the end of the syllable. Orhun-Enasoy, ancient Turkic (Uyghur) language monuments use the order in this form. M. Koshghari also explained separately how the ordinal number is made in this form.
اکند asr – اکند ikindi nen – the second thing. Sira number. The following explanation of the same word is given.
Afternoon is the time of Asr prayer (prayer before sunset).

The number of the second order appears in some written monuments of the 13th-14th centuries in the form of asr, as in "Devonu lug'oti-t-turk". In "Kissasi Rabguzi" it is used in the form: "touch the afternoon prayer".

Ажнь черчунч - the third. Sequence number. This is the rule. So, if the meaning of following or continuation of the previous number is explained in numbers below ten, the letters n and j are added to the number itself (DLT.III.451). So, these letters performed the function of a number-forming suffix.

twrtnj törtünch - the fourth. Four is a very important quantity in the expression of the universe. The universe that surrounds us can be described with this number, this amount and this type of stage. in fact, this ancient world is composed of four elements (air, water, earth and fire). These four elements directly reside in the nature of the earth and the people on it: heat, cold, wet, and dry. These properties are manifested in nature in the form of air, water, fire and earth. A person is a product of these four elements, which is equally recognized in the thinking of every nation.

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Doctors dry with heat; cold with wet; dry with wet and lastly, dry with cold, they describe the four clients of human nature.

بیشنج بیشنک– like the fifth. The original of these words was four or five, for the above purpose n j was added to these words. It can also be added to the words of any number: авннё навньч-tenth, ykrmnj twenty-twentieth, because twenty is a continuation of nineteen. This rule is general. But in the work "Kutadgu bilig" belonging to this period, we see that the order is used in the form of number -th and -th: one - justice, second - state, third - intellect, fourth - satisfaction. So, both forms of ordinal number were used in the language of the 11th century. sekiz is the lighter, shortened version of eight.

According to Koshgari's comment on this word, the word eight is used both with two k and with one k. Mahmud Koshghari made the same comment about some other words. He noted this feature in the words nine, two and even thorn. The middle sounds [k], [t], [q], [l] in the numbers two, seven, eight, nine, thirty, fifty are represented by one letter in Arabic script. (two) in the form of (eight) skz. It is found in some sources of the 13th-14th centuries that the consonants in these numbers are doubled. We see that the numbers thirty and fifty are written with tashdid in "Devonu Lug'oti-t-Turk": atz attuz: atz yrmaq ottuz jarmaq - thirty coins (DLT.I.159), alk ellik: alk yrmaq ellik jarmak - fifty coins (DLT.I.160).

So, the meaning of the quantity is understood from the core of the number. Additives that make up the semantic types of the number have different effects on the quantitative meaning understood from the root. These are used to count, divide, sort, sum, and show the amount.

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VIEWS ON PERSONALITY STRUCTURE

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ANNOTATION

There is still no single point of view on the nature, structure and natural patterns of personality development, which negatively affects the use of diagnostic, prognostic and therapeutic methods. This article provides a brief overview of traditional psychological approaches to personality structure.

KEYWORDS. *Concept of personality, personality structure, body, psyche, mind, id, ego, superego.*

The core feature of any personality theory is structural concepts, which deal with the relatively unchanging characteristics that people exhibit in different circumstances and at different times. These stable characteristics act as the basic building blocks of the human psyche. In this sense, they are analogous to concepts such as atoms and cells in the natural sciences. However, structural concepts are strictly hypothetical in nature. They cannot be seen under a microscope, like, say, neurons in the brain.

To explain what people are, personologists have proposed a kind of mosaic made up of concepts. One of the most popular examples of structural concepts is the concept of personality traits. A trait is viewed as a stable quality or tendency of a person to behave in a certain way in a variety of situations. There are some similarities here with the definitions given by lay people when they talk about the most characteristic behavioral reactions of other people. Common examples of personality traits are impulsiveness, honesty, sensitivity, and timidity. Gordon Allport, Raymond Cattell, and Hans Eysenck, three leading authorities on the study of personality traits, believed that personality structure is best conceptualized in terms of hypothetical qualities underlying behavior. At another level of analysis, personality structure can be described using the concept of personality type. A personality type is described as a collection of many different traits, forming an independent category with clearly defined boundaries. Compared to concepts that deal with personality traits, such concepts imply more permanent and more generalized behavioral characteristics. Because people have many traits expressed to varying degrees, they are usually described as belonging to one type or another. For example, Carl Gustav Jung was of the opinion that people are divided into two categories: introverts and extroverts. From this point of view, any personality is certainly either one or the other.

Personality theories vary depending on the concepts used to describe personality structure. Some theorists put forward highly complex and elaborate constructs, the many components of which are connected to each other in a myriad of ways. Freud's division of the personality into three levels - id, ego and superego - illustrates an unusually complex description of structure and its organization. Other theorists, on the contrary, propose more simply organized systems, with a limited set of component parts and a small number of connections between them. An example is the concept of personality constructs, proposed by the eminent cognitive psychology theorist George Kelly to explain relatively constant dimensions of personality structure.

So, any approach to personality, if it claims to be useful, must somehow consider the question: what are the stable, unchanging aspects of human behavior. The issue of structure and, more importantly, the nature of its organization and impact on the functioning of the individual is a key component in all theories of personality.

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SOCIO-PHILOSOPHICAL PROCESSES OF HUMAN SENSUALIST VIEWS IN AN ENLIGHTENED SOCIETY

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ABSTRACT
Enlightenment occupies a leading place in human sensualist views. Enlightenment is a feature of strengthening a person's will and summarizing his thoughts. The aspect of enlightenment of the human factor is complex and multifaceted in life position and consists of such elements as his worldview, values, goals, interests, moral relations, motives, intellectual and emotional-will qualities.

Keywords: *Society, development, enlightenment, human sensualist, social, philosophical, life position, worldview, value, purpose, interest, moral relations, motives, intellectual, communication, health, scientific news, world order, retrospective.*

Global changes and conflicts in the world indicate the need to study the social and educational foundations of society's development. In this regard, understanding the value of human dignity, which is considered to be the highest level, is recognized as a sign of the spiritual and educational processes of the development of society. This creates the need to form enlightened people and relationships capable of changing the face of society. The creation of a new spiritual space in society is gaining priority in the implementation of socio-philosophical research from the point of view of the era.

In the world's leading scientific centers, as a result of social culture, spiritual and educational changes, strategic scientific research is being conducted into the educational foundations of human views. A number of scientific centers of the West are conducting research on the rational influence of the "human factor" on the development of society. Including VINNOVA, Innovate UK in Sweden, Innosuisse in Switzerland, Enterprise Estonia and MITA institutes in Lithuania, National scientific agencies NSF in the USA, ARC in Australia, ANR in France, WTO in Japan and SFI in Ireland[4], Human Resource Management Scientific Institute at Samarkand State University in Uzbekistan -research centers first of all understand a person as a rational being, and then the rationalistic aspects of the sensualist (emotional, feeling) views and moral theories that develop society are studied.

Scientific research on the sensualist views of an enlightened person in the development of society revealed some aspects of the views of Eastern and Western thinkers. For example, Hakim al-Tirmizi compares enlightenment to light, about its role in the formation of human emotions[14. -B 150.], Rogib Isfahani's rise of sensualist views of man as "Knowledge, practice, manners are equal to high title, noble lineage and wealth" [11. - B 450] states. This rich cultural heritage has not lost its importance even today. Al-Zamakhshari "Where action is weak, strong knowledge is useless. Knowledge without action is a rainbow arrow without a thread" [10]. -B 26.], Abu Nasr Farabi said "City of virtuous people" [5. -B 45.] views put forward in the work is based on the need to be enlightened as a methodological basis for building an enlightened society.

In the works of Western thinkers, human sensualist views are the basis for the development of society. Philosopher Thomas Hobbes believed that man is primarily a part of the state. He believed that he should be the servant of the people and ensure their happiness and security, not the other way around. At the same time, the philosopher criticizes the state system and considers that it humiliates and insults people. According to him, "The ability to have knowledge is enlightenment in a person" [7. – S 513.] forms. He says that a person should feel it.

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In turn, it serves to expand the consciousness and thinking of the members of the society, the philosophy of life and the worldview" [16.] and expresses his attitude to it. That is, he believes that the construction of an enlightened society in the environment of society

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is necessary to research human sensualist views (increasing intellectual potential and worldview, patriotism, love and loyalty to the people).

It should be noted that Abu Rayhan Beruni's statement about the essence of the sensualist views of an enlightened person in the development of society, "Each conscious member of society, regardless of his profession and specialization, can be fully informed only by acquiring knowledge about society in depth." - one should know the causes and consequences of the social events and processes taking place around, and have the ability to manage them" [6. - B 39.], it is appropriate. This makes it possible to determine the general basis of socio-political and moral phenomena in the society, that is, to determine the fundamental foundations of the stability of socio-political life, to preserve the society as a whole. In our opinion, the formation of the scientific-theoretical foundations of the sensualist views of an enlightened person in the development of society is expressed in the thesis, which lays the groundwork for the foundation of the third Renaissance. According to him, "The enlightened society is a national goal, on the basis of harmonizing the interests of society and the interests of the individual, glorifying human dignity, freedom of thought and diversity of ideas, responsibility, tolerance, rule of law and high political culture. is formed" [15]. This means that an enlightened society is important in terms of social and political governance and its improvement.

It has been studied that the activity of the researchers of the sensualist view of man is expressed in the studies of several Western philosophers. In particular, the philosopher J. Berkeley states that knowledge is needed to perceive sensualistic sensations in human views [2], and another philosopher D. Hume states that it is necessary to learn what constitutes the sum of a person's feelings in order to form a more coherent human sensualistic views[8]. . E. Condillac, as one of the most systematic representatives of human sensualist views, tried to derive the whole content of knowledge and intellectual life from sensations in his "Treatise on Feelings". According to E. Condillac, "a collection of sensations (enlightened human intuition) imaginations, feelings of pleasure and displeasure also come from them"[9] It means that it should serve the society.

It is noted that the individuals who caused strategic changes of any developed countries bring new trends and events into the environment of the time. This is the reason that the views of famous philosophers and scientists about the essence of human activity led to the study of the concept of "human factor" of socio-philosophical thinking. The results reveal that the interpretations of the human concept represent the necessity of enlightened human views for the development of human sensualist views in society from a dialectical point of view. In this sense, the author, according to Aristotle: "Sensualism is in the sensations in the mind and what is expected to appear in them [13]", emphasizes the need to highly evaluate the place of sensations in human life in the dialectical materialism theory of knowledge. . Also, that thought must have been individualistic from the point of view of that time. Now, epistemologically, it is based on the comparative analysis that the subject of knowledge includes not society, but all periods of existence of the individual.

In fact, "The importance of enlightenment in the education of the nation and society is unparalleled. Its implementation is primarily the responsibility of intellectuals, first of all, scientists and teachers, poets and artists. If the nation has lost its rights, distanced itself from ancient knowledge, forgotten its identity, and reached the level where society is devoid of spirituality, the task of intellectuals is ten or even a hundred times more difficult. "[3], which creates socio-philosophical aspects of educating enlightened people in the development of society.

From a philosophical point of view, synergetics not only brought a new meaning to dialectical thinking, but also had a positive effect on the change of the ideas of positivism, ontologism, reductionism, relativism, and postmodernism. Also, in synergetics, there is an opportunity to define integrative research methods of nature, society, man, spiritual-aesthetic environment, informational and man-made activities, new description, analysis, their division into groups, observation and interpretation.

In the research, "Formation and development of a prosperous lifestyle in society requires building on the basis of a number of socio-spiritual factors based on moral and aesthetic values. These are:

- Manifestation of the social appearance of a prosperous society, i.e. spiritual, moral and aesthetic image, culture and perfection;
- The appreciation of high human feelings aimed at the realization of the goals and desires of each person in the society and its practical proof;
- Inculcating aesthetic education on the basis of national values in the mind of a person based on the formation of a healthy lifestyle in society, deciding on a strong aesthetic ideal that brings the spirit of freedom and creativity based on the essence of modernity;
- On the basis of a healthy lifestyle, it is necessary to strengthen human aspirations towards perfection, and on this basis, to form a modern way of thinking about the source of power of a prosperous society" [13. – B 13.]. In our opinion, relationships in the synergistic processes of the healing of the social and spiritual environment determine the need for a healthy family environment and neighborhood environment.

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Philosopher A. Astin partially agrees with the views that spirituality has a central place in liberal education and emphasizes the need to add to it. That is, "If the goal of education is to make a person more aware of himself and the world, then teachers should think about how best to develop human abilities to observe different aspects of consciousness in relation to the world. need"[1], in the view of the philosopher, he emphasizes that spirituality is related to the inner world of man, subjective life and human consciousness. The author adds that it is necessary to connect human values and beliefs, as well as concepts such as people's identity, origin, purpose of life.

Fundamental reforms in the field of education, which are implemented as a basis for building an enlightened society in the strategy of continuous spiritual education, require high skill in terms of content. In our opinion, the reforms are expressed by the adoption of the concepts of the development of continuous education on the basis of continuous spiritual education.

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PATIENT ADVOCACY IN SURGICAL NURSING: STRATEGIES FOR ADVOCATING FOR PATIENTS UNDERGOING SURGICAL PROCEDURES, ENSURING THEY RECEIVE THE BEST POSSIBLE CARE

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ABSTRACT

Patient advocacy is a fundamental aspect of nursing, especially in the surgical setting, where patients are often in vulnerable states. This review article aims to discuss the importance of patient advocacy in surgical nursing and to provide strategies for advocating for patients undergoing surgical procedures to ensure they receive the best possible care. Key aspects include preoperative advocacy, intraoperative advocacy, and postoperative advocacy, with a focus on optimizing outcomes and ensuring patient safety. By advocating effectively, surgical nurses can ensure that the patients' needs are met, their rights are respected, and their overall experience is improved.

KEYWORDS: *Patient Advocacy, Surgical Nursing, Surgical Procedures, Preoperative, Intraoperative, Postoperative, Patient Safety, Patient Rights*

INTRODUCTION

Patient advocacy is a fundamental principle of nursing practice and plays a crucial role in ensuring patient safety, dignity, and well-being. In the surgical setting, patient advocacy becomes even more critical as patients are often in vulnerable states, undergoing complex and potentially life-altering procedures. Surgical nurses are in a unique position to advocate for patients throughout their surgical journey, from preoperative preparation to postoperative care. This review article aims to discuss the importance of patient advocacy in surgical nursing and to provide strategies for advocating for patients undergoing surgical procedures to ensure they receive the best possible care. Key aspects include preoperative advocacy, intraoperative advocacy, and postoperative advocacy, with a focus on optimizing outcomes and ensuring patient safety. By advocating effectively, surgical nurses can ensure that the patients' needs are met, their rights are respected, and their overall experience is improved.

PATIENT ADVOCACY IN SURGICAL NURSING

1. Preoperative Advocacy

Preoperative advocacy is crucial in ensuring that patients are adequately prepared for surgery and that their rights and wishes are respected. The following strategies can be employed:

a. **Informed Consent:**

Ensuring that patients fully understand the proposed surgical procedure, its risks, benefits, and alternatives is essential. Surgical nurses should verify that informed consent has been obtained, and they should facilitate communication between the patient and the surgical team to address any concerns or questions.

Informed consent is a legal and ethical requirement for all surgical procedures. It is the responsibility of the surgical nurse to ensure that the patient has been adequately informed and understands the nature of the procedure, its risks, benefits, and alternatives. Before the patient signs the consent form, the surgical nurse should confirm that the patient has received all necessary information and has had the opportunity to ask questions. If the patient has any concerns or questions, the surgical nurse should facilitate communication between the patient and the surgical team to address them.

In addition to the formal consent process, surgical nurses should advocate for patients who may have difficulty understanding the information provided. This may include patients with cognitive impairments, language barriers, or limited health literacy. In such cases, the surgical nurse should ensure that the information is provided in a way that the patient can understand, using plain language, visual aids, or interpreters as needed.

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b. Patient Education

Providing comprehensive preoperative education to patients about their surgical procedure, including what to expect before, during, and after surgery, can alleviate anxiety and improve outcomes. Surgical nurses can offer information on preoperative preparations, including fasting guidelines, medication management, and postoperative care instructions.

Patient education is a crucial aspect of preoperative advocacy. By providing patients with comprehensive information about their surgical procedure and what to expect before, during, and after surgery, surgical nurses can help alleviate anxiety and improve outcomes. Preoperative education should cover a range of topics, including fasting guidelines, medication management, pain management, wound care, and activity restrictions.

The preoperative education process should be tailored to the individual patient, taking into account their level of health literacy, cognitive ability, and cultural background. Surgical nurses should use plain language and avoid medical jargon to ensure that the information is easily understood. Visual aids, such as diagrams and videos, can also be helpful in explaining complex concepts.

c. Advance Directives

Facilitating discussions about advance directives ensures that patients' wishes regarding their medical care are respected, especially in the event they are unable to communicate their preferences. Surgical nurses should encourage patients to complete advance directives and ensure they are documented in the medical record.

Advance directives are legal documents that allow patients to specify their preferences for medical care in the event that they become unable to communicate their wishes. These documents can include a living will, which outlines the types of medical interventions a patient would want or not want in various circumstances, and a durable power of attorney for healthcare, which designates a trusted individual to make medical decisions on the patient's behalf.

Surgical nurses play a crucial role in facilitating discussions about advance directives and ensuring that patients' wishes are documented and respected. This may involve providing information to patients about advance directives, helping them complete the necessary forms, and ensuring that the documents are included in their medical record.

d. **Advocating for Vulnerable Populations**

Identifying and advocating for the needs of vulnerable populations, such as the elderly, children, and patients with cognitive impairments, is essential. Surgical nurses should ensure that the care plan is tailored to meet the specific needs of these patients, including the implementation of appropriate support systems.

Vulnerable populations, such as the elderly, children, and patients with cognitive impairments, may have unique needs that require special attention during the preoperative period. Surgical nurses should advocate for these patients by ensuring that the care plan is tailored to meet their specific needs.

For elderly patients, this may include performing a comprehensive geriatric assessment to identify and address age-related issues that could impact surgical outcomes. For pediatric patients, this may include providing age-appropriate explanations of the surgical procedure and offering emotional support to both the child and their parents. For patients with cognitive impairments, this may include ensuring that the patient has a trusted advocate present to help them understand and make decisions about their care.

2. Intraoperative Advocacy

Intraoperative advocacy is critical for ensuring patient safety and well-being during surgery. The following strategies can be employed:

a. **Time-Out Procedure**

Ensuring that the surgical team performs a time-out before the start of the procedure to verify the correct patient, procedure, and surgical site is essential. Surgical nurses should actively participate in the time-out process and speak up if there are any discrepancies or concerns.

The time-out procedure is a critical safety measure that is performed immediately before the start of a surgical procedure. During the time-out, the surgical team pauses to verify the correct patient, procedure, and surgical site. The surgical nurse plays a key role in this process by actively participating and speaking up if there are any discrepancies or concerns.

The surgical nurse should ensure that the time-out is conducted according to the facility's protocol and that all team members are present and engaged. If there are any discrepancies or concerns identified during the time-out, the surgical nurse should speak up and ensure that they are addressed before the procedure begins.

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b. **Communication**
Facilitating clear and effective communication among members of the surgical team is crucial for patient safety. Surgical nurses should advocate for an environment where team members feel comfortable speaking up and voicing concerns, such as the presence of any allergies, medication reactions, or other patient-specific factors.

Effective communication among members of the surgical team is essential for ensuring patient safety and preventing errors. Surgical nurses should advocate for an environment where team members feel comfortable speaking up and voicing concerns.

The surgical nurse should actively encourage open communication among team members and ensure that everyone feels empowered to speak up if they have any concerns. This may involve using structured communication tools, such as the SBAR (Situation, Background, Assessment, Recommendation) technique, to ensure that important information is communicated clearly and efficiently.

c. **Monitoring and Patient Safety**
Advocating for patient safety by monitoring the patient's physiological status, including vital signs, oxygenation, and anesthesia, is essential. Surgical nurses should speak up if they notice any deviations from the expected or if they have concerns about the patient's well-being.

Patient safety is the highest priority during surgery, and the surgical nurse plays a crucial role in advocating for the patient's well-being. This includes monitoring the patient's physiological status, including vital signs, oxygenation, and anesthesia, and speaking up if there are any deviations from the expected.

The surgical nurse should be vigilant in monitoring the patient throughout the procedure and should speak up if they notice any signs of distress or if there are any concerns about the patient's well-being. This may involve advocating for adjustments to the patient's position, administering medications to address pain or discomfort, or alerting the surgeon to any unexpected findings.

d. **Instrument and Sponge Counts**
Ensuring that instrument and sponge counts are conducted according to protocol is essential for preventing retained surgical items. Surgical nurses should advocate for the accurate counting of all surgical instruments, sponges, and other items used during the procedure.

Preventing retained surgical items is a critical patient safety issue, and the surgical nurse plays a key role in advocating for the accurate counting of all surgical instruments, sponges, and other items used during the procedure.

The surgical nurse should ensure that instrument and sponge counts are conducted according to the facility's protocol and that all team members are actively involved in the process. If there are any discrepancies identified during the count, the surgical nurse should advocate for a thorough search of the surgical field to ensure that no items are left behind.

3. Postoperative Advocacy
Postoperative advocacy is essential for ensuring a smooth recovery and preventing complications. The following strategies can be employed:
a. **Pain Management**
Advocating for adequate pain management is crucial for patient comfort and satisfaction. Surgical nurses should assess the patient's pain regularly and advocate for appropriate pain relief measures, including pharmacological and non-pharmacological interventions. Pain management is a critical aspect of postoperative care, and the surgical nurse plays a key role in advocating for the patient's comfort and well-being. This includes assessing the patient's pain regularly and advocating for appropriate pain relief measures.
The surgical nurse should ensure that the patient's pain is assessed regularly using a validated pain scale and that appropriate interventions are implemented to address the pain. This may include administering pain medications, providing non-pharmacological interventions such as heat or cold therapy, or adjusting the patient's positioning to maximize comfort.

b. **Mobility and Rehabilitation**
Encouraging early mobility and rehabilitation is essential for preventing complications such as deep vein thrombosis, pneumonia, and pressure ulcers. Surgical nurses should advocate for the implementation of early mobilization protocols and involve physical therapists as needed.

Early mobilization and rehabilitation are essential for promoting recovery and preventing complications after surgery. The surgical nurse plays a crucial role in advocating for the implementation of early mobilization protocols and ensuring that the patient is supported in their rehabilitation efforts.

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The surgical nurse should work closely with the physical therapy team to develop an individualized mobilization and rehabilitation plan for each patient. This may involve implementing early mobilization protocols, providing assistance with activities of daily living, and ensuring that the patient has access to any assistive devices or equipment they may need.

c. **Nutritional Support**
Advocating for appropriate nutritional support is essential for promoting healing and preventing malnutrition. Surgical nurses should assess the patient's nutritional status and advocate for nutritional interventions, including dietary modifications, nutritional supplements, and enteral or parenteral nutrition as needed.

Nutritional support is essential for promoting healing and preventing malnutrition after surgery. The surgical nurse plays a key role in advocating for appropriate nutritional support for the patient.

The surgical nurse should assess the patient's nutritional status and advocate for nutritional interventions as needed. This may include providing dietary counseling, offering nutritional supplements, or arranging for enteral or parenteral nutrition if the patient is unable to eat orally.

d. **Psychosocial Support**
Advocating for psychosocial support is essential for addressing the emotional and psychological needs of patients and their families. Surgical nurses should provide emotional support, facilitate communication, and connect patients and families with appropriate resources, including social workers, counsellors, and support groups.

Addressing the emotional and psychological needs of patients and their families is an essential aspect of postoperative care. The surgical nurse plays a crucial role in advocating for psychosocial support and ensuring that the patient's emotional and psychological needs are met.
The surgical nurse should provide emotional support to the patient and their family members and facilitate communication between them and the healthcare team. This may involve providing information about the patient's condition, listening to their concerns, and connecting them with appropriate resources, such as social workers, counsellors, or support groups.

CONCLUSION

Patient advocacy is a fundamental aspect of nursing practice, especially in the surgical setting, where patients are often in vulnerable states. By advocating effectively, surgical nurses can ensure that the patients' needs are met, their rights are respected, and their overall experience is improved. Preoperative advocacy, intraoperative advocacy, and postoperative advocacy are essential for optimizing outcomes and ensuring patient safety. By employing the strategies discussed in this review, surgical nurses can play a pivotal role in advocating for patients undergoing surgical procedures, ensuring they receive the best possible care.

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AN COMPLETE STUDY ON POLYHERBAL CREAM FOR SKIN DISEASE USING NATURAL INGREDIENTS

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ABSTRACT

Although superficial wounds are often easy to treat for healthy individuals, there are some more severe types of wounds (burns, ulcers, diabetic wounds, etc.) that are a challenge for clinicians.

The formulation of a herbal cream containing Elipta Prostrata, Calendula officinalis, Arnica Montana leaves, flowers. They are very fast Action on wound healing additional anti-inflammatory property, This multi herbal cream to increase action on that skin disease. In that the calendula officinalis is carried out angiogenesis, glycoprotein and collagen metabolism leading to improvement in both local granulation tissue formation and blood circulation Calendula officinalis *is an annual herb from Mediterranean origin which is popularly used in wound healing and as an anti-inflammatory agent.*

KEYWORDS:- *wound classification, Wound healing, Elicpta prostrate, Calendula Officinalis, Arnica Montana, anti-inflammatory. Angiogenesis*

❖ INTRODUCTION

Wound healing is the process that the skin goes through as it repairs damage from wounds. There are three main types of wound healing, depending on treatment and wound type: primary, secondary, and tertiary wound healing. Every wound goes through various stages of healing, depending on the type of wound and its severity. Wound healing refers to a living organism's replacement of destroyed or damaged tissue by newly produced tissue[1-3].

Treatments

- Medications and other therapy to improve blood flow
- Therapy to reduce swelling
- Wound debridement, or removing dead tissue around the wound to help it heal
- Special skin ointments to help wounds heal
- Special bandages and other skin coverings to help speed up healing[2]

This antiseptic creams can soothe and heal wounds, protect against infection, and treat minor skin problems and skin inflammation. They can be used on cuts, grazes, minor burns and scalds, small areas of sunburn, dry chapped skin, nappy rash, insect bites, spots, and pimples. Some common antiseptic agents.

This cream is polyharbal mixture of four plant to increase the efficacy (The ability of something to produce a desired result or effect) as well as potency also. In that cream including Eclipta prostrate, Calendula officinalis (heal ulceration), Arnica Montana (reduce pain due to injury), Aloe vera (regenerate tissue), herbal extract.

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❖ MATERIALS AND METHODS

Material

Collection of plant materials The dried crude drugs of Eclipta prostrate,Calendula officinalis, Arnica Montana, and extracted Rose hip, extracted powder of Aloe vera

Chemicals and Reagents

The chemicals used during the experiments for formulation of cream. Lanolin, Tween 60, Stearic acid, Triethanolamine, Propylene Glycol, White petrolatum etc were used

Extraction of plant materials

The extractions of crude drugs were carried out by Simple Maceration method using water (aqueous extract) as menstruum with occasional stirring. Liquid mixture is then pressed and to get a clear liquid extract. The clear liquid is then subjected to freeze drying in order to get a solid mass[6].

Formulation of Polyherbal cream (O/W emulsion)

Ingredient of oil phase (A) was melted in a beaker by using water bath on constant stirring. Components of aqueous phase (B) were mixed together and warmed to about same temperature of oil phase. The preservative methyl paraben and concentrated aqueous extract of the plants were added into aqueous phase and heated. Then oil phase was added to water phase little by little on constant stirring and perfume was added to it when the temperature was 350C - 400 C. Six different formulations were prepared by using varying concentration of aqueous extract, stearic acid and liquid paraffin[9]

❖ Formula

Sr No	Ingredients	Formulation % W/W in grams
1.	Eclipta prostrate	2.8
2.	Calendula officinalis	2.8
3.	Arnica Montana	2.8
4.	Aloe vera	1.5
5.	Rose hip	1.5
6.	White petrolatum	0.4
7.	Stearic acid	8.35
8.	Tween 60	2.5
9.	Triethanolamine	0.5
10.	Propylene Glycol	1.75
11.	Lanolin	0.4
12.	Methyl paraben	0.05
13.	Turmaric	0.5
14.	Liquid paraffin	4.15

Table: 1

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❖ **Excipient Uses**

Sr. No	Excipient	Uses
1.	White petrolatum	As a moisturizer to treat or prevent dry, rough, scaly, itchy skin and minor skin irritations
2.	Stearic acid	• Hydration Stearic acid helps lock in moisture to the skin's cells, making it hydrated and firm for longer. It's especially beneficial for people with dry skin. • Skin aging Stearic acid can help reduce the signs of aging and contribute to a more youthful-looking complexion. • Inflammation Stearic acid has anti-inflammatory properties that can help soothe irritated skin and reduce redness. • Skin barrier Stearic acid can help protect the skin's surface against water loss and shore up the skin's protective barrier.
3.	Tween 60	Surfactant
4.	Triethanolamine	Emulsifier. Adding triethanolamine as an ingredient allows chemical bonds to change, which means fluids not easily mixed can be thoroughly processed into one main product. pH adjuster. Stabilizer. Surfactant. Thickener.
5.	Propylene Glycol	Humectant, solvent, emollient or preservative in various skincare products.. It is best known for the attributes of a hydrating and delivery ingredient. This means it retains moisture in your skin and aids in better absorption of potent ingredients into the skin.
6.	Lanolin	Used on the skin to treat or prevent minor skin irritations such as blisters, burns, dry skin, and diaper rash.
7.	Methyl paraben	Methylparaben is a common preservative used in many cosmetic products, including shaving creams, to prevent the growth of bacteria and mold. Other common parabens used in cosmetics include propylparaben, butylparaben, and ethylparaben.
8.	Turmaric	• Moisturizing: Turmeric creams can help moisturize dry skin • Treating stretch marks: Turmeric creams can help treat the appearance of stretch marks • Protecting against environmental damage: Turmeric creams contain antioxidants that can help protect the skin from pollution, sun exposure, and other environmental irritants • Improving skin tone: Turmeric creams can help improve the appearance of skin tone irregularities, like blotchiness, redness, and unevenness • Lightening skin tone: Turmeric creams can brighten skin tone and reduce dark spots and pigmentation
9.	Liquid paraffin	LIQUID PARAFFIN is used to treat eczema and related dry skin conditions. Liquid paraffin is a soothing agent (a substance that soothes or softens the skin). It works by avoiding water loss from the outer coating of the skin. This reduces dryness and leaves the skin hydrated and soft.

Table:2

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❖ Plant Profile

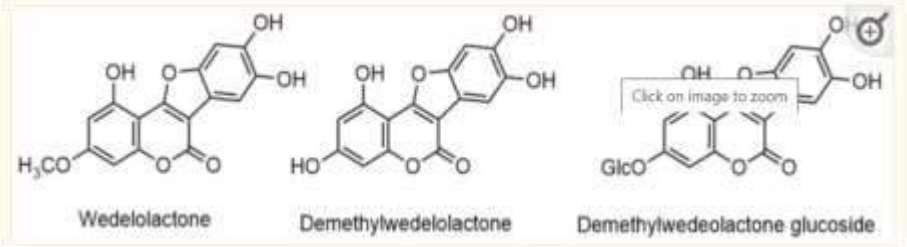
1) Eclipta prostrate

Eclipta prostrata is a species belonging Euphorbiaceae has been long used by various local communities in the world and Indonesia as traditional medicine and to beauty treatments[4]. Eclipta prostrata (L.) L. (Syn.: Eclipta alba (L.) Hassak, Family: Asteraceae) is commonly known as False daisy or Ink plant in English and locally known as Bhringraj, Bhumiraj, Aali jhar,and Nash jhar in Nepali language. *E.* prostrata is a medium-sized, branched, annual herb-bearing white flower natively found in the tropical and subtropical regions of the world. It grows mostly in moist sites such as swamp edges, river or lake banks and edge of rice-fields and easily propagated and spread throughout China, India, Nepal, Brazil and other parts of the world. It is widely distributed in tropical and sub-tropical regions of Asia, Africa, and South America. Traditionally, it is used to treat different skin problems such as wounds, hair loss prevention, and dermatitis. The leaves are used to treat snakebite in India, China, and Brazil. The mixture of leaf juice and honey is used to cure catarrh in infants. The juice of E. prostrata is taken orally or applied locally to promote hair growth[5].



Phytochemical

Eclipta prostrata contains a wide range of active phytoconstituents, which includes coumestan derivatives, triterpene saponins, steroidal saponins, triterpenes, steroids, steroidal alkaloids, flavonoids, phenolic acids, thiophene derivatives and many other compounds. Most of the chemical analysis are reported for whole plant or aerial parts. The detailed list of these compounds. The structures of main coumestan derivatives, triterpene saponins and flavonoids are represented respectively[6].



Therapeutical uses

- The whole plant is used as antiseptic, febrifuge, tonic, deobstruent in hepatic and spleen enlargement and is emetic.
- In combination with aromatics, the juice is given in anemia, catarrh and cough.
- The plant is also used as scalp tonic for promoting hair growth.
- Bhringaraj is commonly used as deobstruent to promote bile flow and to protect the liver parenchymatous tissue in viral hepatitis and other conditions involving hepatic enlargement.
- The fresh juice of the leaves is given in the treatment of edema, fevers, liver disorders, and rheumatic joint pains; it is also used to improve the appetite and to stimulate digestion.
- The juice is given with honey to treat upper respiratory congestion in children.

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2) Calendula officinalis



Calendula officinalis, commonly known as marigold is commonly grown in warm temperate regions of the world. It is commonly used for treating nephrotixicity, jaundice, helps in healing wounds and purifying blood and can potentially cure cancer. *C.* officinalis is known to be an antioxidant as well as an inhibitor. Adult female Wistar rats were pretreated with *C.* officinalis flower extract with incorporation of 3-NP. The flower extract acted as an anti-inflammatory, anti-oxidant and estrogenic agent by preventing significant behavioral changes and neuronal loss in the striatum of the brains of adult female Wistar rats[7].

Phytochemical

Flavonoids, triterpenoids, essential oil and **polysaccharides** are the principal constituents of calendula flowers. All groups have been shown to exhibit pharmacological activity and serve to illustrate the difficulty of devising an assay which represents the true therapeutic activity of the drug. The *EP* and *BP* determine the **flavonoid** content, expressed as hyperoside (not less than 0.4%), utilizing the same method as for Birch Leaf. Other assays based on triterpenoid assessment have been described.

The flavonoid mixture involves **quercetin** and **isorhamnetin** derivatives. Triterpenoid saponins (calendulosides) are glycosides based on oleanolic acid-3-*O*-β-d-glucuronide and are present in variable proportions (2–10%) depending on time of harvesting and chemotype. The roots are a richer source than the flowers. These saponins have haemolytic and anti-inflammatory activity. Polysaccharides include a rhamnoarabinogalactan (M_r 15 000; **rhamnose** 24.8%, **arabinose** 34.2%, **galactose** 41.0%) and two arabinogalactans with Antitumour and **phagocytosis** stimulation properties have been reported for the polysaccharide fraction.
Other constituents of the flowers are **triterpene** alcohols (e.g. α- and β-amyrin, calenduladiol, etc.), **sesquiterpenes** and **carotenoids**[7].

Therapeutical uses[5]

- Antimicrobial and antihelminthic effects
- Anti-inflammatory effects
- Antioxidant and photoprotective effects
- Cytotoxic effects
- Genotoxic and antigenotoxic effects
- Cardiovascular effect
- Neuroprotective effect
- Hepatoprotective effect

3) Arnica Montana

- Montana showed anti-inflammatory activity on several inflamed cells in vitro.
- Montana mother tincture and dilutions significantly reduced inflammation.
- Montana mother tincture and 1C had the largest effect on inflammation and ROS.
- Montana 9C only enhanced the migration of fibroblasts in an in vitro system.

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Phytochemical

One hundred and fifty therapeutically active substances are present in *A. montana* plant, i.e. sesquiterpene lactones, i.e. helenalin,11a,13-dihydohelenalin and their short-chain carbonic acid esters (0.3–1% of dry weight in the flower heads, 0.1–0.5% in leaves), flavonoids (0.6–1.7%) by micellar electrokinetic capillary chromatography in the form of flavonoid glycosides, flavonoid glucuronides and flavonoid aglycones; essential oils, composed thoroughly of fatty acids, thymol derivatives, monoterpenes and sesquiterpene. Other constituents of *A. montana* are carotenoids; diterpenes; arnidiol (triterpene); pyrrolizidine alkaloids (tussilagine and isotussilagine); polyacetylenes; coumarins (umbelliferone and scopoletin); phenolic acids (chlorogenic acid, caffeic acid and cynarin, 1.0–2.2%); lignans; dicaffeoyl quinic derivatives (1,3- 3,5 and 4,5 dicaffeoyl quinic acids); and oligosaccharides. It contains sesquiterpene lactones being metacryl, isobutyryl, tygloyl, methacryloyl, isovaleryl helenalin derivatives, apigenin, luteolin, hispidulin, quercetin and kaempferol glycosides in high quantities. Phytochemical study of *A. montana* notifies that the nature and amount of phytochemicals such as caffeic acid derivatives, phenolics and helenalin esters and dihydrohelenalin esters present in the flower heads vary according to climatic conditions (i.e. temperature and rainfall) and altitudinal variations. It has been investigated by many researchers that flowers of the plant are mainly rich in active constituents The content and nature of sesquiterpene lactones vary with altitude. The flowers collected from high-altitude healthlands contain principally helenalin esters while the flowers from lower altitude meadows contain dihydrohelenalin esters in large amount. In another study, the effect of ecological factors has been investigated on the content of sesquiterpene lactones in 10 German healthlands. Higher content of sesquiterpene lactones (0.59–1.10%) was found in the flower heads collected from the foothills of the Alps[8].

Therapeutical uses

Arnica is used topically for a wide range of conditions, including bruises, sprains, muscle aches, wound healing, superficial phlebitis, joint pain, inflammation from insect bites, and swelling from broken bones. More recent studies suggest it may also be helpful in the treatment of burns.

❖ **Pharmacology**

In this cream was very broad spectrum (effective against a wide range of organisms) activity for the skin disease, hemostasis, inflammation, proliferation, and remodeling.

- Hemostasis

The body stops bleeding by forming a clot, which usually takes a few minutes.

- Inflammatory

The body cleans and protects the wound, which usually takes 4-6 days. Neutrophils kill bacteria and release antimicrobial substances, while monocytes mature into macrophages that eat bacteria, dead neutrophils, and damaged tissue.

- Proliferation

The body rebuilds the wound with new tissue, which usually takes 4-24 days. Macrophages produce substances that cause the body to produce new tissue and blood vessels, and the wound edges slowly contract and move closer together.

- Maturation

The body strengthens the repair, which can take 2 to 5 weeks.

Factors that can prevent wounds from healing or slow the process include:

- Infection
- Diabetes

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- Poor blood flow
- Obesity
- Age
- Heavy alcohol use
- Insufficient proteins and calories

A healthy wound will have predominantly red tissue within the base, which means that healing is occurring, and that adequate blood flow and oxygen are being delivered. Excessive red color surrounding the wound may be an indication of infection (cellulitis).

❖ **Evaluation Test**

Physical test

In this test, the cream was observed for color, odor, texture, state[10] (table 3)

Spread Ability

The spreadability was expressed in terms of time in seconds taken by two slides to slip off from the cream, placed in between the slides, under certain load. Lesser the time taken for separation of the two slides better the spreadability. Two sets of glass slides of standard dimension were taken. Then one slide of suitable dimension was taken and the cream formulation was placed on that slide. Then other slide was placed on the top of the formulation. Then a weight or certain load was placed on the upper slide so that the cream between the two slides was pressed uniformly to form a thin layer. Then the weight was removed and excess of formulation adhering to the slides was scrapped off. The upper slide was allowed to slip off freely by the force of weight tied to it. The time taken by the upper slide to slip off was noted. Show in [10](table 6)

Spread ability= m × l/t

Where,

m= Standard weight which is tied to or placed over the upper slide (30g)

l= length of a glass slide (5 cm)

t= time taken in seconds.

Viscosity

Viscosity of cream was done by using Brooke field viscometer at the temp of 25°C.using spindle no, 63.at rpm. Show in (table 6)

Phase separation

The prepared cream was transferred in a suitable wide mouth container. Set aside for storage the oil phase and aqueous phase separation were visualizing after 24h. (table 6)

Determination of pH:

Take 0.5 g of cream and dispersed it in 50 ml distilled water. Then check it's pH by using digital pH meter Show in[11] (table 6)

Wash ability

A small amount of cream was applied on the hand and it is then washed with tap water show in[10] (table 6)

Irritancy

Mark the area (1 cm^2) on the left-hand . Then the cream was applied to that area and the time was noted. Then it is checked for irritancy, erythema, and edema. Show in [10](table 4)

Test for microbial growth in formulated Cream[12]:

The Formulated Creams were inoculated on the plates of agar media by streak plate method and a control was prepared by excluding the cream. The plates were placed into the incubator and are incubated at 37°C for 24 hours. After the incubation period, plates were taken out and checked for the microbial growth by comparing it with the control.Show in (Table: 5)

Result and Discussion

Formulated herbal cream was evaluated by various standard parameters and found acceptable in all limits. The colour was found greenish brown, semisolid consistency, easily washable with good extrudability. The pH, viscosity and spreadability of formulated herbal cream was found 6.8, 31869 and 22.8 respectively. There is no microbial growth and oil separation in prepared formulation. All the findings were reported in table

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- **Physical test**

Sr No	Parameter	Formulation
1.	Colour	Greenish brown
2.	Odor	unpleasant
3.	Texture	Smooth
4.	State	Semisolid

Table: 3

- **Irritancy**

Irritation	Erythema	Edema
Nil	Nil	Nil

Table:4

- **Test for microbial growth in formulated Cream:**





Microbial Growth	Nil

Table:5

- **Other test**

Sr No.	Test	Infareance
1.	**Spreadability**	22.8 g×cm/sec. in 10 min
2.	**Viscosity**	31869
3.	**Phase Separation**	Nil
4.	**Determination of pH**	6.8
5.	**Wash ability**	Easy washable

Table:6

Shivhare et al Asian Journal of Pharmaceutical Research and Development. 2020; 8(1): 73-78
ISSN: 2320-4850 [76] CODEN (USA): AJPRHS

CONCLUSION

Plants or chemical entities derived from plants need to be identified and formulated for treatment and management of wounds. In this direction, a number of herbal products are being investigated at present. Obtained findings collectively demonstrated that formulated herbal cream possesses wound healing activity and this justifies its use for treatment of wounds. The observed efficacy may possibly be attributed to the presence of different phytoconstituents found in the extracts which are known to contribute in the wound healing properties of these medicinal plants

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FORMULATION AND EVALUATION OF POMEGRANATE PEEL LOZENGES FOR MDR

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ABSTRACT

The pomegranate fruit's (Punica granatum) outer skin is the source of pomegranate peel extract (PPE). Thanks to its scientifically proven antibacterial, antioxidant, anticancer, antiulcer, and anti-inflammatory qualities, this extract has become more and more popular. This review concentrates on PPE's antibacterial efficacy against viruses, fungi, bacteria, and parasites that are resistant to many drugs. The serial dilution method and the cup plate method were used to test PSE's antibacterial activity. According to the findings, PPE exhibits a broad range of antibacterial properties against a variety of microorganisms, such as viruses (S. aureus, E. coli, K. pneumoniae, Salmonella, Salmonella enterica, P. aeruginosa, S. marcescens, Brucella spp., and R. glutinis), fungi, and mold (F. sambucinum, P. digitatum, Saccharomyces cerevisiae, Monilinialaxa, M. fructigena,B. coagulans, B. cereus, and B. subtilis).

KEY WORDS: *Pomegranate peel, Multi Drug Resistance, Antimicrobial Activity, Replica plate, Mutant Bacteria, Cytoplasmic membrane disruption.*

INTRODUCTION [1,2,3,4]

A condition known as multiple drug resistance, or multidrug resistance, makes it possible for an organism that causes disease to withstand various medications or chemicals with a broad range of structures and functions that are intended to destroy the organism. Antimicrobial resistance is an innate phenomenon resulting from genetic alterations in bacteria over time. Human activity, particularly the excessive and inappropriate use of antimicrobials for the treatment, prevention, or management of human diseases, accelerates the formation and spread of this resistance. Bacteria that have developed a resistance to specific medications are known as multidrug-resistant organisms, meaning that the bacteria can no longer be controlled or killed by the antibiotics.

Based on current projections, drug-resistant illnesses were directly responsible for 1.27 million fatalities worldwide in 2019.AMR was the cause of 297,000 fatalities in India in 2019.As per WHO estimates, illnesses resulting from bacteria resistant to drugs cause 700,000 deaths worldwide, with approximately 200,000 of those deaths occurring in neonates.
The Punicaceae family includes pomegranates (Punica granatum L.). The pomegranate fruit is composed of three components: the skins, juice, and seeds.

The pomegranate (Punica granatum L.) plant is one of the earliest plants that humans cultivated. originated in the Mediterranean region, Iran, India, and China. These days, North and South America, as well as tropical Africa, also farm it. Pomegranate fruits are eaten both raw and processed, primarily as juice. It is well known that the fruit and its peel contain high concentrations of several phytochemicals, such as tannins, flavonoids, and phenolic acids. Pomegranate by-products, in particular pomegranate peel extract (PPE), have drawn more attention recently because of their scientifically proven medicinal qualities, which include anti-inflammatory, anti-cancer, antibacterial, and antioxidant effects.

Pomegranate peels' many health benefits have led to their use as folk remedies since ancient times. Bioactive component levels in peels are generally higher than in edible portions. It is also important to remember that the complex bioactive components found in pomegranate peel frequently exist in mixtures, meaning that various physiological activities can be produced by the combined effects of distinct molecules.Peels from pomegranates are rich in many different compounds. Pomegranate peel extract has been found to

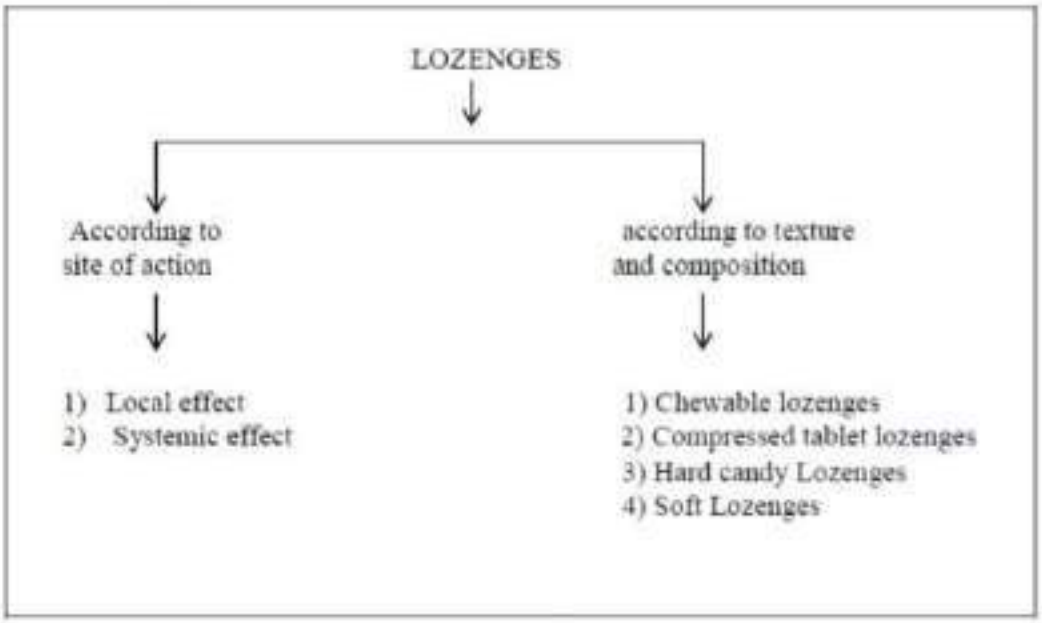
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contain a high concentration of bioactive substances, primarily flavonoids, hydrolysable tannins, and phenolic acids. Ellagic acid, gallic acid, caffeic acid, chlorogenic acid, syringic acid, ferulic acid, vanillic acid, p-coumaric acid, and cinnamic acid are the main phenolic acids found in pomegranate peel extract.

The peel colour was shown to be one of the primary factors determining the phenolic acid concentration; types with a deeper red colour were found to have a higher concentration of phenolic acids than those with lighter colures. Extracted pomegranate peel is a great source of flavonoids. Furthermore, PPEs are said to have abundant supplies of tannins. Nearly 49 different substances, mostly flavonoids, phenolic acids, and tannins.
The investigated microorganisms were actively and successfully inhibited from growing by pomegranate peel extract. Conversely, depending on the type of microbe, the inhibition zone varied from 9.6 to 25.7 mm. Antimicrobial phenolic chemicals have the ability to damage membrane proteins, disrupt the cytoplasmic membrane, break down the cell wall, and obstruct enzymes that are incorporated into the membrane, all of which can finally result in cell death.

CLASSIFICATION OF LOZENGES [5,6,7]

Lozenges are the flavoured medicated dosage form intended to be sucked and held in mouth or pharynx containing one or more medicaments usually in sweetened base.



According to site of action

- Different methods, such as the place of action, are used to classify lozenges into different types.
- Local effect: e.g. Antiseptic.
- Systemic effect: vitamin, Nicotine.

According to texture and composition

Chewable lozenges:are not intended to disintegrate gradually, but rather to be chewed. Usually composed of a blend of sugar, honey, and gum Arabic, they relieve sore throats, improve breathing, and offer additional health advantages. Chewy or caramel-based medicated lozenges are made of medication mixed into a base of caramel that is chewed rather than dissolved in the mouth.

Compressed tablet lozenges: The manufacture of lozenges containing a heat-sensitive active component is done using this method. These tablets are not like regular tablets in that they have delayed dissolving profiles, non-disintegrating properties, and organoleptic properties. To create a tougher tablet, substantial compression equipment is used in the production of the compressed tablet lozenge. It must gradually dissolve within the mouth. It is extremely uncommon to prepare lozenges using the tablet compression method.

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Hard Candy Lozenges: These are solid sugar syrup lozenges. Amorphous or glassy combinations of sugar, other carbohydrates, and herbal excipients are what these are. Hard candy lozenges should have a moisture content of 0.5 to 1.5% and a weight of 1.5 to 4.5g, respectively. Instead of disintegrating, these should dissolve gradually and uniformly over the course of five to ten minutes. Heat-labile ingredients cannot be added to hard candy lozenges since they require a high temperature to be prepared. The heating and congealing process was used to produce these pastilles. This firm lozenge syrup is used to treat mild irritation and painful throat symptoms.

Soft Lozenges: Because they are versatile and easy to prepare on the fly for a wide range of medications, soft lozenges have gained popularity. These soft, translucent lozenges are often made of gelatine, glycerol gelatine, or acacia sucrose as the substrate for the drug. It can be flavoured and coloured, and depending on the intended effect for a specific medicine integrated, it can be chewed or slowly dissolved in the mouth. In order to make lozenges, we can therefore also add a particular herbal excipient. They are composed on sugar-acacia basis including acacia and PEG 1000 or 1450.

List of Instruments and Equipments [10]

Following instrument and equipment were used in the work.

Sr no.	Equipment
1.	Digital weigh balance
2.	Hardness tester
3.	Disintegration apparatus
4.	Digital Friability test apparatus
5.	Incubator
6.	Autoclave

Material and Method

- **Material**[8,9]

Pomegranate peel extract, Candy sugar, Corn starch, Lactose, Mannitol, Talc and Peppermint oil

- **Method of preparation of Hard candy lozenges**[11,12]

Measure the raw material.

⇩

Sugar is pulverized by mechanical agitator to fine powder and passes through 40-80 mesh size.

⇩

Combine sugar, corn starch and water by heating.

⇩

Addition of drugs to this candy matrix.

⇩

The temperature required for the preparation is usually high hence the heat sensitive ingredient cannot be incorporated into them.

⇩

Addition of polymer, colour, flavour, etc.

⇩

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Continue agitating the mixture and add the required amount of peppermint oil drop by drop.

⇩

Keep the mould ready.

⇩

Poured into mould of desired shape and size to form a candy.

⇩

Until it becomes harder, keep it at room temperature.

⇩

Sealing and wrapping of candy in polyethylene wrapping.

- **Microbial evaluation of pomegranate peel powder[13]**

Replica plate method

To mount the piece of sterile velvet, stretch it onto a cylindrical metal block slightly smaller than the Petri dish. Place the block with the velvet side facing up. Turn the Petri dish over with the lawn of bacteria (master plate) gently pressed against the velvet. The number of projecting fibres of the velvet (roughly 1000/sq. Inch) act like inoculating needles sampling each clone of the cell in the lawn. Remove the Petri dish Press two or more Phage coated Agar against the Velvet in turn. Save original master plate. Incubate Phage Coated Plates. A few colonies appear on Phage Coated Plate. Some of these colonies may represent mutations that occurred during the cell division that occurred following replica plating. Colonies found at the same positions on each replica plate can be assumed to have arisen from the inoculum of Phage resistant ones transferred through the velvet from the Phage resistant clone on master plate.



Fig : Agar plate with antibiotic

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Formulation Table[14]

Sr no.	Materials	Quantity
1.	Pomegranate peel extract	0.04 gm
2.	Candy Sugar	1.23 gm
3.	Corn Starch	0.2 gm
4.	Maltose	0.2 gm
5.	Mannitol	0.2 gm
6.	Talc	0.2 gm
7.	Peppermint Oil	q.s.

Rationale

Reason behind developing herbal formulation is to get the lesser side effect and can have multiple benefits.
1.27 million fatalities worldwide in 2019 were directly linked to drug-resistant illnesses, according to current estimates.
In India in 2019, there were 2,97,000 deaths attributable to drug resistant.
Now a days the use of antibiotic is very common so, the resistance is frequently developed due to low immunity, especially in children.
Antibiotic resistance is a public health threat of almost importance, especially when it comes to children.
According to WHO data, infections caused by multidrug resistant bacteria produce 7,00,000 deaths across all ages, of which around 2,00,000 are children.
The problematic overuse and misuse of antibiotics for wrong diagnosis and indications or at wrong dosage leads to the resistance.
To prevent this problem, we formulate the lozenges of pomegranate peel extract which is actively effective against MDR.
A substantial amount of phenolic components, including flavonoids (anthocyanins and catechins), hydrolysable tannins (punicalin, punicalagin, ellagic acid, and gallic acid), and tannins, are present in pomegranate peel extract and are what give it its biological action.
These substances have the potential to cause cell death by damaging membrane proteins, rupturing the cytoplasmic membrane, destroying the cell wall, and interfering with enzymes that are integrated into the membrane.
These lozenges help to prevent the development of mutant bacteria against antibiotic drug.
It will also help to improve the efficacy of antibiotic drug.
It enhances immunity in children and also having many health benefits.

Pre formulation Studies [15,16,17]

An examination of the physical and chemical characteristics of the drug material both by itself and in combination with excipients is known as a preformulation study. Preformulation testing overarching goal is to produce data that will assist the formulator in creating a stable, bioavailable dosage form that can be mass manufactured. The preformulation parameters that are frequently studied are the Hausner ratio, Carr's compressibility index, bulk density, tapped density, pour density, and angle of repose.

Bulk Density

Unless otherwise instructed, pass through a 1.00 mm (no.18) screen a sufficient amount of material to finish the test in order to break up any agglomerates that may have formed during storage. Enter around 100 g of the test sample (M), which was precisely weighed to within 0.1% of its capacity, into a dry 250 ml cylinder without compacting it. The amount of the test sample and the cylinder's volume may be changed if using 100 g is not feasible. Choose a sample mass that has a 150–250 ml apparent untapped volume. For apparent volumes ranging from 50 to 100 ml, a 100 ml cylinder is utilized. Carefully fill the cylinder. Level the powder carefully, taking care not to compact it, and measure the unsettled apparent volume (Vo). Utilizing the following formula, find the bulk density in g/ml:

Bulk Density = Sample Weight / Sample Volume.

Tapped Density

A measured amount of powder is added to a measuring cylinder with precision. Use an appropriate mechanical tapped density tester to mechanically tap the sample-containing cylinder by elevating it and letting it fall under its own weight at a nominal rate of 300 drops/min. After 500 taps on the cylinder, calculate the tapped volume (Va). After 750 more tapings, repeat the process and measure the tapped volume once more as (Vb).

Vb is the final tapped volume (Vf) if there is a less than 2% difference between Va and Vb. The following calculation can be used to determine the tapped density if there is a greater change after 1,250 more tapings (United States Pharmacopoeia, 2004).

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Tapped Density = Weight of sample / Tapped Volume of Sample

Hausner's ratio (H)

By calculating the ratio of tapped density (TD) to bulk density (BD), one may express the flow parameters of the powder. Equation following is used to compute it:

Hausner's ratio = Tapped density/Bulk density

Carr's index

Using Carr's compressibility index, the compressibility index of granules can be calculated using the following formula:

Carr's index (%) = Tapped density - Bulk density/Tapped density x 100

Angle of repose

A powder is let to freely fall onto a surface and pass through a funnel to ascertain it. As soon as the pile reaches the funnel's tip, more powder is not added. Without upsetting the pile, a circle is drawn around it. The resulting cone's height and diameter are measured. After three iterations of the identical process, the average value is determined. Equation for calculating angle of repose is as follows:

Tan ɵ = h/r

Where, h = Height of the powder cone

r = Radius of the powder

Results of Preformulation Study

Sr. No.	Parameter	Observation
1	Organoleptic Characteristics a. Colour b. Odor c. Taste d. Texture e. Shape	 Brown Odorless Sweet Smooth Spherical
2	Bulk Density	0.4 gm/ml
3	Tapped Density	0.5 gm/ml
4	Hausner's Ratio	1.25 %
5	Carr's Index	20 %
6	Angle of Repose	39.99
7	Ash Value	0.56 %

Evaluation of Herbal Lozenges[18,19,20]

1. **Organoleptic parameters**: Organoleptic characteristics of manufactured hard candy lozenges containing pomegranate peel extract were assessed by hand.
2. **Diameter and Thickness**: A vernier caliper was used to measure the thickness and diameter. The dimensions of the hard candy lozenges play a crucial role in their production. After selecting the three lozenges at random from the formulation, the diameter and thickness were measured.
3. **Hardness:** Ten hard lozenges were tested for hardness using a Monsanto hardness tester. A computed and reported mean and standard deviation were obtained. It has the unit of kg/cm3.
4. **Weight Variation Test:** Following a random selection of twenty lozenges from the formulation, each lozenge was weighed separately. If no more than two of the individual lozenge weights differ from the average weight by a greater percentage than the IP limitations indicated in the table, the batch passes the weight variation test.
   % Weight Variation = Initial weight – Average weight / Average weight x 100
5. **Friability Test:** Roche Friabilator was utilized to ascertain friability. All of the friabilator's parameters were established after ten lozenges were weighed and put inside. For four minutes, the device was turned at a speed of 25 rpm. The lozenges were taken out and weighed once again following the revolution. Samples with a maximum mean weight decrease of 1.0% are not allowed.
   % Friability = Initial weight - Final weight / Initial weight x 100
6. **Mouth Dissolving Time:** The USP disintegration device was utilized to ascertain the duration required for the lozenges to dissolve entirely.

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Result of the evaluation parameters of lozenges are given below

Sr. No.	Parameters	Observation
1	Organoleptic Characteristics a. Colour b. Odor c. Taste d. Texture e. Shape	 Brown Odorless Sweet Smooth Oval
2	Diameter	16.1 mm
3	Thickness	7.5 mm
4	Hardness	9.5 kg/cm^3
5	Weight Variation Test	$\pm$ 0.48 – 0.97 %
6	Friability	0.3 %
7	Mouth Dissolving time	9 min

Phytochemical Evaluation of Extract [21]

Test for phytochemicals	Chemical test	Result
Alkaloids	Dragendorff's Test	+
	Mayer's Test	+
	Hager's Test	+
	Wagner's Test	+
Tannins and phenolic compounds	Ferric Chloride Test	+
	Lead Acetate Test	+
Flavonoids	Ferric Chloride Test	-
	Alkaline Test	-
Saponins	Foam Test	+
Carbohydrate	Molisch's Test	-
	Benedict's Test	-
Anthraquinone glycosides	Borntrager's Test	+
Protein	Biuret Test	-
Amino acid	Ninhydrin Test	-
Glycoside	Killer Killani Test	-
Steroid	Salkowski Test	+

CONCLUSION

The text discusses the issue of multidrug resistance in diseases, particularly focusing on bacteria and highlights the antibacterial activity of pomegranate peel against multidrug-resistant bacteria.It also delves into the scientific classification, chemistry and uses of pomegranate peel. Additionally, it provides an overview of lozenges as a dosage form, their advantages, disadvantages, classification and method of preparation. The objective is to explore the potential health benefits of herbal lozenges.

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FORMULATING AND EVALUATION OF HERBAL CREAM CONTAINING ANTIMICROBIAL PROPERTIES OF METHANOLIC EXTRACT OF TAMARINDUS INDICA SEEDS

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ABSTRACT

The demand for natural and herbal-based skincare products has been on the rise due to concerns over synthetic ingredients and their potential side effects. This study aimed to formulate and evaluate a herbal cream using the antimicrobial properties of the methanol extract of Tamarindus indica seeds.

The methanol extract of Tamarindus indica seeds was obtained using standard extraction methods and incorporated into a cream base. Various physicochemical properties, including pH, viscosity, spreadability, and stability, were evaluated. The antimicrobial activity of the formulated cream was assessed against a range of pathogenic microorganisms using agar well diffusion and minimum inhibitory concentration (MIC) methods.

The formulated herbal cream demonstrated satisfactory physicochemical properties, with a pH suitable for skin application and good spreadability. The cream exhibited significant antimicrobial activity against both Gram-positive and Gram-negative bacteria, as well as fungi. The MIC values indicated the potent antimicrobial efficacy of the Tamarindus indica seed extract in the cream formulation.

KEYWORDS: *Tamarindus indica seed, Methanol extract, Antimicrobial properties, Agar well diffusion, Broth microdilution*

INTRODUCTION

In recent years, the search for natural and sustainable antimicrobial agents has gained significant attention due to the emergence of antibiotic-resistant pathogens and the potential adverse effects associated with synthetic antimicrobial compounds. Herbal extracts have been traditionally used in various cultures for their therapeutic properties, including antimicrobial activity. Tamarindus indica, commonly known as tamarind, is a tropical tree whose seeds have been reported to possess a range of pharmacological activities, including antimicrobial properties.[1]

The seeds of Tamarindus indica contain various bioactive compounds such as flavonoids, alkaloids, and phenolic compounds, which have been suggested to exhibit antimicrobial activity against a broad spectrum of microorganisms. Among the different extraction solvents, methanol has been widely used for extracting bioactive compounds from plant materials due to its ability to efficiently solubilize a diverse range of phytochemicals.[2]

This study aims to formulate a herbal cream containing the methanol extract of Tamarindus indica seeds and evaluate its antimicrobial efficacy against selected microbial strains. The formulation of the herbal cream will involve optimizing the concentration of the methanol extract to ensure maximum antimicrobial activity while maintaining the stability and safety of the cream. The antimicrobial activity of the formulated cream will be assessed using standard microbiological methods, and the results will be compared with those of commercially available antimicrobial creams.[3]

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The findings of this study could contribute to the development of natural and sustainable alternatives to synthetic antimicrobial agents, potentially offering a safe and effective treatment option for various microbial infections.[4]

Manufacturing and processing the cold cream for antimicrobial use

Ingredients and material

1. Tamarind seed extract
   - Collect tamarind seed of specified variety
   - Wash thoroughly to remove contaminats
   - Dry the tamarind seed and taturates make fine poweder of tamarind seed
2. Petroleum ether :
   - Choose pharmaceutical grade petroleum ether
   - Measure the required quantity to help for the extraction process .
3. Water :
   - Use distilled water for consistency and to avoid impurities
   - Also use water for the extraction process

Laboratory Equipment

Reagent bottle , measuring cylinder , morter pestle , ph meter , UV visible spectroscopy , whatmaan filter paper , maceration , percolation . etc .

Formulation process

1.Extraction of active compounds from tamarind seed :
- use a suitable solvents (e.g. Ethanol , water)

2. preparation of tamarind seed extract :

Procedure :

1. Air dried seeds (16.71gm) were finely ground and soaked in petroleum ether 5 ml per day at room temperature for 3 days
2. Add 5ml per day petroleum ether and water in the sample for 10days
3. After sample taturated and filtered out through the vaccum filter
4. Check the wavelength of the extract under the UV spectroscopy

3.Preparation of cold cream :

Procedure :

- Phase 1 :
  melt the solid ingredients by heat and add all oils mixture.

- Phase 2 :
  Dissolve borax in water with the help of heat

Add phase 1 into phase 2 with constant stirring to the wax and oil mixture continue process for 5 min .

Formula

SR. NO	Ingredients	QTY Taken (100 ml)	Category
1	Tamarind seed extract	4 ml	Antimicrobial
2	Beeswax	15 gm	Base
3	Borax	0.50 gm	Emulsifying agent
4	Tween 80	Q. S	Emulsifying agent
5	Mint oil	20 ml	Perfumery

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Uses:



Fig. Tamarind seed

A herbal cream containing antimicrobial properties from the methanol extract of Tamarindus indica seeds can have various uses, including:

1. Topical Antimicrobial Treatment: The cream can be applied to the skin to treat various microbial infections such as bacterial and fungal skin infections, including acne, dermatitis, and athlete's foot.
2. Wound Healing: The antimicrobial properties of the cream can help prevent infections in wounds and promote faster healing.
3. Skin Care: The cream can be used as a part of daily skincare routine to maintain healthy skin, prevent microbial infections, and alleviate skin conditions like inflammation and itching.[5]
4. Foot Care: Due to its antifungal properties, the cream can be beneficial for foot care, particularly in preventing and treating fungal infections such as athlete's foot.
5. Hygiene: The cream can be used as a hygiene product to inhibit the growth of harmful microbes on the skin, particularly in situations where hygiene is compromised.[6]
6. Natural Alternative: For individuals preferring natural remedies, the herbal cream provides a natural alternative to synthetic antimicrobial creams.
7. Supportive Care: It can be used as a supportive care option in conjunction with other treatments for microbial infections, enhancing their effectiveness and providing additional benefits.[7]

Before using the cream, it's advisable to perform a patch test to check for any allergic reactions or sensitivities. Additionally, consulting a healthcare professional for specific conditions or concerns is recommended.

Mechanism of action

The antimicrobial properties of Tamarindus indica seeds, specifically in the context of their methanol extract, can be attributed to several mechanisms of action:

1. Disruption of Cell Membrane: Compounds within the extract may disrupt the integrity of microbial cell membranes, leading to leakage of cellular contents and eventual cell death.
2. This disrupts the essential functions of the microorganism, inhibiting its growth and proliferation.
3. Interference with Metabolic Pathways: Active compounds in the extract may interfere with microbial metabolic pathways, disrupting processes vital for the survival and reproduction of microorganisms. This can include inhibition of enzyme activity or interference with essential cellular processes, leading to microbial inhibition.
4. Damage to DNA/RNA: Some components of the extract may induce damage to microbial nucleic acids, including DNA and RNA, thereby impairing replication, transcription, and translation processes. This leads to the inability of the microorganism to proliferate and survive.

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5. Generation of Reactive Oxygen Species (ROS): Certain constituents of the extract may stimulate the generation of reactive oxygen species within microbial cells. ROS can cause oxidative damage to cellular components, including proteins, lipids, and nucleic acids, ultimately leading to cell death.
6. Modulation of Microbial Biofilms: The extract may interfere with the formation and stability of microbial biofilms, which are protective structures formed by microorganisms. By disrupting biofilm formation or enhancing biofilm dispersal, the extract can render microorganisms more susceptible to antimicrobial agents and immune responses.
7. Enhancement of Immune Response: Some compounds in the extract may possess immunomodulatory properties, stimulating the host immune system to recognize and eliminate microbial pathogens more effectively.

These mechanisms collectively contribute to the antimicrobial efficacy of the methanol extract of Tamarindus indica seeds, making it a promising candidate for use in herbal cream formulations targeting microbial infections.[8]

Application

The application of a herbal cream containing the antimicrobial properties of the methanol extract of Tamarindus indica seeds involves the following steps:

1. Cleanse the Skin: Start by cleansing the skin thoroughly with a mild soap and water. Pat the skin dry with a clean towel before applying the cream.
2. Take a Small Amount: Dispense a small amount of the herbal cream onto your fingertips. You typically only need a pea-sized amount for a small area, but adjust according to the size of the affected area.
3. Apply Gently: Use your fingertips to gently spread the cream over the affected area. Massage it into the skin using circular motions until it is evenly distributed.[9]
4. Cover if Necessary: If directed by a healthcare professional or if the condition requires it, cover the treated area with a sterile bandage or dressing to protect it and promote absorption of the cream.
5. Frequency of ApplicationFollow the recommended frequency of application provided with the cream. This could range from once daily to multiple times per day, depending on the severity of the condition.
6. Continue Use: Consistently apply the cream as directed, even if symptoms improve. Complete the full course of treatment unless otherwise instructed by a healthcare professional.
7. Monitor for Side Effects: Keep an eye out for any signs of skin irritation, allergic reactions, or other adverse effects. If any occur, discontinue use and consult a healthcare professional.
8. Store Properly: Store the herbal cream according to the instructions on the packaging. This typically involves keeping it in a cool, dry place away from direct sunlight and heat.

By following these steps, you can effectively apply the herbal cream to harness its antimicrobial properties for various skin conditions.[10]

Pharmacolgy

In pharmacology, understanding the pharmacodynamics and pharmacokinetics of the methanol extract of Tamarindus indica seeds is crucial for assessing its efficacy, safety, and potential interactions. Here's a brief overview:

1. Pharmacodynamics: This involves studying how the methanol extract interacts with microbial targets to exert its antimicrobial effects. Key aspects include:
   - Mechanism of action: As discussed earlier, the extract may disrupt microbial cell membranes, interfere with metabolic pathways, induce DNA/RNA damage, generate reactive oxygen species, and modulate microbial biofilms.
   - Spectrum of activity: Assessing which microorganisms are susceptible to the extract's antimicrobial effects, including bacteria, fungi, and other pathogens.
   - Concentration-response relationships: Determining the concentration of the extract needed to inhibit microbial growth or kill pathogens effectively.
   - Time-course effects: Understanding how quickly the extract acts and how long its effects last once applied or administered.
2. Pharmacokinetics: This involves studying the absorption, distribution, metabolism, and excretion (ADME) of the active compounds in the extract within the body. Key considerations include:
   - Absorption: How the active compounds are absorbed into the bloodstream or through the skin upon topical application.
   - Distribution: How the compounds are distributed to target sites within the body or the skin.
   - Metabolism: How the compounds are metabolized by enzymes in the body, potentially affecting their bioavailability and activity.
   - Excretion: How the compounds are eliminated from the body, whether through urine, feces, sweat, or other routes.[11]
3. Safety and Toxicology: Evaluating the safety profile of the extract, including:
   - Acute and chronic toxicity: Assessing the potential for adverse effects from short-term or long-term exposure to the extract.
   - Skin irritation and sensitization: Determining whether the extract causes irritation or allergic reactions when applied topically.

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- Systemic effects: Monitoring for any systemic effects or interactions with other medications or substances.

4. Interactions: Investigating potential interactions between the extract and other drugs or herbal products, both pharmacodynamic and pharmacokinetic in nature.[12]
5. Dose Optimization: Determining the optimal dose and dosing regimen based on pharmacokinetic and pharmacodynamic data, balancing efficacy with safety considerations.

Overall, a comprehensive understanding of the pharmacology of the methanol extract of Tamarindus indica seeds is essential for its effective and safe use in herbal cream formulations with antimicrobial properties.[13]

Chemical Constituents

The methanol extract of Tamarindus indica seeds contains various chemical constituents that contribute to its antimicrobial properties. Some of the key constituents include:

1. Polyphenols: Tamarind seeds are rich in polyphenolic compounds such as flavonoids and phenolic acids. These compounds have antioxidant and antimicrobial properties and may contribute to the extract's effectiveness against microorganisms.
2. Tannins: Tannins are polyphenolic compounds with astringent properties found in Tamarindus indica seeds. They have been reported to possess antimicrobial activity against a wide range of bacteria and fungi.
3. Saponins: Tamarind seeds contain saponins, which are glycosides with surfactant properties. Saponins have been shown to exhibit antimicrobial activity by disrupting microbial cell membranes.
4. Alkaloids: Some alkaloids have been identified in Tamarindus indica seeds. While their specific antimicrobial properties may vary, certain alkaloids have been reported to exhibit antibacterial and antifungal activities.[14]
5. Phytosterols: Phytosterols are plant-derived compounds structurally similar to cholesterol. They have been reported to possess antimicrobial properties and may contribute to the overall antimicrobial efficacy of the extract.
6. Polysaccharides: Tamarind seeds contain polysaccharides such as galactoxyloglucan, which have been studied for their potential antimicrobial activities. These polysaccharides may help inhibit the growth of microorganisms by interfering with their cellular processes.
7. Fatty Acids: Tamarind seeds contain fatty acids, including both saturated and unsaturated fatty acids. While fatty acids themselves may not exhibit direct antimicrobial activity, they can contribute to the overall composition and properties of the extract.[15]

These chemical constituents work synergistically to exert antimicrobial effects against a wide range of microorganisms, making the methanol extract of Tamarindus indica seeds a promising natural source for antimicrobial applications, including in herbal cream formulations.

Taxonomic Information

Tamarindus indica, commonly known as tamarind, belongs to the plant family Fabaceae, which is also known as the legume, pea, or bean family. Here's some taxonomic information about Tamarindus indica:

- **Kingdom**: Plantae
- **Phylum**: Angiosperms (flowering plants)
- **Class:** Eudicots
- **Order:** Fabales
- **Family:** Fabaceae
- **Genus:** Tamarindus
- **Species:** Tamarindus indica

Tamarindus indica is a tropical tree native to Africa but is cultivated and naturalized in various tropical regions around the world, including parts of Asia and the Americas. It is widely known for its edible fruit, which is used in culinary applications and traditional medicine. Additionally, various parts of the Tamarindus indica tree, including the seeds, bark, and leaves, are utilized for their medicinal and therapeutic properties.[16]

Therapeutic

The methanol extract of Tamarindus indica seeds has several therapeutic applications, primarily due to its antimicrobial properties and other bioactive constituents. Some therapeutic uses include:

1. Antimicrobial Activity: The extract has demonstrated efficacy against various microorganisms, including bacteria, fungi, and viruses. It can be used topically to treat skin infections such as acne, dermatitis, fungal infections, and wounds.
2. Anti-inflammatory Effects: Certain constituents in the extract exhibit anti-inflammatory properties, which can help alleviate symptoms associated with inflammatory skin conditions like eczema, psoriasis, and allergic reactions.

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3. Wound Healing: The antimicrobial and anti-inflammatory properties of the extract contribute to its ability to promote wound healing. It can help prevent infections in wounds and facilitate tissue repair and regeneration.
4. Antioxidant Activity: Polyphenolic compounds in the extract possess antioxidant properties, scavenging free radicals and reducing oxidative stress. This can benefit overall skin health and may have anti-aging effects.[17]
5. Immunomodulatory Effects: Some constituents of the extract have been reported to modulate the immune response, potentially enhancing the body's ability to fight infections and promote healing.
6. Analgesic Effects: The extract may have mild analgesic properties, providing relief from pain and discomfort associated with skin conditions or wounds.
7. Hydrating and Moisturizing: Certain components of the extract can help hydrate and moisturize the skin, improving its overall texture and preventing dryness and irritation.
8. Skin Lightening: Tamarindus indica seed extract has been investigated for its potential to inhibit melanin production, making it useful in cosmetic formulations aimed at reducing hyperpigmentation and promoting a more even skin tone.
9. UV Protection: Some studies suggest that the extract may offer protection against UV-induced skin damage, although further research is needed to fully elucidate its photoprotective effects.
These therapeutic properties make the methanol extract of Tamarindus indica seeds a valuable ingredient in herbal creams and skincare products targeting various skin conditions and promoting overall skin health. However, it's essential to consult a healthcare professional or dermatologist before using any herbal remedies, especially for chronic or severe skin conditions.[18]

Traditional knowledge

Traditional knowledge regarding Tamarindus indica encompasses a wide range of uses and practices across different cultures. Here are some examples of traditional knowledge associated with tamarind:
1. Culinary Use: Tamarind is widely used as a culinary ingredient in many cuisines around the world. Its sour taste adds flavor to dishes such as curries, chutneys, sauces, soups, and beverages. In some cultures, tamarind is also used to make candies and snacks.
2.Medicinal Use: In traditional medicine systems such as Ayurveda, Traditional Chinese Medicine (TCM), and various indigenous healing practices, different parts of the tamarind tree, including the fruit, seeds, leaves, and bark, are used for their medicinal properties. Tamarind is believed to have digestive, laxative, anti-inflammatory, antimicrobial, and antioxidant properties. It is used to treat various ailments such as digestive disorders, fever, sore throat, skin conditions, and more.
3.Oral Health: In some cultures, tamarind is used for oral hygiene. Chewing on tamarind pulp or using tamarind-based toothpaste is believed to help maintain oral health, prevent gum disease, and freshen breath.[19]
4.Textile Industry: Tamarind seeds contain a sticky pulp that can be used as a mordant in the textile industry to fix dyes to fabrics. Tamarind seed powder is also used as a sizing agent in textile sizing processes.
5. Construction: Tamarind wood is known for its durability and resistance to termites, making it suitable for construction purposes such as making furniture, doors, windows, and other wooden structures.
6. Cultural and Religious Significance: Tamarind trees are sometimes considered sacred and are planted near temples, shrines, and religious sites. The fruit and leaves may also have symbolic significance in certain cultural and religious ceremonies.[20]
7.Household Uses: Tamarind pulp is used as a natural cleaning agent due to its acidic properties. It can be used to clean copper, brass, and other metal surfaces.
8. Veterinary Medicine: Tamarind extracts are sometimes used in traditional veterinary medicine to treat livestock ailments such as digestive disorders and skin infections.
Overall, tamarind has a rich history of traditional knowledge and diverse uses across various aspects of human life, including food, medicine, industry, and culture.[21]

Quality Control

1.pH measurement :
- Check the the pH of the formulation to ensure it is suitable for oral use .

2.Stability testing :
- store samples in cool condition .

3.Texture and consistency testing :
- Evaluate the texture and consistency of the cold cream to ensure a comfortable application .

4.Antimicrobial activity study :
In this study we check the antimicrobial activity using a agar medium plate formation method we check the microbial growth are increasing or decreasing .[22]

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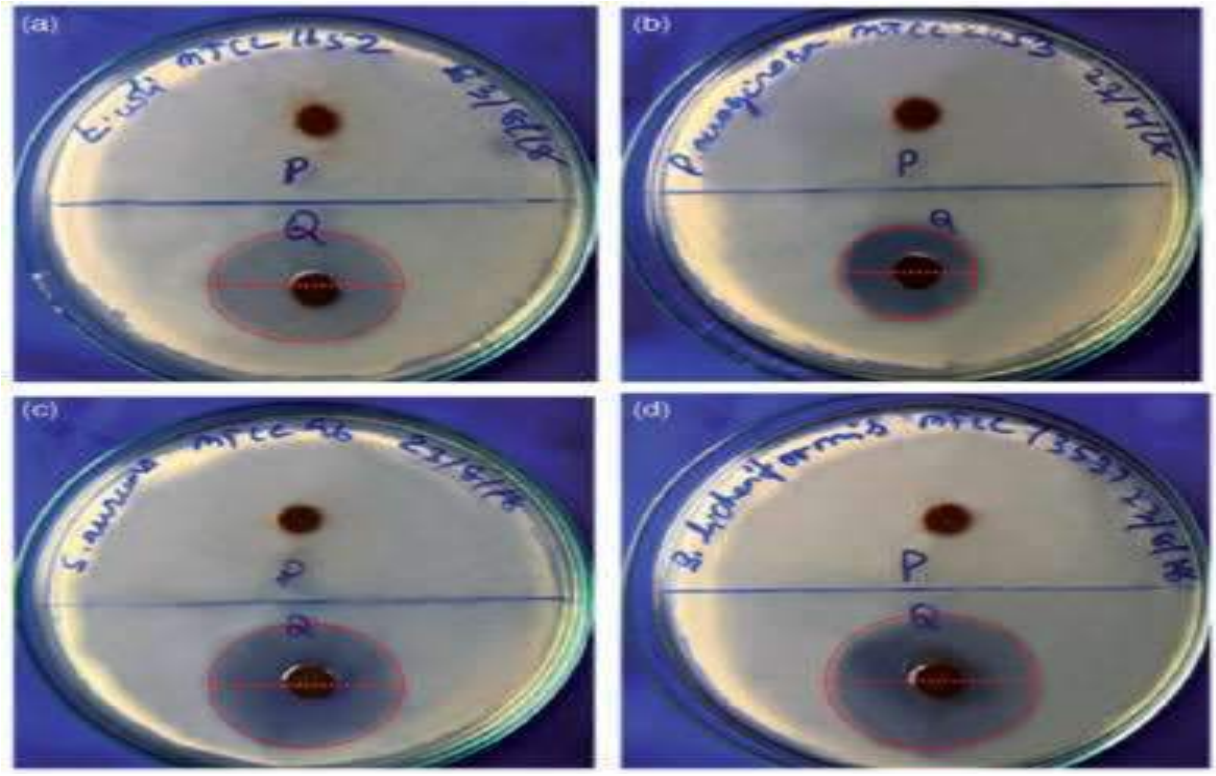


Fig : To check the antimicrobial activity using a different bacteria

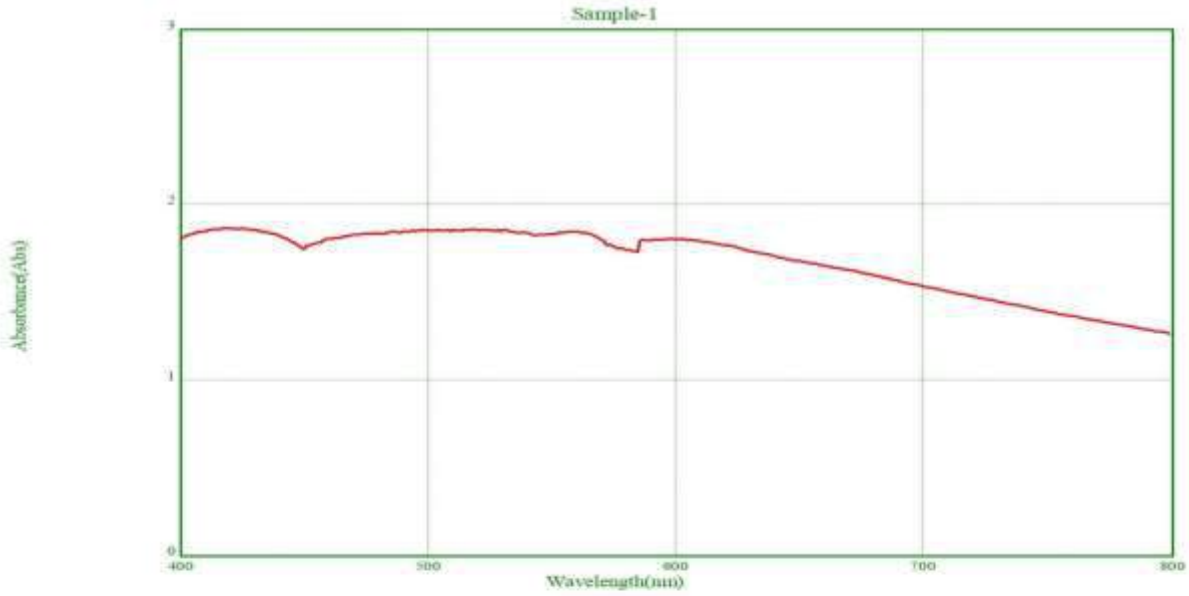
Result , Observation , And Evaluative steps

SR.NO	1) Physical Test	2) Sensory Test
1 2 3 4	Appearance - smooth texture Colour – yellowish Texture – smooth Consistency – semi solid	 Odour – Refreshing odour Irritancy – No irritation and edema found
Sr . no	**3) Chemical Test**	**4) Stability Testing**
1 2 3 4	pH – 4 to 6.7 Phenolic – present Flavonoids – Present Caffeic – Moderate	Temperature – Room temperature(25°c) and below Storage Duration – Stable for upto 12 months when stored in cool & dry place

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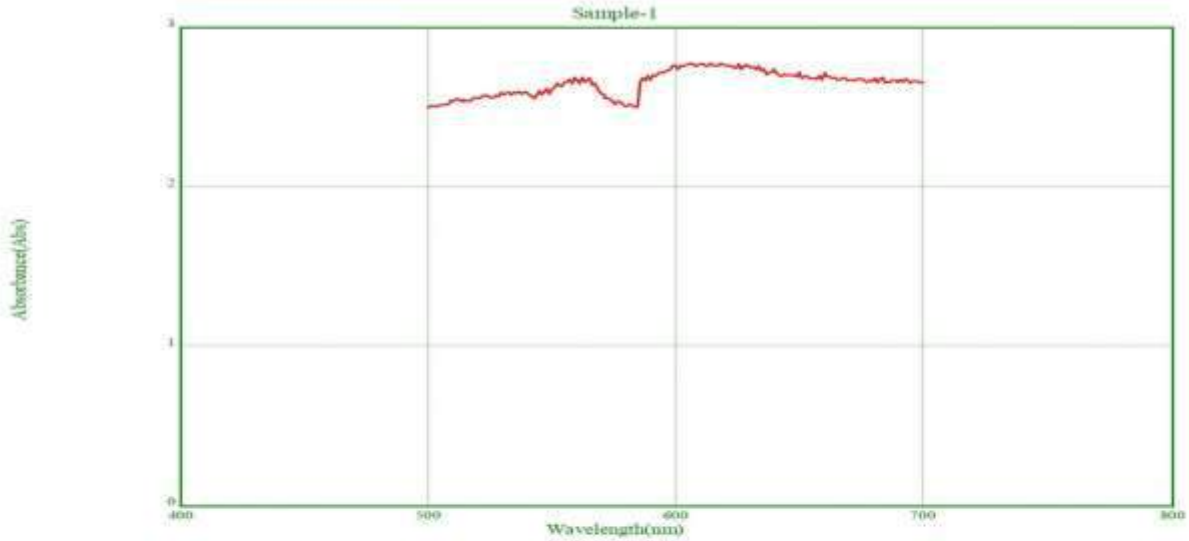
1.UV Frequency λmax (Absorbance) Absorbance Vs Wavelength :

- Sample 1:



Scan Range:400.0-800.0nm
Scan Step: 1.0nm
Scan Filter: 49
Scan Time: March 28 15:38:51 2024

- Sample2 :



Scan Range:500.0-700.0nm
Scan Step: 1.0nm
Scan Filter: 49
Scan Time: March 21 15:14:04 2024

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- **Conclusion on cold cream**
- In conclusion, Tamarindus indica, commonly known as tamarind, is a versatile plant with a wide range of uses and significance across different cultures and industries. Its edible fruit, medicinal properties, durable wood, and cultural symbolism make it an integral part of many societies around the world. From culinary applications to traditional medicine, textile production, and beyond, tamarind plays a multifaceted role in human life.
- Furthermore, ongoing research continues to uncover new insights into the biochemical composition and therapeutic potential of tamarind, particularly in areas such as antimicrobial activity, antioxidant effects, and oral health. This traditional knowledge, combined with modern scientific understanding, highlights the value of tamarind as a valuable resource for both traditional and contemporary applications.
- Overall, tamarind stands as a testament to the enduring relationship between humans and plants, demonstrating how traditional knowledge, cultural practices, and scientific advan

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IMPACT OF DESIGN, INFORMATION AND USEFULNESS OF TRAVEL WEBSITE ON TRAVEL PURCHASE INTENTION

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ABSTRACT

This study explores the impact of design, information, and usefulness of travel websites on travel purchase intention. Utilizing a quantitative research design, data from 177 respondents were collected via a structured questionnaire administered through Google Forms. Regression analysis revealed that design, information, and usefulness significantly and positively influenced travel purchase intention ($p < .001$), with each predictor variable exhibiting a substantial effect on travel purchase decisions (design: $\beta = .748$, information: $\beta = .749$, usefulness: $\beta = .753$). These findings corroborate existing research emphasizing the importance of website design, information quality, and usefulness in shaping consumer purchase intention in the online travel domain. For instance, Kim & Lennon, (2008) found that visually appealing design positively influences purchase intention, while Ruiz Mafé & Sanz Blas, (2006) demonstrated the significant impact of informative content on purchase intention, aligning with the positive coefficients observed in this study.

KEYWORDS- *Travel website design, Information and usefulness of travel website and travel purchase intention*

INTRODUCTION

In the digital age, the emergence and evolution of travel websites has changed the way people plan and book their vacations. These internet platforms help consumers navigate the huge assortment of travel possibilities available to them. Understanding the impact of travel websites on travel purchase decisions is critical for firms in the travel industry looking to effectively engage with customers and optimize their online presence. Travel websites include online travel agencies, booking aggregators, destination guides, and travel blogs. These platforms provide users with detailed information about destinations, lodgings, transit alternatives, activities, and travel-related services. Consumers may easily study, compare, and book travel products and services because these resources are accessible from any internet-enabled device (Buhalis & Law, 2008). The impact of travel websites on travel purchases is varied and impacted by a variety of factors. Firstly, the design and user experience of travel websites have a significant impact on consumer perceptions and behaviors. According to research, visually appealing and user-friendly website designs increase user engagement and trust, ultimately leading to higher purchase intentions (Li and Hitt, 2008). Furthermore, the availability of interactive tools like search filters, maps, and user reviews improves the user experience and allows for more informed decision-making (Xiang & Gretzel, 2010Second, the quality and accuracy of information available on travel websites have a huge impact on consumers' confidence and trust in the platform. According to studies, while making purchasing decisions, consumers seek extensive and credible information on destinations, lodgings, and travel-related services (Wen, 2009). Websites with thorough explanations, high-resolution photos, and user-generated material improve the browsing experience and build user trust. Furthermore, the utility of travel websites in aiding the planning and booking process influences consumer purchasing decisions. According to Chen and Dubinsky (2003), travel websites are seen as having greater utility when they offer features like price comparison tools, real-time availability, and personalized recommendations. Consumers are more likely to make a purchase if they believe the website is a good resource that simplifies trip planning and booking. Industry trends and customer behavior both show that people are relying more and more on travel websites for booking and planning purposes. Online travel companies and travel websites rank among the most widely used platforms for travel planning and research, per a survey (Toh, DeKay & Raven, 2011). This tendency is further reinforced by the expanding worldwide online travel booking market, which is expected to reach $817.5 billion by 2023 (Polat, Esen, & Bilgic, 2019). Businesses in the travel industry must recognize the importance of optimizing their online presence and leveraging the influence of travel websites to effectively engage with consumers and drive purchase conversions.

This study is noteworthy because it explores how important travel websites are in influencing consumers' decisions to buy trips. To effectively engage with consumers in the competitive travel industry and improve their online presence, firms must comprehend the ways in which design, information quality, and usefulness impact consumer behavior. The study intends to offer insights into

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improving user experience and boosting purchase conversions on travel websites by examining these parameters. Although travel websites are increasingly used for booking and planning, little is known about how certain elements like usability, design, and information quality affect consumers' intents to make purchases. This study aims to fill this gap by investigating the impact of these characteristics on customer behavior in the context of travel website use. This study aims to explore the impact of travel website design, information quality, and usefulness on consumer purchase intentions in order to close this knowledge gap and offer insightful information to the travel industry. By analyzing these factors within the context of travel website usage, the study aims to offer actionable recommendations for businesses to optimize their online presence and improve user experience, thereby fostering higher purchase conversions and overall customer satisfaction.

LITERATURE REVIEW

Travel Website Design and Travel Purchase Intention

A travel website's layout, design, and user interface all play a significant role in determining how users interact with the site and make judgments about what to buy. According to Li and Hitt (2008), the way a website is designed has a significant impact on how users perceive it and behave. In the context of travel websites, design factors such as layout, visual aesthetics, navigation, and user interface influence users' entire browsing experience as well as the platform's perceived legitimacy. Numerous research studies have demonstrated how website design affects customer behavior and purchase intentions. According to Li and Hitt (2008), aesthetically pleasing website designs increase user trust and engagement, which in turn influences users' intentions to make purchases. A well-designed website also makes a good initial impression, which has a big impact on customers' propensity to research travel possibilities further, according to a 2003 study by Chen and Dubinsky. According to research, consumers are more inclined to trust and make purchases from websites that have attractive designs, easy-to-navigate interfaces, and captivating images (Law, Leung, Lo, Leung & Fong, 2015). Thus, by improving the design components of travel websites, businesses can effectively engage consumers and positively modify their inclinations to purchase travel-related items and services. Based on above discussion following hypothesis is developed:

H_1: Travel website design significantly influences the travel purchase intention

Information in Travel Website and Travel Purchase Intention

The quality and applicability of the information that is provided to customers in the digital world of travel planning and booking is vital in influencing their decision-making. According to Buhalis and Law (2008), travel websites function as extensive informational databases, providing details on various travel destinations, lodging alternatives, modes of transportation, and activities. Consumers rely on this information to evaluate their travel options, make informed decisions, and eventually make travel-related purchases. Studies emphasize how important high-quality information is in influencing customer behavior in virtual spaces. Gretzel and Yoo (2008) underline the critical impact of internet travel reviews and information in shaping travellers' perceptions and decisions. In addition, Kim and Fesenmaier (2015) stress the significance of context-aware and tailored data in meeting individual preferences and raising user engagement. Purchase intentions for travel are correlated with information seen on travel websites in a variety of ways. Comprehensive and accurate information increases trust and confidence among consumers, resulting in higher purchase intentions (Lăzăroiu, Neguriță, Grecu, Grecu & Mitran, 2020). Furthermore, personalized recommendations and tailored information help to provide a more immersive and engaging user experience, which influences purchasing decisions (Kim & Fesenmaier, 2015). Based on the preceding considerations, the following hypothesis was drawn:

H_2: Information provided in the travel website significantly influences the travel purchase intention

Usefulness of Travel Website and Travel Purchase Intention

In the digital age, where consumers increasingly rely on online platforms for trip planning and booking, the perceived utility of travel websites has a significant impact on consumer behavior. Travel websites can help customers study places, compare pricing, and make informed judgments about travel purchases (Xiang & Gretzel, 2010). Studies have demonstrated the significance of utility in driving consumer engagement and purchase intentions in online contexts. Buhalis and Law (2008) highlight how user ratings, interactive maps, and real-time availability can all improve how useful people think travel websites are. According to Xiang and Gretzel (2010), features that make it easier to compare prices and make reservations also enhance user satisfaction and have a beneficial impact on buying decisions. Users are more inclined to interact with and transact on websites that cater to their wants and interests (Buhalis & Law, 2008). In addition, Kim and Fesenmaier (2015) found that customized information and personalized recommendations improve the user experience overall and increase purchase intentions. The below hypotheses is formed based on the preceding discussion.

H_3: Usefulness of travel websites significantly influences the travel purchase intention

METHODS

This study utilized a quantitative research design to investigate the impact of design, information, and usefulness of travel websites on travel purchase intention. A convenience sampling technique was employed to recruit participants for the study. A total of 177 respondents participated in the survey.

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Data were collected through a structured questionnaire developed based on previous literature and measurement scales stated in existing research. The questionnaire was administered using Google Forms, allowing respondents to provide their answers online. The questionnaire included items measuring the perceived design quality, information quality, usefulness, and travel purchase intention of travel websites. Each item was rated on a five-point Likert scale, ranging from 5 (Strongly Agree) to 1 (Strongly Disagree).

To examine the effect of design, information, and usefulness of travel websites on travel purchase intention, regression analysis was conducted. The independent variables (design, information, and usefulness) were entered into the regression model to assess their predictive power on travel purchase decisions. Data analysis was performed using IBM SPSS Statistics version 20.

ANALYSIS

Table no. 1: Determinants of Travel Purchase Decision

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.805[a]	.821	**.818**	.1125
a. Predictors: (Constant), Travel Website, Design, Information in Travel Website and Usefulness of Travel Website				

Source: Primary Data

The model summary (Table 1) shows a strong correlation (adjusted R square =.818) between the trip purchase intention and the predictors (trip Website Design, Information, and Usefulness). According to this corrected R square value, the combination of these variables may account for about 81.8% of the variance in trip purchase intention. The model fits the data well when the adjusted R square is high, which suggests that the selected variables have a substantial overall impact on explaining differences in trip purchase intention. Thus, as shown in Table 1, the layout, accuracy, and usability of travel websites are important elements that impact people's intents to purchase travel, underscoring the significance of enhancing these aspects to improve user experience.

Table no. 2: Determinants of Travel Purchase Intention

Coefficients						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	Beta		
1	(Constant)	.678	.023		.554	.234
	Travel Website Design	.743	.079	.748	11.045	**.000**
	Information in Travel Website	.752	.086	**.749**	4.042	**.000**
	Usefulness of Travel Website	.761	.097	.753	11.321	.000
a. Dependent Variable: **Travel Purchase Intention**						

Source: Primary Data

The impact of Travel Website Design, Information, and Usefulness on Purchase Intention is shown by the coefficients in Table 2. Travel Purchase Intention exhibits a substantial positive link ($p < .001$) with each predictor variable, namely Design, Information, and Usefulness. In particular, travel purchase intention rises by roughly 0.743, 0.752, and 0.761 units for each unit increase in the travel website's design, information, and usefulness, respectively. This is consistent with previous research findings that highlight the significance of information quality, utility, and website design in influencing consumer purchase intention when it comes to online travel. In support of the positive coefficient for Design in our model, for example, a study by Seo, Chae, and Lee (2012) discovered that aesthetically pleasing design positively increases purchase intention in the e-commerce setting. The positive coefficient for information in our model is supported by studies by Ruiz Mafé & Sanz Blas (2006), which showed that informative material strongly influences purchase intention. However, it's essential to acknowledge potential limitations and contradictory findings. While our results suggest a significant positive relationship between Usefulness of travel websites and Purchase Intention, some studies suggest that excessive information or functionality may overwhelm users and lead to decision paralysis (Moe & Fader, 2016). Therefore, future research should explore the optimal balance between providing useful features and avoiding information overload to enhance user experience and drive purchase behavior effectively.

CONCLUSION

This study examined the complex dynamics of online consumer behavior in the travel business with a focus on the Impact of Design, Information, and Usefulness of Travel Website on Purchase Intention. The main goal was to ascertain whether people's intentions

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to make travel-related purchases are substantially influenced by the design of travel websites, the accuracy of the information they offer, and their perception of the platforms' utility. The results of this study confirm that there is a substantial and favorable correlation between the previously indicated characteristics and the intention to purchase travel. This study highlights the critical importance of website design, information quality, and usability, emphasizing how important it is for travel industry stakeholders to give these factors top priority while developing their online platforms. The outcomes support the importance of maximizing these elements and offer practical advice for improving user experience and, eventually, influencing consumer behavior in the cutthroat online travel industry. Nonetheless, it is imperative to recognize some of the limitations that are inherent in this research. Specifically, the study was cross-sectional in nature, which may limit the generalizability of the results over time and across different demographic segments. Furthermore, the research was limited to examining the effect of travel websites' design, information, and usefulness on purchase intention, potentially ignoring other factors that could influence consumer behavior, such as pricing strategies, customer reviews, and social media presence. Furthermore, the data collection process relied predominantly on self-reported measures, which may be subject to response bias and social desirability effects. Future research endeavors should address these limitations by adopting longitudinal designs, incorporating a broader range of variables, and employing diverse methodological approaches to provide a more comprehensive understanding of online consumer behavior in the travel industry.

In light of the study's findings and limitations, several recommendations for further research emerge. Firstly, future studies could delve deeper into the specific design elements, informational content, and usability features that have the most significant impact on travel purchase intention, thereby providing nuanced insights for website optimization strategies. Moreover, exploring the moderating effects of individual differences, such as personality traits, travel motivations, and prior online shopping experiences, could elucidate how these factors interact with website attributes to shape consumer behavior. Additionally, comparative studies across different segments of the travel industry (e.g., accommodation booking, airline ticketing, tour packages) could reveal sector-specific nuances in the relationship between website features and purchase intention. Finally, investigating emerging trends in technology, such as augmented reality, virtual reality, and artificial intelligence, and their integration into travel websites could offer novel avenues for enhancing user engagement and conversion rates.

In sum, while this study provides valuable insights into the impact of design, information, and usefulness of travel websites on purchase intention, it also highlights the need for continued research efforts to unravel the complexities of online consumer behavior in the ever-evolving landscape of the travel industry. By addressing the identified limitations and pursuing the recommended avenues for further research, scholars and industry practitioners can collaboratively advance knowledge in this domain and devise innovative strategies to meet the evolving needs and preferences of modern travellers.

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FORMULATION AND EVALUATION OF KETOKONAZOLE ANTI-DANDRUFF SHAMPOO

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ABSTRACT

Abstract shampoo is a hair care product that is use for cleansing of hair and nourishing them and making them protective against outer environment. It removes oil, dirt, dandruff and other particles. So basically ketoconazole shampoo helps for the treatment of dandruff and fungus in the scalp which is also called as seborrhoeic dermatitis. So we have made I formulation and compared with the marketed formulation danfree shampoo which is marketed by cipla. With comparison with that product our product shows similar results obtained by marketed product. So we can say our product got satisfactory results and also we have compared the results obtained with available parameters, Basically the ketoconazole shampoo we examined by checking its PH, viscosity, appearance, foam ability and foam stability, surface tension measurement, stability studies, Wetting time, percentage of solid content etc. and the shampoo has been formulated using ingredients like ketoconazole [API], PVP, Sodium metabisulphide, Sodium lauryl sulphate, Stearic acid, Methyl cellulose, EDTA, sodium hydroxide, amaranth color and water. more specifically the product we formulated is sulphate free.

INTRODUCTION

Shampoo is a hair care product use for cleansing of hair, removing dirt, making them strong and nourishing they are applied on the et scalp and and should be rinsed out after sometime. It is in the form of a viscous liquid Dandruff represents one of the most common dermatological skin conditions and is a chronic, non-inflammatory condition of the scalp that is characterized by excessive scaling of scalp tissue. Various antifungal agents are employed in hair care preparations for the treatment of dandruff. These products show many side effects such as loss of hair, increased scaling, itching, irritation, nausea, and headache.

Hence, an attempt was made to formulate synthetic anti- dandruff shampoo which is effective in terms of safety and treating the dandruff condition. Dandruff is apparently caused by a fungus called Malassezia restricted and Malassezia globosa Malassezia formerly called Pityrosporum is a yeast causing infection of skin and scalp. It often causes itching Warm and humid atmosphere, overcrowding, and poor personal hygiene are ideally suited for the growth of Malassezia Dandruff affects 5% of the population and mostly occurs after puberty, between 20 and 30 years and dandruff affects males more than females. Dandruff occurs exclusively on skin in areas with high levels of sebum. Symptoms of dandruff mainly include itching, flakes, and redness of scalp.

Dandruff can be treated in two ways, using herbal-based anti- dandruff shampoo and using chemical-based anti-dandruff shampoo. A shampoo is a preparation containing surfactant (ie, surface active material) in a suitable form - liquid, solid, or powder which when used under the specified conditions will remove surface grease, dirt, and skin debris from the hair shaft and scalp without adversely affecting the user. Most shampoos contain water, a detergent (cleaning agent), surfactant (lather making agent), salt, fragrance (natural and artificial), preservative, and food coloring. With the exception of water and salt (sodium chloride), different chemical compounds are used depending on the desired result of the shampoo. Many shampoos also contain vitamins and moisturizing alcohols to prevent too much of the hair and scalp's natural oils from being stripped away during cleansing

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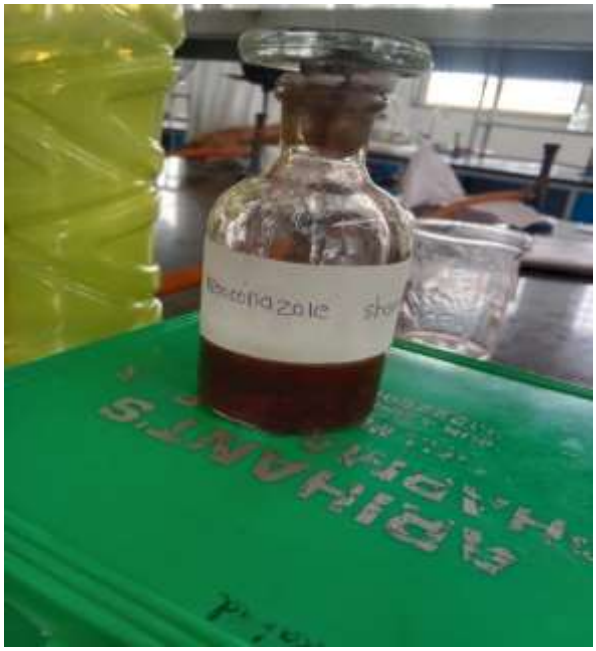


Fig.1. Ketokonazole Shampoo

Dandruff is a common scalp disorder affecting almost half of the population at the pre- pubertal age and of any gender and ethnicity. No population in any geographical region would have passed through freely without being affected by dandruff at some stage in their life. [2] The word dandruff (dandruff, dandriffe) is of Anglo-Saxon origin, a combination of 'tan' meaning 'tetter' and 'drof meaning 'dirty'. Dandruff affects aesthetic value and often causes itching. It has been well established that keratinocytes play a key role in the expression and generation of immunological reactions during dandruff formation. [3] The severity of dandruff may fluctuate with.season.as.it.often.worsens.in.winter. (4) Dandruff is a common scalp condition that occurs when dead skin is shed, producing irritating white flakes and possibly an itchy scalp. Ordinarily, dandruff results from excessive drying of skin and over.

Any substance which destroys or prevents the growth of fungi. It is one of the antibiotic groups. There are several classes of antifungal drugs: Polyenes, which cause an increase in fungal cell wall permeability leading to its death.

Examples: amphotericin B, natamycin, nystatin. Azoles, which act either by inhibiting the synthesis of ergosterol, a component of fungal cell wall or by causing direct wall damage. Examples: clotrimazole, econazole, fluconazole, itraconazole, ketoconazole, miconazole. Pyrimidines, which interfere with the normal function of fungal cells. Example: flucytosine. Syn antimycotic agent, 10-32]

- **CLASSIFICATION OF DANDRUFF**

Depending upon the symptoms the dandruff is classified into two main types

A] Dry Dandruff

- It is also called as pityriasis simplex characterize by excessive formation of minute scales which accumulate on the scalp area.
- In this type of dandruff there is no excessive hair loss.The inflammation on the skin is not observed.
- The scales are first found in middle of the scalp and then spread to frontal, parietal and occupational areas.

B] Oily Dandruff

- It is also called as pityriasis steatites.
- It arrives on the scalp with sebum production.
- It is mostly found in young men following puberty.
- Inflammation of varied intensity developed on the scalp along with oily scales of dirty yellow color.
- Hair fall is most commonly found in this condition.
- The most common site affected by this type of dandruff is scalp, behind the ears, over breast bone, armpits

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ADVANTAGES

- Anti-dandruff shampoos often contain an activating moisturizer. These effective moisturizers work regularly to combat dryness while keeping the scalp healthy and hair beautiful.
- Anti-dandruff shampoo contains a zinc-based activator that can slightly relieve itching. They make your scalp brighter and give you complete comfort.
- Anti-dandruff shampoo has a sedative formula that gently relieves irritation while providing healthy hair without dandruff
- In addition to relieving irritation, anti-dandruff shampoo reduces redness.It makes a person's scalp feel great and their appearance is awesome.
- .Anti-dandruff shampoo is very suitable for controlling the oiliness of the scalp.

IDEAL PROPERTIES OF SHAMPOO

- Make your hair smooth and shiny.
- Produces a large amount of foam.
- 3 Do not irritate the scalp, skin or eyes.
- Dirt needs to be removed completely and effectively.
- Gives hair a pleasant scent.
- **Shampoo Features**
- Dirt and dirt need to be removed effectively and completely.
- You need to wash your hair effectively.
- It should not have any side effects or causes irritation to the skin and eye.

CLASSIFICATION OF SHAMPOO:

1.Based on Appearance

- Powder shampoo, Liquid shampoo or lotion shampoo, Gel shampoo or Solid shampoo, Oil shampoo, Cream shampoo

2. **Based on Use or Function**

- Conditioning shampoo Antidandruff shampoo.
  Therapeutic shampoo Balancing shampoo, Baby shampoo 12-4
- Dandruff is a skin condition that mainly affects the scalp. Symptoms include flaking and sometimes mild itchiness. A more severe form of the condition, which includes inflammation of the skin, is known as seborrhoeic dermatitis

.FACTORS THAT CAUSES DANDRUFF

- Skin oil, commonly referred to as sebum or sebaceous secretions
- The metabolic by-products of skin micro-organisms (most specifically Malassezia yeasts)
- Individual susceptibility and allergy sensitivity
- Scalp conditions
- Yeast overgrowth
- Less shampooing
- Underlying medical conditions
- Allergy)
- An antifungal medication, also known as an antimycotic medication, is a pharmaceutical fungicide or fungistatic used to treat and prevent mycosis such as athlete's foot, ringworm, candidiasis, serious systemic infections such as Cryptococci meningitis, and others.
  Ketoconazole is antifungal of azole group it is a imidazole derivative of antifungal Agent .

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- **COMPOSITION OF SHAMPOOS**



The following are the ingredients used for the preparation of shampoos. They include three anti-dandruff agents such as ketokonazole, sodium lauryl sulfate as solubilizing agent, sequestering agent,sodium ethylenediaminetetraacetic acid (EDTA) as chelating agent, guar gum as foam stabilizing agent and thickening agent, tween 80, and distilled water as vehicle.

- **FORMULATION:**

Ingredients	**F1**
Ketoconazole	1 gm
Pvp	5gm
Sodium lauryl sulphate	40gm
Stearic acid	1.25g
Methyl cellulose	0.9g
EDTA	0.1g
Sodium hydroxide	0.5g
Rose water	1ml
Amaranth colour	0.3ml
Water	Qs.

- **MATERIAL AND METHODS**

METHOD: Firstly methyl cellulose to be taken which is used as a thickener and heating them by mixing it with deionised water, then it should be mixed with sodium lauryl sulphate stearic acid with the above solution. Then to the above solution sodium meta bisulfide were added, finally API Ketoconazole drug is mixed with above prepared solution, then the solution were allowed to cool for sometime at room temperature after that remaining ingredients i.e., EDTA, PVP, Fragrance, colourant were added. To balance the p ^ H sodium hydroxide was added, finally water was added to make upto 100ml

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- **EVALUATION OF KETONAZOLE SHAMPOO**

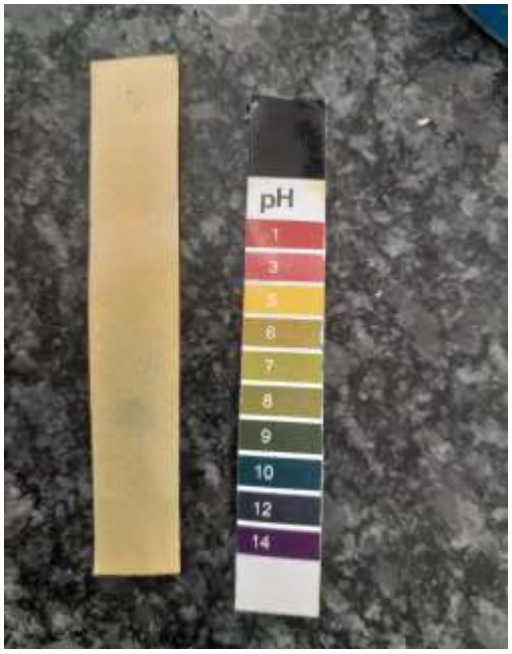
1. **ORGANOLEPTIC PROPERTIES**

i) colour: pink
ii) Fragrance: sweet
iii) Clarity: No greedy particle present
iv) Physical appearance: No aggregate

- **pH DETERMINATION**

The ph of formulated anti-dandruff shampoo was determined using ph paper. Required amount of shampoo was added to 10ml of distilled water in this solution PH paper was dipped and colour change was noted/





- **DETERMINATION OF PERCENT OF SOLIDS**

Clean dry evaporating dish were taken & 4gms of shampoo was added & then dish was kept on hot plate to evaporate the liquid solution. After that solid contents were weighed & percent of solid were calculated A good shampoo will be between 20-30% solids



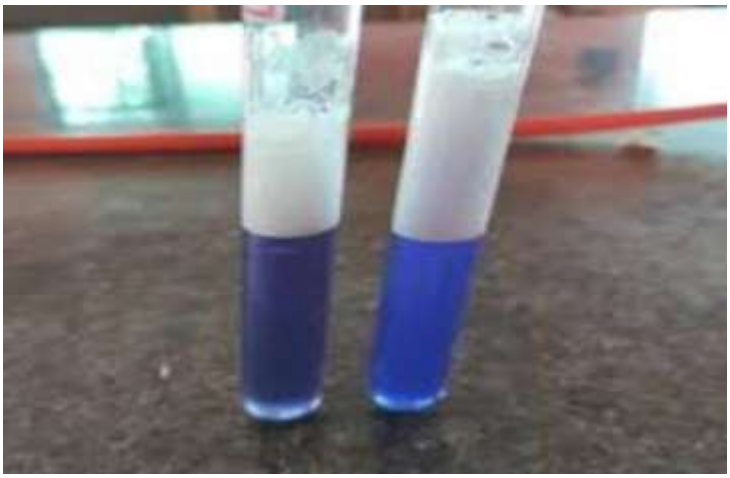


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- **DIRT DISPERSION**

2 drops of shampoo were added to the test tube which was containing 10ml of distilled water, to this 1 drop of indian ink were added & shaken for ten times.

Amount of ink in the foam was noted Shampoo that causes the ink to concentrate in the foam is considered as of poor quality, the dirt should stay in water. The amount of ink in the foam was indicated by the rubric such as none, moderate, light or heavy



- **FOAM ABILITY & FOAM STABILITY**

Foam ability was determined using cylinder shake method. Briefly, 50 mL of the 1% commercial or formulated shampoo solution was placed into a 250 mL. graduated cylinder; it was covered with one hand and shaken 10 times. The total volume of the foam content after 1 min of shaking was recorded.Foam stability was evaluated by recording the foam volume after 1 min and 4 min of shake test



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VISCOSITY MEASUREMENT

Viscosity was measured by using Brookfield viscometer



- **SURFACE TENSION MEASUREMENT**

It is measured using stalagnometer, 10% (10ml of shampoo in 100ml of distilled water) of shampoo solution was prepared thoroughly cleaned the stalagnometer with chronic acid &purified water (because surface tension is highly affected with grease & other lubricants) Data was calculated by the following equation

R 2= (W3-W1)n1 (W2* WI)n2

Where,

W * 1 = Weight of empty beaker

W * 2 = 1 Weight of beaker with distilled water

W * 3 = Weight of beaker with shampoo solution

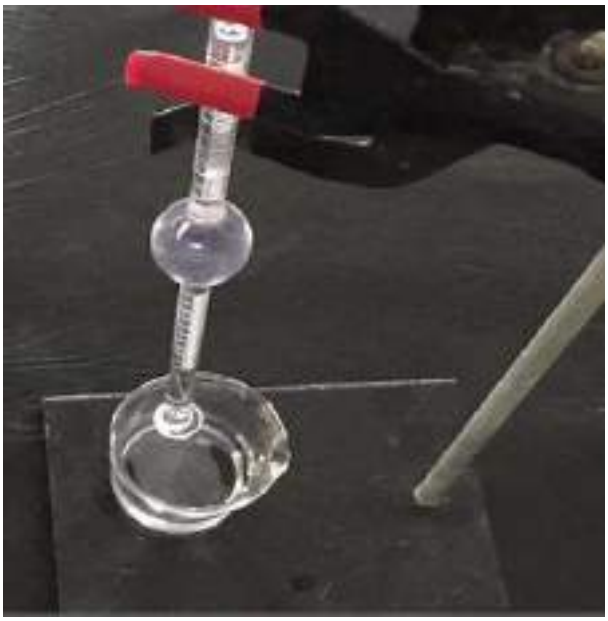
n * 1 = number of drops of distilled water

n * 2 = number of drops of shampoo solution

R * 1 = surface tension of distilled water

R * 2 = surface tention of shampoo solution





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- **WETTING TIME DETERMINATION**

The canvas paper was cut into 1-inch diameter discs having an average weight of 0.44g. The smooth surface of dis was placed on the surface of 1% shampoo solution & the stop watch started. The time required for the disc to begin to sink was noted as wetting time



- **STABILITY STUDIES**

Stability studies is performed to check physical &chemical integrity of the formulation. The thermal stability of the formulated product studied by placing them in glass tubes in humidity chamber at accelerated 40 - 2 deg * C / 60 - 5% * Rh room temperature 25 - 2 ^ o * C / 75 - 5% * Rh the sample kept for stability was evaluated for their appearance, physical stability for a period of 1 month.

RESULT & DISCUSSION

The topical ketoconazole shampoo and conditioner was formulated using different ingredients such as Sodium metabisulphide, Sodium lauryl sulphate, Stearic acid, Methylcellulose, EDTA, Sodium hydroxide, Rosewater, Amaranth colour, Water&pvp was added as a conditioner. Stability studies were performed. The excipients along with the pure drug was found to be compatible when evaluated Finally ketoconazole shampoo and conditioner were evaluated for PH, Dirt dispersion, percent of solid content, surface tension, foam ability & stability

CONCLUSION

Ketoconazole is azole group of drug used for treating fungal drug and treat dandruff caused by fungus. 1 formulations were prepared and characterization of formulation were carried out and compared with marketed (danfree) shampoo and shows similar results.
The PH values for ketoconazole shampoo formulation was found to be 8.5
The percent of solids contents was found to be 22% foam ability & foam stability was determined i.e.,70ml after and wetting time was observed as 30secs and Stability studies were carried out for a period of 1 month & it shows no significance changes in the characteristics of ketoconazole formulation.

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THE COMPREHENSIVE STUDY: AN OVERVIEW FOR UNDERSTANDING THE CONCEPT OF HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY

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ABSTRACT

HPLC is widely applied for separations and purifications in a variety of areas including pharmaceuticals, biotechnology, environmental, polymer and food industries.[1, 2] It is Today accomplished by injection of a small amount of liquid sample into a moving stream of liquid (called the mobile phase) that passes through a column packed with particles of the stationary phase. The separation of a mixture into its components depends on different degrees of retention of each component in the column.[3, 4] HPLC is just one type of liquid chromatography, meaning the mobile phase is a liquid. Reversed-phase HPLC is the most common type of HPLC. The reversed-phase means the mobile phase is relatively polar, and the stationary phase is relatively non-polar. HPLC instrumentation includes a Solvent reservoir, pump, injector, column, detector, and integrator or acquisition and display system. The heart of the system is the column where separation occurs. The information that can be obtained using HPLC includes identification, quantification, and resolution of a compound. The major applications are in the area of Pharmaceuticals, food, research, manufacturing, forensics, and bio-monitoring of pollutants.

KEYWORDS : *Column; Mobile phase; Separation; Stationary phase*

➢ INTRODUCTION TO HPLC

High-performance liquid chromatography (HPLC), formerly referred to as high-pressure liquid chromatography, is a technique in analytical chemistry used to separate, identify, and quantify specific components in mixtures. The mixtures can originate from food, chemicals, pharmaceuticals, biological, environmental and agriculture, etc., which have been dissolved into liquid solutions.High-performance liquid chromatography (or high-pressure liquid chromatography, HPLC) a specific form of column chromatography generally used in bio-chemistry and analysis to separate, identify and quantify the active compounds.It relies on high pressure pumps, which deliver mixtures of various solvents, called the mobile phase, which flows through the system, collecting the sample mixture High-performance liquid chromatography on the way, delivering it into a cylinder, called the column, filled with solid particles, made of adsorbent material, called the stationary phase.

Each component in the sample interacts differently with the adsorbent material, causing different migration rates for each component. These different rates lead to separation as the species flow out of the column into a specific detector such as UV detectors. The output of the detector is a graph, called a chromatogram.

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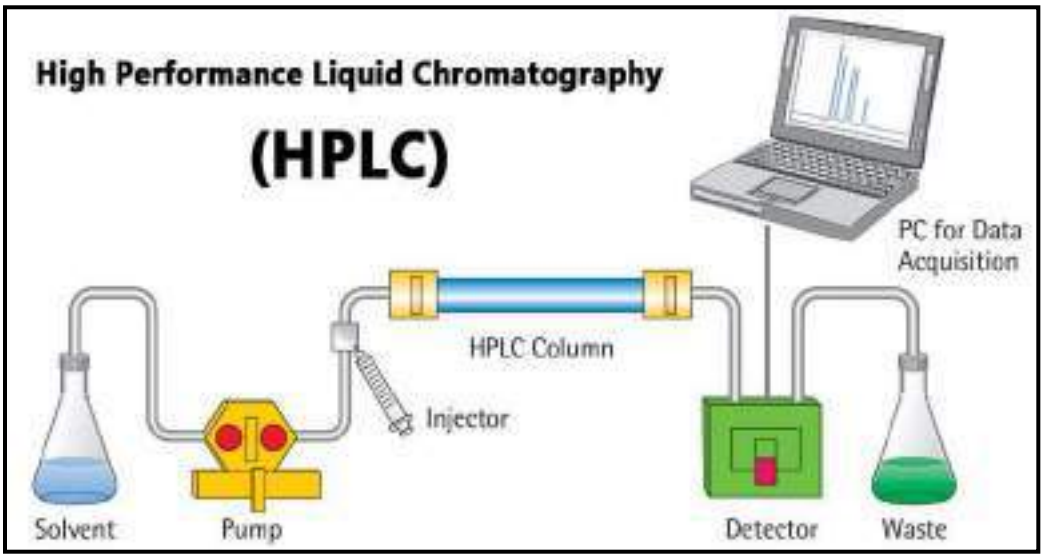


Fig:- 1. HPLC



Fig:- 2. A modern self-contained HPLC.

- **Principle/ Operation**

HPLC is distinguished from traditional ("low pressure") liquid chromatography because operational pressures are significantly higher (50–~1400 bar), while ordinary liquid chromatography typically relies on the force of gravity to pass the mobile phase through the packed column. Due to the small sample amount separated in analytical HPLC, typical column dimensions are 2.1–4.6 mm diameter, and 30–250 mm length.[5] Also, HPLC columns are made with smaller adsorbent particles (1.5 -- 50 µm in average particle size). This gives HPLC superior resolving power (the ability to distinguish between compounds) when separating mixtures, which makes it a popular chromatographic technique

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The principle involved in HPLC can be either adsorption or partition.[5] Chromatographic separation involved in HPLC is the result of interaction of the sample with both stationary phase and mobile phase. The analytes are injected into the flow of the mobile phase, just in front of the separation column. The outlet of the column is connected to a detector where the eluted substances are detected.[5] The separation is achieved in the column packed with stationary phase material of low particle size and the liquid mobile phase is pumped through the column. The reliable flow rate of the mobile phase with appropriate pressure is applied. The sample mixture is interacted between the stationary phase and mobile phase.

- **Instrumentation**
- Degassing
- Pumps
- Precolumn
- Sample injector
- Column
- Column packing material
- Detectors

A line diagram of the HPLC unit is shown in Fig. below. To attain reasonably high flow rates and yet keep particle size of packing very low (3-10 um), pumping pressures of several hundred atmospheres (2000-8000 psi) are required. Thus, the equipment for HPLC is quite elaborate though simple.[6]

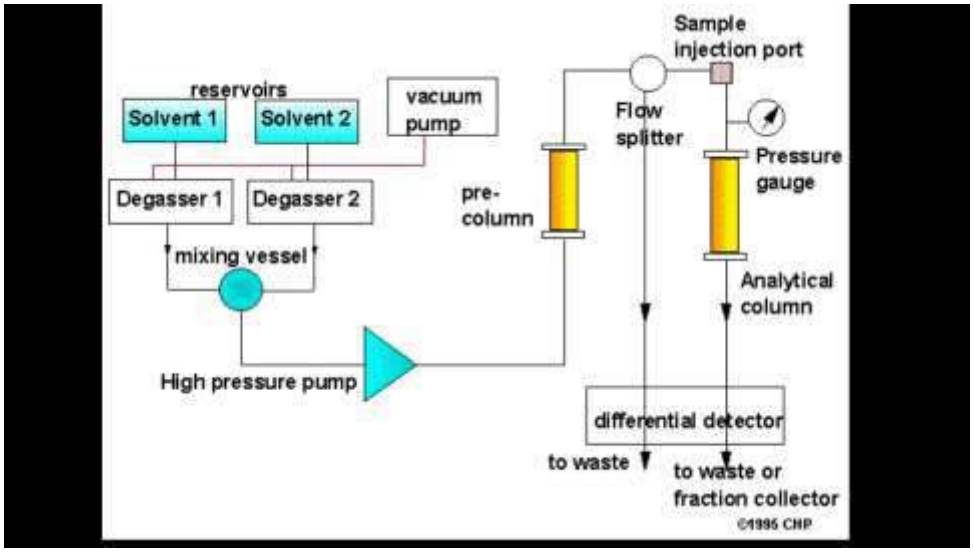


Fig:- 3. Line diagram of HPLC

A modern HPLC apparatus is equipped with one or more glass or stainless steel reservoirs, containing 500 ml or more of solvent.[6] The reservoirs are often equipped by means of removing dissolved gases, usually 02 and N2, that interfere by forming bubbles in the columns and detector systems. These bubbles cause band spreading; in addition, they interfere with the performance of the detector.[6]

- **Degassing**

It is necessary to remove the dissolved gases present in the mobile phase solvent.
Different techniques are followed for degassing which are discussed below.[7,8]

(a) External Vacuum Degassing:

In this method, the solvent in a container is kept in an ultrasonic bath. Ultrasonication is done under vacuum using a vacuum pump.[7] This process will remove the dissolved gases from the solvents and then can be used for HPLC. This technique is more useful for solvents, which can absorb gases like carbon dioxide and also useful for eluent blanketed with an inert gas like helium.

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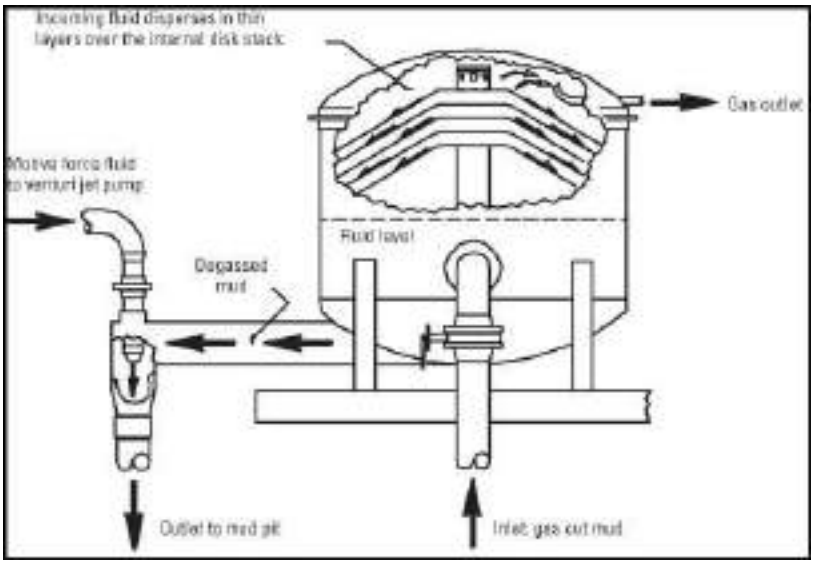


Fig:- 4. External vacuum degassing.

(b) Helium Sparging

In this technique, helium is bubbled into the solvent which will remove the other dissolved gases[8]. The volume and time of application of helium should be decided. Helium is insoluble in the mobile phase so it escapes out without interfering with the chromatographic process. This process is called helium sparging. This can be done online if the helium tank is equipped with the HPLC unit or the process can be done offline. However, the limitations are that Helium may selectively volatilize the more volatile solvent, thus changing the composition of the premixed solvents, more expensive and required in large quantities.

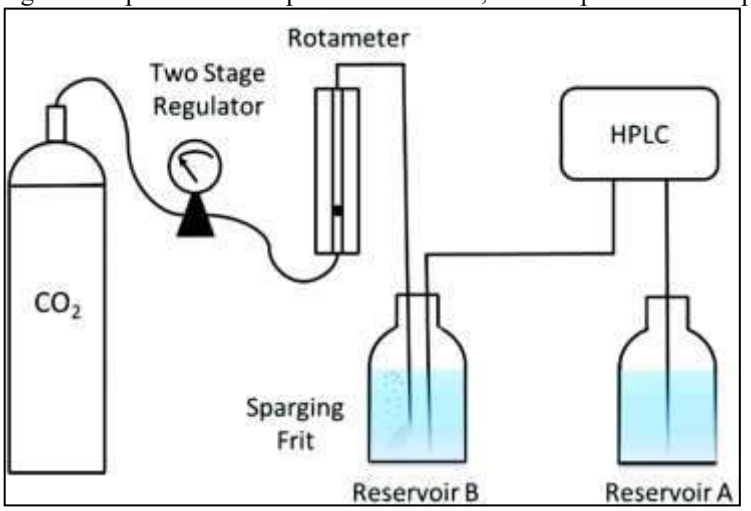


Fig:- 5. Helium sparging degassing

(c) Online Degassing

In this method, a vacuum pump is equipped with the HPLC and vacuum is applied on the semi-permeable tubes in which the solvents run. The air from the solvents is removed and goes to the waste collecting container.[9] This approach is shown in Fig. below:

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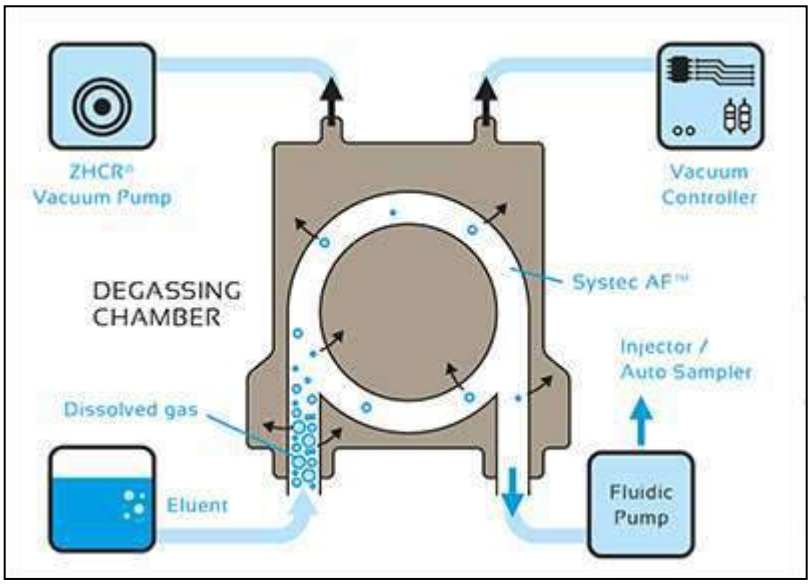


Fig:- 6. Online degassing

d) Filters:

Other than the above methods filters are also used to remove the dust and other matters from the solvents.[10] Membrane filters of 0.45 are usually used. The mobile phase filtered through these filters using Buchner funnel under vacuum followed by ultrasonication.

(a) a vacuum pumping system.

(b) a distillation system.

(c) devices for heating and stirring the solvents.

(d) device for sparing in which the dissolved gases are swept out of solution by fine bubbles of an inert gas of low solubility.

- **Pumps**

The pumps are used to pass mobile phase through the column at high pressure and controlled flow rate.

Based on the mechanism of working the pumps can be classified into**:**

1. Syringe Pump/Displacement pumps.
2. Reciprocating piston pumps.
3. Constant pressure pumps.

1. Syringe Pumps:

A syringe pump consists of a large barrel syringe with a plunger connected to a digital stepping motor or precision-screw drive. As the plunger moves forward, it drives the fixed volume of solvent through the chromatograph with a pulseless flow. These pumps are known for their pulseless flow of solvents. The flow rates are less than 100 l/min.

Flow is independent of viscosity and column back pressure. However, the run-time is limited by the volume of the syringe and no flow occurs during the refill step. It has limitations such as low solvent capacity (200-500 ml) and it is not easy to change solvent during gradient elution.

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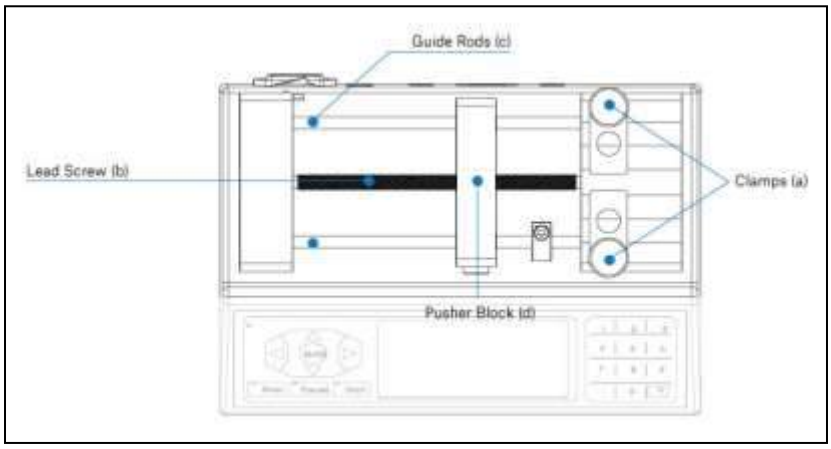


Fig:- 7. Syringe pump.

2. Reciprocating-Piston Pump:

A reciprocating pump is the most common design used in modern HPLC. The mechanism is similar to the constant displacement pump. The pump head consists of check valves and seal-piston assembly. The check valves regulate the flow of solvents from the reservoir to the pump chamber and further to the column. Two strokes namely fill stroke and delivery stroke are involved in the functioning. During fill stroke, the solvent is able to enter the liquid chamber from the solvent reservoir only. During the delivery stroke, the piston moves into the liquid chamber and pressurizes the liquid and the inlet check valve is forced to close. When the pressure inside the pump head exceeds the pressure on the column side of the pump, the outlet check valve opens and the mobile phase flows towards the column.

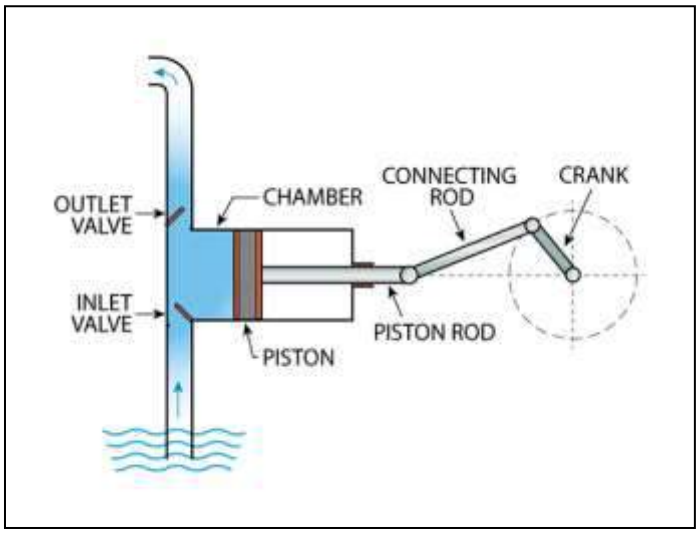


Fig:- 8. Reciprocating-Piston Pump

3.Constant Pressure Pumps:

In these pumps, high pressure from gas is introduced through a large piston which drives the solvent from the pump chamber to the column. The solvent chamber volume is around 70 ml (Fig. 15.9). Since the pressure on the solvent is proportional to the ratio of the area of the two pistons, usually between 30:1 and 50:1, a low-pressure gas source of 1 atm can be used to generate high liquid pressures (1-400 atm). An intermediate solvent can be used to reduce the interference of dissolved gas by entering to solvent. The rapid refill of the solvent chamber is facilitated by a valve. This system provides a continuous and pulseless pumping, and high flow rates for preparative applications. This type is used for packing columns; however it is inconvenient for gradient elution.

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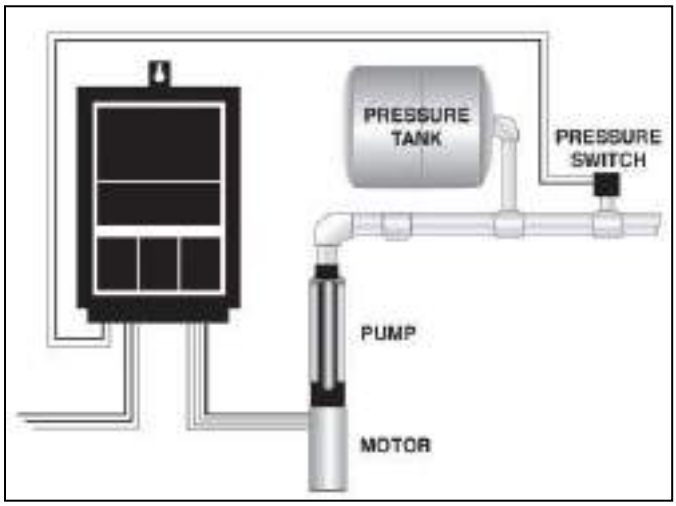


Fig:- 9. Constant pressure pump

Pump Pulsations:

Pump pulsations may be a problem during the trace analysis of analytes due to the baseline noise. It can be minimized by proper selection of pumps or by the use of cam design or pulse dampeners. The flow delivered by a single-piston pump is relatively pulsating, so single piston-pumps are rarely used to deliver eluent.[11]

Cam Design:

This set up consists of a two pump head design and a non-circular cam. The non-circular cam rotates and drives the piston so that when one liquid chamber is emptying, the other is refilling, thus, the two processes occur simultaneously. This produces a pulseless flow. The pistons are 180° out of phase.[12]

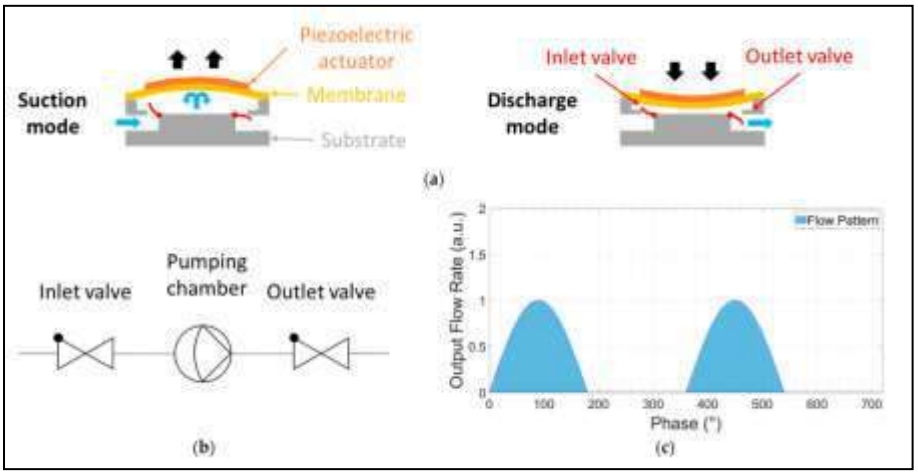


Fig:- 10. Cam driven, dual head reciprocating pump capable of delivering constant flow with relatively low pulsation. Flow rate is controlled by cam rotation frequency.

Pulse Dampers:

These are the useful set up in addition to cam designers. Most reciprocating pumps incorporate pulse dampers. Pulse dampers consist of long and narrow tubings folded back on them many times and placed between the pump and the injector. They receive the solvent during the delivery stroke and discharge during the refilling stroke through a restrictor. This setup minimizes the fluctuations and results in pulseless flow. The limitation of setting up of pulse dampers is the increase in system volume which makes the solvent change over particularly in the gradient elution, making it inconvenient.

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- **Precolumn**

Some HPLC instruments are equipped with a precolumn, which contains a packing chemically identical to that in the analytical column. Particle size is large; hence the pressure drop across the precolumn is negligible with respect to the analytical column. The precolumn is mainly used to remove the impurities from the solvent and thus prevent contamination of the analytical column

- **Sample Injectors**

Often the limiting factor in the precision of liquid chromatographic measurements lies in the reproducibility wherewith samples can be introduced into the column packing. It must be noted that overloading of the sample causes band broadening. Therefore, a minimum amount of samples must be introduced. It is convenient to introduce the sample without depressurizing the system. The sample is usually injected at the head of the column with minimum disturbance of the column material.[13]
There are different types of sample injection systems in practice.

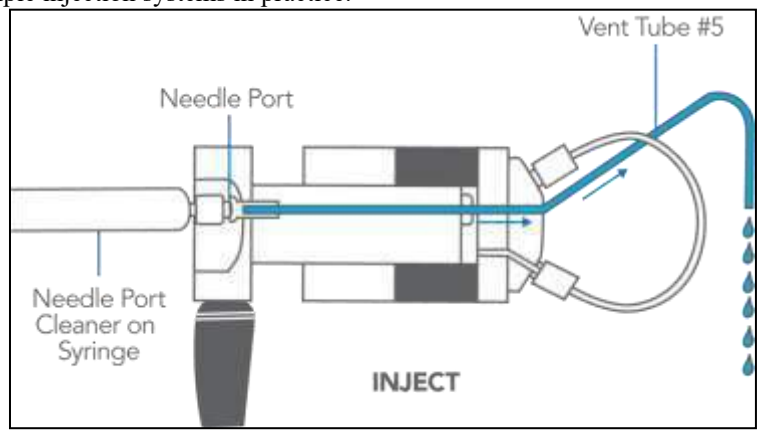


Fig:- 11. Sample injectors

Nowadays the above methods are replaced by the incorporation of valves for injection.
There are two types of valves:
1. External loop valve injector
2. Internal loop valve injector
1. External Loop:
It has 6 ports, out of which 2 ports connected with a fixed volume sample-loop and other 4 ports are used to carry the mobile phase and sample in and out of the valve. The valve consists of two positions namely 'load' and 'inject'. At load position, sample is loaded into the loop using a microlitre syringe and the position is rotated to inject position to inject the fixed volume of sample contained in the loop into the column along with mobile phase. The minimum volume of this loop starts from 10 ul. These are expensive but give precise results.

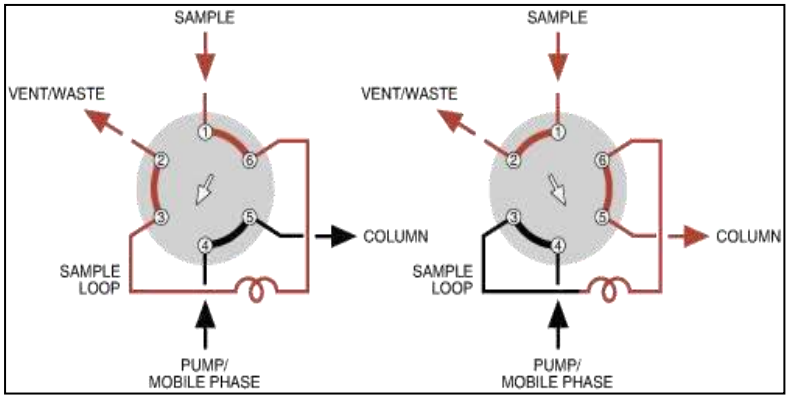


Fig:- 12. External loop

2. Internal Loop
This type of valve consists of 4 ports with an internal loop. In this, the sample loop is an engraved slot in the body of the valve. These types are used for small volume injection. This also has the same functioning as an external loop valve.

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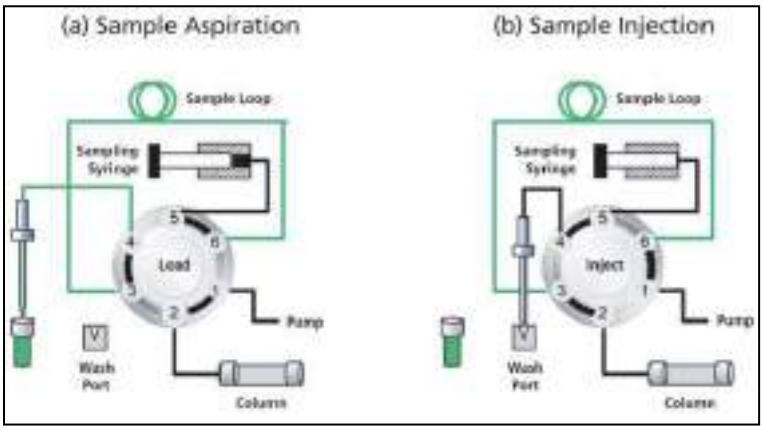


Fig:- 13. Internal loop

- **Liquid Chromatographic Columns**

They are usually constructed from smooth bore stainless steel tubing or heavy-walled glass tubing. If prepared from heavy walled glass tubing, then pressure is restricted to lower than 600 psi. Occasionally, you may come across coiled columns, but their use is very limited.
The columns are of two types:
(a) Analytical
(b) Preparative.
For analytical columns:
Size: Length: 25-100 cm with internal diameter of 2-6 mm.
For preparative columns:
Size: Length: 25-100 cm and internal diameter of 06 mm or more.
The common particle size is 5-10 um; recently manufacturers have been producing high speed, high performance micro-columns which have smaller dimensions.
Length: 3-7.5 cm and internal diameter of 1-4.6 mm; particle size: 3 or 5 um.
The main advantage of these columns is speed and minimum solvent consumption.
These columns should be provided with a system for temperature control to withstand high pressure.

- **Requirements for an Ideal HPLC Column**

An ideal HPLC column should fulfill the following conditions.
1. It should have uniform column packing.
2. It should have spherical particles.
3. The particle diameters should be ranging from 3 to 10 um.
4.The porosity of the particles should be in the range 50-70%, extending to 80% for the size-exclusion chromatography.
5. The column should withstand the pressure during operation.[14]
6. It should give reproducible results.
7. It should be easy to handle.
8. The particles should not shrink or swell with the nature of the eluent.[14]
9. It should have a uniform particle pore size distribution.
10. Particles should be available with a range of mean pore diameters of 60-100 A°.
11. Column packing should be chemically inert.
12. It should provide reproducible results.
13. It should be easily available and cost effective.

- **Column Packing Materials**

Construction Materials of Column:
Most columns are constructed from 316 stainless steel, Glass, Teflon and PEEK. Columns are also available for use with more aggressive mobile phases like HCl or solutes like proteins that may adsorb to the stainless steel. Polymeric columns are more common for ion-exchange packings while glass is commonly used for protein separations.
Types of Columns:

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(i) Guard Column: Guard column is the column placed before the analytical column. It contains a packing chemically identical to that in an analytical column with large particle size. The pressure drop across the precolumn is negligible as compared to that in the analytical column. These columns are otherwise called pre columns.

They are used to protect the analytical column from the impurities and other contaminants from solvent. It also removes the components that bind irreversibly to the stationary phase. The guard columns are compulsorily used during the bioanalytical studies to protect the analytical column from biological matrix.[15]

(i) Analytical Column: Analytical column is considered as the heart of an HPLC system.
The reason is that it is the part where the separation of the mixture takes place. The efficiency of the separation purely depends on the column.

Types of Analytical Columns:
(a) Small-bore Columns: Small-bore or microbore is the term used for HPLC columns having a diameter less than about 2 mm. They are also known as 'microcolumns'.
(b) 3 x 3 Columns: Short (3.3 x 4.6 mm) columns packed with 3 um bonded silica stationary phases have sufficient efficiency for many separations. They are commonly called 3 x 3 columns and compared to the conventional columns, they offer the following advantages.
(c) Monolithic Columns: It is a type of column used in HPLC that has porous channels rather than being packed with beads. They have a structure different from that of the traditional columns. Their construction is more similar to a rod with random channeling and outcroppings.



Fig:- 14. Types of column

Types of Packing used in HPLC Columns:
Different types of packing used in HPLC are as follows:
(a) Porous
(b) Pellicular
(c) Bonded phases.
(a) Porous Packings: Porous microparticles are the most commonly used stationary phase particles in modern HPLC. They consist of fully porous particles that can be either irregular or spherical in shape. The diameters are ranging from 3 to 10 um. The pores provide the surface with which the sample interacts.[16] Particles with smaller pore size exhibit a larger surface area and therefore have greater retention. Large particles like proteins require a large pore size.[17] The particles are composed of silica, alumina, the synthetic resin polystyrene-divinylbenzene, or an ion-exchange resin. Silica is by far the most common packing used in LC.
(b) Pellicular Packings: Pellicular materials consist of a solid spherical bead of relatively large inner diameter with a thin outer layer of stationary phase.[17] The original pellicular particles were spherical, non-porous, glass or polymer beads with typical diameters of 30 to

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40 um. A thin, porous layer of silica, alumina, a polystyrene-divinylbenzene synthetic resin, or an ion-exchange resin is deposited on the surface of these beads.

- **Detectors**

A detector is required to sense the presence, and the amount of sample component in the column effluent. A detector that measures property possessed by both mobile phase and solute is called bulk property detector, e.g. Refractive Index detector.
If the solute possesses the property e.g. absorption of UV/visible light of electrochemical property, the detectors are called a solute property detector.
A good detector should have the following features:
(a) It should respond to all components of the mixture in a wide range of mobile phases.
(b) It should not respond to the mobile phase.
(c) It should be unaffected by changes in temperature and flow rate.
(d) It should have high sensitivity, i.e. larger detector signal for smaller amount of solute.
(e) Low noise and a wide linear response to solutes present.
(f) It should not constitute zone spreading.
(g) Non-destructive, inexpensive, reliable and easy to use.
Generally two types of detectors are used:

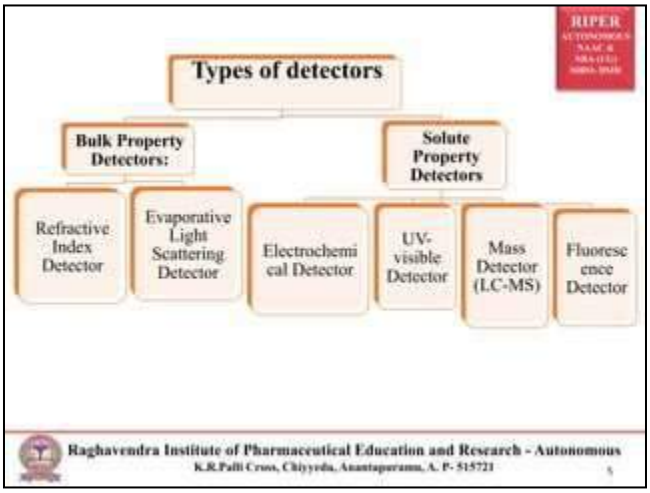


Fig:- 15. Types of detectors

- Bulk property detectors and Solute property detectors.

1. Refractive index monitors detectors:

Since every compound has its own refractive index, this property becomes a universal indicator. A differential refractometer continuously monitors the difference in Ri between the pure mobile phase (reference stream) and the column effluent. The advantages of these detectors are: (a) They respond to nearly all solutes. (b) They are reliable and unaffected by flow rate. (c) They do not require any double bond or aromaticity to be. present in the structure for elucidating a response while disadvantage is that there must be a difference between the refractive index of the solutes and of the mobile phase. Besides, this is not a sensitive detector.
Construction of Refractive Index monitor detector:
1. Several different designs of a refractive index detector have been used in HPLC, one of which is the deflection refractometer.

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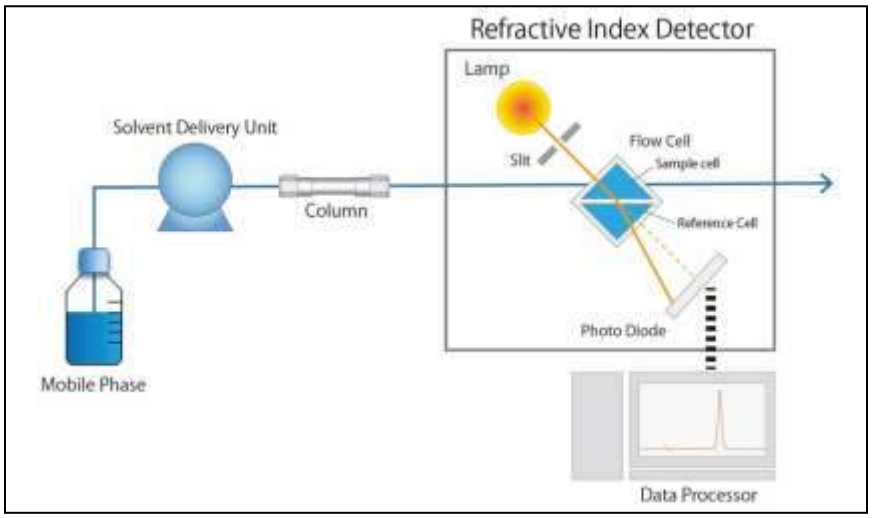


Fig:- 16. Construction of Refractive Index monitor detector

2. UV-visible absorption detector

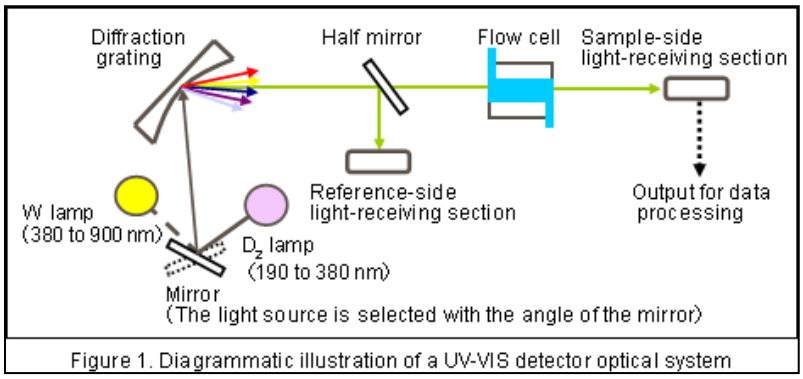


Fig:- 17. Flow cell for UV/visible absorbance detector

UV Absorption Detectors with Filters:

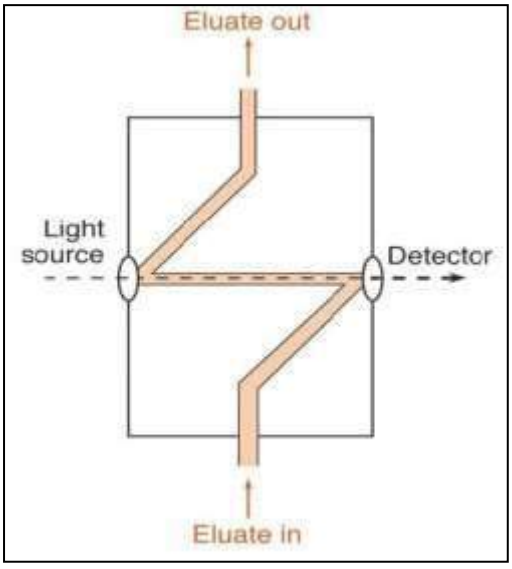


Fig:- 18. A typical Z-shaped UV flow-through cell

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Absorption Detectors with Scanning Capabilities:
These detectors are provided with scanning spectrophotometer with grating optics. This provides various benefits such as single wavelength analysis and multi-wavelength analysis.
Best wavelength for each eluent can be selected in a mixture and analysed.

3. Photodiode Array (PDA):
These are the most powerful UV-visible detectors. The detection is carried out in the UV-visible region. A DAD has multiple photodiode arrays. Using this detector a wide range of wavelengths can be employed at a time. At an interval of 1 second or less the spectra of analytes are recorded. In addition to retention time the comparison of spectra will give the proper identification of the analyte. The light from the lamps directly approach the flow cell, dispersed by the diffraction grating, and the amount of the dispersed light is estimated for each wavelength in a photodiode array.

4. Fluorescence Detectors:
Fluorimetric detectors used In HPLC are similar in design to the fluorometers and spectrofluorometers used for fluorometry. In most of these, fluorescence is observed by a photoelectric transducer located at 90° to the excitation beam. Mercury excitation source or xenon source and monochromator to isolate the fluorescence radiation are used. The advantage of the fluorimetric detectors is their higher sensitivity.

5. Amperometric Detectors:
These detectors are based on measurement of electrochemical detection. The detector has three types of electrodes which include, reference electrode, working electrode and auxiliary electrode. The potential of the working electrode is set relative to the reference electrode. When the analyte, which is an electroactive substance, reaches the detector, it is subjected to a reaction of either oxidation or reduction in the electrodes. This reaction creates some current flow in the electrode due to the transfer of electrons. The electrodes are connected to an electronic circuitry and the electric current signal is amplified and measured as a signal.
Other detectors:
(1) Infrared Absorption Detectors
IR spectrophotometer and FTIR spectrophotometer have been used for HPLC.[18] IR detector cells are similar in construction to those used in the UV instruments, except that the IR cuvettes are made up of Sodium chloride or Calcium fluoride. Cell path lengths range from0.2 to 1.0 mm and volumes from 1.5 to 10 uL. A major limitation in the use of the IR detectors is the low transparency of many useful solvents.[19] Also, the use of aqueous mobile phases is restricted.

(2) Evaporative Light Scattering Detector (ELSD):
In this, the column effluent is converted into a fine mist by a flow of nitrogen or air using a nebulizer. The fine-droplets are passed through a heated tube where the mobile phase evaporates,leaving fine particles of the analyte. This is then passed through a laser beam.

(3) Mass Spectrometric Detectors
Nowadays the highly sophisticated mass spectrometric detectors are widely used due to their sensitivity and reliability. When a mass spectrometer is used as a detector for LC (LC-MS), it can greatly aid in identifying species as they elute from a chromatographic column. Various interfaces are used to couple LC with MS.[20]

- **Recorder**

There are various types of data processors; from a simple system consisting of the in-built printer and word processor while those with software that are specifically designed for an LC system which not only data acquisition but features like peak-fitting, baseline correction, automatic concentration calculation, molecular weight determination, etc.[21]

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FORMULATING AND EVALUATING POLYHERBAL AROMATHERAPY CANDLE (DIFFUSER) FOR ANXIETY DISORDERS

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ABSTRACT

Aromatherapy is defined as "the art and science of utilizing naturally extracted aromatic essences from plants to balance, harmonize and promote the health of body, mind and spirit".[1] Aromatherapy is the use of essential oils from plants for healing. Essential oils have been used for therapeutic purposes for nearly 6,000 years. The ancient Chinese, Indians, Egyptians, Greeks, and Romans used them in cosmetics, perfumes, and drugs. Essential oils were also commonly used for spiritual, therapeutic, hygienic, and ritualistic purposes. By the 1950s massage therapists, beauticians, nurses, physiotherapists, doctors, and other health care providers began using aromatherapy.[2] Aromatherapy did not become popular in the United States until the 1980s. Today, many lotions, candles, and beauty products are sold as "aromatherapy." [3]

Aromatherapy is used in a wide range of settings from health spas to hospitals to treat a variety of conditions. In general, it seems to relieve pain, improve mood, and promote a sense of relaxation. In fact, several essential oils A including lavender, rose, orange, lemon, sandalwood, and others have been shown to relieve anxiety, stress, and depression. The purpose of this article is to review the current state of the science of aromatherapy and to propose future research. The author also offers guidelines for safe aromatherapy practice while awaiting future research on its clinical efficacy. This review also aims to summarize the randomized intervention Studies that have been carried out on the use of aromatic plant extracts (essential oils) for a variety of conditions.[4]

KEY WORDS: *Aromatherapy , essential oil , candle diffuser, anxiety.*

INTRODUCTION

In the contemporary context, relaxation has emerged as a crucial process for alleviating both mental and physical stress. Amid the diverse array of relaxation methods available today, aromatic candles have gained prominence. Scented candles serve as a vital component in health spas, effectively relieving symptoms associated with bronchitis, high blood pressure, tension, and insomnia. Moreover, they offer holistic approaches to address emotional and mental stress, grief, and trauma. These scented candles incorporate a range of natural additives, including essential oils, herbs, spices, citrus fruits, berries, musk, oatmeal, and sea breeze. In the present day, the mass production of scented candles often relies on petroleum[5]-derived sources like paraffin and benzene homologues, potentially posing health risks (Wilson EJ,2005; Bartsch J,2016; Derudi M,2012; Petry T,2014).Hence, it becomes imperative to craft aromatic candles from natural sources such as soy wax, beeswax, and natural essential oils to deliver the most practical benefits to use.[6]

The primary objective of this study Is to create scented candles that emit delightful fragrances.[7] This is achieved using carriers, specifically sugars such as sucrose, dextrose, levulose, mannose, and glucose (Stabile L,2012; DerudiM,2012).[8] The current approach involves a process for producing scented and/or colored candles, which comprises (a) forming numerous individual particles of candle wax; (b) blending the coloring and scenting agents with these particles; (c) enveloping the particles with the chosen agent(s) through agitation; and (d) situating the coated and dried particles around a candle wick. Various additives are employed in candles to impart desirable attributes, including color, aroma, texture, and stability (Petry T,2014; Stabile L,2012; Ahn JH,2015). The quantity of diluent required is precisely the amount needed to dissolve the fragrance or antioxidant. Scented candles incorporate a fragrance agent, typically scented oils, incorporated into the candle wax during the manufacturing process. This agent releases its aroma when the candle burns, and candles may offer varying concentrations of these scents. There is growing trend toward

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Highly scented candles with a potent concentration of the scenting agent. Fragrance-dispersing candles are readily available and are commonly used to infuse spaces with pleasant scents.[9]

However, very few studies have focused on the production of scented candles using a combination of beeswax, soy wax, and self-distilled lemongrass essential oil(Carroll AL,2016;Orecchio S,2011; Balti MA,2018). Notably, this product is crafted entirely from Candles and maintain the consistency of their aroma during storage and transport, antioxidants are employed.[10]

The objectives of this study encompass three main areas: (i) investigating the factors influencing the distillation process of lemongrass essential oil; (ii) developing candles that are durable, affordable, and free from health concerns; and (iii) assessing certain physicochemical properties and conducting sensory evaluations of the end product. Aromatherapy's ability to influence human emotions has led to a widespread demand for aromatic candles, which are not only valued for their therapeutic benefits but also for their capacity to create diverse and pleasing aesthetic experiences, whether for religious, celebratory, or relaxation purposes.[11]

OBJECTIVE

1. One of the biggest benefits of scented candles remains to be that they help to relieve stress.
2. We rely on our sense of smell a lot and exposing our noses to the pleasant essential oils in fragrance candles affects our hormones – helping to ease your anxiety and worries.
3. Scented candles are a popular relaxation method, promoting well-being through ambient lighting.
4. This study aims to create practical scented candles using natural materials like soy wax, beeswax, and essential oils.
5. The desired candle should offer a long burn time, be cost-effective, and pose no health risks to users.

Ingredient

1. Bees wax
2. Lavender oil
3. Orange peel oil
4. Sandal wood oil

Material Collection

Lavender oil: Lavender essential oil collected from market

Orange peel oil:

Fresh and healthy orange (citrus sinensis) peels collected from market and washed Thoroughly with distilled water. The peel of oranges is boiled in water and the oil produced (limonene) distilled in steam at a temperature just below 100°C, well below its normal boiling point. The immiscible oil can then be separated.[12]

Sandal wood oil:

Sandal wood essential oil collected from the local market.

Procedure

1. Take a beeswax and Weigh the beeswax accurately.
2. Cut the beeswax in small cuts and Melt the beeswax in beaker with the help of heating Mantel.
3. After the properly melting Start add the essential oil lavender oil, orange peel oil and sandalwood oil in beaker
4. After the adding extract then Start the mechanical stirrer slowly
5. After adding all ingredient , Keep stirring up to 15 minutes.
6. Pour above mixture in suitable size mould.
7. Allow the mould to be cooled at room temperature.
8. After ½ hour remove the candle from mould.

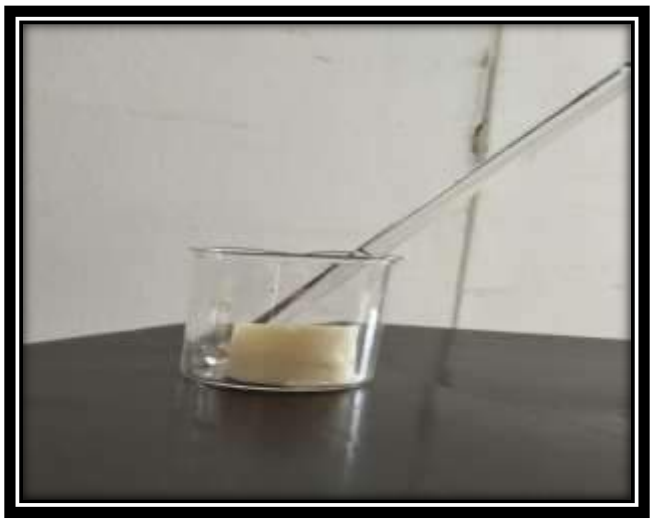
Formulation

Sr.no	Ingredients	Quantity gm/ml	Uses
1	Bees wax	50g	Emits the brightest most warm toned flame
2	Lavender oil	1.5ml	Treating anxiety, insomnia, depression, and restlessness
3	Orange peel oil	1ml	Lifting mood and reducing stress to adding a fresh.
4	Sandal wood oil	1ml	Improves mental functions by boosting memory and focus

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Material Collection

1. **Bees wax**



Beeswax is a natural biological polymer containing a mixture of several non-toxic and cheap substance (esters of fatty acids, alcohols, acids, etc.).The number of reported individual components have been contained bees wax exceeds 300 which are from various species of honeybees. Depending on the honeybee species and the geographical zone, the concentrations of individual components and substance classes may have only small differences.[13] In addition, from the view point of chemistry it is a stable and water-repellent substance . Beeswax is a highly crystalline natural product that is used in pharmaceutical, cosmetics, food and other industries. It also is frequently used in the preparation of controlled release drug preparations .it is a natural pesticide and it is also used in the mosquito repellents candles.

Lavender Oil



Synonym : lilac

Biological source : Lavender oil, obtained from the flowers of Lavandula angustifolia

Family : Lamiaceae

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Common name : Lavandula Angustifolia

Organoleptic Characteristics
Color: light shade of purple or violet.
Odour: floral scent, but one that is light and fresh, without being too pungent or overwhelming
Taste : floral with hints of mint and rosemary

Chemicals Constituents
1. Linalool,
2. linalyl acetate,
3. 1,8-cineole,
4. β-ocimene,
5. terpinen-4-ol,
6. camphor.

Uses
It can be taken orally, applied to the skin, and breathed in through aromatherapy. Lavender oil can benefit the skin in numerous ways. It has the ability to lessen acne, help even skin tone, and reduce wrinkles. It can even be used to treat other things, such as improving hair health and digestion.[14]

Orange Peel Oil



Synonyms: Citrus Aurantium Var.Sinensis peel

Biological source: Orange peel oil is obtained from orange peel which is dried or fresh outer part of the pericarp of ripe or nearly ripe fruits of Citrus aurantium.

Family: Rutaceae
Geographical Source: Orange peel oil is obtained from orange peel which is dried or fresh outer part of the pericarp of ripe or nearly ripe fruits of Citrus aurantium. It is indigenous to India and commercially cultivated in Spain, Caribbean islands, the USA, Morocco, and Sicily.[15]

Organoleptic Characteristics
Color: Yellow orange to deep orange clear liquid.
Odour: Citric, fresh, juicy, sweet.

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Taste : unpleasant, bitter

Chemical Constituents
Limonene, α-Pinene, Sabinene and β-Pinene, Myrcene, Monoterpene hydrocarbons, linalool ,aliphatic aldehydes, octanal ,decanal .

Uses
Used in aromatherapy, Orange Essential Oil's pleasant scent has a cheerful and uplifting yet simultaneously relaxing, calming effect that helps reduce pulse rate. It can not only create a warm environment but can also stimulate the strength and resilience of the immune system and eliminate airborne bacteria.[16]



Sandal Wood Oil
Synonyms :chandan, cendana
Biological source: Sandalwood album oil (SAO), also known as East Indian sandalwood oil (EISO), is an essential oil distilled from the Santalum album tree and has demonstrated biological activity as an anti-inflammatory, anti-microbial, and anti-proliferative agent.

Family: Santalaceae

Geographical source: Found in India and Malaysia. Sandalwood tree is an evergreen plant, 10- 12 m high found widely distributed in India. 3. HEARTWOOD AND SAPWOOD • Central region of old trees forms heart wood.[17]

Organoleptic Characteristics
Color**:** yellow or brown
Odour**:** sweet and smells slightly of hay
Taste: slightly bitter, resinous.

Chemical Constituents
Sesquiterpene alcohol
α-santalol
β-santalol, .
hydrocarbons santene,
nor-tricycloekasantalene,
α-, and β- santalenes.

Uses
Sandalwood essential oil is anti-inflammatory and antiseptic. It is also restorative and a sedative which is effective in relieving stress and anxiety

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The sweet, powerful, and lasting odour has made sandalwood oil useful in the perfume industry, soaps, candles, incense, folk medicine, and religious and cultural purposes for centuries. In addition, the wood and its powder are used for religious and medicinal purposes, and the food industry, especially in India.[18]

Aromatherapy Scented Candle

This is another prevalent form of aromatherapy Diffuser, which is common in homes and offices. This is Somewhat similar to the candle diffuser method with the Only difference being the essential oils are mixed with the Wax in the actual recipe for making the candle.[19] Therefore, As the heat continues to burn through the wax, it gradually Releases the vapours' from the oil into the air for you to Inhale in. There are a few essential oils commonly used in Making aromatherapy candles, such as sandal wood oil, lavender, orange oil, among others. Lighting the aromatherapy candle is A great way to de-stress anytime during the day wherein The aroma from the oil creates a relaxing and calming Effect on the body.[20]



Formulation of Polyherbal Scented Candle

CLAY POT DIFFUSER

This particular aromatherapy diffuser comes in Different sizes and styles. To use this device, simply pour in The essential oil into the clay pot.[21] It comes with an opening that you must seal with a cork-style cap. Eventually, the Aroma from the oil will be released and permeate through The opening.

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Although quite new, many are already using Clay pot diffuser due to the convenience and since it is Inexpensive as compared to other types of diffuser. To Achieve the right strength in aroma, you can simply adjust The amount of essential oil to use. One disadvantage with The clay pot diffuser is that the scent is not long lasting.[22]

Mechanism of action

Lavender Oil

Lavender essential oil has an extensive anecdotal history of anxiolytic benefit that has recently been supported by clinical studies examining its efficacy in the treatment of anxiety. The two primary terpenoid constituents of lavender essential oil, linalool and linalyl acetate, produce an anxiolytic (calming) effect in combination. Investigators believe this occurs due to inhibition of voltage-gated calcium channels, reduction of 5HT1A receptor activity, and increased parasympathetic tone.[23]

Orange Peel Oil

Sweet orange peel contains a variety of chemical compounds, including essential oils, flavonoids, carotenoids, steroids, terpenoids, alkane groups, and ethyl esters.[24] These chemical compositions confer antioxidant properties to sweet orange peel, which can protect the body from oxidative damage caused by free radical

Its antioxidant properties reduce the pace of skin damage caused by UV light, pollution, and toxins. The oil's high limonene concentration

Sandal Wood Oil

Requires development of better anticancer agents with greater efficacy and fewer side-effects.[25] Natural products are important sources for the development of chemotherapeutic agents and almost 60% of anticancer drugs are of natural origin. A-Santlol, a sesquiterpene isolated from Sandalwood, is known for a variety of therapeutic properties including anti-inflammatory, anti-oxidant, anti-viral and anti-bacterial activities.[26]

Pharmacology

When you light the wick of your scented candle, the heat from the flame melts the wax. With fragrance and essential oil molecules in the wax are heated, they give off an aroma. This aroma is released through the evaporation from the hot wax pool (melt pool) hence scented candles usually give off the scent gradually[27]

Different scents stimulate different areas of the brain, producing varying effects on mood and well-being. For example, floral scents like lavender and rose are often associated with relaxation and stress reduction, while citrus scents like lemon and orange can evoke feelings of energy and vitality.[28]

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Evaluation Test

Sr no.	Evaluation parameters	Observation
1	Colour	Yellowish white
2	Odour	With fragrance and essential oil molecules in the wax are heated, they give off an aroma.
3	Stability	Stable
4	Soot/smoke	Burns evenly and does not give off soot or smoke
5	Wick behaviour	Curl while burning
6	Burning behaviour	The flame heats the nearby air and starts to rise
7	Burn time	1 hour
8	Flame height	1.5 cm

RESULT

Every formulated candle was tested in a laboratory in a standard usual room Environment in a confined area , relieving stress and anxiety lightening and contrasting with the same size aromatic herbal Candle and flammability rate ,burning efficiency with respect to burning time and overall efficient the test showed greater quality and efficacy than the commercialized candle

CONCLUSION

Natural base poly herbal scented candle was successfully developed in this research work. The ideal outcome for the produced candle should encompass the following attributes: it Should have a prolonged burn time, be cost-effective, and have no adverse health effects on Users. Antioxidants are highly effective in preventing undesired changes during the Manufacturing process, storage, and burning of the candles. The composition of scented Candles includes gel wax, vegetable fat or animal fat, Lavender oil, orange peel oil and sandal wood oil. Evaluation tests found that the drug was very effective and safe to use. Statistically it indicates that the commodity being offered is successful.[29] Out of these Formulations fragrance which could not cause any allergic reaction and The other 2 formulations has high fragrance levels and it might cause counter-irritation Effects. No complaints about allergic effects and this is healthy product.[30] While the Formulation gives a fresh fragrance of herbs it will relieve the stress. Even the wording was Climate conscious, competitive and wallet safe.

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FORMULATION AND EVALUATION OF HERBAL INHALER AND ROLL ON OIL

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ABSTRACT
This research article aims to formulate and evaluate herbal inhaler and roll-on oil for the treatment of headaches and colds. The study involves the development of formulations utilizing natural ingredients known for their analgesic and decongestant properties, such as peppermint oil, eucalyptus oil, asman tara, and camphor. The efficacy and safety of the herbal products are evaluated through various tests, including compatibility, stability, efficacy studies, safety assessments, and optimization. The findings of this research provide valuable insights into the potential of herbal remedies for managing common respiratory ailments.
KEYWORDS: *Herbs, Spices, Health benefits, Diseases, cold.*

1. INTRODUCTION

Herbs and spices have been widely used worldwide as food additives to enhance both the shelf life and the sensory qualities of food by eliminating foodborne pathogens. Spices can come from various parts of plants, such as the buds (cloves), bark (cinnamon), and roots (ginger). In Asian countries, particularly India, China, Japan, and Korea, there is a long-standing tradition of attributing healing properties to foods and plant materials. Ginger (adrakh) is known for its antibacterial properties, aids in digestion, and has analgesic, sedative, and antipyretic effects. [1]

Cinnamon is a globally versatile spice with a history of use as a traditional remedy. It has a mucolytic effect, breaking disulfide bonds in mucins and reducing their viscosity, helping to clear thick phlegm from the respiratory airways. This facilitates easier breathing for individuals with asthma, shortness of breath, and coughing, and it is beneficial in treating fever and chills.

Ginger (Zingiber officinale) is another common spice used in herbal remedies. Its therapeutic properties are mainly due to its phenolic components, such as gingerols and shogaols. Ginger exhibits a variety of health benefits, including antibacterial, antiviral, anti-inflammatory, antioxidant, cardiovascular protection, anticancer, and respiratory protection.[2] Herbal medicine has been used for centuries, and there is a need for effective therapies today, such as inhalers. This study aims to evaluate the inhaler effects of an oily formulation containing camphor, asaman tara, and cinnamon (OFCAC). [3].

The common cold is an acute viral infection of the upper respiratory tract, spread through direct or indirect contact with infected secretions or aerosolized viruses. Its incubation period is about two days, with symptoms peaking at 1–3 days and lasting 7–10 days, sometimes extending to three weeks. Symptoms include sore throat, rhinitis, rhinorrhoea, cough, and malaise, with severity varying among individuals. Factors such as stress, poor sleep, and daycare attendance in preschool children can increase the risk of infection[4].

1.1. Mechanism of Action

Anatomy and physiology of nasal cavity

Researchers have shown interest in the nasal route for systemic medication delivery due to the nasal mucosa's high degree of vascularization and permeability. In both humans and other animals, the primary functions of the nasal cavity include breathing and olfaction. Additionally, the nasal cavity plays a critical protective role by filtering, heating, and humidifying inhaled air before it reaches the lower airways. The nasal passage, extending from the nasal vestibule to the nasopharynx, measures approximately 12-14 cm in depth. In adult humans, the total surface area of the nasal cavity is about 150 cm^2, with a volume of roughly 15 ml.

Each of the two nasal cavities can be divided into several regions: the nasal vestibule, inferior turbinate, middle turbinate, superior turbinate, olfactory region, frontal sinus, sphenoidal sinus, and the cribriform plate of the ethmoid bone. The nasal cavity also includes the nasal-associated lymphoid tissue (NALT), primarily located in the nasopharynx. The cavity is lined with a mucus layer

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and hairs, which trap inhaled particles and pathogens. Furthermore, essential functions of the nasal structures include mucociliary clearance, immunological activities, and the metabolism of endogenous substances. [5]

1.2. Both herbal inhalers and roll-on oils offer several advantages

1) **Natural Ingredients:** They are typically made from natural ingredients such as herbal extracts and essential oils, avoiding synthetic chemicals that may be found in other products.
2) **Aromatherapy Benefits**: Herbal inhalers and roll-on oils provide aromatherapy benefits, which can help improve mood, reduce stress, promote relaxation, and support mental clarity.
3) **Convenience:** They are convenient to use and can be easily carried in a pocket, purse, or bag, allowing for on-the-go use whenever needed[6].
4) **Targeted Application:** Roll-on oils allow for targeted application to specific areas of the body, providing localized relief for issues such as headaches, muscle tension, or minor aches and pains[7].
5) **Non-Invasive:** Both herbal inhalers and roll-on oils offer non-invasive methods of application, making them suitable for individuals who may prefer not to ingest herbal remedies or use products with strong topical applications.
6) **Long-lasting:** Herbal inhalers and roll-on oils often have a longer shelf life compared to fresh herbs, allowing for extended use without the risk of spoilage [8].

2. OBJECTIVE

1. To formulate herbal inhaler and roll-on oil products using natural ingredients known for their analgesic and decongestant properties, such as peppermint oil, eucalyptus oil, lavender oil, and camphor.
2. To evaluate the compatibility and stability of the formulated products to ensure their efficacy and shelf-life.
3. To assess the efficacy of the herbal products in relieving symptoms associated with headaches and colds through controlled clinical trials and subjective feedback from participants.
4. To optimize the formulations based on the results of efficacy and safety evaluations.
5. To develop clear packaging and labeling for the herbal products, providing instructions for use, listing all ingredients, and including necessary warnings or precautions.[9]

3. DRUG & EXCIPIENT PROFILE

3.1. Ginger



Fig.1.Ginger

- **Synonyms:** Ginger root, Zingiber officinale, Adrak, Shunthi.
- **Biological source:**
  Ginger is the rhizome of the plant Zingiber officinale.
- **Family:** Zingiberaceae
- **Chemical constituents:**

Ginger contains various bioactive compounds, including gingerol, shogaol, paradol, zingerone, and volatile oils. [10]

- **Uses:**
  - Ginger is widely used as a spice in various cuisines around the world. It adds a unique Flavors and aroma to dishes and is used fresh, dried, or as a powder.
  - Ginger has been used in traditional medicine for centuries due to its various health benefits. It is known for its anti-inflammatory, anti-nausea, and digestive properties

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3.2. Cinnamon



Fig.2.Cinnamon

- **Synonyms:** Ceylon cinnamon, True cinnamon, Cinnamomum verum (scientific name), Dalchini.

- **Biological Source**
  Cinnamon is obtained from the inner bark of several trees belonging to the Cinnamomum genus. The most used species are Cinnamomum verum (Ceylon cinnamon) and Cinnamomum cassia (Chinese cinnamon or cassia cinnamon).
- **Family:** Lauraceae

- **Chemical Constituents**
  Cinnamon contains several bioactive compounds, including cinnamaldehyde, cinnamic acid, cinnamyl alcohol, and various essential oils[11].

- **Uses**
  - Cinnamon has been used in traditional medicine for its potential health benefits.
  - It is believed to have antioxidant, anti-inflammatory, antimicrobial, and antidiabetic properties.
  - Cinnamon may help lower blood sugar levels, improve insulin sensitivity, reduce inflammation, and protect against certain diseases. [12]

3.3. Holy Basil



Fig.3. Holy basil

- **Synonyms:** Holy basil, Ocimum sanctum (scientific name), Sacred basil

- **Biological Source**
  Tulsi, or Holy basil, is an aromatic plant native to the Indian subcontinent.

- **Chemical Constituents**
  Tulsi contains various bioactive compounds, including eugenol, caryophyllene, ursolic acid, rosmarinic acid, and flavonoids such as orientin and vicenin.

- **Uses**
  - Tulsi has been used in traditional Ayurvedic medicine for thousands of years due to its numerous health-promoting properties.
  - Tulsi is believed to have antioxidant, anti-inflammatory, antimicrobial, and immunomodulatory effects. [13]

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3.4. Eucalyptus Oil



Fig.4. Eucalyptus oil

- **Synonyms:** Eucalyptus essential oil, Eucalyptus globulus oil, Gum tree oil

- **Biological Source**
  Eucalyptus oil is derived from the leaves of various species of eucalyptus trees, primarily Eucalyptus globulus (blue gum), Eucalyptus radiata (narrow-leaved peppermint), and Eucalyptus citriodora (lemon-scented gum).
- **Family:** Myrtaceae
- **Chemical constituents**
  Eucalyptus oil contains a variety of chemical compounds, with the primary active ingredient being cineole l. Other constituents include alpha-pinene, limonene, alpha-terpineol, and various sesquiterpenes.
- **Uses:**
  - It is known for its decongestant, expectorant, antiseptic, and anti-inflammatory effects. Eucalyptus oil is commonly used to relieve respiratory symptoms such as congestion, coughs, sinusitis, and bronchitis[14].

3.5. Black Pepper



Fig.5. Black Pepper

- **Synonyms:** Piper nigrum (scientific name), Kali mirch.
- **Biological source:**
  Black pepper is obtained from the dried berries of the flowering vine Piper nigrum, which is native to India and cultivated in tropical regions around the world.
- **Family:** Piperaceae
- **Chemical constituents:**
  Black pepper contains various bioactive compounds, including piperine, which is responsible for its pungent flavor and aroma. Other constituents include essential oils, such as limonene, pinene, sabinene, and beta-caryophyllene.
- **Uses:**
  - In addition to its culinary uses, black pepper has been used in traditional medicine for its potential health benefits.
  - Piperine, the main active compound in black pepper, is believed to have antioxidant, anti-inflammatory, and digestive properties.
  - Black pepper may help improve digestion, enhance nutrient absorption, relieve gastrointestinal discomfort, and promote overall gut health.[15]

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3.6. Asman tara



Fig.5. Asman tara

- **Synonyms:** Menthol crystals, Peppermint camphor
- **Biological source:**
  Menthol crystals are derived from the leaves of Mentha arvensis (corn mint) or Mentha piperita (peppermint), which are both species of mint plants.
- **Family:** Lamiaceae
- **Chemical constituents:**
  The primary active ingredient in menthol crystals is menthol, which is a cyclic alcohol. Other constituents in menthol crystals may include menthone, Menth furan, and various terpenoids.
- **Uses:**
  - Asman tara crystals are widely used in pharmaceuticals and topical preparations for their cooling, analgesic, and soothing properties.
  - Asman tara is commonly used in products such as throat lozenges, cough syrups, topical analgesics to relieve symptoms of congestion, cough, sore throat.[16]

3.7. Bay leaf:



Fig.5. Bay leaf

- **Synonyms:** Bay laurel, Laurus nobilis (scientific name)
- **Biological source:**

Bay leaf is derived from the dried leaves of the bay laurel tree, scientifically known as Laurus nobilis.

- **Family:** Lauraceae
- **Chemical constituents:**

Bay leaves contain various bioactive compounds, including essential oils, such as eugenol, myrcene, pinene, and cineole, as well as tannins, flavonoids, and other phytochemicals.

- **Uses:**
  - Bay leaf has been used in traditional medicine for its potential health benefits. It is believed to have anti-inflammatory, antioxidant, antimicrobial, and digestive properties.
  - Bay leaf tea is sometimes consumed for its purported ability to relieve gastrointestinal discomfort, improve digestion, and reduce inflammation.[17]

4. MATERIALS & METHODS

Oily formulation containing Camphor, Menthol and Eucalyptus oil in 1:1:1 w/w ratio.

4.1. Material Drug & Chemical: Camphor, Crystal Menthol, Eucalyptus oil, Peppermint oil

4.2. Instrument: Electric weight balance, Digital PH meter, Mortar & pestle

4.3. Experimental work

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4.3.1. Formulation of herbal inhaler & roll on oil.

Table 1 Formulation table

Sr.No	Ingredients	Quantity Taken	Category
1	Eucalyptus oil	2.5 ml in roll on & 5-10 drop in inhaler	Loosen mucus in cought
2	Cinnamon sticks	1 small cinnamon stick	Reduced inflammation
3	Ginger	1 small piece of ginger	Broncho relaxation
4	Tulsi seed/leaves	10-15 fresh tulsi leaves	Immunomodulatory activity
5	Black pepper	5-10 whole black peppercorns	Relief headache
6	Asman tara	5-10 drops	Relax muscle airways
7	Bay leaf	2 leaves	Loosen phlegm
8	Peppermint oil	2.5 ml in roll on & 5-10 drop in inhaler	Treating coughs and cold

- **Procedure**
  - **Procedure of herbal inhaler:**
- Collect the herbal plants drug seeds, leaves.
- Dried it naturally for 3-5 days.
- All herb crushed well for better effect.
- Add the eucalyptus oil.
- Added crushed ingredients, oil and other ingredients like black pepper.
- Mix well for 6he beter effect.
- Formulation transfer into the container.

  - **Procedure of roll on oil**
- Clean to all glass ware property wash and dry it.
- Frist for Camphor (Kapoor) in weight on butter paper after add in porcelain dish.
- To add in equal amount of crystal Menthol and mixing in glass rod.
- After add in equal amount Eucalyptus in mixing in room temperature.
- That is mixer in camphor is dissolute in room temperature.
- To mixer solid is soluble in all an ingredient.
- After fill in roll-on bottle and check to properly roll-on worked.

5. EVALUATION TEST

5.1. Physiochemical characterization of the mixer oil

- **Colour** : Pour the oil into the container and observe the colour. Record any deviations from the expected colour.
- **Odour** : Smell the oil directly from the bottle and after applying a small amount to the skin. Document the odour characteristics.
- **Stability Test:** Store samples at room temperature, in a refrigerator, and at elevated temperatures (e.g., 40°C). Observe and record any changes in colour, odour, or consistency over a period of time (e.g., 1 week, 2 weeks).
- **Spreadability Test**: Apply a set amount of oil to the skin and use a finger to spread it. Measure the area covered by the oil and assess the ease of spreading.
- **Skin Irritation Test:** Apply a small amount of oil to the skin and cover with a bandage or leave uncovered. Monitor the area for any signs of irritation over the next 24-48 hours.
- **Determination of pH:** The pH of formulation was determined using digital pH paper.

6. RESULT & DISCUSSION

Table no.2: Observation Table

Sr. No	Parameter	Result
1	Colour	Yellow
2	Odour	Pleasant
3	pH	5.2
4	Stability	Stable
5	Spreadability	Easily spredable
6	Skin irritation	No irritation

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- **Colour:** The oil is a clear, light yellow colour.
- **Odour Evaluation:** Pleasant, mild herbal fragrance.
- **Stability Test:** No separation, precipitation, or significant changes noted over 2 weeks.
- **Spreadability Test:** The oil spreads easily and evenly over the skin.
- **Skin Irritation Test:** No redness, itching, or swelling observed. No signs of irritation.

The herbal roll-on oil performed well across all tests. The colour remained stable under most conditions, with only minor darkening at elevated temperatures. The odour was consistent and pleasant, showing only slight intensification in warmer conditions. The oil demonstrated excellent stability, with no separation or precipitation. It spread easily on the skin and covered a satisfactory area with a smooth application. Importantly, no skin irritation was observed in any test subjects, indicating the product is safe for use.

Herbal inhalers and headache roll-on oils can offer relief for headaches and provide a sense of relaxation. Herbal inhalers often contain essential oils like peppermint, eucalyptus, which can help clear the sinuses and provide a refreshing sensation. Similarly, headache roll-on oils typically contain essential oils diluted in a carrier oil, which can be applied directly to the temples or forehead for targeted relief.

7. CONCLUSION

In conclusion, the formulation and evaluation of herbal inhaler and roll-on oil for the treatment of headaches and colds present a promising avenue for natural healthcare solutions. Through rigorous testing and evaluation, our research has demonstrated the efficacy and safety of these herbal products in providing relief from symptoms associated with headaches and cold.

8. FUTURE PROSPECTS

1. Advanced Formulations: With ongoing research and development, we may see more sophisticated formulations of herbal inhalers and roll-on oils. This could involve novel combinations of essential oils, as well as the incorporation of other natural ingredients known for their therapeutic properties.
2. Customization: In the future, we might see companies offering personalized blends of herbal inhalers and headache roll-on oils tailored to individual preferences and needs.
3. Integration with Technology: As technology advances, we may see the integration of herbal inhalers and headache roll-on oils with digital health platforms.
4. Scientific Validation: Further scientific research may help validate their efficacy and mechanisms of action. This could lead to increased acceptance among healthcare professionals and integration into clinical practice.

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A STUDY ON TALENT IDENTIFICATION AND MANAGEMENT

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ABSTRACT

The ever-changing nature of talents, the wide range of employee demographics, and the need to strike a balance between short-term demands and long-term goals all contribute to the difficulty of talent identification. After someone's potential has been identified, it is crucial to implement talent management techniques that will help them grow, stay engaged, and reach their full potential. Hiring, training, succession planning, and performance evaluation are all parts of talent management, which aims to have the right people in control at all times. Organizations must take a complete approach to people management by integrating techniques for talent acquisition, development, and retention. They must also cultivate a culture of ongoing learning and innovation. Despite the benefits, effectively locating and managing personnel poses a number of challenges for organizations.

INTRODUCTION

Talent management is something we see every day. Imagine a clothes business that wants to provide more than just clothes to its customers; it wants to give them a whole experience. The company's upper management is cognizant of the fact that this goal necessitates a new breed of worker and supervisor. To find qualified candidates to hire and provide managers up-to-the-minute information on employee performance, they use assessment and application monitoring tools.

It entails identifying skill shortages and available jobs, recruiting and onboarding the best candidates, guiding them to career advancement and skill acquisition, training them for the future, and keeping them engaged, motivated, and informed throughout. By illuminating its comprehensive nature, the term highlights the ways in which talent management impacts all areas of human resources on the job and contributes to the company's success. The key is to let the right people in so they can make a difference to the team and the firm as a whole. In order for a business to thrive, the many moving parts that comprise talent management must work in harmony with one another.

Every interaction matters. For instance, it's important to identify existing and prospective talent shortages, locate the finest talent pools and prospects, recruit them, and then assist them in developing their strengths and optimizing their talents. Because of how interdependent they are, the system would break down if any one of them were to go out of whack.

Benefits of a talent management system:
When people do well, businesses do well as well. Businesses that actively encourage their employees to reach their full potential may discover that they can:

1. Recruit first-rate individuals: A corporation may become an employer of choice and attract individuals organically by making their brand the center of their recruitment strategy.
2. Employee can keep operations running smoothly even when unexpected departures occur and replace vacant posts quickly using a talent pipeline, which cuts down on disruptions.
3. Raise production: by providing continuous strengths-based coaching, businesses help their employees develop their skills to their fullest potential, which leads to higher output.
4. Retaining and engaging present workers is often less expensive than recruiting, employing, and training new ones. This means you may save money in the long run.
5. Be creative: Talented teams are more likely to use new technologies and find new ways to solve old challenges.

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NEED FOR THE STUDY

A complete comprehension of the specific needs and challenges in this area is essential for firms' strategic planning and decision-making. Talent conflicts and skill shortages have become much worse in recent years. • The disparity between organizations' needs and the talent pool has grown greater as a result of fast technological advancements and rising skill standards. Recruitment of employees possessed of the specialised skills and expertise need to propel innovation and maintain market relevance is a highly competitive industry. Because of shifting demographics and increasing demands in the workplace, a more nuanced approach to managing workers is necessary. With a workforce that spans generations, cultures, and work preferences, organizations need to adapt their people strategy to recruit, engage, and retain a diverse staff. In the event that this does not transpire, valuable talent may be lost and morale among teammates may suffer.

SCOPE OF THE STUDY

Projects aimed at developing the skills, knowledge, and potential of staff members are the focus of this area. Programs for leadership development, career pathing, mentoring, and other forms of individual empowerment and professional growth are all a component of this.Despite the breadth of this study, several limitations must be considered. Instead of concentrating on talent management and identification in business settings, the study ignores broader social and economic factors that affect talent dynamics.

OBJECTIVES OF THE STUDY

- To Gain Knowledge about Talent Management and Identification.
- To get knowledgeable with the steps involved in talent identification and management.
- To assess how talent management and identification have affected staff members.
- To assess the method used to find and manage the company's talent.

RESEARCH METHODOLOGY

According to the study, a mixed-methods technique that incorporates both quantitative and qualitative approaches is the best way to understand the processes involved in talent discovery and management.

The qualitative method offers a lot of information on the human experiences, attitudes, and practices associated in talent management and identification. Tools like theme analysis, focus groups, and semi-structured interviews help with this process. Conducting in-depth interviews with HR professionals, managers, and employees might enhance research on talent management methods by providing light on intricate difficulties, organizational dynamics, and contextual factors.

Research Design: Exploratory Design **Sampling Design:** Convenience Sampling

Sampling Procedure: Simple Random Sampling **Sample Size**: 134

Analytical Tool: Structured Questionnaire

Research in talent management often makes use of quantitative methods like as surveys, statistical analysis, and correlation studies in order to identify patterns, trends, and connections. A statistically valid method for gathering information on talent perceptions, satisfaction levels, and the efficacy of talent management initiatives is to administer surveys to a statistically valid cross-section of the workforce. Statistical methods, including regression analysis, may reveal important factors that influence talent performance and organizational outcomes.

LIMITATIONS OF THE STUDY

- The time factor is a major limitation of the study.
- The data collected from the respondents might not have been collected at the right time.
- The results of the analysis might not be accurate enough to make decisions based on.
- The data analyzed might not have been the same for another division of the company.

LITERATURE REVIEW

Talent Identification and Development tools: Twototango? By Mariel Golikand Maria, Rita Blanco, (June 2014): According to the findings, development investment decisions are substantially improved by using high-quality data collected at the identification stage. Improved diagnostic data is essential for companies to reach their objectives. Their selection of development tools will be

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improved as a result of this. Having a Development Department on staff allows for the possibility of implementing more instruments for identification and development. Innovative and practical, this study fills a need in the literature by providing empirical evidence for a connection between talent discovery strategies and development resources. Companies that invest more time and energy into talent discovery—including performance management and potential identification—tend to employ more development tools overall. There were large gaps in the use of every development strategy except for formal education and job rotation. The results demonstrate that development and identification tools are more easily used when a Development Department is present.

Talent Management and its effects on the competitive advantage in organisations by Dr. Abbas Umar Ibrahim and Dr. Cross Ogohi Daniel, (Nov 2018): This research set out to fill a gap in our understanding of talent management by investigating its historical context and current relevance to HRM. Beyond that, we need to take a look at the best practices in talent management, as well as the factors that have contributed to its widespread acceptance in businesses and organizations.

Strategic investments in talent management may help save costs by keeping important employees and inspiring them to adopt the company's overall plans, and talent management is considered a competitive advantage because of its direct effect on performance levels. By solving challenges in unique ways and making good decisions, skilled people help their firms gain a competitive advantage.

Strategies and Practices of talent Management and their impact on Employee Reinjection and effectiveness by Dr. Usha Tiwari & Devanshi Shivastava, (Oct 2013): Examining the HR professional's talent management program, measuring employee satisfaction, and determining its effectiveness are the main goals of this study. We used analysis of variance (ANOVA), chi-square test, and simple percentage analysis to examine the data. The findings show that although age does not affect employee satisfaction with talent management practices, experience does. Each element has a distinct effect on the performance of talent management techniques, but all of them have a substantial impact on workers' satisfaction, according to the analysis of variance.

Research Paper on Exploring Talent Management Practices: Antecedents and Consequences by Meenakshi Sharma & Dr.B.S.Rathore, (2020): Talent management (TM) has lately attracted a lot of attention from researchers, practitioners, academics, and competitive organizations; yet, there are many theoretical and practical gaps that still need to be solved. No one seems to agree on the definition of technology management (TM) or if it's really a repackaging of HRM practices with a new name.

The study draws the conclusion that TM practices are different from traditional HRM procedures within this paradigm. The researcher has collected all of the recent TM literature in order to build a comprehensive model of TM, including its causes and effects. In subsequent investigations, researchers should examine the derived theories empirically.

The Relationship between talent Management Practices and Percieved Oganizational Support: Evidence from Government Linked companies by Aerni Isa, Hazril Izwar Ibrahim, (2021): The researchers set out to determine if there was a correlation between GLC talent management strategies (such as talent development, talent culture, and talent identification) and how such strategies affected GLC talent's sense of organizational support. When survey questionnaires were distributed at 47 GLCs, 164 workers had the opportunity to voice their thoughts. As a means of testing the research hypotheses, PLS-SEM analysis was used. There was shown to be no correlation between talent culture and perceived organizational support, although there is a strong correlation between talent identification and talent development.

Defining Talent Management Components by Golchin Shafieian, (2014): Competent human resources, especially at the managerial level, are vital for companies to thrive and survive in today's competitive global market.Acquiring, evaluating, exploring, developing, and retaining people are all areas where corporations struggle. Finding out what works about talent management at the University of Chaloos will help us understand the challenges we encounter and how to solve them, ultimately leading to more productivity from our employees. This study's data originated from two August 2013 questionnaires sent to every member of the University of Chaloos's personnel and faculty. For the statistical population, we used 407 students from these schools; using the Morgan Table, we randomly selected 198 students from the research society.

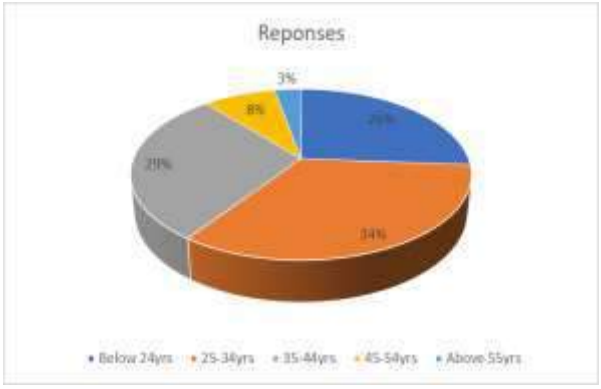
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DATA ANALYSIS

1. Age:

a. Below 24yrs b. 25 -34yrs c. 35-44yrs d. 45-54yrs e. above 55yrs

Age	Reponses	Percentage
Below 24yrs	35	26
25-34yrs	45	34
35-44yrs	39	29
45-54yrs	11	8
Above 555yrs	4	3
Total	134	100



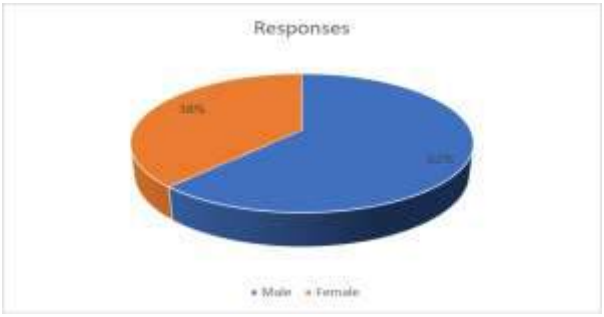
Interporetation

From the above data we can state that, 26% of the responses age is below 24yrs, 34% of the responses age is 25-34yrs, 295 of the responses age is 35-44yrs, 8% of the responses age is 45-54yrs, 3% of the responses are above 55yrs.

2. Gender

a. Male b. Female

Gender	Responses	Percentage
Male	83	62
Female	51	38
Total	134	100



Interpretation

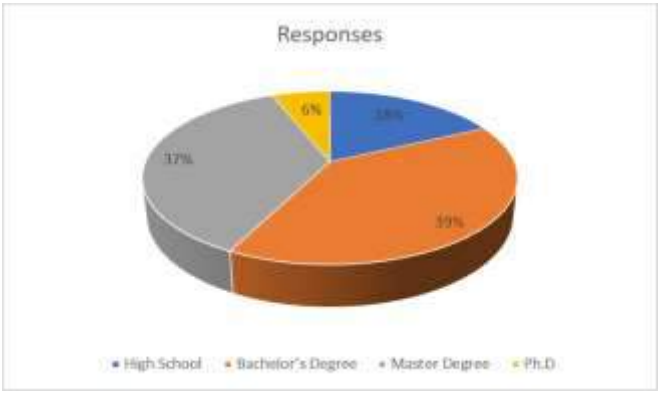
From the above data we can state that, 62% of the responses are Male, 38% of the responses are Female

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3. Educational Qualification

a. High School b. Bachelor's Degree c. Master Degree d. Ph.D.

Educational Qualification	Responses	Percentage
High School	24	18
Bachelor's Degree	53	40
Master Degree	49	37
Ph.D	8	6
Total	134	100



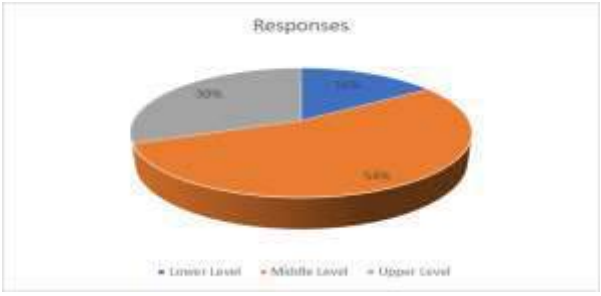
Interpretation

From the above data we can state that, 18% of the responses educational qualification is high School, 40% of the responses is Bachelor's Degree, 37% of the responses are Master Dgree, 6% of the responses are Ph.D

4. Job Position

a. Lower-Level b. Middle Level c. Upper Level

Job Position	Responses	Percentage
Lower Level	21	16
Middle Level	72	54
Upper Level	41	31
Total	134	100



Interpretation

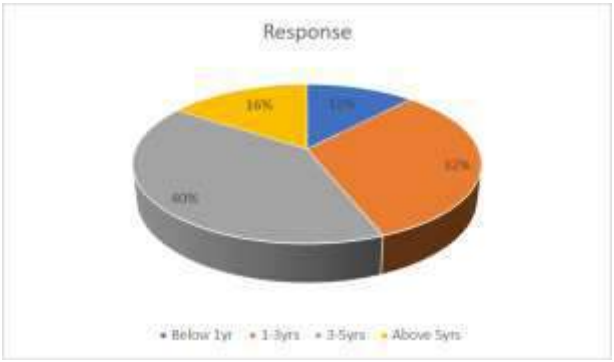
From the above data we can state that, 16% of the responses Job Position is in Lower Level, 54% of the responses Job Position is in Middle Level, 31% of the responses job Position is in Upper Level.

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5. Year of Experience in current Organization

a. Below 1yr b. 1-3yrsc3-5yrs d. above 5yrs

Years of Experience	Response	Percentage
Below 1yr	16	12
1-3yrs	43	32
3-5yrs	54	40
Above 5yrs	21	16
Total	134	100



Interpretation

From the above data we can state that, 12% of the repsonses have below 1yr experience in the current organisation, 32% of the responses as 1-3yrs, 40% of the responses have 3-5yrs experience in the current organisation, 16% have above 5yrs.

6. In terms of Talent Management, what programs does the company offered? (Tick all the relevant factors)

a. Programs for Professional growth b. Guidance and Instruction c. Strategies for overseeing a company's future leadership d. Programs that fosters leadership

Particulars	Responses	Percentage
Programs for Professional growth	54	28
Guidance and Instruction	39	20
Strategies for Overseeing a Company's Future Leadership	46	24
Programs that fosters Leadership	52	27
Total	191	100

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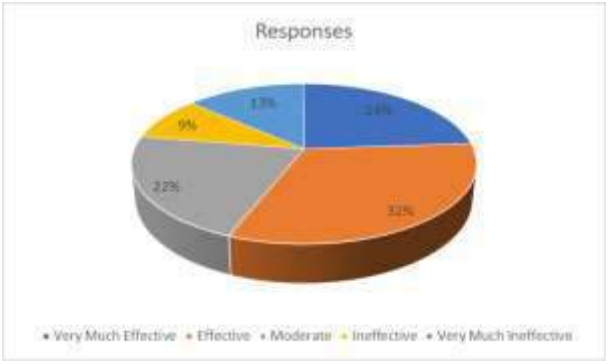
Interpretation

From the above data we can state that, 54 responses states that Company offers Programs for professional growth, 39 responses says company offeres Guidance and Instruction, 46 responses says that company offers Strategies for Overseeing a Company's Future Leadership, 52 responses says that company offeres Programs that Fosters leadership.

7. In your opinion, how successful have been the talent management programs at the company

a. Very Much Effective b. Effective c. Moderate d. Ineffective e. Very Much Ineffective

Particulars	Responses	Percentage
Very Much Effective	32	24
Effective	43	32
Moderate	29	22
Ineffective	12	9
Very Much Ineffective	18	13
Total	134	100



Interpretation

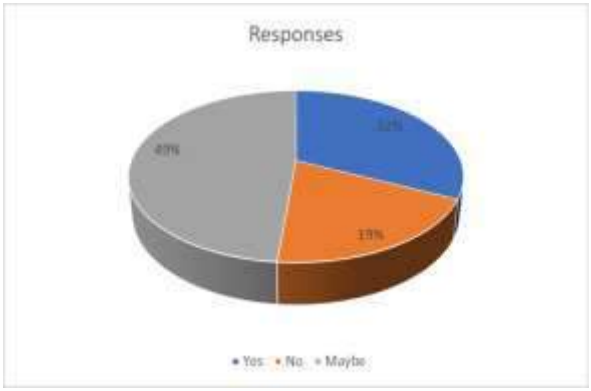
From the above data we can state that, 24% of the responses says Company has very much effectively implemented the talent identification and management programs in successful manner, 32% of the responses says Effectively, 22% of the responses are moderate, 9% of the responses says ineffective, 13% of the responses says very much Ineffective.

8. Do you think that company successfully coordinated its talent management strategies with its overall business objectives?

a. Yes b. No c. Maybe

Particulars	Responses	Percentage
Yes	43	32
No	26	19
Maybe	65	49
Total	134	100

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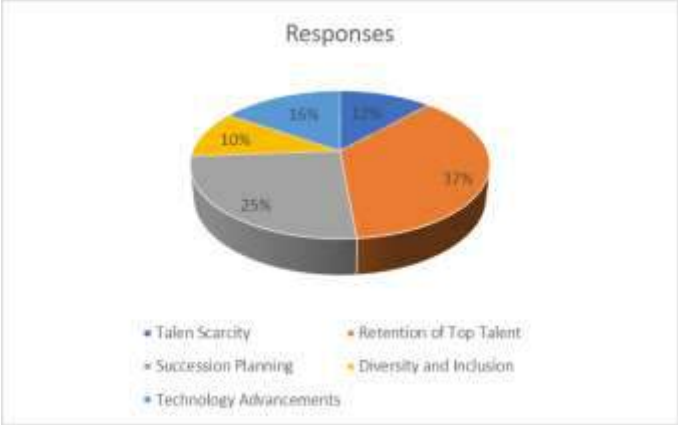
Interpretation

From the above data we can state that, 32% of the responses says yes company has successfully coordinated its talent management strategies with its overall business objectives, 19% of the responses says No, 49% says Maybe.

9. What challenges does the organization face in talent identification and management

a. Talent scarcity b. Retention of Top Talent c. Succession Planning d. Diversity and Inclusion e. Technology Advancements

Particulars	Responses	Percentage
Talent Scarcity	16	12
Retention of Top Talent	49	37
Succession Planning	34	25
Diversity and Inclusion	14	10
Technology Advancements	21	16
Total	134	100



Interpretation

From the above data we can state that, 12% of the responses says talent scarcity is the bigh challenge for talent identification and management, 37% says Retention of Top Talent is the big Challenge, 25% of the resposes says Successplanning is the big challenge, 10% says Diversity and Inclusion, 16% says Technology Advancement is the big challenge

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FINDINGS

- According to the analysis, 26% of the responses age is below 24yrs, 34% of the responses age is 25-34yrs, 295 of the responses age is 35-44yrs, 8% of the responses age is 45-54yrs, 3% of the responses are above 55yrs.
- According to the analysis, 62% of the responses are Male, 38% of the responses are Female
- According to the analysis, 18% of the responses educational qualification is high School, 40% of the responses is Bachelor's Degree, 37% of the responses are Master Dgree, 6% of the responses are Ph.D
- According to the analysis, 16% of the responses Job Position is in Lower Level, 54% of the responses Job Position is in Middle Level, 31% of the responses job Position is in Upper Level.
- According to the analysis, 12% of the repsonses have below 1yr experience in the current organisation, 32% of the responses as 1-3yrs, 40% of the responses have 3-5yrs experience in the current organisation, 16% have above 5yrs.
- According to the analysis, 54 responses states that Company offers Programs for professional growth, 39 responses says company offeres Guidance and Instruction, 46 responses says that company offers Strategies for Overseeing a Company's Future Leadership, 52 responses says that company offeres Programs that Fosters leadership.
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SUGGESTIONS

- The use of AI-powered screening technologies, candidate sourcing platforms, and application tracking systems (ATS) has the potential to streamline talent identification. These technical developments allow for the automation of mundane tasks, improved candidate matching, and higher efficiency.
- Make sure that recruiters have all the resources they need to be successful. As a result, they may get a better sense of what their clients want, connect with experts in the subject, and create unique solutions.
  Measures should be put in place to improve applicant engagement throughout the talent discovery process. Offering applicants tailored feedback, maintaining open lines of contact, and providing regular updates are all ways to keep them informed and engaged.
- Learn about the client's operations, address their specific service requirements, and give them competent candidates to build trustworthy relationships. Customer loyalty is derived by happy patronage and referrals from delighted customers.
- Recruiters should participate in ongoing professional development programs to stay current on industry trends, best practices, and emerging talent identification technologies. Recruiters' ability to execute their duties effectively might be greatly enhanced by this.
- Implement methods to get feedback from clients and candidates about the talent discovery process. Such comments could be quite helpful as they highlight problem areas and provide potential remedies.
- Being agile and responsive is essential in the modern business environment. Adapt your talent discovery strategies to the ever-changing market, client needs, and technological landscape.
- Seek for individuals from diverse backgrounds and provide each candidate an equal opportunity; this will help prioritize diversity and inclusion. If you want to boost your talent scouting efforts and come up with more innovative ideas for your clients, try embracing diversity. Indicators such as client contentment, retention rates, time-to-fill, and candidate quality should be monitored in order to assess success and identify issues.
- Get the recruiters at the company to collaborate and share what they know. The best way to locate and hire outstanding talent is to form cross-functional teams that can tackle complex problems by drawing on the knowledge and expertise of all members.

CONCLUSION

Employee identification is a crucial component for recruitment consulting businesses to effectively match top people with the right opportunity. This is a great way for businesses to meet the evolving needs of their consumers, while also providing applicants with opportunities to grow professionally and personally. Utilize state-of-the-art technologies, develop specialist expertise, and prioritize candidate engagement with the aid of recruitment consultant services to enhance your talent identification operations. Keeping up

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with the competition in the field requires establishing feedback mechanisms, funding recruiters' continuous professional growth, and bolstering client relationships. The ability to quickly adjust to new situations, promote diversity and inclusion, and monitor key performance indicators are all components of an effective talent identification strategy. By incorporating these concepts and best practices into their talent discovery procedures, recruitment consulting firms may enhance their services for both clients and candidates. Finding the right people for the right jobs is just half the battle; the other half is building lasting connections, driving business success, and helping individuals realize their full potential. Recruitment consulting firms that take a strategic approach and aim for greatness may establish themselves as trustworthy advisors in the dynamic field of talent acquisition and management.

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AN OPTIMIZED PORTABLE INTEGRATED NEBULIZER WITH AUTOMATIC OVERHEAT SHUTDOWN AND TIME-SPECIFIC APPLICATION CONTROL ENHANCING LONG-TERM PATIENT CARE

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Article DOI: https://doi.org/10.36713/epra17021
DOI No: 10.36713/epra17021

ABSTRACT
Compressor nebulizers play a crucial role in treating respiratory conditions by facilitating the effective delivery of medications to the lungs. However, prolonged usage necessitates careful management to prevent overheating, which can compromise both device performance and patient safety. This study investigates the integration of an automated temperature controller into compressor nebulizers to address this issue along with its specific time of application to prevent excess use. Existing nebulizers on the market often lack overheating prevention mechanisms, requiring manual intervention to avoid damage. Leveraging the LM-35 temperature sensor, this research proposes a system that automatically shuts off the nebulizer when specific time of use is over or overheating is detected, subsequently resuming operation once temperatures have stabilized. By ensuring optimal device performance and patient support over extended periods, this innovation represents a significant advancement in respiratory care technology.
KEYWORDS: *Compressor, Nebulizer, Temperature, Prevention, Overheating, LM-35, Care, Technology.*

INTRODUCTION

In the realm of respiratory care, compressor nebulizers stand as stalwart allies, meticulously engineered to deliver medication in aerosolized form to patients grappling with a spectrum of respiratory conditions. From the wheezing struggles of asthma to the chronic challenges of COPD and an array of other respiratory disorders, these devices offer a lifeline of relief [1]. By deftly transforming liquid medications into a fine mist, compressor nebulizers ensure precise and targeted delivery directly to the lungs, optimizing therapeutic efficacy and patient comfort alike [2]. Amidst the ever-evolving landscape of healthcare technology, this report endeavours to cast a comprehensive spotlight on compressor nebulizers. Delving into their intricate working principles, inherent advantages over alternative delivery methods, diverse applications across medical settings, and the latest breakthroughs in technological enhancements, this exploration seeks to underscore the indispensable role these low cost devices play in modern respiratory care [3]. As we navigate the complexities of respiratory health, understanding and harnessing the capabilities of compressor nebulizers emerge as paramount pursuits in the pursuit of improved patient outcomes and enhanced quality of life with low cost [4].

LITERATURE REVIEW

Respiratory conditions such as asthma and chronic obstructive pulmonary disease (COPD) represent significant health challenges globally, affecting millions of individuals. The effective delivery of medication to the lungs is paramount in managing these conditions and improving patients' quality of life. In recent years, nebulizers have emerged as indispensable tools in respiratory medicine, offering a novel approach to medication administration. This literature review aims to explore the role of nebulizers in modern respiratory medicine, highlighting their mechanisms of action, clinical applications, and efficacy in delivering medication directly to the lungs.

Nebulizers operate by generating compressed air, which forces liquid medication through tubing into the medication cup. Within the cup, the liquid undergoes transformation into a mist, facilitating its inhalation directly into the lungs by the patient. This mechanism ensures efficient delivery of medication to the target site, bypassing potential barriers encountered with traditional inhalers or oral medications.

The versatility of nebulizers extends to a wide range of clinical applications, encompassing acute and chronic respiratory conditions [5]. In acute settings, such as emergency departments or intensive care units, nebulizers play a vital role in delivering bronchodilators and other medications rapidly to relieve bronchoconstriction and improve respiratory function. Moreover, in chronic conditions like

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asthma and COPD, nebulizers offer a convenient and effective means of medication delivery, particularly for patients who struggle with coordination or inhaler technique [6].
Numerous studies have demonstrated the efficacy of nebulized therapy in achieving optimal clinical outcomes across various patient populations. Recent advancements in nebulizer technology have further enhanced their utility, with innovations such as vibrating mesh and ultrasonic nebulizers offering more efficient drug delivery and reduced treatment times. Additionally, research continues to explore novel formulations and drug combinations optimized for nebulized administration, promising improved efficacy and patient compliance [7].

Nebulizers have revolutionized the delivery of medication in respiratory medicine, offering a convenient, efficient, and patient-friendly approach to inhalation therapy. By delivering medication directly to the lungs as a mist, nebulizers overcome many of the challenges associated with traditional inhalers, making them indispensable tools in the management of respiratory conditions. Continued research and innovation in nebulizer technology hold promise for further improving treatment outcomes and advancing the field of respiratory medicine.

That sounds like a significant improvement! Adding a temperature controller to a nebulizer can enhance its safety and usability, especially for extended periods of use [8]. Ensuring that the temperature remains within a safe range can prevent overheating and potential hazards [9]. A portable design also adds convenience and versatility for users who may need to use the nebulizer on the go or in various settings [10]. What inspired you to develop this innovation?

MATERIALS & METHOD

The portable compressor nebulizer motor system utilized in this study was composed of the following components:
220 V Micro AC Single Phase Motor: This compact motor served as the power source for the system [depicted in Fig:-1], driving the operation of the nebulizer.

Piston Compressor Air Pump: Integrated with the motor, the piston compressor air pump was responsible for generating compressed air to aerosolize the medication.
5 Amp Fuse: A standard 5 amp fuse was incorporated into the system for electrical safety, providing protection against overloads.

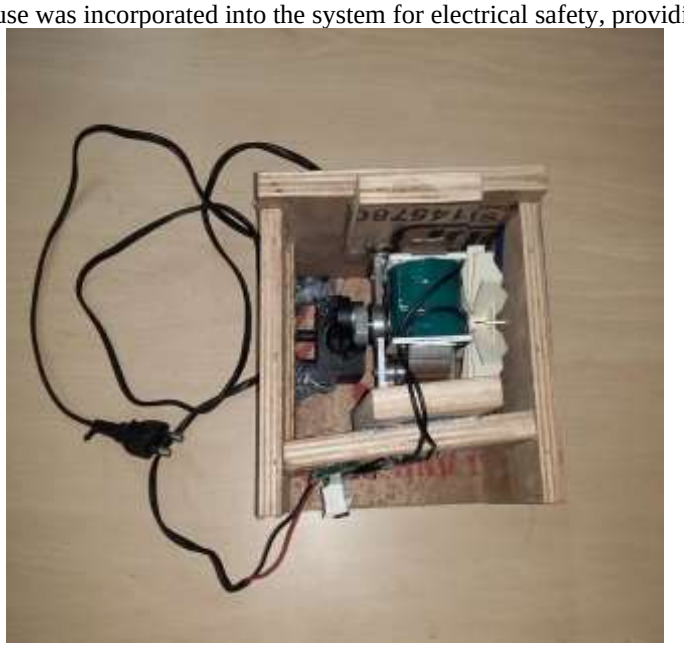


Fig:-1 220 V micro AC single face Compact Portable Compressor

In our study, we employed a motor with a speed nearing 1000 rotations per minute (RPM), which proved capable of effectively nebulizing and transferring drug solutions to the patient. The apparatus utilized in our experiment included a specialized mask equipped with a mouth cap designed for the inhalation of medicine (refer to Fig. 2), a nebulizer cup serving as the receptacle for the medicine (refer to Fig. 3), and tubing connecting the mouthpiece to the compressor (refer to Fig. 4).

The mask with the mouth cap (Fig. 2) was tailored to ensure efficient inhalation of the medication by the patient. It provided a secure fit over the nose and mouth, facilitating the delivery of the nebulized medication directly into the respiratory system.

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The nebulizer cup (Fig. 3) played a pivotal role in holding the medication solution during the nebulization process. Its design allowed for optimal dispersion and atomization of the drug, ensuring a fine mist for inhalation by the patient.
Connecting the mask and nebulizer cup to the compressor was a tubing system (Fig. 4), which served as the conduit for the airflow generated by the motor. This tubing facilitated the smooth transfer of the nebulized medication from the cup to the mask, enabling effective delivery to the patient.

Overall, the integrated system comprising the motor, mask with mouth cap, nebulizer cup, and tubing provided a reliable and efficient method for administering medication via nebulization. This setup offered precise control over drug delivery, ensuring targeted treatment for respiratory conditions.



Fig:-2. Mask with mouth cap for inhalation of Medicine



Fig:-3. Nebulizer Cup to hold the medicine

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Fig:-4. Tubing connecting the mouth piece to the Compressor

Temperature Controller Sensor (Figure 5):

Figure:-5, Illustrates the temperature controller sensor, which serves as a pivotal component in maintaining optimal operating conditions. This sensor continuously monitors the temperature of the system and ensures adherence to predefined thresholds. The integration of the LM-35 sensor exemplifies a critical advancement in enhancing the safety and performance of the system from its overheating.



Fig-5: LM-35 to sense the Temperature due to Motor Heat

The ultimate portable, compact, and cost-effective system, as illustrated in Figure: - 6, signifies a ground-breaking achievement in the field.

Over heat control and Time specific Application:

The study's innovation in employing the LM-35 temperature sensor to manage overheating is indeed noteworthy. By integrating this sensor, the system can effectively regulate temperatures and automatically shut down when they exceed 45°C, preventing potential overheating issues. However, it's noted that in the initial phase of the research, the time required for the system to reach restrictive conditions is slightly prolonged. Additionally, an automated restart feature hasn't been incorporated into this model yet, necessitating manual restarts after shutdowns. To further improve operational efficiency, the system integrates a time interval parameter, which likely plays a role in optimizing performance.

However, it's noted that there are some areas for improvement, such as the slightly prolonged time required for the system to reach restrictive conditions initially and the absence of an automated restart feature, which may inconvenience users who need seamless operation. The integration of a time interval parameter seems like a promising addition to enhance operational efficiency, likely allowing for better optimization of performance.

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Moreover, the implementation of a time-specific application feature adds another layer of usefulness to the system. By allowing users to set specific durations of application, even if the system doesn't reach 45°C, it prevents excessive usage and potentially extends the lifespan of the device. Overall, these enhancements suggest a thoughtful approach to improving the system's functionality and usability, while also addressing potential safety concerns and optimizing performance.

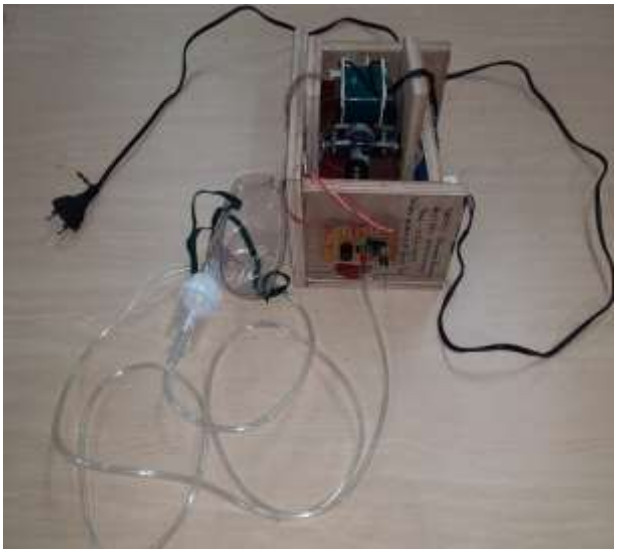


Fig-6: Compact automated Low cost portable Nebulizer

RESULT AND DISCUSSIONS

The handmade portable automated nebulizer demonstrated promising functionality during initial testing, particularly in its efficient delivery of medication to patients, highlighting its potential as a viable medical device. However, an important observation emerged during testing—the system ceased operation when the temperature of the compressor exceeded 44-45°C. This limitation likely stems from the thermal constraints of the components used in the nebulizer's construction.

Despite this thermal limitation, the nebulizer demonstrated resilience and durability, notably outperforming commercially available alternatives. Its robust performance suggests it could provide a cost-effective solution for patients in need of respiratory therapy, especially in resource-constrained environments.

The overheating time was measured at two ambient temperatures, yielding satisfactory results. At room temperature (30°C), the system reached its overheated state (45°C) after 10 minutes of operation. Conversely, at a lower ambient temperature of 25°C, the overheating occurred after 15 minutes. Similarly, at 20°C, the application time extended to 20 minutes before overheating at 45°C. It's noteworthy that if the ambient temperature falls below 20°C, the system will shut down based on the set application time rather than overheating. This is summarized in Table 1:

Sl. No.	Room Temperature(ºC)	Application Time (min)	System heating temperature (ºC)
1	30	10	45ºC
2	25	15	45ºC
3	20	20	45ºC

Table: 1. Performance Summary of Handmade Portable Automated Nebulizer at Different Ambient Temperatures

The output result is also summarized in Figure:-7 to enhance understanding.

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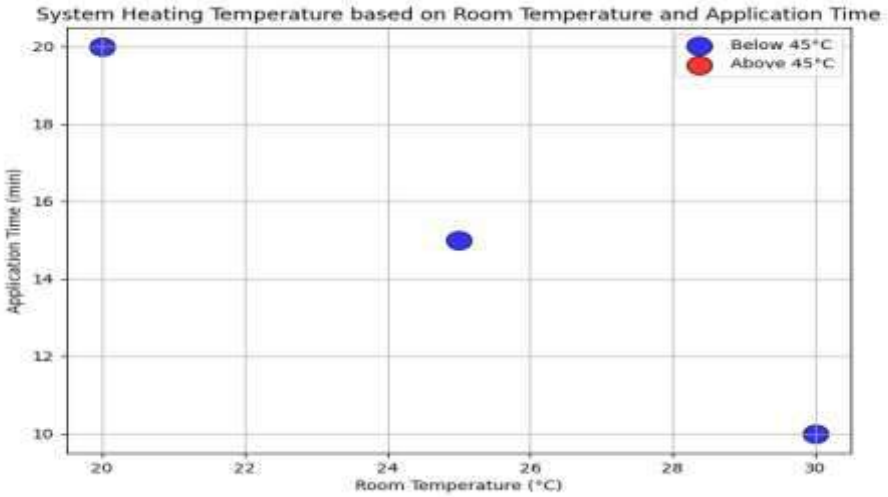


Fig:-7. Relationship between Room Temperature, Application Time, and System Heating Temperature

The low initial investment of only Rs-500 to Rs-1000 (INR) underscores the affordability of this solution, making it accessible to a wider demographic. Furthermore, its portability enhances its suitability for use in various settings, including homes, clinics, and remote healthcare facilities.

FUTURE SCOPE AND CONCLUSION

In summary, our research underscores the potential of the handmade portable automated nebulizer as a cost-effective and robust alternative to traditional nebulizer systems. Through innovative solutions such as integrating heat dissipation mechanisms and regulating motor speed for precise drug administration, we endeavour to bolster the device's reliability and effectiveness.

Moving ahead, our focus will be on fine-tuning these enhancements and substantiating their efficacy through additional testing. Future iterations may explore advancements in thermal management, including the incorporation of more temperature-resistant materials, to further elevate device performance and dependability.

Furthermore, we have observed that the cooling rate of the system after one use is inadequate. To address this, future iterations will incorporate a cooling system, transitioning the device into a fully automated, temperature, and time-specific application-based system, thus enhancing reliability and efficiency.

Ultimately, by continuously refining and validating the portable automated nebulizer, we aim to broaden access to respiratory therapies, particularly in regions with limited resources. Through maximizing its clinical utility, we aspire to make meaningful contributions to enhanced patient care and healthcare outcomes globally.

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PHYSIOTHERAPY INTERVENTION IN DYSPHAGIA AMONG POST STROKE PATIENTS-A NARRATIVE REVIEW

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ABSTRACT

The available data supporting the use of physiotherapy as an intervention for dysphagia in post-stroke patients is the main topic of this study's literature review. A computerized database related to studies including physiotherapy among stroke patients was used in the investigation. There were fifteen articles that demonstrated the effects of physiotherapy on oropharyngeal dysphagia, the Masako technique, Mendelson's procedures, and the shakers maneuver on post-stroke patients. Among the top factors contributing to stroke patients' incapacity and demise is oropharyngeal dysphagia (OD). Patients with OD who go undiagnosed and untreated have a higher chance of dying, spending a lengthy time in the hospital, contracting pneumonia, respiratory infections, malnutrition, and dehydration. Early detection of post-stroke oropharyngeal dysphagia (PSOD) is essential for lowering hospital admission and post-discharge morbidity and mortality rates.

Key words: Oropharyngeal dysphagia, stroke, physiotherapy

Search Method

By applying key words (stoke – definition, incidence, prevalence, ethology, pathophysiology, process of swallowing, dysphagia, recent advance intervention, shakers maneuver, Mendelsohn's maneuver, Masako maneuver, swallowing problem) on search bar in google schooler, PubMed, Scopus index,

INTRODUCTION

A stroke, also known as a cerebrovascular accident (CVA), is an abrupt loss of brain function brought on by a disruption in blood supply to the brain. About 80% of stroke victims experience an ischemic brain injury, which is the most common kind. It occurs when a clot obstructs or reduces blood flow, depriving the brain of vital nutrients and oxygen. When blood arteries burst, blood leaks into or around the brain, resulting in hemorrhagic stroke. Clinically, a range of focused abnormalities can occur, such as altered consciousness and deficiencies in motor, cognitive, perceptual, sensory, and language abilities.

For neurological abnormalities to be categorized as stroke, they must last for a minimum of twenty-four hours. Hemiplegia (paralysis) or hemiparesis (weakness), usually on the side of the body opposite the injury, are the hallmarks of motor impairments. Hemiplegia is a term that is frequently used to describe a broad range of motor impairments following a stroke. The severity of neurological abnormalities in a given patient is determined by the location and extent of brain injury, the amount of collateral blood flow, and the prompt acute care therapy. In most cases, impairments go away on their own in three weeks or less when brain swelling goes down (reversible ischemic neurological deficit). Neurological deficits that continue longer than three weeks are referred to as residual and have the potential to cause permanent disability. The etiological groups of strokes are thrombosis, Global Health Estimates: According to this report's life expectancy and main causes of death and disability, stroke ranks as the second most common cause of death[1)]. It is anticipated to rise in the upcoming decades[2)]. It is having an effect on higher socioeconomic[3)]. progressively in low- and middle-income nations (LMICs)[4)]. LMICs account for 70% of stroke cases, and as a result, their illness burden is higher than that of high-income nations[5)]. India's life expectancy has recently risen to well than 60 years of age[6,7)]. According to a recent systematic review, which primarily included cross-sectional studies, India's annual stroke incidence is thought to be between 105 and 152/100,000 persons. The World Health Organization recognizes poststroke oropharyngeal dysphagia, which has the following International Classification of Diseases (ICD) codes: 438.82 in the the I69.391 in the ICD-10.19 and the ICD-9). At the time of admission, 45% of patients had post-stroke (PS) OD, and up to 38% of them had clinical indications of compromised swallow safety. A voice change was the most common indicator of decreased swallow safety, appearing in as many as 43.65% of cases [10)]. A food bolus that is difficult to transport from the oral cavity to the stomach is known as dysphagia. This swallowing issue

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is caused by abnormalities in the pharynx, oesophagus, and oral cavity. The feeling of obstruction when swallowing, the sense of food stuck in the throat, and coughing or choking are among the symptoms [13]. Oropharyngeal dysphagia (OD) is the disorder's most prevalent manifestation. Stroke or cerebrovascular accident (CVA) is the most prevalent cause of dysphagia [14], as it disrupts deglutition and prevents the swallowing trigger [12]. Apraxia, slurred speech, and aphasia are additional stroke symptoms that can impair function[15]. Stroke accounted for 35,960 fatalities in 2018, making it the leading cause of death in the UK [16].The OD incidence in strokes that are acute (37%) and chronic (over 6 months) (78%)[17]. Other dysphagia problems range from drastically reduced deglutition with a high aspirational incidence to malnourishment and dehydration after poor swallowing effectiveness [19.20]. Of the deaths after a stroke, aspiration pneumonia accounts for 35%, making it among the top cleading factor of death[21]. Because cortical reorganization takes place undamaged hemisphere, roughly 50% of stroke-related dysphagia patients get a rapid resolution of their dysfunction[22]. Symptoms that last six months or more for 11e50% of patients are the main obstacle to recovery. In stroke patients, dysphagia is caused by a disturbance in the swallowing process, which calls for several sensory input elements from central nervous system and peripheral nerves coordination, motor responses, and feedback. This is evident in cases [23,24,25] Interference with the regulation of innervation during the swallowing process, particularly in cranial nerves V, VII, IX, X, and XII, results in dysphagia. shown that between 28 and 65 percent of stroke patients have dysphagia. [26].

Treatment options for dysphagia include the shaker manoeuvre, Mendelsohn manoeuvre, and Masako manoeuvre. electrical stimulation of the muscles (NMES)[27], Stimulation with Transcranial Direct Current[29], Tongue-Pressure Resistance Training Protocols[30], Lingual Exercise [31], Resistance exercise from the tongue to the palate enhances oropharyngeal and tongue strength[32].
DEGLUTITION (SWALLOWING) Swallowing of food occurs in three stages described below. Muscles of pharynx act during swallowing.
Flow chart. 1 Stages of swallowing [47]

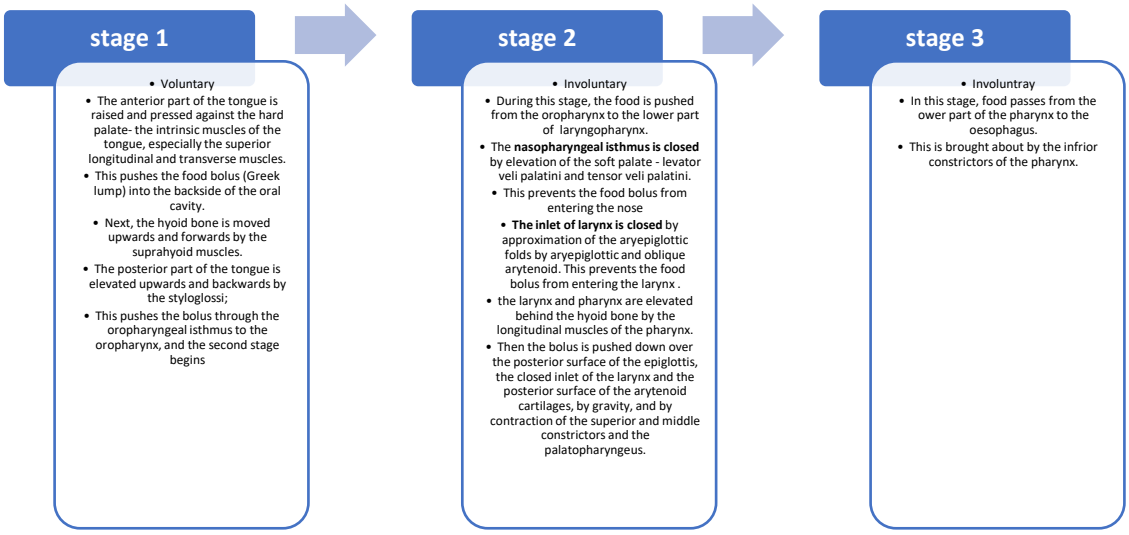


Table:1 [48]

S NO	CRANINAL NERVES	INNERVATION	SENSORY FUNCTIONS	MOTOR FUNCTIONS
1.	**TRIGEMIAL(V) MIXED**	snout, eye ball, lachrymal gland, lower eye lid, upper eye lid, upper jaw, gum, teeth.	Touch sensation skin on face and taste.	Mastication and movement of lower jaw.
2.	**FACIAL(VII) MIXED**	Tastebud, salivary gland, facial and neck muscle.	Taste, salivation and tear secretion.	Facial expression and neck muscles.
3.	**GLASSOPHARYGEAL(IX) MIXED**	Pharynx, tongue, salivary gland.	Taste and salivation.	Swallowing.
4.	**VAGUS(X)MIXED**	Pharynx, heart rate, respiratory tract, pancreas, blood vessels and alimentary canal.	Gastric and pancreas secretion.	GI movements, gastric reflex, pancreas reflex, visceral reflex and respiratory reflex.
5	**HYPOGLOSSAL (XI) MOTOR**	Tongue.	-------	Tongue movements.

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NEED OF THE STUDY AND TOOLS TO MEASURE

One of the leading factors contributing to stroke patients' disability and death is oropharyngeal dysphagia (OD). Our group conducted a study that found that 45% of patients had post-stroke (PS) OD upon admission, and that up to 38% of patients had clinical indications of reduced swallow safety. A shift in voice was the most common indicator of compromised swallow safety, occurring in as many as 43.65% of cases. Patients with OD who go undiagnosed and untreated have a higher chance of dying, spending a lengthy time in the hospital, contracting pneumonia, respiratory infections, malnutrition, and dehydration. Early detection of post-stroke oropharyngeal dysphagia (PSOD) is essential for lowering hospital admission and post-discharge morbidity and mortality rates. There is a dearth of research on the management of dysphagia, making it difficult to determine whether maneuverer best shakers, Mendelsohn's and Masako maneuverer.

METHODOLOGY

The research published after 2015 up until July 2023 were included in the review of the literature. The Shakers Manoeuvre, Masako Manoeuvre, Mendelson's Manoeuvre, Jaw Opening Exercises and Head Lifting Exercises, Kinesio Taping, and game based chin tuck exercises vs head lifting exercises are some of the databases that were included in PubMed Cochran and Google Scholar. exercises that raise the head, A total of 15 publications that examined dysphagia in stroke patients were included. These included studies on lingual strengthening, transcutaneous neuromuscular electrical stimulation, electroacupuncture, 4-channel neuromuscular electrical stimulation, and transcranial direct current stimulation.

Inclusion criteria

1. Both male and female
2. Initial days of acute stroke
3. Conscious and oriented individuals
4. Aged from 21-60 years old

Exclusion criteria

1. Tracheostomy tube placement and limitations in neck mobility.
2. Comatose and unconscious patients[52)]
3. Malignant tumour
4. Severe systemic disease;
5. Mental illnesses;
6. Organ dysfunction;
7. A long history of alcoholism;
8. A long history of psychotropic substance abuse;
9. Neurological dysfunction;
10. Dementia caused by infection,
11. Metabolic disorder, or poisoning;
12. Myocardial infarction,
13. Systemic acute and chronic infection, or
14. Any unstable condition.[44)]

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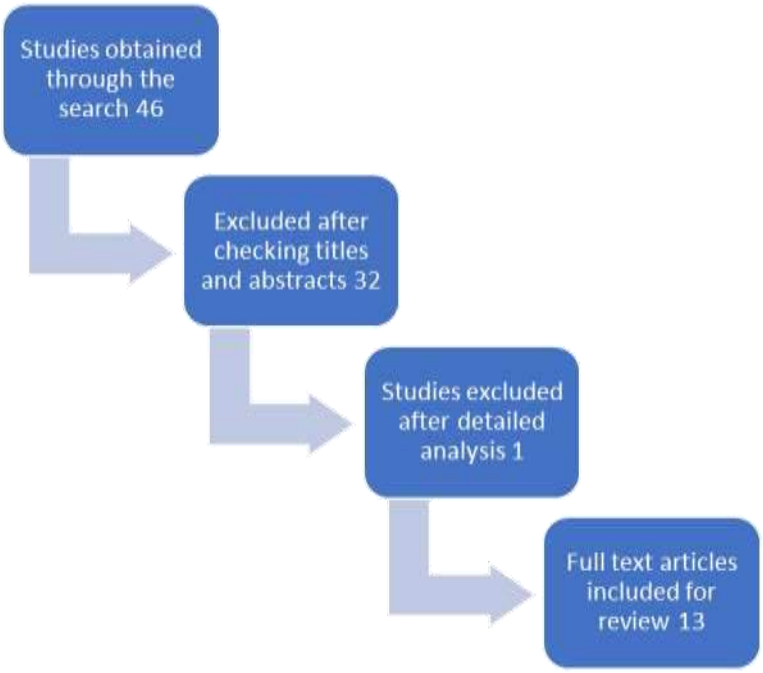


Table.2 Reviews

S NO	TITTLE OF THE ARTICLE	NAME OF THE AUTHER	YEAR OF PUBLIC-ATION	TYPE OF STUDY	MODE OF INTERVENTION	RESULTS
1.	A systematic review and Meta- Analysis of dysphagia and associated with pneumonia in patients with stroke from India[32)]	Rahul Krishnamurthy et al.	2022	experimental	Dysphagia prevalence among stoke patient	prevalence of dysphagia (47.71%; 95% confidence interval [CI] [20.49%, 70.92%], $p < .001$) for the patients with stroke in India.
2.	Comparison of 2 types of therapeutic exercise jaw opening exercises and head lift exercise for dysphagic stroke[33)]	Jong Bae Choi, PhDa et al	2020	Experimental	Jaw opening exercises and head lifting exercises	This study demonstrated that both the JOE and the HLE exhibited comparable outcomes in relation to increasing the thickness of the suprahyoid muscles and improving hyoid bone movement. However, the JOE may require less overall physical effort than the HLE, but may cause discomfort in the temporomandibular joint. Therefore, it is recommended that these 2 exercises be selected according to the condition of the patient.
3.	Effect of head lift exercise on kinematic	J.S. Park et al.	2017	Experimental	Head lift exercise on kinematic the hyolaryngeal complex's motility	For patients with dysphagic stroke, HLE is a useful strategy for

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	motion of the hyolaryngeal complex and aspitarion in patients with dysphagic stroke[34)]					improving hyoid mobility and reducing aspiration. This non-invasive, low-cost indirect treatment is secure. Without a therapist, patients are able to conduct HLE on their own. HLE is therefore advised as a successful course of treatment for people who have dysphagic stroke.
4.	Effect of Shaker's Swallowing Exercises on Swallowing Ability among Dysphagic Patients with Cerebrovascular Accident[35)]	Zeinab Gamal Mohamed Ellatif Abouelezz et al.	2020.	Quasi experimental.	Shaker's maneuver.	Based on the study results, the current study findings concluded that Shaker's swallowing exercises were effective in enhancing dysphagic patients' capacity to swallow after a cerebrovascular accident.
5.	Effect of the combination of Mendelsohn maneuver and effortful swallowing on aspiration in patients with dysphagia after stroke[36)]	Ji-Hoon Kim et al.	2017	Experimental	Mendelsohn maneuver and effortful swallowing on aspiration.	Participant 1's aspiration reduced with food type, going from 6 to 4 points for liquid food and from 3 to 2 points for semi-solid food, according to the PAS assessment. With liquid-type food, participant 2's aspiration dropped from 6 to 4 points, and with semi-solid-type food, it decreased from 3 to 2 points. When eating liquid-type food, participant 3's aspiration dropped from 5 to 4 points, and when eating semi-solid food, it dropped from 3 to 1 points. With liquid food, participant 4's aspiration dropped from 7 to 5 points, and with semi-solid food, it dropped from 5 to 4 points.
6.	Efficacy of modified chin tuck against resistance exercise using hand-free device for dysphagia in stroke survivors: A randomised controlled trial [37)]	Hwan-Hee Kim et al	2019	Experimental	Chin tuck exercises against resistance exercises	This study showed that individuals with post-stroke dysphagia may improve their nutritional levels and reduce aspiration by using the mCTAR exercise. Consequently, it is anticipated that mCTAR training will be advantageous for physically susceptible dysphagia patients who have restricted hand

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						strength and range of motion.
7.	Immediate effects of Kinesio Taping on the movement of the hyoid bone and epiglottis during swallowing by stroke patients with dysphagia[38)]	Seo Yoon Heo et al.	2015	Experimental	Kinesio taping	the kinematic analysis of the hyoid bone and the epiglottis should continue to be used as it's the optimal method for determining the results of dysphagia therapy approaches. Consequently, research in the future should look at not only clinical evaluation tools but also kinematic analysis using VFSS. With more evidence, KT for dysphagia p
8.	effects of game-based chin tuck against resistance exercise vs head-lift exercise in patients with dysphagia after stroke: an assessor-blind, randomized controlled trial[39)]	Ji-Su PARK et al	2019	Experimental	game-based chin tuck against resistance exercise vs head-lift exercise.	The effects of gbCTAR exercise and HLE on swallowing function and compliance in stroke patients with dysphagia were compared in this research. Swallowing function significantly improved with both approaches, although there was no discernible difference between the two groups. This implies that in dysphagic individuals, gbCTAR exercise and HLE have comparable benefits.
9.	Effects of Device-Facilitated Lingual Strengthening Therapy on Dysphagia Related Outcomes in Patients Post-Stroke: A Randomized Controlled Trial[40)]	Brittany N. kekeler et al.	2023	experimental	Lingual strengthening	Lingual strengthening exercise resulted in notable advancements in functional oral consumption in individuals with post-stroke dysphagia contrasted with usual care after 8 weeks. Future studies should include greater sample size and address treatment impact on specific aspects of swallow physiology
10.	Effect of the Masako maneuver and neuromuscular electrical stimulation on the improvement of swallowing function in patients with dysphagia	Haewon Byeon, Dr Sc	2016	experimental	Masako maneuver and neuromuscular electrical stimulation	Both Masako maneuver and NMES significantly improved the swallowing ability in dysphagic patients caused by stroke;

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	caused by stroke[41)]					
11.	Examining the Evidence on Neuromuscular Electrical Stimulation for Swallowing[42)]	Giselle D. Carnaby-Mann, MPH et al.	2023	Meta analysis	Neuromuscular electrical stimulation.	For adult dysphagic patients undergoing NMES therapy, there has been a marginally statistically significant improvement in their clinical swallowing function. These results offer some indication that NMES for swallowing treatment may be a useful technique in the rehabilitation of dysphagic patients, but they are constrained by the quality of the studies that were available for analysis.
12.	Electroacupuncture improves swallowing function in a post-stroke dysphagia mouse model by activating the motor cortex inputs to the nucleus tractus solitarii through the parabrachial nuclei [43)]	Lulu Yao et al.	2023	Experimental study	Electroacupuncture activating the motor cortex inputs to the nucleus tractus solitarii through the parabrachial nuclei	effectively with acupuncture combined with balloon dilatation. In comparison with balloon dilatation alone, acupuncture combined with balloon dilatation can significantly improve the gulping capability of patients, and it is also effective for patients at different courses of the disease (less than one month or longer than one month), different ages (over 60 years old and under 60 years old) and different treatment course (over 30 days and under 30 days), while patients over 60 years old and the treatment course over 30 days may have the better clinical outcome.
13.	Effects of transcutaneous neuromuscular electrical stimulation on post-stroke dysphagia: a systematic review and meta-analysis[44)]	Yuhan Wang et al.	2023	Systematic review; Meta Analysis	Transcutaneous neuromuscular electrical stimulation and swallowing therapy	Transcutaneous neuromuscular electrical stimulation and swallowing therapy reduced the rate of complication and promote the restoration of swallowing function. NMES with a frequency of 25 Hz, an intensity of 0–15 mA, and a treatment course of 4 weeks or less may have better results. Patients with an onset of fewer than 20 days and over 60 years old appear more effective with NMES + ST.

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14.	Compensatory Effects of Sequential Treatment of Acute, Subacute, and Chronic Dysphagia Using 4-Channel Neuromuscular Electrical Stimulation in a Prospective, Double-Blinded Randomized Clinical Trial[45)]	So Young Lee, MD, PhD et al.	2021	experimental	4-Channel Neuromuscular Electrical Stimulation	Regarding VDS, PAS, and kinematic analysis, 4-channel NMES that activated the suprahyoid, thyrohyoid, and other infrahyoid muscles during swallowing shown a substantial increase in clinical outcomes. Consequently, a novel functional electrical stimulation method for the management of dysphagia might be consecutive 4-channel NMES.
15.	Efficacy and Safety of Transcranial Direct Current Stimulation on Post-Stroke Dysphagia: A Systematic Review and Meta-Analysis[46)]	Kelin He et al.	2022	Experimental	Transcranial Direct Current Stimulation	The application of tDCS can promote the recovery of deglutition function in stroke patients who have dysphagia, and bilateral stimulation and high-intensity stimulation may have better effects.

DISCUSSION

In their comparison of two therapeutic exercise types—the mouth opening exercise and the exercise with a head raise for dysphagic stroke—Jong Bae Choi, PhDa et al. address muscle thickness, hyoid movement, the Borg rating scale, and compliance related to dropout rates. Both HLE and JOE have similar effects, as seen by the lack of significant differences in muscle thickness and hyoid movement between the two. Borg grading system HLE has the advantage over JOE since it is a more severe and demanding workout than JOW. compliance related to dropout rates HLE group 4 withdrew from the trial due to exhaustion in their necks and abdomens, but no problems followed. Muscle exhaustion, temporomandibular discomfort, and TMJ displacement were reported by JOE subjects[33)].

An investigation of the effects of head lift exercise on aspiration and hyolaryngeal complex kinematic motion Among individuals suffering from dysphagia stroke was carried out by Park, J. S. et al. Random assignment accustomed to place the enrolled members of the experimental group (n = 20) or the controlled group (n = 17). HLE was administered to the experimental cohort in addition to standard CDT (traditional dysphagia therapy). The control group only got CDT. CDT consists of therapeutic maneuvers, ice stick thermal tactile stimulation, and orofacial muscular exercises. The hyolaryngeal complex was analyzed for movement using the Image J program, and the degree of penetration-aspiration was measured using the Penetration-Aspiration Scale (PAS). The approach used to examine hyporyngeal movement was identical to that used in a prior study. A frame from the VFSS accustomed to record the swallowing process. Kinematic influence on the the mobility of the hyolarynx The larynx's anterior and superior movements were significantly increased in the experimental group. The larynx and hyoid bone's anterior and superior movements both significantly increased in the control group. After the intervention, the experimental group outperformed the control group in terms of only superior movement of the hyoid bone, with a statistically significant increase. When the groups' respective amounts of change were compared, only the hyoid bone's vertical displacements revealed significant variations between them. Impact on aspiration and penetration The experimental group had a significant drop in PAS scores for liquids and semisolids in the aspiration evaluation. The PAS scores for liquids and semisolids significantly decreased in the control group as well. Following the intervention, the PAS scores for liquids in the experimental group declined far more than those in the control group. Both groups' PAS scores for liquids and semisolids showed no discernible difference when the magnitude of change between them was compared[34)].

Gamal Zeinab The impact of Shaker's swallowing exercises on the ability to swallow in dysphagic study participants with cerebrovascular accidents by Mohamed Ellatif Abouelezz et al. In order to complete the Shaker exercise, Every patient had a separate interview. and in private for 25 to 35 minutes per session. During six sessions—two theoretical and four practical—the researchers provide the patients a thorough description of the swallowing exercises. According to the study, there was a considerable

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improvement in the awareness of dysphagic patients about the Shaker swallowing exercise before, after two weeks, and one month after its implementation. At various stages of implementation, there was a highly substantial favorable association between the overall knowledge and swallowing skills of dysphagic patients [35].

A study by Ji-Hoon Kim et al. combined the Mendelsohn maneuver with forceful swallowing to examine dysphagia in stroke patients. The videofluoroscopic swallowing study (VFSS) modified Logemann protocol and penetration-aspiration scale (PAS) are employed to assess the VFSS outcome on a pre- and post-study basis for all subjects. PAS maximum of eight subjects with a high level of ambition Participant 1's aspiration reduced with food type, going from 6 to 4 points for liquid food and from 3 to 2 points for semi-solid food, according to the PAS assessment. With liquid-type food, participant 2's aspiration dropped from 6 to 4 points, and with semi-solid-type food, it decreased from 3 to 2 points. When eating liquid-type food, participant 3's aspiration dropped from 5 to 4 points, and when eating semi-solid food, it dropped from 3 to 1 points. With liquid-type food, participant 4's aspiration dropped from 7 to 5 points, and with semi-solid-type food, from 5 to 4 points [36].

A study comparing the chin tuck against the shaker maneuver (SM) and the resistant exercise (CTAR) was done by Jing GAO et al. Self-Rating Depression Scale (SDS) and video fluoroscopic swallowing study (VFSS) outcome measures. One group received CTAR, another group received shakers, and a third group had conventional intervention. Of the three groups, the CTAR group showed the greatest improvement, followed by the SM group, which showed the least change when compared to CATR and SM[37]. Kinematic analysis of the results of KT on the motion of the epiglottis and hyoid bone dysphagia in stroke patients was carried out by Seo Yoon Heo et al. Marosis M-view 5.4 accustomed to administer the functional dysphagia scale (FDS) in order to Evaluate the effect of KT in a real swallowing scenario. two groups kinesio taping and non kinesio taping The KT group demonstrated advancements in the vertical excursion of the hyoid bone and rotation of the epiglottis, the results were statistically significant. The clinical assessment and analysis revealed changes in FDS and horizontal movement, but the differences were not statistically significant[38].

A study on the effects of the device-facilitated lingual strengthening in stroke victims experiencing dysphagia was carried out by Brittany N. Kekeler et al. Approach split into two groups: one for lingual strengthening exercises and the other for routine medical attention. In order to evaluate group differences in oral intake, lingual pressure generation, swallow safety, efficiency, and swallowing quality of life, outcomes were examined at 8 and 12 weeks. Exercises for strengthening the tongue demonstrate a considerable improvement over standard care[39].

A study was done by Ji-Su PARK et al. on game-based tucks in stroke victims who have dysphagia, comparing them to resistance exercise and head lifts. While the controlled group engaged in HLE, the experimental group used the LES 100 gadget to finish the gbCTAR task. The video fluoroscopic dysphagia scale (VDS), penetration aspiration scale (PAS), and functional oral intake scale (FOIS), which is according to the VFSS, were the outcome measures utilized to assess oral diet and swallowing performance. The organization conducting the experiment demonstrated a statistically notable advancement in their the capacity to ingest during the pharyngeal and oral stages of VDS, PAS, and FOIS. The control group exhibited noteworthy advancements in the oral and pharyngeal stages of VDS, PAS, and FOIS. Between the two groups, there was no appreciable difference in the pharyngeal and oral phases of VDS, PAS, or FOIS after the intervention. During the pharyngeal and oral stages of VDS, there were no discernible differences between the groups when the quantity of change was compared. Rate of dropouts and adverse effects In terms of adhering to as part of the gbCTAR exercise, there no dropout in the experimental group. Conversely, though, four patients in the control group withdrew due to transient neck pain, exhaustion, and discomfort. Nonetheless, the patient described the discomfort as transient, and no other adverse effects were reported. According to a numerical rating self-report scale, the experimental group scored higher than the control group on the items related to motivation and interest/enjoyment, but considerably lower on the items related to physical effort required and muscle fatigue[40].

An investigation of the effects of neuromuscular electrical stimulation and the Masako manuvere on dysphagia in stroke patients was carried out by Haewon Byeon and colleagues. For four weeks, the NMES group received 20 minutes of stimulation five days a week. 20 minutes a day, five days a week, for four weeks is the Masako move. Result evaluates the functional dysphagia scale using video fluoroscopic analysis. There was not observable change between the two groups[41].

A comprehensive analysis was conducted by Giselle D. Carnaby-Mann, MPH, et al. to discover all the publications published between January 1996 and 2006. As a result, adult dysphagic patients receiving NMES have demonstrated a modest yet statistically meaningful rise in their clinical swallowing function, according to this early meta-analysis evaluating the treatment's efficacy. These findings suggest that using NMES for ingesting treatment might be a useful technique in the recovery of dysphagic patients, but they are constrained based on how well the research was done that were available for analysis. As new information becomes available, Guidelines for implementing this method ought to be reassessed. To determine if NMES for swallowing is more effective

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than standard swallowing treatments alone, more separate experiments involving carefully controlled designs and analyses based on intent-to-treate required[42].

According to a study by Lulu Yao et al., electroacupuncture activates the motor cortex inputs to the nucleus tractus solitarii through the parabrachial nuclei, an acupoint situated on the anterior median line and in the depression above the hyoid bone. This improves swallowing function in a post-stroke dysphagia mouse model. The Video Fluoroscopic Swallowing Study (VFSS) measures the pharyngeal transit time, oesophageal transit time, and food size; Fibreoptic evaluation of swallowing (FEES) assesses the structure of the pharynx and larynx; Standardized Swallowing Assessment (SSA) measures consciousness, body control, breathing, oral closure, laryngeal function, pharyngeal reflex, and spontaneous cough, among other things. These assessments are used in clinical practice to evaluate swallowing function following stimulation at CV23 [43].

Transcutaneous neuromuscular electrical stimulation's impact on stroke patients' dysphagia were studied by Yuhan Wang et al. in a systematic review. The database collecting deadline was June 9, 2022. final measurements The Water swallow test, the Video fluoroscopic Swallow Study, the Penetration-Aspiration Scale, the Standardized Swallowing Assessment, and the Functional Oral Intake and Dysphagia Scale. Regular swallowing treatment (ST) in conjunction with NMES effectively enhances swallowing function. The Water Swallow Test increased the hyoid bone's upward and forward movement distances, decreased the rate of problems, and enhanced quality of life[44].

Thus, Young Lee, MD, PhD, et al. studied 4-channel neuromuscular electrical stimulation's impact on stroke patients' dysphagia, which was verified by stable vital signs and the video fluoroscopic swallowing study (VFSS). score ≥6 on the penetration–aspiration scale (PAS). 52 individuals in all (26 in the sham group and 26 in the NMES 4 channel group). With regard to PAS, VDS AND kinematic analysis, a novel technique that employed consecutive During swallowing, 4-channel NMES is applied to the suprahyoid, thyrohyoid, and infrahyoid muscles. shown a notable improvement in clinical outcomes. Given that No negative consequences were seen during the study, 4-channel NMES appears to hold the position of secure and well-absorbed dysphagia treatment option. Thus, a novel therapeutic approach for the method of compensation in dysphagic patients is consecutive 4-channel NMES [45].

These seven digital repositories were thoroughly searched by Kelin He et al. in a comprehensive analysis that was finished between January 1, 2021, and December 31, 2021. The intervention in the experiment group consisted of tDCS alone or in tandem with conventional therapy, while Conventional therapy was administered to the control group. and/or sham tDCS. The Kubota water-drinking test, the modified Mann assessment of swallowing ability, the functional oral intake scale, the dysphagia outcome and severity scale, and the dysphagia outcome and severity scale are the outcome measures. Patients with dysphagia following a stroke could gain additional from transcranial direct current stimulation (tDCS); higher-intensity stimulation and bilateral stimulation may yield greater benefits. Nevertheless, there is not enough safety data to support tDCS for dysphagia following a stroke. Furthermore, Each research only contains one center and no common assessment tool. To overcome these limitations, more investigation should move in this direction[46].

CONCLUSION

All the above review interventions for dysphagia among post stroke patients effective hence above interventions are recommended.

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EXPERIMENTS BASED ON INSTRUMENTAL TECHNIQUES HANDLING

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GENERAL INTRODUCTION RELATED TO PHARMACEUTICAL ANALYSIS

INTRODUCTION TO ANALYTICAL TECHNIQUES

IMPORTANT DEFINITION[1]

Analysis

Pharmaceutical analysis or chemical analysis a technique to identify and or quantify any sample, substance, compound by using manual, chemical or instrumental techniques by qualitative or quantitative method

Qualitative Analysis

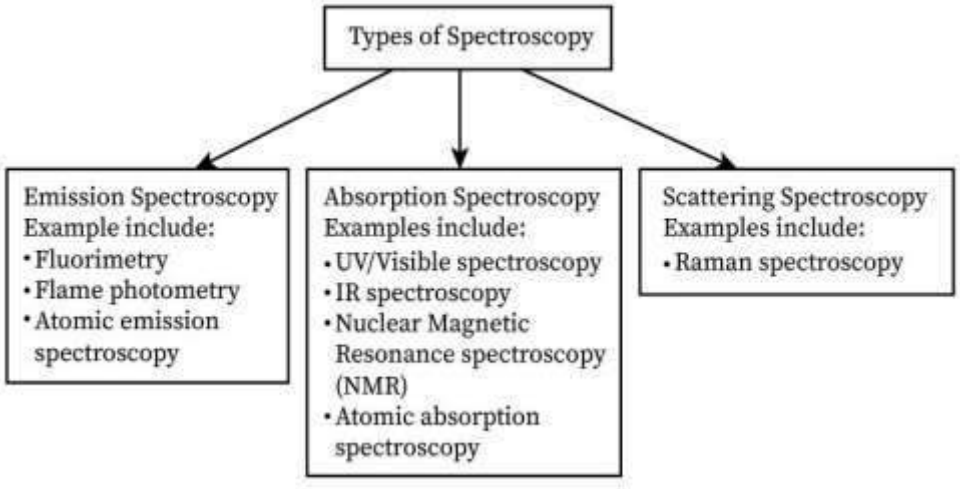
When Completely unknown sample is analysed to determine the presence or absence of the particular substance in the sample, and the technique is known as qualitative analysis. Ex. Phenolphthalein indicator gives light pink color in alkaline solution will be either present or absent.

Quantitative Analysis

Determination of the quantity in numbers weight, length or any other measurement parameter is carried out under quantitative analysis. Specific components are quantified in the sample by using quantitative ,method are available to determine the sample i.e titrimetry ,volumetry, gravimetry, thermal, electro-chemical, spectral analysis etc.

Spectroscopy:

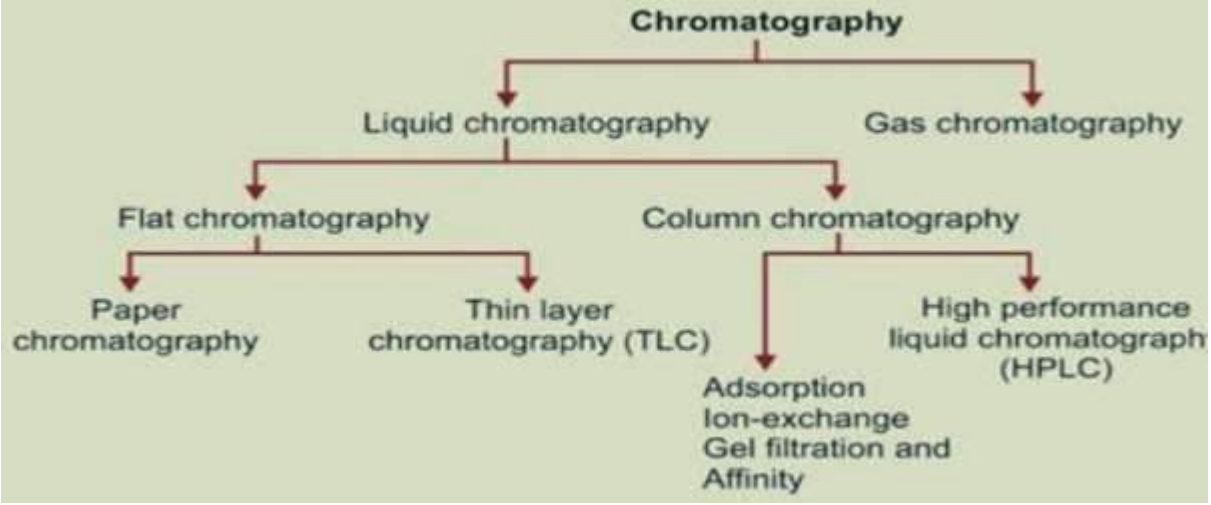
Spectroscopy is defined as the branch of science which studies the introduction of matters with light or electromagnetic radiation, in this method electromagnetic waves of particular wavelength or range of wavelength are use to identify the qualitative and quantitative analysis of matter.



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Chromatography[2]

Chromatography is a physical method for the separation of mixture components. The mixture (sample)is dissolved in a fluid called mobile phase. Which flow through the stationary phase. Chromatography can be analytical or preparative. It can't gas , mobile phase can be liquid or gas but can't be solid.



Pharmaceutical consideration in developing QA / QC systems [3]

pharmaceutical QA/QC procedures requires resources expertise and time In is expected developing any QA / QC system, Resources allocated to QC for different source categories and the completion process.

Elements of a QA/QC system

Inventory Agency

The inventory agency is responsible for coordinating QA/Qc activities for the national inventory. The inventory agency is also responsible for ensuring that the QA/QC plan is developed and implemented.

QA/QC Plan

AQA/QC plan is a fundamental element of a QA/QC system and it is good practice to develop one. The plan should in general outline QA/QC that will be implemented and include a schedule time frame that follows inventory preparation from its initial development through to final reporting in any year.

General QC Procedures

The focus of general QC techniques is on the processing, handling, documenting, archiving and reporting procedures that are common to all the inventory source categories. General Inventory Level QC Procedures, lists the general QC checks that the inventory agency should use routinely throughout the preparation of the annual inventory..

QA procedures

Good practice for QA procedures requires on objective review to assess the quality of the inventory and also to identify areas. Where third party reviewers outside the inventory agency are not available staff from another part of the inventory agency not involved in the portion of the inventory being reviewed can also fulfill QA ro QC.

Documentation, Archiving and Reporting

Internal documentation and archiving As part of general QC procedures, it is good practice to document and archive all information required to produce the national emissions inventory estimates

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Reporting[4]:
It is good practice to report a summary of implemented QA/QC activities and key findings as a supplement to each country's national inventory. However, it is not practical or necessary to report all the internal documentation that is retained by the inventory agency.

CALIBRATION OF ANALYTICAL INSTRUMENT [11]:
Introduction: Calibration is a comparison between measurements one of known magnitude or correctness made or set with one device and another measurement made in as similar a way as possible with a second device. The device with the known or assigned correctness is called the standard. The second device is the unit under test, test instrument, or any of several other names for the device being calibrated.



Calibration may be called for

- A new instrument.
- After an instrument has been repaired or modified when a specified time period has elapsed.
- When a specified time period has elapsed.
  Before and/or after a critical measurement.

Calibration of IR spectrophotometer

The calibration of IR Spectrophotometer consists of five tests. It is done in intervals of every 3 months or after every heavy usage of the instrument. The tests are as follows
1. Power spectrum. 2. Wavenumber accuracy test. 3. Resolution. 4. Wavenumber reproducibility. 5. Transmittance reproducibility.

Calibration of HPLC
1. Tests for pump. 2. Tests for autosampler. 3. Tests for detector. 4. Tests for heating system.

Preventive Actions :
1. Trending and monitoring of calibration data.
2. Minimizing the calibration intervals.
3. Minimizing the Preventive maintenance intervals.
4. Unused/ less used instruments- calibrate before use.
5. Instrument history cards to be sincerely maintained with all details.
6. Proper training on calibration/ instrument handling.
7. Analyst qualification calibration.
8. Experienced person shall be responsible for calibration and related activities.

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Experiments Based On Instrumental
Techniques Instrument handling

Potentiometer[14] 1. Before connecting the mains keep the controls as under (a) SELECTOR switch to 'O' (b) STIRRER switch to "MIN". (to its built-in "OFF" position) (c) SET POINTER to about the middle of its full range. 2.Connect the mains supply (230 Volts 50 HZ) and switch "ON" the MAINS switch. The red pilot lamp will then light up and the display will show some reading near about to Omv 3. Rotate the STIRRER control knob and adjust the stirrer speed. 4. Connect the pins of the sensors to the sockets provided on the machine on both sides of the pled rod. (Calomel to black socket) and lower the sensors with the spring clamp. So that the tips of the sensors are well immersed in the solution in the beaker. Care should be taken to see that the tips may not get smashed by the rotating magnetic rotor. Tum SELECTOR to 'POT-G' or 'POT-M' as the case may be. To 'POT-G if Class/Calomel pair is used and to "POT-M' for Metal/Calomel pair. 5.The display will now show some positive or negative reading depending on the nature and strength of the solution. Adjust it near to "O" by SET POINTER knob. Note: The instrument is provided with COARSE and FINE" SET POINTER controls. Fine control can be used to adjust the milli-volts reading precisely to O on the digital display. While coarse control is used for major change in the milli-volt reading. When "SELECTOR" is in 'O' or 'O-R' position, both FINE and COARSE "SET POINTER" will have no control on Digital display. 6. Add some drops of solution from the burette and note the reading on the digital display. Add fixed volume of solution from the burette (say Iml, 0.5 ml OR 0.1 ml) every time and note the reading of "CHANGE IN MILLIVOLTS" for each addition. It will be found that for the same addition every time the display will[15]

Conductivity meter[16] 1: Switch ON the main switch in switch board 2: Press the ON/OFF switch of the instrument 3: It will show Cell K value, Battery level and Temperature 4: It will go to 'AUTORANGING mode and show 'rAnd. 5: Then it will show the conductivity of the solution in the beaker in which the sensor is dipped (generally DM water). 6: Wash the beaker and pour the sample solution in it to measure its conductivity (ensure the sensor is dipped in the soln.). 7: The conductivity will be displayed on the screen. 8: Press "MODE' to get the values of Salinity and TDS of the soln. 9: Wash the beaker, fill it with DM water and dip the sensor in it 10: Press the ON/OFF switch of the instrument to turn it OFF Step 11: Switch OFF the main switch in switch board

HPLC[17]

- Read the SDS for all materials.
- Prepare the analyte solution in a fume hood.
- Make sure the solvent reservoirs are filled before using the instrument.
- Make sure that you are using the correct mobile phase. If you are changing the mobile phase, completely wash all lines and columns before use.
- Ensure that the pump lines have been purged of air bubbles and check the system for leaks before beginning the analysis.
- Turn on the HPLC and equilibrate the mobile phase solution.
- Make sure that the pressure is behaving normally and is well below the maximum pressure for the HPLC system.
- Constantly monitor the solvent levels in the solvent mobile phase bottles, NEVER let them run dry.
- Click the 'injection' icon button (or the equivalent on your instrument). Inject the background into the instrument.
- Once the background has stabilized, then inject your sample into the instrument.
- The HPLC column should be washed for at least 30 minutes after each run to ensure that it is properly cleaned. The procedure for washing the column and inject will vary depending on the instrument and on the sample that is being analyzed.
- Turn off the HPLC.
- Dispose of all waste in the appropriate hazardous waste containers.

FTIR 1. Switch on the FTIR, the power switch is located on the lower left side of theinstrument.2. Open the main tank valve on the nitrogen cylinder. The flow-rate should be preset to approximately 50 ml/min. To purge the sample chamber of air the nitrogen should flow for approximately 20 minutes before running a sample. 3. Press the (Proceed) button-soft key located at the top right of the FTIR control panel. 4. Log on to the computer located to the left of the FTIR. Log on as (username= analab) (password = Letmein!). 5. Start the (Spectrumv2.00) software from the desktop. 6. Insert the sample. If you are using the Durascope see the section on Durascope operation. After inserting the sample wait 5 minutes before scanning to purge the sample chamber. 7. Using the Spectrum software, go to (instrument) and click on (scanbackground). Label file as desired. 8. Save background as new stored background. 9. Click on (Print) under (File Option) menu to print the background scan. 10, Insert the sample you wish to scan in the FTIR sample holder. Close cover and wait 2 minutes to re-establishing nitrogen purge. 11. Go to (instrument) select (scan sample). 12. Name sample. Verify the (Ratio vs. File) option is selected.13. Scan sample. 14. When sample is scanned, select the background sample on the lower left hand corner of the screen. Go to (File) (Close) this will close the background

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scan and display the spectra of your sample as compared to the background. 15. Select the sample scan by highlighting the filename in the lower left hand corner of the window. Go to (View) and click on (Full Scale). 16. To label peaks go to (View) and click on (Label Peaks). 17. To remove peak labels go to (View) and click on (Clear All Peak Labels) 18. To add comments go to (View) and click on (Add/Edit Text). 19. To view peak area/ height or to change the view from absorbance to transmittance go to tools and click on (A). (T) or the peak icon as desired. 20. Print from the print icon or (File) (Print). 21. To save go to (File) (Save As). Use ASCII file format which can be converted into Excel

Interpretation of various spectra and graph

UV Spectroscopy[18]

Has been widely used for the identification and quantification of organic compounds, the aim of this text is to describe some important topics related to this theme. Both qualitative and quantitative analysis, including the direct and the derivatization procedures, are dealt with. Since, in some cases, the compounds to be analyzed are present in very low concentrations, some pretreatment sample techniques are mentioned. Additionally, different kinds of detectors used in UV–Vis spectrophotometry. (EX: RIZATRIPTAN)

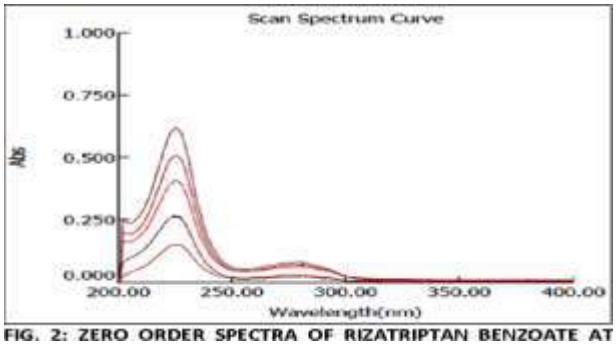
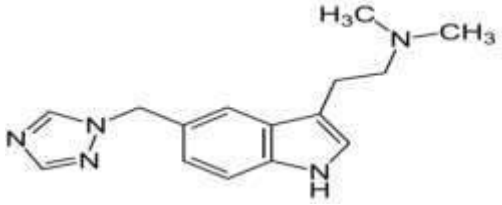


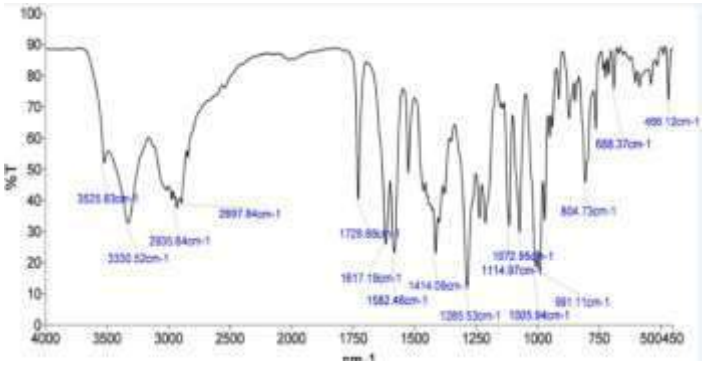
FIG. 2: ZERO ORDER SPECTRA OF RIZATRIPTAN BENZOATE AT

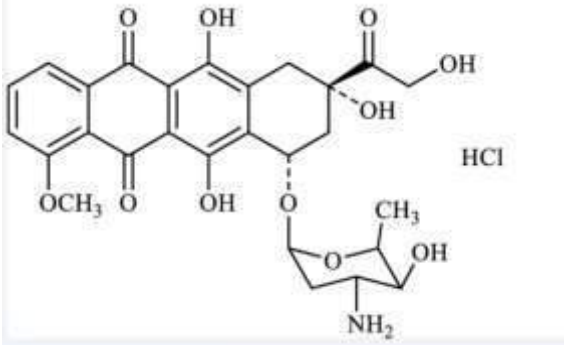


RIZATRIPTAN

Infra Red Spectroscopy[19]

Monitors the interaction of functional groups in chemical molecules with infrared light resulting predictable vibrations that provides a "fingerprint" characteristic of chemical or biochemical substances present in the sample. (EX: DOXORUBICIN HYDROCLORIDE)



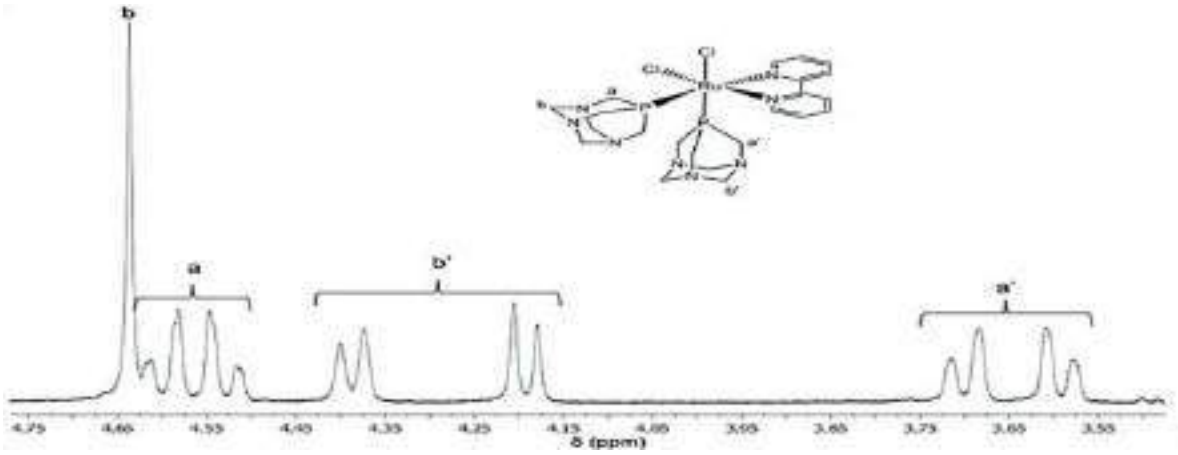


DOXORUBICIN HYDROCLORIDE

NMR Spectroscopy[20]

NMR spectroscopy is a physicochemical analysis technique that is based on the interaction of an externally applied radiofrequency radiation with atomic nuclei. During this interaction there is a net exchange of energy which leads to a change in an intrinsic property of the atomic nuclei called **nuclear spin**.

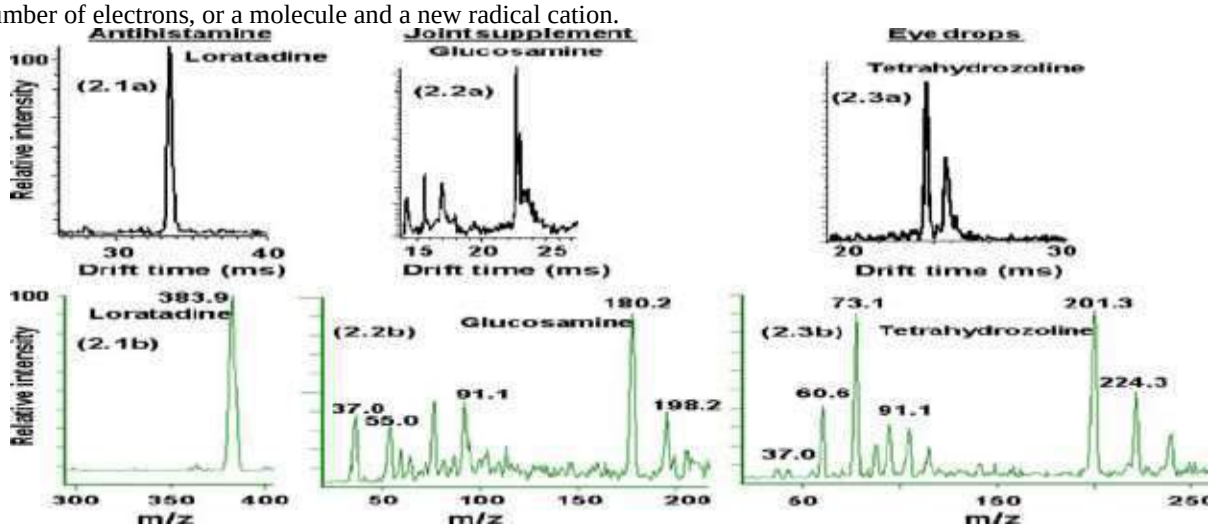
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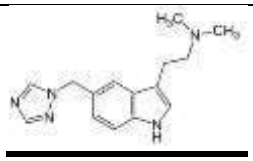
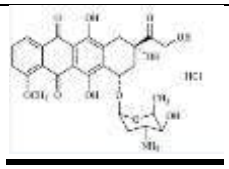
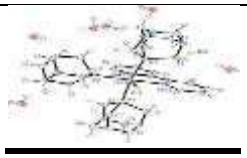
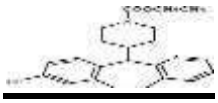
(Neutral 1,3,5-Triaza-7-phosphaadamantane-Ruthenium(II) Complexes as Precursors for the Preparation of Highly Water Soluble Derivatives.)

Mass Spectroscopy[21]

Mass spectrometry's characteristics have raised it to an outstanding position among analytical methods: unequalled sensitivity, detection limits, speed and diversity of its applications. The first step in the mass spectrometric analysis of compounds is the production of gasphase ions of the compound, for example by electron ionization: $M + e^- \longrightarrow M^{\bullet +} + 2e^-$ This molecular ion normally undergoes fragmentations. Because it is a radical cation with an odd number of electrons, it can fragment to give either a radical and an ion with an even number of electrons, or a molecule and a new radical cation.



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Sr. No	Instrument name	Molecular Changes	Detection (Graph)	Example	Drug Structure
1	UV Spectroscopy	Electronic transition lower state to higher state	Absorption VS Wave length	Rizatriptan	
2	IR Spectroscopy	Stretching and Bending vibration	% Transmittance VS Wave number	Doxorubicin hydrocloride	
3	MNR Spectroscopy	Change Spine Orintation	Applied radio frequency VS Absorption	Neutral 1,3,5-Triaza-7-phosphaadamantane-Ruthenium	
4	Mass Spectroscopy	Ionization and fragmentation of molecule	Reletive intensity VS Drift time	Loratadine	

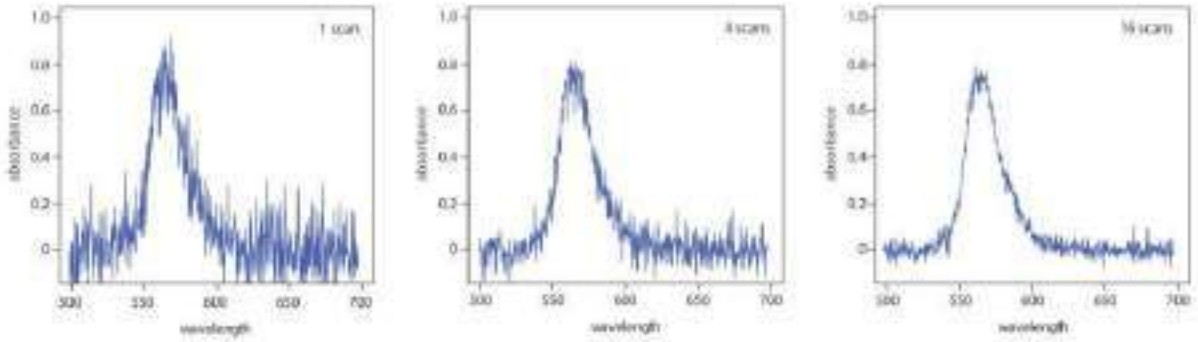
Interpretation of Result :- Structural educidation by physical method.[18, 19,20, 2]

Instrument :-

Uv-Spectroscopy Introduction:-[23] The alternative title for this technique is electronic spectroscopy, since it involve the promotion of electron of (σ π n^*) the group state to the higher energy state. Visible and ultra-violet spectra electronic excitation occurs in the range of 200-800 mμ and involve the promotion of electron to the higher energy molecules orbits.

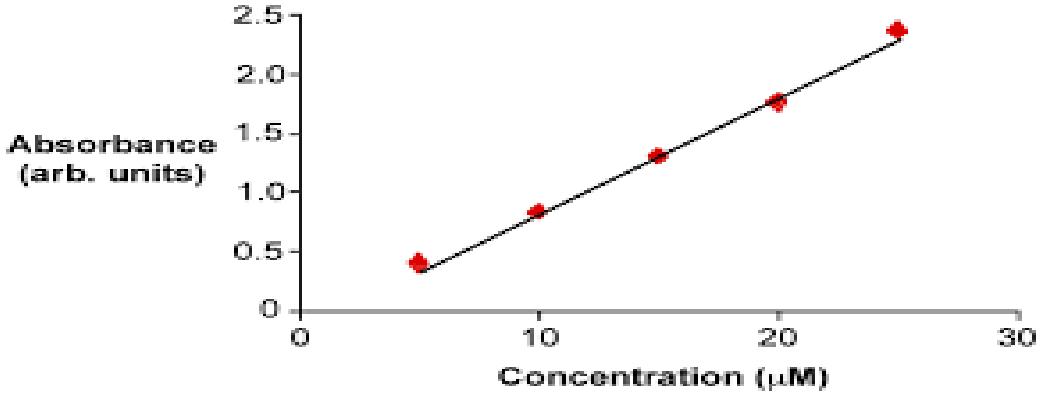
5.1 Calibration Graph

5.1.1 Absorption vs Wavelenght Qualitative application/ absorption



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5.1.2 Absorption vs concentration:- Quantitative application. To interpret the results from AAS, a calibration graph needs to be made. A line of best fit is drawn between all the data points and is used to work out the concentration of the sample from its detected absorbance level[24].



UV visible absortion lows[25]

- Beers law absortion and concentration relation.
- Lambert law absortion and path length relationship.

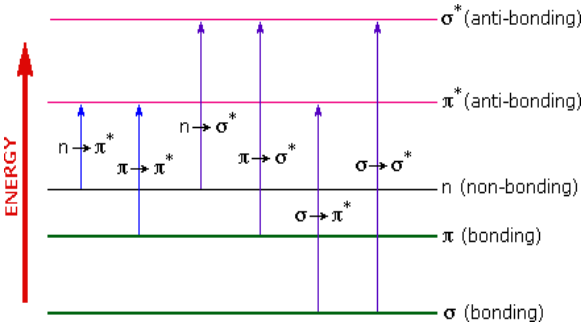
Beers law:- Whan a beam monochromatic radiation passes through a homogeneous absorption substance the rate of intensityof radiation (-DI) with concentration absortion solution is proportional to the intensity of Incident radiation.
Acc to the law = -DI/DI ∝ I. $I = I_0e^{-kc}$. $A \propto C$. $A = \varepsilon C$ A = Absortion
ε = molar extinction coefficient. C = Concetration.

5.2.2 Lambert's law:- Whan a beam monochromatic radiation passes through a homogeneous absorption substance the rate of intensity of radiation (-DI) with thickness of absortion solution is proportion to the intensity of the incident radiation Acc to this law = -DI/DI $\propto I_o$ and $I = I_0e^{-kl}$. $A \propto L$. $A = \varepsilon L$
Beers law and Lambert's law used combined from in UV spectroscopy $A = logI_0/I = \varepsilon CL$ I_0 = Intensity of incident light

I = intensity of transmitted light C = concentration of solution in mol litre^{-1} . L = Path length of the sample (usually 1 CM)

Both law combine $I = I_0e^{-kcl}$ and A=εCL

Electronic transition[26]:- A] σ $(sigma)electron$:- they required amount of energy for their excitation and do not show absorption in UV region. Absorption band is appeared in vaccum UV region. These electrons are involve in satural bond. Example saturated hydrocarbon are transparent inear UV region and thus they can be used as solvent.



B] π $(Pia)electron$:- They are found in multiple bond. They are generally mobile electron. Since π bond are weak bonds they energy produced by UV visible radiation can excite π electron to higher energy level. These electron are involved in unsaturation hydrocarbon.
C] N $(non\ bonding)$ electron:- Valance electron which do not participat in chemical bonding. In molecule are called as non bonding electron or pia electron. These are located principle in atomic orbital of N, O, S, and halogen as a lone pair of electron.

Energy required for the excitate $\sigma \rightarrow \sigma^* > n \rightarrow \sigma * > \pi \rightarrow \pi * > n \rightarrow \pi *$

$\sigma \rightarrow \sigma^*$ Note excited in the UV visible spectra because they required high amount of energy for excitation.

Chromophore[26]**:-** It is defined as any covalently bonded group that shows a characteristic absorption of electromagnetic absortion of in the UV visible region. The part of a molecule responsible for absorbing radiation is called a chromophore, and it generally include unsaturation group such as C=C C=O, N=N, -NO_2 or the benzene ring.

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Auxochrome[26]:- The colour of a molecule may be intensified by group called auxochrome which generally do not absorb significantly in the 200-800 nm region but will affect the spectrum of the chromophore to which it is attached the most and their properties are acidic(phonolic) or basic. The actually effect of an auxochromes on a chromophore depends on the polarity of the auxochromes e.g group like CH_3. In generally it should be possible to prediction the effect of non polar or weakly polar auxochromees but the effect of an auxochrome.

A] Bathochromic shift or effect or red shift Absorption maxima is shifted towards longer wavelength due to presenceof auxochrome or by the change of auxochrome or by the change of solvent. Extended conjugation and the addition of ring shift the lambda max towards longer ʎ. Trans isomer of olefin absorb at longer ʎ with more intensity than cis isomer.

B] Hypsochromic shift or effect or blue shift. Absorption maxima shigted toward shorter wavelength it may be caused by the removal of conjugation and also by changing the polarity of te solvent[4].

C] Hyperchromic effect Intensity of absorption maxima increase i.e E max increase[4].

D] Hypochromic effect intensity of absorption maxima decrease ε max decrease[4]

Absorption band[27]:- K-band, B-band, R-band, E-band.

K- band- Intensity of the k-band is usually > 10^4/10000. Occurs due to ---------- transition. Conjugation system like dienes polumers enones etc. Aromatic compound substituted by a chromophore. Affected by changing the polarity of solvent.

R-Band:- Intensity of the R-band is usually less than 100. Occurs due to---------- transition, R-band are also called forbidden band

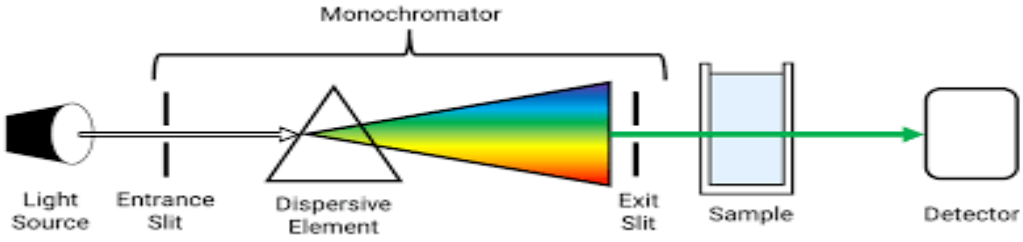
B-Band Occurs due to ------trasition in aromatic or heteroaromatic compound, Ex Benzene, Toluene, Phenol.

E-Band:- Occurs due to electronic trasition in the benzenoid system of three ethylene bond which are in closed cyclic conjugation. These are further characterized as $E_1$and E_2 bands of benzene at 184 nm and 204 nm respectively.

Transition probability:- Extinction coefficient $0.87 \times 10^{20} \times P \times A$ where P- transition probability with values from 0 to 1. A- Taeget area of the absorption system, usually called chromophore**.**

Used solvent. Water, Ether, Methanol, Chloroform, Carbone, tetrachloride, benzene, tetrahydrofuran**.**

INSTRUMENT USED IN UV VISIBLE SPECTROSCOPY[28]



Photometer:- Measured relative intensity. Illuminometer, Isolate a narrow wavelength region[6].

Spectrophotometer:- Measured the ratio, Isolate a large wavelength region have dispersing element. Commonly used 10 single beam spectrophptpmeter and double beam spectrophotometer[6].

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colorimeter:- Used visible radiation only.



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Sample cell[29]: The containers for the sample and reference solution must be transparent to the radiation which will pass through them. Quartz or fused silica cuvettes are required for spectroscopy in the UV region. These cells are also transparent in the visible region. Silicate glasses can be used for the manufacture of cuvettes for use between 350 and 2000 nm.

Applcations Of Uv-Vis Spectroscopy: UV –vis spectroscopy has many different application 1. Detection of impurities 2. Structural elucidation of organic compounds 3. Quantitative analysis 4. Qualitative analysis 5. Chemical analysis 6. Quantitative analysis of pharmaceutical substance 7. Dissociation constant of acids and bases 8. Molecular weight determination 9. As HPLC detector 10. Deviations from the Beer-Lambert law

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5. *R. SWETHA SRI , 2 CH. MOUNIKA, 3Dr.K.BHAVYA SRI 1Assistant professor, 2Research Student, 3Associate professor Department of Pharmaceutical Analysis RBVRR Women's College of Pharmacy, Barkatpura, Hyderabad, India on page no 134-137*
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FORMULATION AND EVALUATION OF NATURAL POLYHERBAL FACE PACK

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**Corresponding Author*

ABSTRACT
The aim is project is to create and test a herbal cosmetic face pack for all skin types utilising naturalComponents in varied doses. Three different mixtures that include, chandan powder,multanimitti,orange peel, neem powder,Sandalwood, respectively. Physiochemical, general powder, and chemical properties. They were then sieved through number 85, geometrically mixed, and evaluated for their organoleptic, Flow characteristics, making it appropriate for a face pack.
The majority of cosmetic products on market are synthetic in nature and have a variety of negative side effects when used is an Extended length of time. Use of herbal cosmetics is one remedy for this issue. Herbal cosmetics are thought to be generally safe with Little adverse effects.
KEY WORD: *FacePack, Skin, Natural Ingredient, Natural product.*

INTRODUCTION

Everyone aspires to have beautiful skin that is fair. Acne, black heads, pimples, and dark circles are now veryFrequent among young people and those who have the condition According to Ayurveda, blood impurities.

Among young people and those who have the condition According to Ayurveda, blood impurities areTypically the cause of skin issues. Skin related disorders are brought on by toxins that have built up in the Blood due to poor diet and lifestyle choices. In Ayurveda, various herbs and medications arespecified for Different skin types require various herbal face packs Women who have wrinkles, dark bags under their Eyes, pimples, or acne can get rid of them with the aid of the ayurvedic face packs. The fairness and Smoothness of the skin are improved by herbal face packs. We can use herbal face packs to their fullest

Potential by using them in accordance with the type of skin we have these face packs improve skin radiance and are the greatest ayurvedic remedy for boosting fairness. One of the most traditional and attractive waysTo cleanse the skin is using face packs. Ayurveda describes a variety of face packs with nourishing, healing, Cleansing, astringent, and antiseptic effects. Face packs can be made at home using common ingredients found In the kitchen and house Ayurveda describes a variety of face packs with nourishing, healing, cleansing, Astringent, and antiseptic effects. Face packs are easy to make .(1))

Ayurveda suggests using face packs to ledies.women get rid of wrinkles, dark bags, pimples, and acne. The Fairness and smooth ness of the skin are improved by herbal face packs. .The greatest ayurvedic treatment To promote fairness is ayurvedic face packs, which make the skin glow. A face pack is a smooth powder that is applied to the face. A good herbal face pack should penetrate the subcutaneous tissue and provide the skin with the nutrients it needs.to provide the necessary nutrition. Different herbal f ace packs are required for different skin types. Ayurvedic face packs are used to lighten dark spots, acne, and wrinkles, Dark circles.(3)

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OBJECTIVE

1 Feeds the skin. Essential fruit face packs are available. Vitamins for the skin.
2 Depending on its herbal ingredients, aids in reducing acne, pimples, scars, and marks.
3 Face packs typically remove skin's dead cells.
4 The skin is soothed and relaxed by these face masks.
5 They aid in quickly restoring the skin's lost radiance and glow
6 Regular use of natural face masks improves skin texture and complexion while giving skin aglow.
7 The wise application of face packs can effectively counteract the negative effects of pollution
8 Harsh environments
9 They aid in preventing early skin ageing(4)

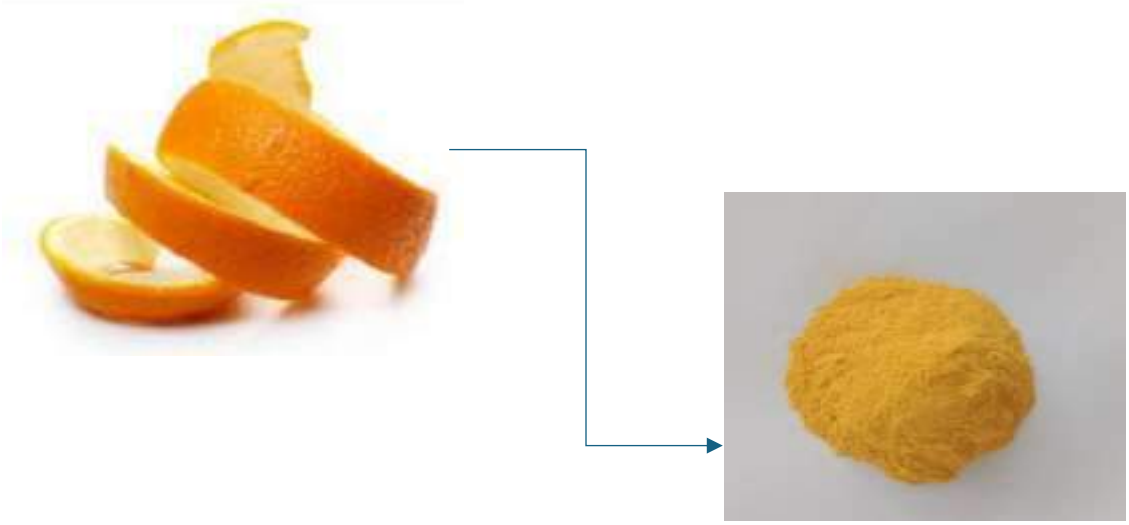
METHODS AND MATERIAL

- **Material**
  1. Orange peel
  2. Nutmeg
  3. Multani mitti
  4. Neem
  5. Chandan whood

❖ **Profile of Herbal Ingredient's**

1. Orange peel

Synonym: Citrus sinesis (sweet orange) Bitter orange, Citrus aurantium.



Family: Rutacea.
Genus : Citrus
Active components include: Limonene (90%), Citral (4%), Vitamin C, Pectin, Hesperidine, Aurantimarin Aurantimaric acid, Octana l (39%), Decanal (42%), Monoterpene (91%) and at least 2.5% Volatil e Oil. (4)

Orange is citrus fruit which highly contain vit C and other nutrient which are helpful to skin the product have so many medicinal value according to their different uses in many type if formulation such as food industry, folk medicine, cosmetic etc peel are the skin part of the orange, in epidermis of orange contain epicuticular wax which present small aromatic gland has responsible to smell .Orange prevents the skin from free radical breakdown, help to maintain skin rehydration and oxidative stress. (4)

Uses

1. Prevents skin damage from free radicals.

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2. Treats flaky, dry, and irritated skin
3. Rehydrates skin that needs it.
4. Replenishes moisture
5. Stops oxidative stress in skin cells for healthy, young skin.
6. Supports the renewal of tattered cells
7. As a skin whitening agent, it works.
8. Eliminates tan.Full of anti-aging qualities
9. Enhances the shine of healthy skin.(6)

2) Nutmeg

Synonym: - Myristica fragrans

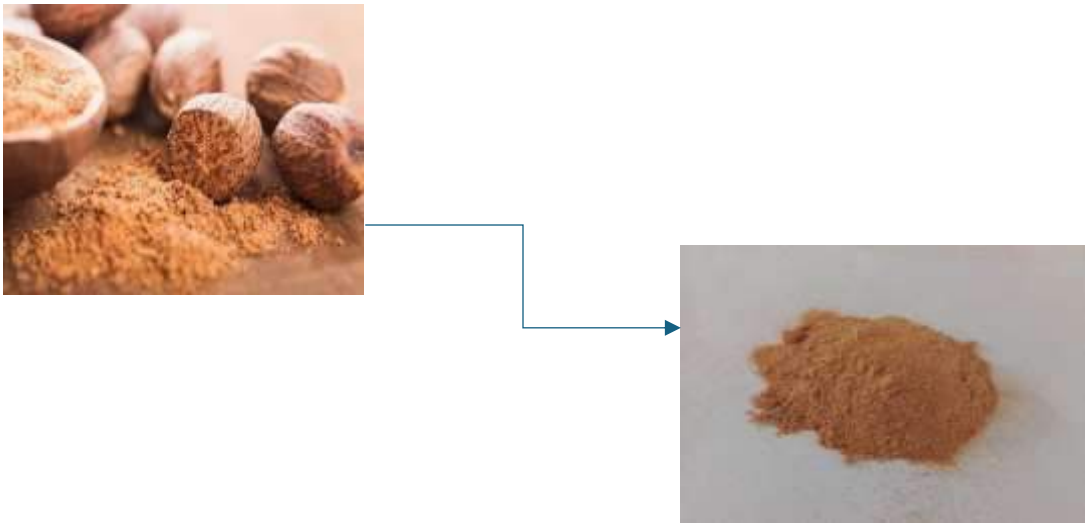
Family: - Myristicaceae

Myristica fragrans, sometimes known as nutmeg, belongs to the Myristicaceaefamily of plants.

Species: Myristica.

Nutmeg's active ingredients

Include 5 to 15% volatile oil, lignin, stearin, starch, gum, coloring agents, and 0.08% acid. Calcimine, Myristicin, Geraniol, Borneol, Pinene, Camphene, and Dipentene are all present in volatile oil. It also has trace amounts of isoeugenol, pcymene, euglol and safrol.Nutmeg is widely used for its analgesic, anti-inflammatory, antiseptic and anti-bacterial property. It helps in reducing wrinkles, fine lines and other signs of aging. It also helps in reducing acne scars and to make them less noticeable. Number of species in the genus Myristica produce the seeds or ground spice known as nutmeg. A dark leaved evergreen plant known as Myristica fragrans is farmed for the two spices that come out of its fruit. nutmeg, which is made from the seed, and mace, which is made from the seed covering. Moreover, it serves as a commercial source for nutmeg butter and an essential oil. Although the seeds of the California nutmeg, Torreya californica, resemble those of Myristica fragrans, they are unrelated to the latter and are not utilised as spices.(7) Trace amounts of isoeugenol, pcymene, eugenol, and safrol.



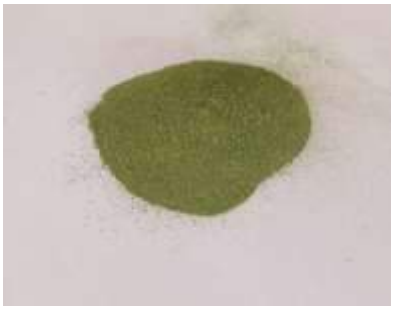
Uses

- It lightness the skin's pigment.
- Due to its mild abrasiveness, nutmeg is an excellent skin exfolia
- Because of its anti-oxidant and anti-agung qualities, nutmeg treats oily skinwhile also making skin Soft and smooth.Hence, it encourages the development of youthful skin.
- The pigmentation is lessened.
- The mild abrasive quality of nutmeg makes it a fantastic skin exfoliant.
- As result, skin becomes soft and smooth.
- deals with greasy skin.
- Anti-oxidant and anti-aging effects are present in nutmeg. Hence, it encourages youthful skin. natural (8)

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3) Neem:





Botanical name: - Azadirachta indica
Family: - Meliaceae
Genus: - Azadirachta

A tree in the mahogany group Meliaceae is known as Azadirachta indica, also known as neem, nimtree, or Indian lilac. It is a species of the genus Azadirachta, one of just two species, and is indigenous to much of Africa and the Indian subcontinent. Typically, tropical and semi-tropical climates are where it is grown. In Islands in southern Iran, neem trees are also present. Neem oil is made from its fruits and seeds. (9)

ACTIVE CONSTITUENTS
Nimbin, Salanin, And Valassin. Azadirachtin, Salannin, Meliantriol, or Nimbin were considered the top four Limonoids Compounds, Because limonoids have insecticidal and pesticidal properties,
Neem a tree of azadirachita indica which belongs to the family of meliaceae, it grown in tropical region evergreen plant has related to mahogany.neemis basically is Indian tree it also grown in several other countries like Burma, south asia and west Africa(10)

Uses
1 -Neem leaves powder has and many medicinal properties like anti- cancer, anti- inflammatory and antiseptic.
2 neem are very beneficial to oily and acne skin it is used as anti acne due to its have antibacterial and anti inflammatory properties.
3.The powder has also had anti oxidant agent and it's prevented and cures skin pimples, neem has potency to pure the blood (11)

❖ **Multani Mitti**
They also provide the Appearance of glowing skin because they are rich in vital Nutrients.Multani mitti is known as fuller earth widely used substance as a home remedy in any Asian countries for various purpose like it is used as a skin cleansing agent and cleansing for hair, also used to giveMultani mitti is a natural cleanser with various skin benefits, including oil reduction, acne treatment, skin tone levelling, and brighteningskin.

In modern era it is used as bleaching agent and as dust absorbent (12) 0f Multani mitti.Multanimitti helps to skin by different behavior like it removing the blackheads and whiteheads of the skin, effective against sun rays to prevent skin, usable for improving blood circulation, remove complexation and for skin glowing. Fuller earth contain health beneficial nutrients mainly rich in magnesium chloride (13)

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Fig: Multani mitti

❖ **Sandal wood**

Sandalwood has an anti-tanning and anti-aging property. It also helps skin imany ways like toning effect, Emollient, antibacterial properties, cooling astringent property, soothing and healing property.



Fig: Sandal wood

The tree of sandal wood is most valuable tree used for many purpose in Indian tradition, its wood are the most expensive and the tress also known as for its aroma. Sandalwood are mainly use d in many form like wood, oil, powder. oil is used for cosmetics, perfumes, and pharmaceuticals formulations(14). The plant belong to the class of santalum album have family santalaceae in india it is also known as Hindi name chandan. Sandalwood is used to treat many way like diuretic, expectorant, and stimulant it has sweet and aromatic in odor, used in various deodorant and body spray preparation in tradition system is used to treat various systemic and local disorder like diarrhea, poisoning, chickenpox (15)

Our formulation we used sandalwood has a anti ageing and anti tannig agent which is helps to maintain skin many ways like emollient, cooling due to astringent properties, cooling and quick healing it a strong anti bacterial agent (16)

PREPARATION OF POLYHERBAL FACE PACK:

- **Drying**

All the powder are in dry form and grinded.

- **Size Reduction**

The crude ingredients were collected and these ingredients were size reduced using driven mixer individually.

- **Sieving:**

Then this fine powder was passed through sieve no:60,80, to get the sufficient quantity of fine powder.

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- **Weighing:**

All the required herbal powders weigh.

- **Mixing:**

All these fine ingredients were mixed throughly by mixer to form a homogeneous fine powder.

- **Packing and Labeling:**

Then it was packed and labeled suitably

❖ **Method of application**:

Take a powder mixture made up of neem leaveOrange peel powder,nutmeg powder, Multani mitti, and Sandalwood. To create a smooth paste, add 3-4ml of roseWater or water. Apply this paste all over your face, give It 10 to 15 minutes to dry. Gently scrape pack off skin once Powder has dried, then rinse it of with water. When gently Massaged into the skin for a few minutes, face pack also Functions as:

- **Apply to face pack**

1. Place the made face pack powder inside a basin with the rose water.
2. Mix thoroughly to create a paste with the correct thickness.
3. Use a brush to apply it uniformly all over the face.
4. Hide the pimples and imperfections.
5. Let in the same condition for 20–25 minutes to dry completely

- **Chart of formulation face pack**

Sr. No	Ingredients	Quntitiy
1.	Orange peel	3 gm
2.	Nutmeg	3 gm
3.	Neem	1 gm
4.	Mulatani mitti	5 gm
5.	Sandal wood	3 gm

❖ **METHOD OF EVALUATIONS**

Organoleptic Evaluations:

A number of organoleptic characteristics, including colour,Oduor, look, texture, and consistency, were assessed for the Prepared face pack. The sensesof touch and sensation were Used to evaluate colour, smell, and texture visually.Grittyness, and washability of the substance are among the Organoleptic factors that were personally assessed for their physical attributes.

❖ **PHYSICOCHEMICAL EVALUATION**

• Physical and chemical parameters, such as moisture content, extractive values, pH, and ash value.

Determining moisture content:

The amount of moisture in plant drugs is crucial because insufficient drying could result in the active

Ingredients losing some of their potency due to enzymatic deterioration. Loss on drying was used to calculate

1) Moisture content (LOD)

Weigh accurately of 3gms of the powder medicine should be weighed before being placed in a petri dish and Heated to between 100 and 108 degrees Celsius. Drugs. It aids in judging the product's purity and overall

Determining Moistures Content

it is dfined as the amount of water that can be removed without water that can be removed without alteratin of chemicals structure of frains.

- **Procedure**

1. Take 2-3 gram of ground sample
2. Places this sample in a air oven at 130c for about 1-2 hr
3. Afterwards the sample are taken out and placed in decicator to cool down
4. The drop in weight of sample was measured.
5. Moisture content material based on the sirf between the initial weight and final weight of sample

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2) Total ash value

Total ash value is defined to measure the total amount of material.produced after.copmlet innervetion of the drug material at as low temprture as possible about 450c to all the carbons

- **Procedure**

1. Weight sample in (in privious dried and weight dish / crucible)
2. heat the dish carefully over a small flame to char the material.
3. Ignore in a muffle furance at 550()
4. Grey ash is obtained
5. Cool in the desicator
6. If wetting show ash to be carbon free, remove dish from desicator
7. Weight the dish
8. Repat the operation of two.succesive weighing
9. record the lowest mass.
10. Calculate the result.

Formula

% total ash = Weightsof Ash / Weight of Sample× 100

Measurement of pH:

It is a measurement of the product's acidity or alkalinity Goods evaluated on a 0–14 scale. The pH of the face pack's composition in rose water was discovered.

RHEOLOGICAL EVALUATION

It provides a general overview of the product's visco elastic flow characteristics. For the formulation, physicalVariables such the angle of repose, the tapped density, the bulk density,Index were measured and calculated.

1. **Tapped Density**

   A graduated measuring cylinder containing a powder sample is mechanically tapped to raise the bulk density. A powder's compressibility and flow characteristics can both be predicted using the tap density of the material.In a graduated cylinder, the capacity of the packing can be measured

2. **Bulk Density**

   The volume of each pore in the powder sample is taken into account while calculating bulk density.Bulk Density is a word used to describe a way to package particles or granules. The graduated cylinder was filledWith 25gms of powder that h ad been weighed out. It was remarked how much space the powder took up.

3. **Aangel of repose**

   The steepest angle of fall or dip in relation to the horizontal plane to which a material can be piled withoutStumping is known as the angle of repose, or critical angle of repose, of a granular material.

   It is crucial for the processing, storing, and transporting of particulate materials systems, Because it affects how well the various particles adhere to one another, it is also helpful to quantify the flow Characteristics of powder The fixed funnel cone method determines the height (H) above a piece of paper

   That is placed on a flat surface. The prepared mixture was gently poured through the funnel until the conicalHeap peak just brushed the tip. "R" here stands for the radius of the conical pile.

   Angle of repose(a) is calculated using the equation

   $\Theta = \tan^{-1} h/r$

4) **Tapped Density**

   A graduated measuring cylinder containing a powder sample is mechanically tapped to raise the bulk density.A powder's compressibility and flow characteristics can both be predicted using the tap density of the material.

   In a graduated cylinder, the capacity of the packing can be measured.

   The volume of each pore in the powder sample is taken into account whileCalculating bulk densityA graduated measuring cylinder containing a powder.

BENEFITS AND PRECAUTION

BENEFITS OF APPLYING FACE PACK

1. Nourishes the skin. Fruit face packs supply essential nutrients to skin
2. Helps to reduce, acne, pimple, scars and marks depending on its herbalIngredients
3. Face packs usually remove dead cells of skin
4. These face masks provide a soothing and relaxing effect on skin

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5. They help to restore the lost shine and glow of skin in short span of time
6. Regular use of natural face masks bring glow to skin, improve skin texture and complex
7. The harmful effects of pollution and harsh climates can be effectively combated with judicial use of face pack.
8. They help to prevent premature aging of skin
9. Formation of wrinkles, fine lines and sagging of skin can be effectively controlled by using natural face pack
10. Natural face packs make the skin look young and healthy

Face packs which are recommended for acne, pimple, black heads usually control the over discharge of sebum From sebaceous glands and remove the harmful bacteria inside acne lesion.

The scars and marks of skin can be reduced by adding fine powder of sandal, rose petals and orange lentils with acne face pack.

PRECAUTIONS AFTERAPPLYING FACE PACK

a. Select the face pack according to your skin type. Take opinion of naturaltherapist or concerned skin Expert before applying face pack.
b. The face pack should not be left on face more than 15 to 20 minutes. Keeping for very long time may Result in formation of wrinkles, sagging of skin and
c. Enlargement of open pores.
d. Apply face pack once in a week. Don't try to peel or scratch the dried face pack. This may harm Underlying skin
e. Spray water (which is at room temperature) on face before removing dried face pack. After removing the mask, roll an ice cube on facial skin. This helps to close open pores and tightens skin. It also tones and sooths the skin
f. Do not scrub face vigorously. This may result in eruption of pimples and dark spots. Stay away from Heat when you have applied face pack
g. Avoid applying face pack near "eye zone". The skin around eye is very delicate. The process of Removing face pack may damage skin around eyes.

RESULT

- **Organolepticstest**

To ensure that the credited face pack was outstanding, the following evaluation criteria were use organoleptic assessment. The evaluation of a herbal face pack for organoleptic criteria is shown in Table 2

The prepared mixture was brown in colour.

The aroma of the finished mixture was pleasant and well tolerated which is ideal for cosmetic Applications.

Sr.No	Parameter	Observation
1	Colure	Cream colure
2	Odour	Pleasant
3	Apperance	Smooth,fine
4	Texture	Fine

Table No. 2

- **Biological Test**

1) An Irritation Test

An irritation test was performed on the skin produced by herbal face pack, and the results are shown in Table No. 3

The recipe for the herbal face pack during irritancy studies, did not exhibit any signs of redness,swelling, Irritation.

Sr.No	Parameter	Observation
1	Irritation	Nill
2	Redness	Nill
3	Swelling	Nill
4	Photo annyonce	Without Sensitivity

Table No. 3

As a result of the herbals in their product, the irritancy test for irritancy, redness, swelling, and photo annyonce.
The proteins in the skin were discovered to be compatible with natural forms without the use of chemicals.

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3) Rheological Table

Rheological results supported the flow characteristics of natural face mask. It was discovered to beNaturally free-flowing and non-sticky.

Sr no	Parameter	Observation
1	Volume density	0.49 g/ml
2	Density tapped	0.58 g/mll
3	Posingangle	26. 56

Table No. 4

Observation: the face pack was discovered to be free flowing and non sticky in nature, rheological Data supported the flow characteristics of the product.

The outcomes demonstrated that the formulation was stable in every way.

3) **Stability Studies** :

A stability study of the prepared herbal face pack was conducted, and the results are shown in Table. No.5

No colour variation, smell, feel, smoothness, and pH were observed.

Sr No.	Parameter	Observation
1	Room temperature	35
2	Colour	Cream colour
3	Odour	Unpleasant
4	Tinctuer	Fine
5	Smoothness	Smooth
6	PH	6

Table No.5

Over the course of a month, stability tests conducted at various temperatures proved the face's inert statein terms of pH, colour, odour, appearance, and texture.

DISCUSSION

Herbal face packs or masks are used to stimulate blood circulation, rejuvenates the muscles and help to maintain the elasticity of the skin and remove dirt from skin pores. The advantage of herbal cosmetics is their nontoxic nature, reduce the allergic reactions and time tested usefulness of many ingredients. Formulation was creamish yellow in color and had semisolid consistency.

The formulation was found homogenous, easily washable and also had very slightly alkaline pH which were compatible with normal skin physiology. Angle of repose is a characteristic related to inter particulate friction or resistance to the movement between the particles. The flow property has been classified as per limit of Indian Pharmacopoeia in terms of the angle of repose. The results of all these parameters indicated that the dried powder of combined form possess good flow properties and good packing ability. Consequently, it exhibited good flow properties for formulation to achieve soft, fresh and clean formulation.

CONCLUSION

The combined powders' dried form demonstrated strong flow characteristics, making it ideal for just a face pack. An organoleptic analysis revealed that the pack was smooth and has a good smell.

The pack's flow characteristics were supported by rheological studies, which revealed that it was naturally free-flowing and non-sticky. No irritation existed, and the formulation was steady in all respects. Stability testing showed that the pack was inert. A herbal face pack was applied to refresh the muscles, keep the skin elastic, sweep away stuck-on debris, and enhance blood flow. Herbal-based cosmetics have the advantage of being nontoxic. It nourishes the skin on the face. These face pack gives the cooling effect .They do so in the quickest possible time to restore the skin's natural radiance.

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MULTIDISCIPLINARY METHOD IN TEACHING ENGLISH

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ANNOTATION

In this article dedicates using multidisciplinary method in teaching English. In multidisciplinary approach, facts, theories, methods, notions and concepts creates conceptual framework underlying the interlinking the basic common factors of more than two disciplines aiming the desired result in the content of English language teaching.

KEY WORDS: *multidisciplinary, methods, curriculum, combine two disciplines.*

Аннотация: Данная статья посвящена использованию мультидисциплинарного метода в обучении английскому языку. При мультидисциплинарном подходе факты, теории, методы, понятия и концепции создают концептуальную основу, лежащую в основе взаимосвязи основных общих факторов более чем двух дисциплин, направленных на достижение желаемого результата в содержании преподавания английского языка.

Ключевые слова: мультидисциплинарность, методы, учебная программа, объединение двух дисциплин.

INTRODUCTION

Multidisciplinary approach is a method of curriculum integration that highlights the diverse perspectives that different disciplines can bring to illustrate a theme, subject or issue. In a multidisciplinary curriculum, multiple disciplines are used to study the same topic.

This attempt to employ multidisciplinary approach can enhance the instructional delivery in teaching English language to the university students. (Stern, 1983, 143). Linguistic experts and researchers have been working hard in the process of finding out better English language teaching and learning strategies, tracking down the pragmatic methods of testing English language skills. This has become one of the most concentrated issues in the present day linguistic research endeavour. This paper attempts to explore the impact of multidisciplinary collaboration in English language teaching by drawing valuable findings from the experimental study. The aim of this paper is to evaluate the impact of multidisciplinary approach in accelerating English language writing skills among the post graduate gifted students studying in various departments. To answer the research question ‘’Can English language writing skills be accelerated better by Multidisciplinary approach than other two types of approach?’’ an experimental study was conducted and the impact of three types of approach was evaluated.

The effective pedagogic practice can be reinforced by incorporating the multidisciplinary approach in the field of English language. Introducing the multidisciplinary approach in English language teaching, promotes the skill of English language learners to apply the knowledge gained in learning English language to the acquisition of knowledge in various content domains across the disciplines.

The tests were administered to them for evaluating the effect of multidisciplinary approach in term of the following learning outcomes of the training program given to them earlier. 1. understanding the differences and similarities between academic writing and journalistic writing. 2. ability to write an effective topic sentence. 3. ability to write an effective thesis statement. 4. ability to write a five paragraph essay exhibiting an attractive introduction, well developed body and effective conclusion with coherence and unity throughout the essay.and 5. ability to write complex formal texts for academic purpose in demanding context, demonstrating an excellent range of idiomatic language with complete control of variations and subtleties of grammar, structure, tone and style. Though overall performance of the students is excellent, the following findings exhibit distinct unique facts. 1. 85 percentage of the students scored at least 46 marks out of 50 marks from organisation scoring and content scoring sections. 2. Students from multidisciplinary approach group better performed than those of other groups. and 3. 11 percentage of students scored less than 10 marks out of 15 from language use scoring section. The following are the advantages of Multidisciplinary approach in teaching English language to the university students. 1) As in this approach key concepts and ideas from various disciplines are incorporated natural way of learning is promoted. 2) As it empowers the learners to construct better integrated system of knowledge and

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information, they can solve problematic situations in the real world in the context of English language teaching and learning. 3) It enhances comprehensive learning at any situation. 4) It makes learning English language experience amusing and thought provoking. 5) This approach gets all the students learning English language to get the desired results.

The main objectives of this paper are the following: 1. To throw light on the concepts related to the disciplinary, interdisciplinary and multidisciplinary approaches in the content of English language teaching. 2. To substantiate the advantages of multidisciplinary approach in teaching English language. The disciplinary approach or the subject approach limits its scope to its own boundary and allows only a single academic discipline is taught. This approach also limits facts, methods, concepts and theories to its own boundary.

This paper reports the outcome of the research borders on three types of macro linguistics namely

1. Psycholinguistics
2. Anthropological linguistics
3. Socio linguistics.

The population sample consists of post graduate final year students and much of their academic course work is linked to the use of English. The pretest and posttest have been administered to all the respondents belonging to both control and experimental groups. The researcher conducted a training program to 125 post graduate gifted students focusing on higher level writing skills and multidisciplinary approach followed by a test. During the training that spread over three months the following instructions and writing tips assimilated from various sources were being provided to them

1. Advancing a point or thesis statement and supporting that thesis are the most important steps in competent essay writing.
2. Aim to make your own writing equally convincing by providing detailed support.
3. All the details in the essay must cohere or stick together, so that the reader will be able to move smoothly from one bit of supporting information to next.
4. Begin and end an essay with effective introductory and concluding paragraphs.
5. Developing a scratch outline into a well written thesis requires great deal of careful thinking and hard work.
6. In time or chronological order, details are listed as they occur in time.
7. In time or chronological order, phrases or words like first, first of all, next, then and after that are used.
8. Learn the chief ways to organize and connect the supporting information in a paper.
9. Organize and connect specific evidence in the body paragraphs of an essay.
10. Organize and connect supporting details by the use of 1. Common methods of organization, 2.Transitions and 3.Other connecting words.
11. Provide enough specific details and evidences to fully support the point in a body paragraph of an essay.
12. Specific details and evidences excite the reader's interest and explain a writer's points.
13. Start an essay with a suitable introductory paragraph and finish it with a well-rounded concluding paragraph.
14. The best received paragraphs are almost sure to be those with plenty of specific details.

CONCLUSION

In spite of the following challenges in English language teaching, multidisciplinary approach should be encouraged by all the stock holders of English language teaching for its pedagogical impact. 1) Lack of Time availability 2) Long working process 3) Unfavourable evaluation of articles about multidisciplinary approach products. and 4) Lack of full commitment. The following demands to encourage multi-disciplinary approach in English language teaching are recommended 1) Official recognition of collaborative approach. 2) Rewards 3) On-campus administrative support 4) Institutions collaboration and 5) setting common goals among the stock holders.

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WORKS OF MAHMUD ZAMAKHSHARI ON LINGUISTICS

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ABSTRACT
This article provides information about Zamakhshari's works on linguistics. The author pays special attention to the work "Nukatu-l-e'rab" by the author and provides enough information about its structure and sections.
KEY WORDS. *Zamakshari, point, point, e'rob, nahv, balogat, sarf, tafsir.*

It should be emphasized that all the initiatives in the development of the education sector of the Action Strategy of the Republic of Uzbekistan in the five priority directions of development in 2017-2021, approved by the Decree of the President of the Republic of Uzbekistan dated February 7, 2017, are of particular importance. must The fifth direction of this document is aimed at ensuring security, inter-ethnic harmony and religious tolerance, in which the study of the scientific heritage of the great ancestors of the ancient and recent past will strengthen the atmosphere of sincerity, peace and tolerance, extremism among the youth. and is determined to serve as an important tool in the prevention of terrorist ideas[1].

Studying the scientific heritage of our great ancestors and applying it to life is of great importance in educating the young generation in the spirit of loyalty to national and universal values. The research of the works and activities of one such scholar, Mahmud Zamakhshari, occupies a special place.

After the independence of our country, among other great ancestors, with deep respect and love, such as "Ustozu-l-arab wa-l-ajam" ("Master of Arabs and non-Arabs"), "Fakhru Khwarazm" ("Pride of Khorezm") The life and scientific heritage of Mahmud Zamakhshari, who gained fame with honorable names, began to be studied on a scientific basis.

The name of the great scientist Zamakhshari, who grew up in the land of old Khorezm and made a significant contribution to world culture, is well-known in the world. His immortal works and scientific works and articles written about him can be found in libraries all over the world. No matter how much the people of Central Asia are proud of this great breed, who added priceless masterpieces to the treasury of science[2].

Abul Kasim Mahmud ibn Umar Zamakhshari was born on the 27th day of Rajab 467 AH (March 19, 1075 AD) in the village of Zamakhshar, Khorezm. Information about Zamakhshari is mainly given in medieval Arabic sources. Although his father was not very wealthy, he was a literate, pious, pious person who spent most of his time reciting the Qur'an and praying, and was an imam in a mosque in Zamakhshar. Alloma's mother was considered one of the pious and religious women.

Zamakhshari was one of the leading scientists of his time and wrote about seventy works on various fields of science, only some of them have survived. The list of Alloma's works is given differently in different sources. The German orientalist K. Brockelmann in his work entitled "History of Arabic Literature" gave information about 31 works of Mahmoud Zamakhshari", Dr. Ahmad Muhammad al-Khufi - 48 of his works in the treatise "Az Zamakhshari" Academician A. Rustamov's book "Mahmud Zamakshari" contains information about 39 works of Alloma. U. Uvatov, another researcher of the scientific heritage of Mahmud Zamakhshari, gave information about 34 works of the scholar in his book "Delicate Phrases" .

[1] *Mirziyoyev Sh. We will resolutely continue our path of national development and raise it to a new level. Book 1. - T.: Uzbekistan, 2017. - P.504*
[2] *A. Rustamov. Mahmoud Zamakhshari. -T.: Science Publishing House, 1971. -P.3*

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I.Yu. Krachkovsky, V.V. Barthol'd, A.A. Borovkov, A. Krimsky, V.L. Vyatkin; Western scientists K. Brockelman, Goldsier, Wetstein, Nyol'deke, Poppe, Wright, Bensing, Zayonchikovsky showed great interest in the scholar's scientific heritage and conducted research on his works.

Jurji Zaidan, Ahmad Muhammad al-Khudi, Ali al-Bajawi, Bahija Baqir al-Husni, Muhammad Abul Fazl Ibrahim, Husni Abdujalil Yusuf, Ibrahim al-Samarai, Muhammad Basil Uyun al-Sud and others from the Arab scholars studied the work of scholars in every way. those who tried[3].

Mahmoud Zamakhshari perfectly mastered various fields of science, including the usage of the Arabic language, literary studies, lexicography, linguistics, geography, aruz, logic, religious sciences, interpretation of the Qur'an.

Among Zamakhshari's priceless heritage, the most famous works on linguistics are "Asosu-l-Balogha" ("Foundation of Puberty"), "Sharh abyat Kitab Sibawayh" ("Commentary of the Book of Sibawayh") on grammar, "Al-Mufassal", "Al-Unmuzaj" ("Example"), "Muqaddamatu-l-adab" are of special importance. Among them, it is appropriate to give special recognition to his work "Al-Kashshof", which includes his comments on the Holy Qur'an in 1134. This work is a work on tafsir, and it is recognized as the most perfect among the books of tafsir by Orientalists and Arabic scholars. That is why manuscript and lithographic copies of these works are kept in manuscript funds of different countries of the world and are still used as textbooks in the higher education system of many countries. Commentaries on most of these works were written by famous scholars. These comments indicate the high value of the works of the scholar.

At this point, we consider it appropriate to briefly touch on the book "Muqaddimatu-l-adab", one of the most important books of the scholar in learning the grammar of the Arabic language.

"Muqaddamatu-l-adab" is a work written by Zamakhshari dedicated to Khorezmshah Alauddin Abulmuzaffar Otsiz, and it is one of the more widely studied works. It should be noted that during the time of the Khorezmshahs, science and culture were very advanced. The rulers, especially Khorezmshah Otsiz, respected scientists, poets and writers, and he was a talented, enlightened person, interested in literature, and knowledgeable. During his time, many good things were done in the way of the development of science. Probably for this reason, Zamakhshari wrote "Muqaddamatu-l-adab" dedicated to him. The work is divided into five major sections and discusses nouns, verbs, conjunctions, noun inflections, and verb inflections. The work was completed in 1137.

In his work, Zamakhshari tried to cover all the words and expressions of the Arabic language that were in use at that time, and paid great attention to their etymology. That is why this great work of Zamakhshari can be said to be one of the first works in this direction.

The work "Muqaddamatu-l-adab" was written for the purpose of teaching the Arabic language to non-Arab nationalities. It was originally created in Arabic-Persian-Turkish languages. Currently, there are copies of it in Arabic-Persian-Turkish, Arabic-Persian-Turkish-Mongolian, as well as, according to some sources, a Greek dictionary[4] .

"Muqaddamatu-l-adab" consists of an introduction and five parts devoted to the description of nouns, verbs, auxiliary words (letters), nouns, and verbs.

Abu-l-Qasim Mahmud Zamakhshari's work "Muqaddamatu-l-adab" is a multilingual, complex structure, encyclopedic work, such a work is rare in the history of philology. The first part of the nouns of "Muqaddamatu-l-adab" literally serves as a modern encyclopedic dictionary, while the second part of the verbs is perfectly structured at a high scientific level based on the rules of Arabic grammar. The third, fourth, and fifth parts of "Muqaddamatu-l-adab" are devoted to the rules of pure Arabic grammar, such as auxiliary words, nouns, and verb conjugations. Each grammar rule is reinforced with many examples.

Another of Allama's works that reveals the subtleties of Arabic grammar is the work "Nukatu-l-e'rab fil gharib e'rob fi-l-Qur'anil Karim", in which by revealing the subtleties of the verses of the Holy Qur'an grammar topics are explained to the student. This work is in manuscript form, and Zamakhshari named it "Nukatu-l-e'rab fiy gharibi-l-e'rab". Some scholars of translation and tabaqat added the phrase "Fiy Qur'an-l-Karim" to this title in their books[5].

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[5] *"Nukatul e'rob fil ghorib e'rob fil Qur'anil Karim". - Cairo: "Darul Ma'arif" publishing house -P. 32*

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"Dot" is the plural form of the word "Dot", which means every black dot on a white object, or every white dot on a black object, as it appears in dictionaries. In general, "point" means "a fine point of something". The point of the word means that the original purpose of the word is revealed by revealing its subtleties, secrets, and subtleties. In this work, Zamakhshari revealed the specific subtleties of some surahs in the Holy Qur'an.

As for the structure of the book, we can see that the scientist divided it into chapters called surahs. The work is explained in the same order as "Fatiha" sura, then "Baqara" sura, then "Ali Imran" sura. The work ends with "Ikhlos" surah. However, the scholar did not study all 114 surahs of the Holy Qur'an in this work. As long as there are 68 chapters in the work, it means that the scholar worked on 68 chapters. The remaining 64 chapters are not included in the book. Az-Zamakhshari chose those with more subtle aspects in terms of grammar.

As for the writing style of the work, Zamakhshari chooses the educational method of covering the work. First, he asks the student a question. Then he answers the question himself. In this way, he presents the book to the public in the form of a conversation. This thing serves to further increase the scientific value of the book.

In conclusion, it can be said that although the scholar created works related to various fields, his greatest contribution to science was the development and development of the grammatical rules of the Arabic language. The whole world recognized this service of Zamakhshari and his works are still being studied.

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QUESTION OF SUICIDE IN ISLAMIC DOGMA

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ABSTRACT
This article raises the issue of human suicide in terms of Islamic dogma. In particular, it is highlighted that the influence of this activity on a person's faith and his fate in the judgment day, according to the doctrine of "Ahl-s-Sunnah wa-l-Jamaa", based on the Koran and the Sunnah. The main goal of the article is to prove the inferiority of suicide for the development of social society and the disastrous outcome for a person in the other world, based on the science of dogmatic theology.
KEYWORDS: *Religion, Quran, Savings, Hell, Paradise, Suicide, Death, Fard, Haram, Sin, Forever, Disbelief, Funeral.*

It is known that Allah created man as the dearest and noblest of all His creations. On earth, all people, regardless of their religion, race, nationality, color and other qualities, are considered dear and honorable. Because they are human. The Qur'an says that people are noble and honorable in Surah Isra, verse 70: "Indeed, (We) honored the children of Adam and made them ride on land and sea (on horses and ships) and provided them with pure things and made them better than many creatures We created" [1].

In this verse, Allah the Exalted said, "**The children of Adam.**" Accordingly, every person, regardless of his nationality or religion, deserves respect for his humanity.

God Almighty entrusted life and life to man. It is necessary for a person to make proper use of this life and avoid doing things that God has forbidden. The actions that Allah Almighty has given for life are not to waste it, not to waste time. Because we are not the owner of the soul in us, the members in us. All this is the property of Allah Almighty!

One of the prominent scholars of our time, Allama Sheikh Yusuf Karzavi, the Imam of Wasatiyyah, may Allah bless him and grant him peace, says: **"A person's life is not his property. Because man did not create not only himself, but also a single cell. A person's life is a trust given to him by Allah. Therefore, it will not be permissible for him to allow a shortcoming or to attack his life."**

We acknowledge death without doubt. Because it is said in the Holy Qur'an, Surah Ali Imran, verse 185: **"Every soul tastes** the (bitterness) **of death"** [1].

But we do not have the right to choose this death ourselves, to assassinate this dear soul! Because suicide is strongly condemned in the Holy Qur'an and Hadith. For example, verse 195 of Surah Al-Baqarah says:

"**Don't throw yourself into destruction with your own hands!"** [1] Verse 29 of Surah Nisa says: **"Do not kill yourselves!"** [1].

In Sahih al-Bukhari, it is as follows: Abu Huraira, may Allah be pleased with him, says: **"We participated in the Khyber Ghazat. The Messenger of Allah, may God bless him and grant him peace, said about a person who claimed Islam from among those who were with him":** He is from the people of Hell. When the war broke out, he fought very hard and suffered many injuries. Some people were almost skeptical. At that moment, the man stretched out his hand to the arrow from the pain of the wound, took an arrow from it and strangled himself with it. Some of the Muslims rushed to him and said, **"O Messenger of God, God has made your words come true, so-and-so committed suicide and killed himself."** Then he said: **"O so-and-so, get up and shout, 'Only the believer will enter Paradise!'"** [2: 342].

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Means of Suicide

A person can commit suicide by various means. For example: Suicide can be by using a knife, gun, drinking poison, throwing oneself from a high place, burning oneself, throwing oneself into water, throwing oneself under a car, hanging oneself.

In addition, it is possible to commit suicide by abstaining from eating and drinking, not treating a wound that is certain to heal, not trying to escape from drowning or burning in fire, and not running away from a predator, although it is possible to escape.

Whoever dies avoiding what is forbidden, he is considered to have committed suicide in the eyes of all the scholars [3:148]. Because it is fard to eat and drink enough to avoid death. If he died because he stopped eating and drinking, he committed suicide. The reason for this is that with this work, he will realize the self-destruction that is mentioned in the Holy Qur'an [4:215].

A person's life is so precious that even if he is forced to eat things prohibited by Sharia such as deadly, pork, or intoxicating drinks, and if he is in such a desperate situation that he will die if he does not eat them, then it is necessary to eat these things. If he dies without eating and drinking in such a state, he is considered to have killed himself. His deed is in the judgment of the one who forsakes eating bread and drinking water while he has the opportunity. Because a person who abandons food and drink is considered to be a person who tries to destroy his life. Allah the Exalted said: **"Do not kill yourselves!".**

Human life is so precious that even in the case of danger of loss of life, prayers, which are the pillars of religion, are given relief. Examples of this include performing tayammum when there is a risk of using water, praying while sitting when one is unable to pray standing, a sick person fasting at another time, and Hajj not being obligatory for a person whose path is dangerous until his path is safe.

Sentence of Suicide

Suicide is forbidden. Also, it is one of the greatest sins after associating with God. Allah Almighty said in verse 151 of Surah An'am: **"Do not unjustly execute a soul whom Allah has forbidden!"** [1].

And again, in the 29th verse of Surah Nisa, he said: **"Also, do not kill yourselves!" Indeed, God is merciful to you"** [1].

Scholars have decided that the sin of committing suicide is more serious than killing someone else. The appearance of some hadiths indicates that a person who commits suicide will stay in hell forever. For example, in the hadith narrated by Imam Bukhari, it is said: **"Whoever throws himself off the mountain and dies, he will be in the fire of hell, where he will throw himself forever. Whoever kills himself by drinking poison, will drink the poison in his hand forever while remaining in hell forever. "Whoever kills himself with a blade, will remain forever in the fire of hell, and will keep the blade in his stomach forever"** [5:VII j, 311].

This hadith narrated by Jundub from the Prophet, may God bless him and grant him peace, is one of them: **"A man had an injury and he committed suicide. Then Allah said: "My servant has gone ahead of Me in regard to his life. He said, "I have forbidden paradise for him"** [6:147].

But it is said that these hadiths were said for someone who hastened death due to suicide and considered it halal. Because he becomes a disbeliever as soon as he considers this work as halal. Because of this, a person who considers a major sin as halal is a disbeliever in the eyes of the people of Sunnah and community. And the unbeliever will surely be in hell forever.

If he did this act without considering it as halal, he is not a disbeliever, but he deserves a great punishment for committing a great sin. None of the scholars of the four schools of thought said that a person who commits suicide is a disbeliever. Because disbelief is denying the religion of Islam and leaving it. A person who commits a major sin other than shirk does not leave the religion of Islam in the eyes of Ahl-e-Sunnah wal-Jamaa. With this, the sin of suicide should not be taken lightly. Because a person who commits suicide has committed a very big sin. His punishment in the Hereafter will be very severe.

Funeral for a person who Committed Suicide

According to Jumhur (Hanafi, Maliki and Shafi'i) jurists, a funeral is performed for a person who commits suicide. Because, as mentioned above, because he committed suicide - as long as he did not believe that it was halal - he does not leave the religion of Islam.

According to Umar ibn Abdulaziz, Awza'i, and Imam Abu Yusuf from the Hanafis, the funeral prayer should not be offered to a person who commits suicide under any circumstances. Some of the Hanafis said that this is authentic. The proof of this is this hadith

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narrated by Jabir ibn Samura, may God bless him and grant him peace: "A person who committed suicide with a blade was brought to the presence of the Prophet, may God bless him and grant him peace. Then he did not perform a funeral for him" [7:50]. Also, in the hadith narrated by Abu Dawud, may God bless him and grant him peace, it is said: "A person went to the presence of the Prophet, may God bless him and grant him peace, and informed him that a person had died. У зот: **“Қаердан билдинг?”,** дедилар. У киши: “Унинг ўз жонига қасд қилаётганини кўргандим”, деди. У зот: **“Сен ўзинг кўрдингми?”,** дедилар”. У: “Ҳа”, деди. Шунда у зот: **“Ундай бўлса, мен унга жаноза ўқимайман”,** дедилар [8:513].

He said: **"How did you know?"** The man said: "I saw him commit suicide." He said: **"Did you see it yourself?"** He said, "Yes." Then he said: **"In that case, I will not perform the funeral for him"** [8:513].

Some jurists explained the reason for this and said that since the person who committed suicide has not repented, the funeral is not performed for him.

According to the saying of Imam Abu Hanifa and Imam Muhammad, may Allah bless him and grant him peace, a person who commits suicide should be bathed in ghusl and funeral prayers will be recited for him.

The conclusion is that from the above verses and hadiths, it became clear how great a sin it is to commit suicide. Therefore, it is absolutely wrong for young people to take their own lives for trivial reasons, such as quarreling with friends, teachers, parents, in-laws, etc., or when faced with difficult trials of life. Because suicide puts an end to all the possibilities that can be achieved in the life of the world. He buys the suffering of the hereafter in exchange for the troubles of this world, which are transitory.

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THE SCIENTIFIC HERITAGE OF THE SCHOLARS OF PAZDA CITY IN THE DEVELOPMENT OF ISLAMIC CIVILIZATION

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ABSTRACT
The article examines information on the ancient Pazda of Kashkadarya Oasis, its history and tangible as well as intangible heritage. Article sheds light on the life, scientific activity and contribution of more than ten Pazdawian scholars from Pazda to the development of Islamic theology and education in Mavarannahr. It also provides information on the importance of their scientific work and the impact on the literature of the subsequent period.
KEY WORDS: *Pazdavian scholars, jurist, Doctrine of Maturidiyyah, hadith, Nasaf.*

The ancient town of "Pazda" or "Bazda" located in the Kashkadarya oasis was one of the centers of science in the early Middle Ages, despite being a small area. There are also many scholars who worked in different fields of science with the Pazdavi ratio. They made a significant contribution to the development of science through their works. Despite the huge scientific heritage of Pazdavian scholars, there are very few scientific researches about them. From the existing studies, it is not possible to draw certain conclusions about the development of science in the town of Pazda and the scientists who came from the region and their contributions to the development of science.

In the article, the lives and scientific works of more than twenty scientists who worked in various fields of science with the "Pazdavi" (Pazdawi) ratio are studied. Most of these works are still extant, and they are fundamental sources of Islamic law, Islamic philosophy, and linguistic theories. In historical written sources, the town of "Pazda" (in Arabic sources, "bazda" - Bazda, in Persian and Turkish sources, "pazda" came in the form "Pazda") was a large population center that appeared in the southwest of the Kashkadarya oasis at the beginning of the 13th century. Due to the invasion of the Mongols that happened at the beginning, Paz, along with many cities in Central Asia, became ruins, and this city now belongs to the territory of Pazli village, Kasbi district of Kashkadarya region[1].

The 10th century Arab geographer Ibn Havqal in his works mentions Kasbi town 4 farsakhs (1 farsakh equals 6 kilometers) on the way from Nasaf to Bukhara, and Pazda town 6 farsakhs away. It is mentioned that Jami' Mosque exists in these two cities[2]. In another geographical-historical work of the 10th century, "Hudud al-Alam" (Boundaries of the World), Paz is described as a city with well-developed agriculture, and it is noted that the fields are irrigated from the river bed that flows through the area in certain seasons, and in most cases from wells and waterworks[3]. The famous historian of the twelfth century Abdulkarim Sam'ani (1163-1167) mentioned that Pazda is the name of a high and strong fortress located six farsakhs away from Nasaf, and he stayed there for a while and learned from local scholars[4]. Academician V. V. Bartold also listed Pazda among the cities of the Kashka oasis and, relying on historical sources, added that there were brick casting and baking ovens near the mosque[5].

In the early Middle Ages, mosques were not only a place to gather for worship, but also a place where some political issues were resolved and people were educated. Also, in the biographies of more than ten famous muhaddith and faqihs from Pazda whose names are mentioned below, it is noted that they were engaged in teaching students in Pazda for a certain period of time. These circumstances testify to the development of various fields of science in Pazda until the 13th century.

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Aziz ibn Salim ibn Mansur Basri Pazdavi is the first of the Pazdavi scholars mentioned in the sources. He was a friend of the Arab general Qutayba ibn Muslim (669-715) and came to Pazda from Basra between 704-715. The scientist received the nisba of Pazdavi because he stayed in the city until the end of his life, teaching the inhabitants the instructions of a new religion - Islam[6].

Abu Talha Mansour ibn Muhammad ibn Ali ibn Qariyna Pazdavi (d. 329/941) was the first muhaddith who grew up in the city of Pazda and was a student of Imam Bukhari (810-870). He was the last student who narrated the work "al-Jami' as-sahih" (The Reliable Collection) from the author Bukhari. Abu Talha Pazdavi taught the science of hadith to students in Nasaf for a long time[7]. Also, Ubaidullah ibn Amr ibn Hafs Pazdavi (d. 323/935), Yusuf ibn Muhammad ibn Adam ibn Isa Qassar Pazdavi, Abu Sulayman Dawood ibn Nasr ibn Suhail Pazdavi are also mentioned among the great scholars.

The most famous of the scientists who grew up in Pazda are Abdulkarim Pazdavi (912-999) and his descendants. Son Husain, grandson Muhammad, his two sons Fakhrul-Islam Abul Usr Pazdavi (1009-1089) and Sadrul-Islam Abul Yusr Pazdavi (1030-1100) and their children Hasan ibn Fakhrul-Islam (1078 -1161) and Ahmad ibn Abul Yusr Pazdavi (1088-1147) made a great contribution to the development of Hanafi jurisprudence and doctrine of Maturidia.

There is little information about the life and scientific heritage of Abdulkarim ibn Musa ibn Isa ibn Mujahid ibn Abdullah Pazdavi. According to the sources, Abdulkarim Pazdavi studied with Imam Abu Mansur Moturidi (870-944) and became a jurist, mutakallim, muhaddis. He narrated the work of Abu Hanifa "al-Alim wal-muta'allim" (The Master and the Disciple) from his teacher. Also, the chain of teachers reached the sectarians Muhammad ibn Hasan Shaybani and Abu Hanifa through Imam Moturidi[8].

It is known that the grandson of Abdulkarim Pazdavi, Muhammad ibn Husayn ibn Abdulkarim Pazdavi, was a great jurist of his time and served as a judge in the cities of Samarkand and Bukhara[9]. Muhammad's two children, Abul Usr Ali and Abul Yusr Muhammad Pazdavi are considered important figures in the development of Hanafi jurisprudence and Maturidyya doctrine.

Ali ibn Muhammad Pazdavi (1010-1090) was known as Fakhru-l-Islam (Pride of Islam), and the books written by him with the nickname "Abul Usr" (Father of Troubles) were of a high level, and their understanding required knowledge of certain sciences. Unlike his younger brother Muhammad's works, he was known by the nickname "Abul Yusr" (Father of Simplicity).

Fakhrul-Islam Pazdavi's work on Usul al-Fiqh (Theory of Islamic law) Kanzul Wusul ila Ma'rifti-l-Usul (Treasure for the Study of Usul), known as "Usul al-Bazdawi", is the main manual of Hanafi Usul al-Fiqh. Gained fame and many commentaries were written on this work. Also, Fakhrul-Islam Ali Pazdavi "Kashfu-l-astor fi-t-tafsir" (120 one hundred twenty volumes), "Sharhu Jami'u-l-kabir", "Siyratu-l-mazhab fi sifati-l-adab", "Sharhu Jami'u-s-sahih" (A Commentary on Imam Bukhari's "al-Jami as-sahih"), "Ginou-l-fuqaho fi-l-furu'", "Mukhtasaru Taqwimu-l-adilla", "Sharhu Taqwimul adilla fi-l-usul", "Sharhu Jami'us saghir", "Ziyadotu-z-ziyadot", "Kitab al-mabsut", "Zallatu-l-qariy", "Sharhu Fiqhul akbar", "Amoli", "al-Muyassar fil kalam", "Sharhu Mukhtasaru-l-Quduriy" works, most of which have reached us[10].

Fakhrul-Islam Ali Pazdavi's son Abu Sabit Hasan ibn Ali Pazdavi (470/1078 557/1161) also became a great jurist and muhaddith after learning from several mature scholars of his time. After living in Marv for a while, he was elected to the Qazi of Samarkand. After the death of his cousin Abul Ma'ali Ahmad in 542/1146, Abu Sabit Hassan was appointed as the judge of Bukhara in his place, and at the end of his life he moved to the city of Pazda, where he was engaged in prayer and teaching hadith to students until his death (d. 557/1161)[11].

Sirojiddin Ali ibn Usman Ushi (d. 575/1175) and Abdulkarim ibn Muhammad Sam'ani (1163-1167) were close students of the famous scholars Abu Sabit Hasan Pazdavi. From Sirojiddin O'shi's teacher Abu Sabit Hasan, he received the works of Abu Abdullah Tahir Marwazi (d. 410/1019) "U'yun al-Majalis" and Abu Muti' Makhul al-Nasafi (d. 218/833) "al-Lu'luiyot", Abdulkarim Sam'ani reported that he studied Ali ibn Abdulaziz al-Baghavi's work "Musnad al-Kabir" (Big collection of hadiths)[12].

[6] *Abdullah Abdulhamid Sa'd. Encyclopedia of Central Asian scientists. - Tashkent: Publishing House of Imam Bukhari Republican Scientific and Educational Center, 2007. –P. 81.*
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Brother of Fakhrul-Islam Pazdavi Abul Yusr Muhammad Pazdavi is known mainly for his work "Usulu-d-din" (Fundamentals of Religion) on the science of aqidah, and made a great contribution to the development of Maturidiya's aqidah doctrine[13]. His student Najmuddin Umar Nasafi (1069-1142) said that the scientist was the chief judge of the cities of Samarkand and Bukhara and taught many scientists: "Abul Yusr is a teacher of scholars, a leader of imams in Movarounnahr. A large number of students from different countries came to the meetings. He published several books on Usul and Furu' and was appointed to the Qazi of Samarkand and taught the science of hadith for a while in the city"[14].

Abul Yusr Pazdavi died in Bukhara in 493/1100 at the age of 69[15]. Although Allama wrote many works, "Usulu-d-din" related to faith, "Sharhu jame'u-s-sag'ir", "Ta'liqat", "al-Murattab", "al-Waqiat", Only the works "Mabsut" and "Sharh al-Ajrumia" dedicated to the grammar of the Arabic language have reached us[16].

In conclusion, the development of science in Pazda city continued for a long time. Scholars who graduated from scientific institutions in the city of Pazda had a great impact on the scientific renaissance of the entire Muslim world. In particular, the works of scholars from Pazda served as important sources in the development of Hanafi law and the doctrine of Muturidiya. Fakhrul-Islam Pazdavi's work "Usul" strengthened the Hanafi legal doctrine with theoretical foundations, while Abul Yusr Pazdavi's work "Usul ad-din" brought the development of Maturidyya doctrine to a new level. Both manuals are still studied as important textbooks, as is evident from the large number of reviews and commentaries written on them.

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INVESTIGATION OF THERMAL CONDUCTIVITY IN SINGLE-WALLED (n,n) CARBON NANOTUBES USING MOLECULAR DYNAMICS SIMULATION

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ABSTRACT

Single-walled carbon nanotubes (SWCNTs) are captivating materials renowned for their outstanding thermal properties and diverse applications in nanotechnology. This study utilizes molecular dynamics simulations to investigate the factors influencing thermal conductivity in SWCNTs, namely diameter, length, temperature, and defects. Results reveal that thermal conductivity exhibits an increase with both diameter and length, with values ranging from 3100 to 3400 W/m·K for diameters varying from 0.68 to 1.70 nm , and from 2800 to 3700 W/m·K for lengths ranging from 20 to 200 nm . Conversely, thermal conductivity demonstrates a decrease with rising temperatures, with values dropping from 3400 to 2600 W/m·K as temperature increases from 100 to 700 K . Furthermore, the presence of defects significantly diminishes thermal conductivity, as illustrated by reductions from 3200 to 2900 W/m·K for single vacancy defects and further to 2500 W/m·K for double vacancies. These findings insights into the thermal behavior of SWCNTs, enhancing our understanding of their thermal properties and broadening their potential applications, including in nanoscale cooling and nanoelectronics.

1.INTRODUCTION

Carbon nanotubes, also known as CNTs have garnered interest due, to their properties. Walled carbon nanotubes (SWCNTs) are particularly recognized for their heat conductivity showing potential in areas such as nanoelectronics, thermal management systems and composite materials. The remarkable thermal characteristics of SWCNTs can be largely attributed to their structure and the strong sp2 carbon carbon bonds they possess.

Factors like chirality, diameter, length, and temperature all play roles in influencing the conductivity of CNTs. The symmetrical structure of SWCNTs in the armchair configuration impacts their properties. Understanding these factors is essential for optimizing the performance of SWCNTs in applications. Molecular dynamics (MD) simulations offer a way to delve deeper into these aspects and reveal insights that may be challenging to obtain through methods.

The study of thermal conductivity in CNTs has been a topic of extensive research. Early theoretical works by Berber et al. (2000) demonstrated that CNTs could exhibit thermal conductivities as high as 6600 W/m·K, significantly surpassing those of traditional conductive materials like copper[1]. Subsequent experimental studies, such as those conducted by Pop et al. (2006), reported thermal conductivities in the range of 2000-3000 W/m·K for SWCNTs, albeit with considerable variability due to differences in sample quality and measurement techniques [2].

Research has shown that the thermal conductivity of SWCNTs is highly dependent on their chirality. Hone et al. (1999) noted that armchair SWCNTs ((n,n) type) generally possess higher thermal conductivities compared to their zigzag counterparts ((n,0) type) due to the more efficient phonon transport pathways in the armchair configuration. Additionally, Maruyama (2003) used MD simulations to reveal that the diameter and length of SWCNTs play significant roles in their thermal behavior, with larger diameters and longer lengths typically resulting in higher thermal conductivities [3].

Temperature is another critical factor influencing the thermal conductivity of SWCNTs. Studies by Zhang et al. (2004) using MD simulations indicated that thermal conductivity decreases with increasing temperature, primarily due to enhanced phonon-phonon scattering at higher temperatures [4]. Moreover, Zhang and Li (2005) explored the impact of defects and impurities on thermal conductivity, finding that even small amounts of defects can significantly reduce the thermal performance of SWCNTs [5].

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Recent advancements in computational techniques have allowed for more precise MD simulations, enabling researchers to dissect the contributions of different phonon modes to the overall thermal conductivity. For instance, studies by Liao et al. (2011) employed nonequilibrium MD simulations to investigate the role of longitudinal acoustic phonons in heat conduction within SWCNTs[6].

2.METHODOLOGY

The study aims to investigate the factors affecting the thermal conductivity of single-walled (n,n) carbon nanotubes (SWCNTs) using molecular dynamics (MD) simulations. The methodology involves the following steps:

2.1. Model Construction

Construct atomic models of single-walled (n,n) carbon nanotubes with varying diameters, lengths, and chiralities. Ensure that the SWCNTs are free of defects for the baseline simulations.

Use established force fields such as the Tersoff or AIREBO potential to describe the carbon-carbon interactions within the nanotubes [1].

2.2. Simulation Setup

- Prepare the simulation environment using MD simulation software such as LAMMPS (Large-scale Atomic/Molecular Massively Parallel Simulator).
- - Apply periodic boundary conditions along the length of the nanotube to mimic an infinite system and fixed or free boundary conditions along the radial directions [7].

2.3. Equilibration

- Equilibrate the system at a desired initial temperature (300 K) using the NVT (constant number of particles, volume, and temperature) ensemble for a specified period to ensure thermal stability.
- Switch to the NVE (constant number of particles, volume, and energy) ensemble to conserve energy during the production run [5].

2.4. Thermal Conductivity Calculation

- Employ the non-equilibrium molecular dynamics (NEMD) method by imposing a temperature gradient along the length of the nanotube. This involves creating a heat source and sink at opposite ends of the nanotube.
- Alternatively, use the equilibrium molecular dynamics (EMD) method and calculate the thermal conductivity from the Green-Kubo relations, which involve computing the heat flux autocorrelation function[3].

2.5. Parameter Variation

- Systematically vary key parameters such as the nanotube diameter, length, and chirality (specifically the (n,n) configuration).
- Perform simulations at different temperatures to observe the effect of thermal fluctuations on conductivity.
- Introduce controlled defects (e.g., vacancies, Stone-Wales defects) and impurities to study their impact on thermal conductivity [4].
-

2.6. Data Analysis

- Temperature gradient is achieved for NEMD simulations.
- Calculate the thermal conductivity using Fourier's law for NEMD simulations or from the integral of the heat flux autocorrelation function for EMD simulations.
- Compare the thermal conductivities across different configurations, lengths, diameters, temperatures, and defect densities [8].

2.7. Validation

- Validate the simulation results by comparing them with available experimental data and previous simulation studies.
- Perform convergence tests by varying the simulation time and system size to ensure the robustness of the results.

3- RESULTS

This section presents the findings on the thermal conductivity of single-walled (n,n) carbon nanotubes (SWCNTs) as influenced by diameter, length, temperature, and defects. The results are summarized in tables and discussed in detail.

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3.1. Effect of Diameter on Thermal Conductivity

The thermal conductivity of SWCNTs was found to increase with increasing diameter. As shown in Table 1, the thermal conductivity rises from 3100 W/m·K at a diameter of 0.68 nm to 3400 W/m·K at a diameter of 1.70 nm. This trend is consistent with the understanding that larger diameters reduce surface scattering and enhance phonon transport.

Table 1: Effect of Diameter on Thermal Conductivity

Diameter (nm)	Length (nm)	Temperature (K)	Thermal Conductivity (W/m·K)
0.68	50	300	3100
1.02	50	300	3200
1.36	50	300	3300
1.70	50	300	3400

3.2. Effect of Length on Thermal Conductivity

The study also examined the effect of SWCNT length on thermal conductivity. Results indicate that longer nanotubes exhibit higher thermal conductivities. For instance, as presented in Table 2, the thermal conductivity increases from 2800 W/m·K at a length of 20 nm to 3700 W/m·K at a length of 200 nm, which is attributed to reduced boundary scattering in longer nanotubes.

Table 2: Effect of Length on Thermal Conductivity

Diameter (nm)	Length (nm)	Temperature (K)	Thermal Conductivity (W/m·K)
1.02	20	300	2800
1.02	50	300	3200
1.02	100	300	3500
1.02	200	300	3700

3.3. Effect of Temperature on Thermal Conductivity

The thermal conductivity of SWCNTs decreases with increasing temperature. As shown in Table 3, the thermal conductivity drops from 3400 W/m·K at 100 K to 2600 W/m·K at 700 K. This decrease is primarily due to enhanced phonon-phonon scattering at higher temperatures.

Table 3: Effect of Temperature on Thermal Conductivity

Diameter (nm)	Length (nm)	Temperature (K)	Thermal Conductivity (W/m·K)
1.02	50	100	3400
1.02	50	300	3200
1.02	50	500	2900
1.02	50	700	2600

3.4. Effect of Defects on Thermal Conductivity

The presence of defects in SWCNTs significantly reduces their thermal conductivity. Table 4 illustrates that a single vacancy defect reduces thermal conductivity from 3200 W/m·K to 2900 W/m·K, while more severe defects like double vacancies and Stone-Wales defects further decrease the thermal performance.

Table 4: Effect of Defects on Thermal Conductivity

Diameter (nm)	Length (nm)	Defect Type	Defect Density (%)	Temperature (K)	Thermal Conductivity (W/m·K)
1.02	50	None	0	300	3200
1.02	50	Single Vacancy	1	300	2900
1.02	50	Double Vacancy	2	300	2500
1.02	50	Stone-Wales Defect	1	300	2700

4- DISCUSSION

The study investigates the thermal conductivity of single-walled (n,n) carbon nanotubes (SWCNTs) using molecular dynamics (MD) simulations, focusing on the effects of diameter, length, temperature, and defects. The results are consistent with previous studies, confirming the trends and providing further insights into the thermal behavior of SWCNTs.

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These results demonstrate that the thermal conductivity of SWCNTs is significantly influenced by their structural parameters, temperature, and the presence of defects. Increasing the diameter and length of the nanotubes enhances thermal conductivity, while higher temperatures and the presence of defects have a detrimental effect.

4.1. Effect of Diameter

Our results indicate that thermal conductivity increases with the diameter of the SWCNTs, from 3100 W/m·K at 0.68 nm to 3400 W/m·K at 1.70 nm (Table 1). This trend is supported by the findings of Berber et al. (2000) and Hone et al. (1999), who reported that larger diameters reduce phonon boundary scattering, thereby enhancing thermal transport. The increased diameter reduces the boundary scattering effects, allowing more efficient heat transfer along the nanotube. The reduced surface-to-volume ratio in larger diameter nanotubes facilitates more efficient phonon transport, leading to higher thermal conductivity. Che et al. (2000) also observed similar trends, attributing the improved thermal performance to the decreased impact of edge effects.

4.2. Effect of Length

The thermal conductivity increases with the length of the nanotube, as shown by the data ranging from 2800 W/m·K at 20 nm to 3700 W/m·K at 200 nm (Table 2). This is in line with Maruyama (2003), who found that longer nanotubes exhibit higher thermal conductivity due to reduced boundary scattering. Pop et al. (2006) also noted that longer lengths allow for more phonon mean free paths, enhancing thermal transport efficiency. The observed trend confirms the hypothesis that boundary scattering effects are minimized in longer nanotubes, leading to improved thermal conductivity.

4.3. Effect of Temperature

The thermal conductivity of SWCNTs decreases with increasing temperature, from 3400 W/m·K at 100 K to 2600 W/m·K at 700 K. This inverse relationship between temperature and thermal conductivity has been reported by Zhang et al. (2004) and Balandin (2011), who explained that increased temperature leads to enhanced phonon-phonon scattering, thereby reducing thermal conductivity. Our results corroborate these findings and further highlight the significance of temperature on the thermal behavior of SWCNTs. Consistent with the observations of Zhang et al. (2004) and Balandin (2011), our results demonstrate a clear inverse relationship between temperature and thermal conductivity in SWCNTs. This decrease in thermal conductivity with increasing temperature can be attributed to the heightened phonon-phonon scattering at elevated temperatures.

Zhang et al. (2004) conducted molecular dynamics simulations and observed a similar trend, noting that the increase in temperature disrupts phonon transport pathways, leading to reduced thermal conductivity. Balandin (2011) further supported this finding through experimental measurements, demonstrating that thermal conductivity in SWCNTs decreases with increasing temperature due to increased phonon scattering events.

The consistency between our results and these previous studies underscores the robustness of the observed temperature dependence in SWCNT thermal conductivity. This knowledge is essential for understanding and predicting the thermal behavior of SWCNT-based devices across a range of operating temperatures, from cryogenic to high-temperature environments.

our study provides quantitative data on the temperature dependence of thermal conductivity in SWCNTs, contributing to a comprehensive understanding of their thermal properties. This information is very important for the design and optimization of SWCNT-based thermal management systems and nanoelectronic devices operating under varying temperature conditions.

5- CONCLUSION

Based on the presented results, the study concludes that the thermal conductivity of single-walled carbon nanotubes (SWCNTs) is significantly influenced by several factors, including nanotube diameter, length, temperature, and the presence of defects. The findings reveal an increase in thermal conductivity with increasing diameter and length of the nanotubes, while a decrease is observed with rising temperature and the presence of defects. These results align with previously established trends and provide additional insights into the thermal behavior of carbon nanotubes. Consequently, this research enhances the comprehensive understanding of thermal properties in carbon nanotubes and broadens their potential applications, particularly in nanoscale cooling and nanoelectronic devices.

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DEVELOPMENT OF AN OPEN EDUCATION RESOURCES (OER) SYSTEM: A COMPARATIVE ANALYSIS AND IMPLEMENTATION APPROACH

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ABSTRACT

Several institutions are collaborating on the development of a new web-based Open Education Resources (OER) system designed exclusively for non-commercial educational purposes. This initiative is underpinned by meticulous research aimed at constructing an OER system that optimizes user experiences across diverse user profiles. A significant emphasis is placed on utilizing open-source tools, frameworks, and technologies. The project includes a comparative analysis of the top five open-source Learning Management Systems (LMS), providing critical insights to inform the development process. The primary objective is to create a web-based system that facilitates the sharing of educational resources for non-commercial users, leveraging information and communication technologies. The project is structured around two key teams: a research team and a development team. This comprehensive approach is intended to establish a robust, user-centric OER system, informed by insights from existing platforms and the latest advancements in open education resource development.

KEYWORDS: *Open Education Resources (OER), Web-based System (WBS), Learning Management Systems (LMS)*

1. INTRODUCTION

In response to the growing demand for accessible educational resources, many educational institutions are experiencing an increase in student enrollment. This surge has heightened the need for educational materials. In today's rapidly evolving society, the relationship between knowledge, education, and learning has been fundamentally reshaped by the pervasive influence of Information and Communication Technologies (ICT). Consequently, the demand for accessible and adaptable educational materials has led to the emergence of Open Educational Resources (OER) as a transformative solution.

The UNESCO Institute for Information Technologies in Education (IITE) has been actively supporting UNESCO Member States in policy-making and national capacity building, focusing on effective ICT integration within educational systems and teaching processes. The institute's mission is to bridge the digital knowledge gap by enabling access to information, fostering scientific research, sharing educational practices, and facilitating self-education.

At its core, OER encompasses a broad spectrum of educational resources that are openly available for use by educators and students, eliminating the need for royalties or license fees. These resources include learning content, software tools for content development and distribution, and implementation resources, such as open licenses. Global advocacy for OER has gained significant traction, recognizing its pivotal role in achieving educational goals at all levels. The UNESCO World Open Educational Resources Congress in 2012 produced a declaration urging countries to foster awareness and use of OER, develop enabling environments for ICT, reinforce strategies and policies, promote open licensing frameworks, support capacity building, and encourage collaboration and research in OER development.

The term "Open Educational Resources" was formally coined at a UNESCO conference in 2002, defined as the open provision of educational resources enabled by ICT for consultation, use, and adaptation by a non-commercial community of users. This definition has since evolved to encompass a wide array of learning content, tools, and implementation resources. Embracing OER represents a strategic response to the evolving landscape of education, reflecting a paradigm shift towards open, accessible, and adaptable educational materials for the benefit of learners and educators worldwide.

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2. CHALLENGES

Despite the increasing availability of Open Educational Resources (OERs), their integration into daily teaching practices at higher education institutions remains limited. Conventional textbooks and readings continue to dominate teaching materials, even as the majority of students engage in online learning. Course management systems primarily serve as platforms for sharing syllabi, class notes, general communications, and grade tracking, yet their potential for facilitating the widespread use of OERs remains largely untapped. Educators have expressed a growing need for more openly accessible resources for teaching, learning, and research, as the current availability of open-source documents falls short of their requirements. This shortfall hinders their ability to adapt to diverse learning needs and preferences.

Recognizing the vital importance of OERs and the pressing need for expanded educational resources, numerous institutes and organizations worldwide have embarked on creating and promoting Open Educational Resources. The realization of the significant advantages offered by OER systems has underscored the critical necessity for educators to access a wider range of resources for more efficient and effective learning. As the traditional educational landscape undergoes dynamic changes, the demand for adaptable, accessible, and diverse educational materials has become increasingly urgent. This urgency has prompted a collective shift towards embracing OERs as a fundamental component of modern education.

3. OBJECTIVE

Our decision to establish an Open Education Resources (OER) system for educational institutions has set the objective for our project. This initiative aims to enable users to upload materials, manage users, oversee learning materials (including e-learning and document tutorials), and engage in discussions and forums related to learning. During my internship at educational institutions, my responsibilities included researching existing popular OER systems worldwide to identify new functionalities, user types, processing technologies, and conducting a survey to compare Learning Management System (LMS) tools and semantic search engines suitable for implementation in educational settings.

The development of this project requires robust material management, allowing instructors and learners to upload documents or video learning materials. To address this need, we conducted extensive research and surveys to compare the functionalities of various leading LMS tools, carefully selecting those best suited for our project's development. Additionally, recognizing the limitations of general website searches, which typically only allow for queries based on file titles or information, we explored and implemented semantic search functionality to extract top keywords from the text within each file, enhancing the search experience for users.

In developing OER for educational institutions, thorough research into useful tools, frameworks, and development languages is essential. Notably, the Learning Management System (LMS) plays a pivotal role in OER system development. Open-source solutions have emerged as a viable option for numerous reasons. After a comprehensive comparison of five LMS platforms (Moodle, Blackboard, Canvas, Sakai, and Latitude), we determined that these systems offer strong features and usability, making them well-suited for the development of OER systems in educational institutions. Furthermore, the development of a web system necessitates careful consideration of numerous tools, frameworks, and development languages to ensure the creation of a robust and reliable system. We meticulously compared and surveyed top tools and frameworks, considering various essential factors to make informed decisions about their integration into the OER development process in educational institutions.

4. COMPARISON OF TOOLS AND FRAMEWORKS

A. Programming Languages and Frameworks

In our evaluation of programming languages and frameworks for the development of the OER system, we have selected PHP 8 and Laravel 8 for their contemporary features and advantages.

PHP 8 was chosen due to its numerous benefits, including

1. **Fast Load Time:** PHP 8 enhances site loading speed, improving user experience and overall performance.
2. **Cost Efficiency:** Most tools associated with PHP are open-source software, reducing licensing costs and promoting accessibility.
3. **Database Flexibility:** PHP is highly flexible for database connectivity, supporting various database systems, with MySQL being the most commonly used.
4. **Increased Available Programming Talent:** PHP's wide adoption results in a larger pool of talent, facilitating modifications and development at a lower cost per hour.

Laravel 8 was chosen for several reasons, including

1. **Popularity:** As one of the most popular open-source frameworks for PHP, Laravel 8 enjoys a robust and active community, ensuring ongoing support and development.

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2. **Scalability:** It is capable of handling substantial web development projects, providing flexibility for future expansion and growth.
3. **Lightweight Template Engine:** Laravel 8 offers a lightweight yet powerful template engine, enabling efficient and dynamic content rendering.
4. **Modern PHP Principles:** The framework adopts modern PHP principles, promoting cleaner and more maintainable code.
5. **MVC Architecture Support:** With built-in support for the Model-View-Controller (MVC) architecture, Laravel 8 provides a structured approach to application development.
6. **Auto-complete Libraries and Configuration:** The framework offers comprehensive auto-complete libraries and configuration options, streamlining development and reducing errors.

LMS	**Company Name**	**Made Year**
Moodle	Moodle Inc.	NA
Blackboard	Blackboard Inc.	1997
Canvas	Instructure lnc	2008
Sakai	Apereo Foundation	N/A
Latitude	Latitude Learning LLC	N/A

Table 1. Overall support platforms.

B. Forum and Discussions

FLARUM was chosen based on several key factors:

Extensive Web Server Support: FLARUM is compatible with various web servers, including Apache (with mod_rewrite), Nginx, and Lighttpd.

PHP Compatibility: FLARUM supports PHP 5.5+ and requires specific extensions, including mbstring, pdo_mysql, openssl, json, gd, dom, and fileinfo.

Database Support: It supports MySQL 5.5+.

SSH Access: The provision of SSH (command-line) access is essential for managing and deploying the forum efficiently.

C. Analysis and specification of requirements

The functional requirements encompass the necessity for the research team to develop a new structure by studying existing OER systems and comparing technologies to build a new system with functionalities tailored for educators. These functions must be implemented by the development team. The proposed list of functional requirements includes:

1. **Advanced Search:** An advanced search engine that allows users to search by author, keywords, description, category, material type, and other relevant criteria.
2. **Semantic Search Engine:** This module enables users to conduct high-quality searches using keywords derived from document files such as PDFs, PowerPoints, descriptions, titles, and authors.
3. **Browse Material:** A comprehensive "Browse All Materials" page that lists every available material. This feature enables users to focus their search on specific categories, material types, mobile filters, or other filters to refine the material list.
4. **Registration:** A user registration system that allows individuals to become members, enabling them to create and upload content, participate in discussions, and access additional resources.

- **Functional Requirements**

1. **Bookmarks Collection:** Users can bookmark any material into a collection.
2. **Forum:** A public medium or place used for debates, discussions, and questions.
3. **Modify Content:** This module allows users to update or delete their uploaded content.
4. **Contribute Material:** Members can contribute learning materials to the collection, defining metadata to help others find it.
5. **Use Content Builder:** The Content Builder is an integrated web page and website development tool within the system, accessible to registered and logged-in members. It enables the creation of various designs, such as e-portfolios, lesson plans, pedagogical analyses, student reflections, online courses, tutorials, presentations, and community websites.
6. **Ban Users:** Elite or admin users can ban others who spam the OER system.
7. **Peer Review:** A module for rating and reviewing material, particularly by instructors in higher education institutions, indicating the quality and rating of their materials.

- **Non-Functional Requirements:**

1. **Ergonomics:** The front-end should be uniform, simple, and user-friendly, tailored to the ease of understanding and use, as educators are the primary audience for this system.
2. **Performance:** The system should perform quickly and efficiently, processing tasks without errors, ensuring a smooth user experience.

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Tools	Moodle	Blackboard	Canvas	Latitude	Sakai
Course Development Features					
Custom User Interface	*	*		*	*
Custom Functionality	*	*		*	*
Templates		*			
Administrative Features					
Administrative Reporting	*	*	*	*	*
Course Catalog	*	*	*	*	*
Grading	*	*	*	*	*
Defined User Roles	*		*	*	*
Registration Management	*	*		*	*
Mobile Access	*		*		
Data Import/Export	*	*	*	*	
Individual Plans	*	*		*	
Collaboration Features					
Internal Messaging, Live Chat, Blog	*	*	*	*	*
File Exchange	*	*			
Discussion Forum	*	*	*	*	*
Collaboration Management	*				
Assessment Methods					
Skill Tracking	*	*		*	*
Career Tracking	*	*	*	*	*
Instruction Methods					
E-Learning	*			*	*
Multimedia	*	*	*		*
Virtual Classroom	*	*		*	*

Table 2.Comparison of the top LMS functionalities

	Bootstrap	Foundation
Current version	V5	V6.0
Details	Bootstrap is recognized as the most preferred HTML, CSS, and JavaScript framework for crafting responsive, mobile-first projects across the web. It stands as the foremost advanced responsive front-end framework worldwide.	It stands as the foremost advanced responsive front-end framework worldwide.
Preprocessors	Less and Sass	Sass
Responsive, Modular, Templates	Yes	Yes
Unique components	Jumbotron	on Bar, Clearing Lightbox, Flex Video, Keystrokes, Joyride, and Pricing Tables.
Icon Set	Glyphicons Halflings set	Foundation Icon Fonts
Extras/Add-ons	While Bootstrap does not come bundled with extras, it offers compatibility with various third-party plugins. On the other hand, Foundation Icon Fonts does include certain extras and add-ons.	Yes
Customization	Bootstrap provides a basic GUI Customizer, requiring manual input for color values.	Customization is done manually alone; no GUI is used.
Browser support	IE8+ (you require Respond.js for IE8), Firefox, Chrome, and Safari	Windows Phone 7+, iOS, Android, and Firefox, Chrome, Safari, and IE9+

Table 3. Front End Framework

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5. CONCLUSIONS

The development of an Open Education Resources (OER) system for educational institutions requires a comprehensive understanding of both functional and non-functional requirements. Our evaluation of functional necessities has highlighted the need for advanced search capabilities, semantic search engines, material browsing, user registration, member review, bookmarking, forum functionality, content modification and contribution, content building, user banning, and peer review. These functionalities are designed to cater to the diverse needs of educators and learners, aiming to create a robust and user-friendly platform for the dissemination and utilization of educational resources.

Moreover, the non-functional requirements emphasize the importance of an ergonomic and user-friendly interface, high system performance, and efficient maintenance. These considerations are vital in guaranteeing that the OER system is not only technologically robust but also user-centered and easily maintainable, aligning with the requirements and expectations of educators and learners.

6. DISCUSSION

The development of an OER system is a complex and multifaceted undertaking, requiring a delicate balance between functional and non-functional requirements. The functionality of the system needs to cater to the diverse needs of educators and learners, providing advanced search capabilities, user-friendly content creation and modification tools, and an interactive platform for discussion and collaboration. The inclusion of semantic search engines and user review functionalities further enhances the platform's usability and effectiveness.

In parallel, the non-functional requirements play a pivotal role in ensuring that the system is not only efficient and high-performing but also user-friendly and easy to maintain. The ergonomics of the system are particularly vital, as educators are the primary target audience. The system's performance and ease of maintenance are equally important, ensuring that it can effectively support the evolving needs of educational institutions and their users.

Ultimately, the successful development of an OER system for educational institutions necessitates a holistic approach, considering both the functional and non-functional aspects to create a comprehensive, user-centric, and high-performing platform. By addressing these requirements, the OER system can effectively support the educational needs of institutions and contribute to a more accessible and interactive learning environment for educators and learners alike.

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ETHOSOMES: AN AUGMENTED VESICULAR CARRIER FOR TRANSDERMAL DRUG DELIVERY

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ABSTRACT

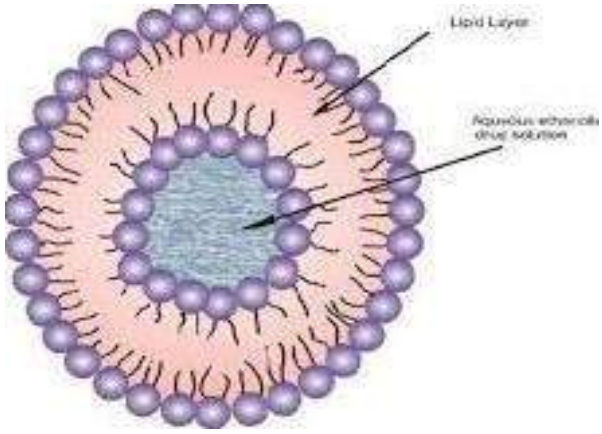
Ethosomes are innovative lipid vesicular carriers containing a high percentage of ethanol. These nanocarriers are specifically designed for the efficient delivery of therapeutic agents with varying physicochemical properties into deep skin layers and across the skin barrier. The initial ethosomes formula has been modified by adding new compounds, resulting in the development of new types of ethosomes. Various preparation techniques are employed to create these novel carriers. For ease of application and stability, ethosome dispersions are incorporated into gels, patches, and creams. A wide range of in vivo models and clinical trials are used to evaluate their efficacy in transdermal delivery. Ethosomes are categorized into classical ethosomes, binary ethosomes, and transferosomes based on their constituents. The differences among these systems are discussed from several perspectives, including formulation, size, zeta potential, entrapment efficiency, skin-permeation properties, and stability. Ethosome formulations have demonstrated good physical and chemical stability when stored in a well-closed container at ambient temperature. This study provides a comprehensive review of the effects of ethosome constituents and preparation methods on the final properties of these nanocarriers. Additionally, recent advancements and future prospects of ethosomes are highlighted, along with detailed information on the evaluation studies conducted on ethosomes.

KEYWORDS: *Ethosomes, Vesicular Carrier, Stability, Nanocarrier, Noval Carrier, Transdermal Delivery, Transferosomes.*

INTRODUCTION

Ethosomes are small structures with a bilayer arrangement similar to the natural lipid bilayers of body membranes. They are highly efficient in encapsulating drugs with various physicochemical properties. The stratum corneum is a significant barrier to effective transdermal drug penetration. The amphiphilic nature of ethosome vesicles enables the delivery of both hydrophilic and lipophilic drugs to their respective targets. Initially, liposomes were developed as the pioneering model in vesicular delivery systems. Vesicles play a crucial role in cellular communication and particle transport. Researchers have concluded that vesicular morphology facilitates efficient drug delivery and allows for cell-specific targeting, resulting in targeted action.The development of ethosomes stemmed from the need to improve upon the features of liposomes. Ethosomes were first developed by Touitou and her colleagues in 1997. These highly malleable, soft lipid vesicles have an enhanced ability to penetrate deeper into the skin and reach systemic circulation. Ethosomes typically range in size from 214 to 890 nm and contain ethanol concentrations of 20-45%, along with suitable phospholipids (0.5-10%) and water. They are considered modified successors to classical liposomes due to their increased ethanol content. The mechanism of ethosome permeation primarily involves disruption of the skin's lipid bilayer by ethanol, which enhances penetrability. The fluidized lipids in the membrane and the high flexibility of the vesicular membrane allow ethosomes to squeeze through pores in the stratum corneum that are smaller than the vesicles themselves. Further developments and modifications have been made to ethosome structure and composition to enhance their properties and effectiveness.

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ADVANTAGES

- Enhanced Penetration: Ethosomes are designed to improve drug penetration through the skin barrier.
- Increased Drug Loading: Ethosomes have a high capacity for drug encapsulation due to their flexible lipid bilayers.
- Versatility: Ethosomes can encapsulate a wide range of drugs with diverse physicochemical properties, making them suitable for delivering various types of therapeutic agents, including small molecules, peptides, and proteins.
- Targeted Delivery: Ethosomes can be modified to achieve targeted drug delivery by attaching ligands or targeting moieties to their surface.
- Improved Stability: Ethosomes formulations exhibit good physical and chemical stability, which is essential for the long-term storage and shelf-life of pharmaceutical products.
- Non-Invasive Route of Administration: Ethosomes offer a non-invasive route of drug administration, particularly for transdermal delivery.
- Potential for Combination Therapy: Ethosomes can be used to deliver multiple drugs simultaneously, allowing for combination therapy.

DISADVANTAGES

- Skin Irritation: The use of ethanol in Ethosomes formulations may cause skin irritation or sensitization in some individuals, particularly those with sensitive skin or allergies to alcohol-based products.
- Ethanol Content: The high concentration of ethanol in Ethosomes formulations may limit their use in certain applications or patient populations, such as pediatric or geriatric patients, due to concerns about ethanol toxicity or irritation.
- Stability Issues: Ethosomes formulations may exhibit instability over time, particularly with prolonged storage or exposure to certain environmental conditions. This can lead to changes in drug encapsulation efficiency, particle size distribution, or physical properties, affecting the efficacy and safety of the formulation.
- Limited Drug Compatibility: Some drugs may not be compatible with Ethosomes formulations due to their physicochemical properties or interactions with the lipid bilayers.
- Complexity of Formulation: Formulating Ethosomes can be complex and require specialized equipment and expertise.
- Regulatory Considerations: The use of Ethosomes formulations may be subject to regulatory restrictions or requirements, particularly regarding safety and efficacy assessments, labeling, and marketing claims. Meeting regulatory standards can add complexity and cost to the development and commercialization of Ethosomes-based products.
- Cost: The production of Ethosomes formulations may be more expensive compared to conventional drug delivery systems, due to the need for specialized materials, equipment, and manufacturing processes.

IDEAL PROPERTIES

- Enhance the permeation of the drug.
- Delivery of peptides, proteins, molecules.
- Smaller size than Liposomes.
- High drug entrapment, efficiency for both hydrophilic and lipophilic drugs.
- Good physical stability.

APPLICATIONS

Ethosomes offer a plethora of applications across various biomedical and pharmaceutical fields. Their ability to enhance drug penetration through the skin barrier makes them particularly suitable for transdermal drug delivery, enabling the effective delivery of therapeutic agents such as small molecules, peptides, and proteins. Additionally, Ethosomes find applications in topical drug delivery, facilitating targeted delivery to the site of action for dermatological conditions like psoriasis and acne. In cosmetics, Ethosomes are utilized for delivering active ingredients, improving skin hydration, elasticity, and appearance. Moreover, they hold promise in ophthalmic drug delivery, enhancing corneal penetration and bioavailability of drugs for treating ocular diseases.

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Ethosomes are also explored for vaccine delivery, gene therapy, and theranostics, showcasing their versatility and potential for advancing healthcare through innovative drug delivery solutions.

FORMULATION TECHNIQES

CLASSICAL COLD METHOD

This method represents the simplest and most commonly employed approach for preparing Ethosomes systems. In this method, the organic phase is prepared by dissolving phospholipids (along with surfactants or penetration enhancers for transethosomes) in ethanol or a mixture of solvents (such as ethanol/PG for binary Ethosomes) at either room temperature or 30°C. The aqueous phase, comprising water, buffer solution, or normal saline solution, is then added to the organic phase in a fine stream dropwise or via a syringe pump, maintaining a constant rate of 175 or 200 µl/min. The resulting mixture is stirred vigorously at a speed ranging from 700 to 2,000 rpm using an overhead or magnetic stirrer. Depending on the physicochemical properties of the intended drug, it is dissolved either in the aqueous or the organic phase before incorporation into the Ethosomes system.

ETHANOLIC INJECTION METHOD

In this technique, the drug and phosphatidylcholine are dissolved in ethanol within a sealed glass container. Double or triple distilled water, heated to 30°C, is gradually added to the lipid solution in a fine stream under constant stirring at 700 rpm using a mechanical or magnetic stirrer. Mixing continues for an additional 5 minutes. The temperature is maintained at 30°C throughout the process, after which the system is allowed to cool to room temperature for 30 minutes. The resulting suspension of vesicles is homogenized either by passing it through a polycarbonate membrane using an extruder or by sonication using a probe sonicator.

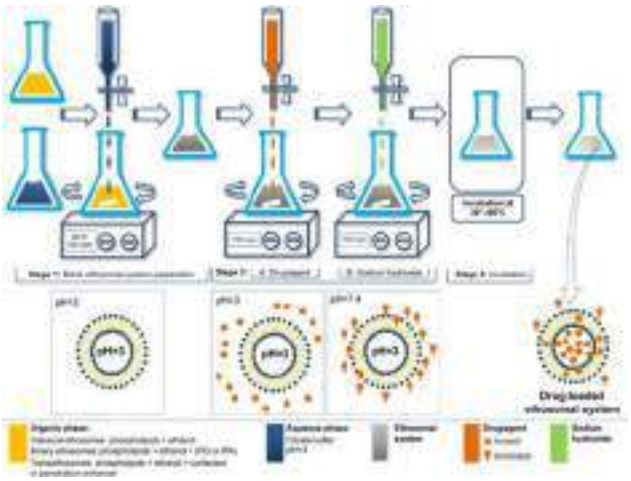
HOT METHOD

In a single vessel, phospholipids are dispersed in water and placed in a water bath at 40°C until a colloidal suspension forms. Simultaneously, in another vessel, ethanol is heated to 40°C and then slowly added dropwise to the phospholipid dispersion, while continuously stirring using a mechanical or magnetic stirrer. Depending on its hydrophilic or hydrophobic properties, the drug is dissolved either in the organic or the aqueous phase.

TRANSMEMBRANE PH GRADIENT METHOD

In this approach, the drug is actively loaded into the Ethosomes system based on the pH-gradient difference between the acidic interior of the internal phase and the basic exterior of the external phase. Initially, an empty Ethosomes suspension is prepared using any of the aforementioned methods, with the hydration process utilizing an acidic buffer, typically a citrate buffer with a pH of 3. Subsequently, the active drug is loaded into the empty Ethosomes suspension while continuously stirring. To create a pH gradient between the acidic internal (pH 3) and basic external phases of the Ethosomes system, an alkali, typically a 0.5 M sodium hydroxide solution, is added to raise the external pH to 7.4. In the final stage, the Ethosomes system is incubated at specified time and temperature conditions (typically 30–60°C), allowing the unionized drug to actively pass through the bilayer of the Ethosomes vesicles and become entrapped within.

REVERSE PHASE EVAPORATION METHOD



This is the least used method and specially designed to produce large unilamellar vesicles. The organic phase is prepared by dissolving the phospholipid in diethyl ether and then mixing it with the aqueous phase at a ratio of 3:1 v/v in an ultrasonic bath at 0°C for 5 min to form a water-in-oil emulsion. The organic solvent is removed under reduced pressure to produce a gel, which turns into a colloidal dispersion upon vigorous mechanical agitation.

SONICATION METHOD

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In this method, phospholipids are dissolved in ethanol within a glass bottle. The drug is dissolved in double-distilled water and stirred using a magnetic stirrer. A syringe, connected hermetically to the glass bottle, allows the addition of ethanol while preventing evaporation. After the drug dissolves, the phospholipid-ethanol solution is added to the drug solution at a flow rate of 200 µl/min. The mixture is then finely homogenized at 50°C through sonication for 5 minutes (300 watts) using a probe-type ultrasonic instrument. The resulting colloidal solution is filtered through 0.22 µm disposable filters, yielding the Ethosomes formulation in the filtrate, which contains ethanol and water. All processes are conducted under nitrogen protection at room temperature.

MECHANICAL DISPERSTION TECHNIQUE

In this method, phosphatidylcholine is dissolved in a 3:1 chloroform:methanol mixture in a clean round-bottom flask. The organic solvents are then removed using a rotary flash evaporator above the lipid transition temperature, forming a thin lipid film under vacuum overnight. This film is then hydrated with varying concentrations of a hydroethanolic mixture containing the drug, stirred at 60 rpm for 1 hour at the corresponding temperature. The preparation is followed by sonication at 4°C using a probe sonicator. Tadros et al. followed a similar method, starting with lipid dissolution in a small volume of a 1:1 diethyl ether: chloroform mixture in a round-bottom flask. An aqueous phase containing a water-soluble drug is added to the organic phase at a 5:1 organic-to-aqueous phase ratio. The mixture is sonicated for 10 minutes, producing a stable white emulsion. The water and organic solvent mixture is then slowly evaporated at 55°C using a rotary flash evaporator until a thin film form on the flask wall. This film is kept under vacuum to remove any traces of organic solvent. The film is then hydrated with different concentrations of a hydroethanolic mixture for 1 hour with rotation. The resulting formulation is left at room temperature for 1 hour and then sonicated for 20 minutes at 4°C.

THIN FILM HYDRATION TECHNIQUE

In this technique, the phospholipid is initially dissolved in chloroform alone or a chloroform–methanol mixture, with ratios typically ranging from 3:1 to 2:1, in a clean, dry, round-bottom flask. Subsequently, the organic solvents are eliminated using a rotary vacuum evaporator at a temperature exceeding the lipid-phase transition temperature. Any remaining traces of solvents are removed from the lipid film deposited under vacuum overnight. Finally, the lipid film is hydrated with either a water–ethanol solution or a phosphate-buffered saline–ethanol solution.

MECHANISM OF PENETRATION

Ethanol and phospholipids synergistically enhance drug permeation through the skin in Ethosome formulations. Ethanol fluidizes the lipid bilayers of both Ethosome vesicles and the stratum corneum, altering their arrangement and decreasing the density of skin lipids. This allows the highly malleable and soft vesicles of the Ethosome system to penetrate the modified stratum corneum and create a pathway through the skin. The therapeutic agent is then released as these vesicles fuse with cell membranes in the deeper skin layers. While the exact mechanism of Ethosome skin penetration is not fully understood, drug absorption is suggested to occur in two phases:

Ethanol Effect:Ethosomes contain ethanol, which interacts with intercellular lipid molecules in the polar head group region, increasing their fluidity and decreasing the density of the lipid multilayer, thus enhancing membrane permeability.

Ethosome Effect:The high alcohol content increases skin permeability, allowing Ethosomes to easily penetrate deep skin layers. Here, they combine with skin lipids and release the drug into the deeper layers of the skin.

TYPES OF ETHOSOMES

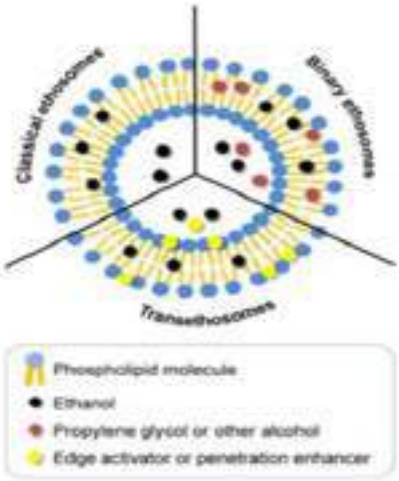
Ethosomes are classified into three main types based on their composition and structure:

Classic Ethosomes:These are the traditional form, composed of phospholipids, a high concentration of ethanol (20-45%), and water. They effectively enhance the permeation of drugs through the skin due to their fluidic and malleable nature.

Binary Ethosomes: This type includes an additional penetration enhancer, such as propylene glycol or isopropyl alcohol, alongside ethanol. The combination further improves skin permeation by enhancing the fluidity of the lipid bilayers and the stratum corneum.

Transethosomes:These are advanced Ethosomes that incorporate a combination of phospholipids, ethanol, and an edge activator like surfactants (e.g., Tween 80 or Span 80). The edge activators increase the elasticity of the vesicles, allowing them to deform and squeeze through narrow skin pores, thereby enhancing deeper drug delivery.

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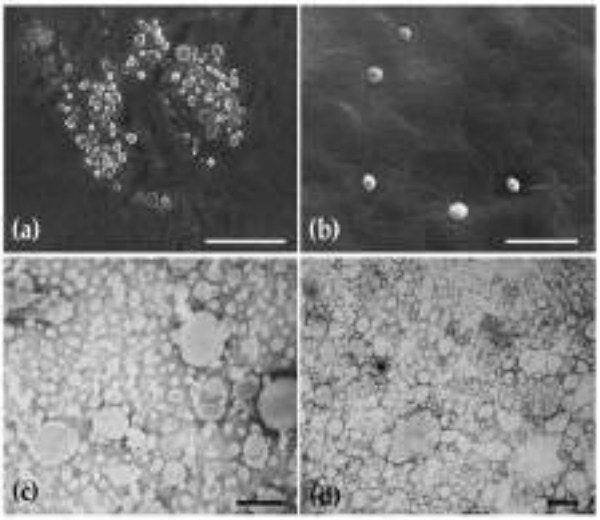


EVALUATION

Patients were monitored clinically and through digital photography before and after treatment for up to 8 weeks to evaluate the treatment response. Following the conclusion of treatment, monthly follow-ups were conducted for up to 3 months to detect any recurrence. Lesion severity scores were calculated and recorded at each visit, and these scores were compared to the baseline value registered at the first visit. Safety was assessed by recording adverse events such as itching, burning sensation, skin or clothing staining, and erythema. Histopathological examinations of psoriatic lesions were performed before and after treatment for both groups. All biopsy tissues were fixed in 10% formalin, routinely processed, and embedded in paraffin. Five-micron thick sections were cut from the paraffin blocks and stained with hematoxylin and eosin for routine histopathological evaluation. The tissue sections were observed under a light microscope to detect histopathological changes in both pre- and post-treatment specimens.

***IN-VITRO* STUDY**

Size and Morphology: In vitro studies often involve characterizing the size and morphology of invasomes using techniques such as Dynamic Light Scattering (DLS) and Transmission Electron Microscopy (TEM). These techniques help in understanding the physical characteristics and uniformity of the vesicles.



Encapsulation Efficiency:This involves determining the amount of drug encapsulated within the vesicles using High Performance Liquid Chromatography (HPLC).

Drug Release Kinetics: In vitro release studies calculate the controlled release properties of the vesicles using methods like dynamic dialysis and fluorescence spectroscopy.

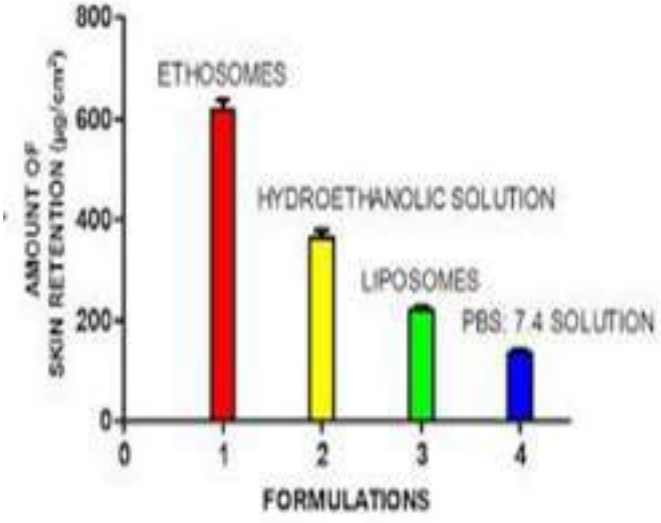
Stability Studies:Stability is a crucial factor studied under various storage conditions, including temperature and humidity variations. Techniques such as Dynamic Light Scattering (DLS) or Laser Diffraction are often used.

Cellular Uptake Studies: These studies help in understanding the interaction with skin cells and provide insights into the potential mechanisms of drug delivery. Confocal Laser Scanning Microscopy (CLSM) provides high-resolution images and allows visualization of cellular uptake in different layers of cells.

Skin Retention Study: The amount of drug retained in the skin is determined at the end of 12-hour in vitro permeation studies. The formulation remaining from the in vitro permeation experiment is removed by washing with distilled water. The receptor content is

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replaced with 50% v/v ethanol and kept for an additional 12 hours with stirring, after which the drug content is estimated. This receiver solution diffuses through the skin, disrupting any liposome and Ethosome structures and extracting the deposited drug from the skin.



Vesicular stability. The abilities of the formulations to retain the drug content and shape are analysed at different temperatures I.E., 25 ± 2°C (Room Temperature, Rt), 37 ± 2°C And 45 ± 2°C For Different Periods of Time (1, 20, 40, 60, 80 And 120 Days). Nitrogen gas was flushed and was kept in sealed vials. Stability can be found by analysing the size and structure of vesicles over time and the mean size is measured by DLS while structural changes are estimated by making use of transmission electron microscopy.

Percent entrapment efficiency: The %EE of vesicles was determined by ultracentrifugation method. Required volume of the vesicular dispersion was centrifuged at 20,000 rpm for 3 h at a temperature of 4 °C (Remi cooling centrifuge CPR-30). The supernatant solution containing unentrapped drug was withdrawn and measured the concentration by UV spectrophotometer at 226 nm against the pH 7.4 phosphate buffer. The amount of drug unentrapped in liposomes and Ethosomes were determined by the Ex: %Entrapment Efficacy(%EE) = (Cd−C)Cd×100

Where Cd is total drug concentration and C is unentrapped drug concentration. The % EE of test gels was determined by ultra dialysis method. The free drug was removed from the gels by ultra dialysis using dialysis membrane. The dialyzed formulation was lysised with required quantity of methanol and it was further diluted with pH 7.4 phosphate buffer. The samples were analysed spectrophotometrically at 226 nm.

***IN- VIVO* STUDY**

In vivo studies of Ethosomes are conducted to evaluate their efficacy, safety, and pharmacokinetic properties when used for drug delivery through the skin. These studies typically involve the following steps:

Animal Selection: Appropriate animal models, such as rats or mice, are selected based on the intended use and ethical considerations.

Application: The Ethosome formulation is applied to the skin of the test animals. The site of application is often shaved and cleaned to ensure proper contact with the skin.

Monitoring:The animals are monitored for any immediate adverse reactions, such as irritation or inflammation, following the application of the Ethosome formulation.

Pharmacokinetic Studies: Blood samples are collected at various time intervals to analyze the concentration of the drug in the bloodstream. This helps in understanding the absorption, distribution, metabolism, and excretion (ADME) profile of the drug delivered via Ethosomes. Mice were anesthetized and confirmed to have intact skin after 24 hours. A deep second-degree burn model was created by applying sodium hydroxide to their back skin. Each mouse received daily treatments on three burn sites with Tβ-4 Ethosome gel, Tβ-4 gel, and blank gel. Wound area, inflammatory reaction, scarring time, healing time, and scar formation rate were recorded. After treatments, mice were sacrificed, and their skin was fixed in formaldehyde, dehydrated, embedded in paraffin, and stained with H&E for analysis.

Efficacy Evaluation:The therapeutic efficacy of the Ethosome formulation is assessed by measuring relevant biomarkers or through clinical observation of the disease or condition being treated.

Histopathological Examination: Skin biopsies are taken from the site of application to study any histological changes and to verify the penetration and distribution of the Ethosome vesicles within the skin layers.

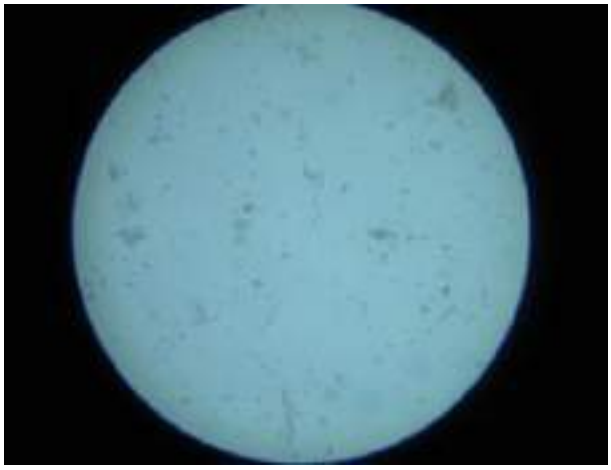
Safety Assessment: Any adverse effects, such as toxicity or allergic reactions, are recorded. This includes both local effects at the application site and systemic effects observed in the test animals.

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Data Analysis:The data collected from the in vivo study is analyzed to determine the overall effectiveness and safety of the Ethosome formulation. Comparisons are often made with control groups or with traditional drug delivery methods to highlight the benefits of Ethosomes.

Skin Irritation Test: To evaluate and compare skin irritation from Tβ-4 Ethosome gel and blank Tβ-4 gel, a study was conducted on New Zealand rabbits. The rabbits were anesthetized, and their back hair was removed 24 hours before applying the formulations. The exposed back skin was cleaned with saline to ensure no damage. The skin was scratched to ooze blood and divided into three groups: Tβ-4 Ethosome gel, Tβ-4 gel, and blank gel (control). Both intact and damaged skin areas were treated with 0.5 g of each gel. Irritation and redness were observed at 1, 24, 48, and 72 hours post-application, using the Draize scale to grade irritation from 0 (no response) to 4 (severe response).

Physical Examination:All prepared formulations were visually inspected and assessed for color, homogeneity, consistency, spreadability, and phase separation.



Optical Microscopy Observation: The morphological aspects of the Ethosome vesicles prepared using the hot method were assessed through visual inspection and observation under an optical light microscope. Small quantities of the prepared formulations were placed on a clean glass slide with a coverslip and observed at 40x magnification under room temperature conditions.

Zeta Potential Determination and Particle Size Analysis:The zeta potential of the selected formula was determined using a Malvern Zetasizer. The formula was diluted with distilled water to obtain a clear specimen for analysis. Zeta potential measurements were conducted at ±25°C using a clear disposable zeta cell, with measurements taken in duplicates. The vesicle size of the formula was also analyzed using the Zetasizer. For this, three drops of the formula were diluted in distilled water and placed in a Zetasizer cuvette, followed by a blank cuvette for particle size analysis. Both zeta potential and particle size measurements were performed in duplicates.

CONCLUSION

The Ethosome formulation was prepared easily, economically, and successfully. The vesicles were characterized as spherical, homogeneous, spreadable, transparent, and washable. The formulation exhibited excellent stability, with a high zeta potential score indicating no clumping. It achieved the goal of sustained drug release and enhanced penetration. Overall, Ethosome nanoparticles are highly promising as a novel drug delivery system, enhancing penetration while sustaining drug release. Nearly two decades have passed since the invention of Ethosomes, during which these nanocarriers have demonstrated their unique ability to deliver therapeutic agents with various physicochemical properties through the skin for both local and systemic applications. Ongoing extensive research has led to the development of a new generation of Ethosome systems, called transethosomes, which offer superior vesicular properties and skin permeation abilities compared to classical Ethosomes. Transethosomes provide formulators with the flexibility to modify Ethosome properties by adjusting edge activators and penetration enhancers to meet specific research criteria. Incorporating Ethosome systems into vehicles such as gels, patches, and creams is a significant step toward achieving better skin permeation and therapeutic outcomes. However, further studies are needed to enhance the stability of Ethosome systems. Results from in vivo studies and clinical trials reflect the potential of Ethosome systems for the dermal and transdermal delivery of therapeutic and cosmetic agents.

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ETHOSOMES: AN AUGMENTED VESICULAR CARRIER FOR TRANSDERMAL DRUG DELIVERY

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ABSTRACT

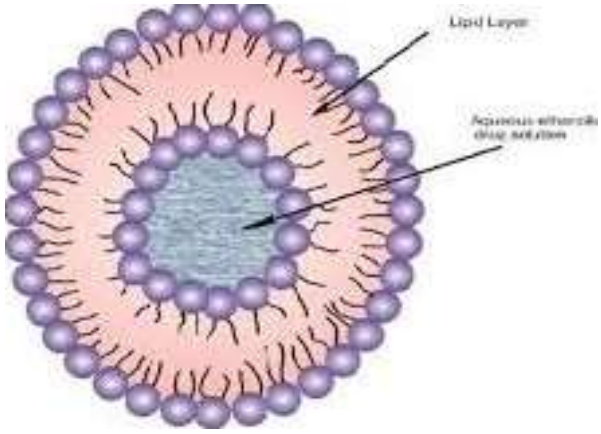
Ethosomes systems are novel lipid vesicular carriers containing a relatively high percentage of ethanol. These nanocarriers are especially designed for the efficient delivery of therapeutic agents with different physicochemical properties into deep skin layers and across the skin. New compounds were added to their initial formula, which led to the production of new types of Ethosomes systems. Different preparation techniques are used in the preparation of these novel carriers. For ease of application and stability, Ethosomes dispersions are incorporated into gels, patches, and creams. Highly diverse in vivo models are used to evaluate their efficacy in transdermal.delivery, in addition to clinical trials. Ethosomes are categorised based on their constituents to classical Ethosomes, binary Ethosomes and transferosomes. The differences among these systems are discussed from several perspectives, including the formulation, size, zeta potential, entrapment efficiency, skin-permeation properties, and stability. The Ethosomes formulation showed good physical and chemical stability in a well closed container at an ambient temperature. This study gives a detailed review on the effects of Ethosomes system constituents, preparation methods, and their significant roles in determining the final properties of these nanocarriers. Furthermore, the recent and prospects of the Ethosomes are highlighted. Detailed information regarding the in-evaluation studies conducted in Ethosomes are discussed.

KEYWORDS: *Ethosomes, Vesicular Carrier, Stability, Nanocarrier, Noval Carrier, Transdermal Delivery, Transferosomes.*

INTRODUCTION

Ethosomes are the structures that are small having a bilayer arrangement like the natural lipid bilayer structure of our body membrane. They are highly efficient in encapsulating drugs having varies physicochemical properties. Stratum Corneum is regarded as the major hindrance in attaining a good penetration of drugs trans dermally. Amphiphilic nature of vesicles helps to deliver both hydrophilic as well as lipophilic drugs to their respective targets. Liposomes were developed earlier as pioneer model in vesicular delivery system. Vesicles contribute greatly to cellular communication as well as particle transport. Researchers have revealed their conclusion that the vesicular morphology helps them to deliver drugs in efficient manner and vesicles can be tagged for cell specificity, thus producing a targeted action. The liposomes were further modified for better features which lead to the discovery of Ethosomes. Ethosomes was developed in the first place by Touitou and her colleagues in 1997. They are highly malleable, soft lipid vesicles and have an enhanced chance to attain deeper penetration into the skin as well as systemic circulation. Their size range of 214 to 890 nm and contain concentration of ethanol 20-45% along with suitable Phospholipids 0.5-10% and water. They are considered as the modified successors to classical liposome with increased ethanol content. The action of Ethosomes permeation is mainly by lipid bilayer disturbance in skin caused by the ethanol which enhances their penetrability. Fluidized lipids in the membrane and high flexibility of the vesicular membrane together help them to even squeeze through the pores in stratum corneum which are smaller than them. Further several developments and modifications has been done in the Ethosomes structure and composition to enhance its properties and action.

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ADVANTAGES

- Enhanced permeation of drug through skin for transdermal drug delivery.
- Delivery of large molecules (peptides, protein molecules) is possible.
- It contains nontoxic raw material in formulation.
- Ethosomes system is passive, non-invasive and is available for immediate commercialization.
- Ethosomes drug delivery system can be applied widely in Pharmaceutical, Veterinary, Cosmetic fields.
- Simple method for drug delivery in comparison to Iontophoresis.
- Low risk profile-Technology has no large-scale drug development risk since toxicological profiles of the Ethosomes components are well documented in the scientific literature.
- High patient compliance- The Ethosomes drug is administrated in semisolid form (gel or cream), producing high patient compliance by is high. In contrast, iontophoresis and phonophoresis are relatively complicated to use which will affect patient compliance.
- High market attractiveness for products with proprietary technology. Relatively simple to Manufacture with no complicated technical investments required for production of Ethosomes.

DISADVANTAGES

- Poor yield and may not be economical.
- Percutaneous absorption depends on the molecular size of the drug which should be rational.
- Ethosomes drug delivery system is limited to potent drugs and not for drugs that require high blood levels.
- Skin irritation or dermatitis may occur in some patients due to permeation enhancer or the excipients used.
- Ethosomes administration is not a means to achieve rapid bolus type drug input, rather it is usually designed to offer slow, sustained drug delivery.
- Ethosomes may coalescence and fall apart on transfer into water.
- Loss of product during transfer form organic to water media.

IDEAL PROPERTIES

- Enhance the permeation of the drug.
- Delivery of peptides, proteins, molecules.
- Smaller size than Liposomes.
- High drug entrapment, efficiency for both hydrophilic and lipophilic drugs.
- Good physical stability.

APPLICATIONS

- Hormones delivery
- Carrier of Antibiotics
- Delivery of anti-parkinsonism agent
- Transcellular delivery
- Topical carrier of DNA
- Anti-arthritis drug delivery
- Pilosebaceous targeting.

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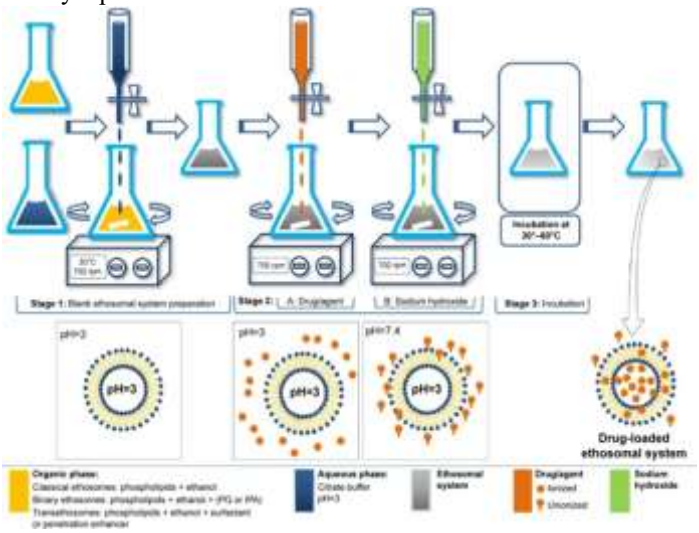
FORMULATION TECHNIQES

CLASSICAL COLD METHOD

This is the simplest and most widely used method for the preparation of Ethosomes systems. The organic phase is obtained by dissolving the phospholipids, (in addition to the surfactant or penetration enhancer for the preparation of transethosomes) in ethanol, or in mixture of solvents (ethanol/PG for binary Ethosomes), at room temperature, or at 30°C. The used aqueous phase is either water, buffer solution or normal saline solution. The aqueous phase is added to the organic phase in a fine stream dropwise or using a syringe pump at a constant rate of 175or 200 µl/min. The mixture is stirred at a speed of 700 – 2,000 rpm using an overhead or magnetic stirrer. The intended drug for incorporation within the Ethosomes system will be dissolved in either the aqueous or the organic phase, depending on its physicochemical properties.

ETHANOLIC INJECTION METHOD

In this method the drug and phosphatidyl choline is dissolved in ethanol and taken in a closed glass bottle. Double or triple distilled water heated to 30°C is added slowly in a fine stream to the lipid solution with constant stirring at 700rpm with a mechanical or magnetic stirrer. Mixing is continued for additional 5 minutes. The system is maintained at 30°C during the preparation and then left to cool to room temperature for 30 minutes. The resulting vesicle suspension is homogenized by passing through polycarbonate membrane with extruder or sonication by a probe sonicator.



HOT METHOD

In one vessel, phospholipid is dispersed in water and placed in a water bath at 40°C until a colloidal suspension is obtained. In another vessel, ethanol is heated to 40°C and then added dropwise to the phospholipid dispersion, under continuous mixing using a mechanical or magnetic stirrer. The drug is dissolved in either the organic or the aqueous phase, based on its hydrophilic/hydrophobic properties.

TRANSMEMBRANE PH GRADIENT METHOD

In this method, the drug is loaded “actively”, based on the pH-gradient difference between the acidic interior of the internal phase and the basic exterior of the external phase of the Ethosomes system. At first, the empty Ethosomes suspension is prepared using any of the forementioned methods, but the aqueous phase or the hydration process uses an acidic buffer (usually citrate buffer, pH 3). Secondly, the active drug is loaded into the empty Ethosomes suspension, followed by continuous stirring. To make the external phase more alkaline and to establish the pH gradient between the acidic internal (pH 3) and basic external phases of the Ethosomes system, an alkali, usually a sodium hydroxide solution of 0.5 M is added to make the external pH 7.4. In the third stage, the Ethosomes system is incubated at a specified time and temperature (30 – 60°C) to give the opportunity for the unionized drug to actively pass the bilayer of the Ethosomes vesicles and get entrapped.

REVERSE PHASE EVAPORATION METHOD

This is the least used method and specially designed to produce large unilamellar vesicles. The organic phase is prepared by dissolving the phospholipid in diethyl ether and then mixing it with the aqueous phase at a ratio of 3:1 v/v in an ultrasonic bath at 0°C for 5 min to form a water-in-oil emulsion. The organic solvent is removed under reduced pressure to produce a gel, which turns into a colloidal dispersion upon vigorous mechanical agitation.

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SONICATION METHOD

This approach involves dissolving the phospholipid in ethanol within a glass bottle. Using a magnetic stirrer, the medication is dissolved in double-distilled water and mixed. A hermetically sealed connection between the glass bottle and syringe allows for the addition of ethanol while preventing evaporation. Following the drug's dissolution, the phospholipid-ethanol solution is added to the drug solution at a flow rate of 200µl/min. A sonifier probe type ultrasonic instrument is then used to sonicate the mixture for 5 minutes at 50°C, producing fine homogenization, using 300 watts of power. The resulting colloidal solution is filtered using disposable 0.22 µm filters, and the filtrate contains the ethanol and water formulation of the ethosomes. Every procedure is conducted with nitrogen shielding it.

MECHANICAL DISPERSTION TECHNIQUE

In this method phosphatidyl choline is dissolved in chloroform: methanol 3:1 mixture in a clean round bottom flask followed by removal of the organic solvents using rotary flash evaporator above the lipid transition temperature to form a thin lipid film under vacuum overnight followed by hydration with different concentration of hydro ethanolic mixture containing drug with 60 rpm for 1hour at the corresponding temperature. The preparation followed by sonication at 4°C using a probe sonicator. The same method is followed by Tadros et al. with emulsification by sonication followed by solvent evaporation in rotary flash evaporator. In this procedure the lipid dissolved in small volume of Diethyl ether: chloroform 1:1 mixture in a round bottom flask. An aqueous phase containing water soluble drug is added to the organic phase such that organic to aqueous phase ratio was 5:1. The mixture is then sonicated for 10 minutes. A stable white emulsion produced from which the water and organic solvent mixture slowly evaporated at 55°C using rotary flash evaporator until a thin film formed on the wall of the flask. The resulting film kept vacuum to eliminate the traces of organic solvent. This film was hydrated with different concentration of hydro ethanolic mixture for 1hour with rotation. The resulted formulation left at room temperature for 1hour and then sonicated for 20 minutesat4°C.

THIN FILM HYDRATION TECHNIQUE

This process involves dissolving the phospholipid in a clean, dry, round-bottom flask with a ratio of 3:1 or 2:1 for chloroform alone or in a mixture of chloroform and methanol. The organic solvents are then extracted using a rotary vacuum evaporator at a temperature higher than the lipid-phase transition temperature. A water-ethanol solution or phosphate buffered saline-ethanol solution is used to hydrate the lipid film after the solvent traces have been eliminated under vacuum for an entire night.

MECHANISM OF PENETRATION

Ethanol and phospholipids are reported to act synergistically to enhance the skin permeation of drugs in Ethosomes formulations. Ethanol fluidizes the lipid bi-layers of the Ethosomes vesicles and the stratum-corneum simultaneously, changing the arrangement and decreasing the density of skin lipids. Therefore, the highly malleable and soft vesicles of an Ethosomes system will penetrate the altered structure of the stratum corneum and create a pathway through the skin. The release of the therapeutic agent occurs by the fusion of these vesicles into cell membranes in the deeper layers of the skin. The mechanism of penetration of the Ethosomes in and through the skin is not yet completely clear. But it is suggested that the drug absorption probably occurs in following two phases:

1. Ethanol effect: according the first mechanism, Ethosomes formulations contain ethanol in their composition that interacts with intercellular lipid molecules in the polar head group region, thereby increasing their fluidity and decreasing the density of the lipid multilayer, which results in an increase in membrane permeability
2. Ethosomes effect: the high alcohol content is expected to result in increased skin permeability. So, the Ethosomes permeates very easily inside the deep skin layers, where it got combined with skin lipids and releases the drugs into deep layer of skin.

TYPES OF ETHOSOMES

Classical Ethosomes

They are modification of classical liposomes with alcohol content(45%w/w). They have enhanced entrapment efficiency and higher negative zeta potential compared to other Ethosomes. Molecular weight ranges from 130.07Da to 24kDa.Thus have greater stability as well as increased permeation.

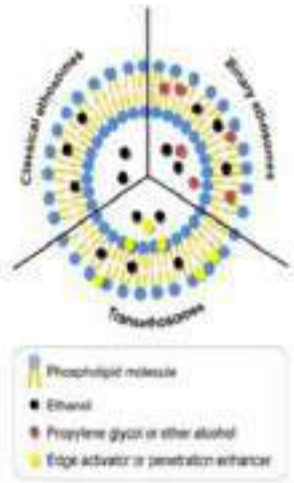
Binary Ethosomes

They are binary because they are made by adding another alcohol in to the formulation for enhancement of ideal properties. The commonly added alcohols include propylene glycol (PG) and isopropyl alcohol (IPA).

Transethosome

They are like classical preparations but contains an additional component in the form of an edge activator (surfactant mostly) and penetration enhancer. The novel delivery system combines the ideal properties of classical Ethosomes as well as the elasticity and deformability of transferosomes as in one formulation known as transethosomes. They were reported to have superior and beneficial characteristics compared to classical Ethosomes. They are capable of entrapping drug which have a molecular weight ranging from 130.077Da to 200-235kDa.

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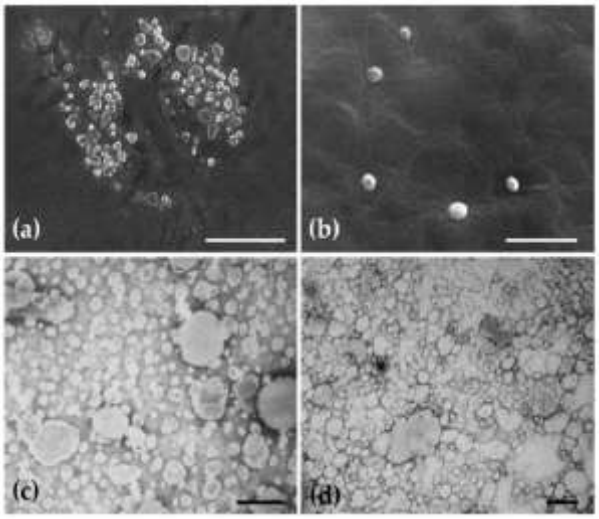
EVALUATION

Patients were followed up clinically and by digital photography before and after treatment for up to 8 weeks and evaluate the response of treatment. After the end of treatment, follow up was done monthly up to 3 months to detect recurrence. The lesion severity scores were calculated at each visit and registered. The scores were compared to the baseline value that was registered at the first visit. Safety was assessed by recording adverse events like itching, burning sensation, staining of skin or clothes and erythema.

Histopathological examination of psoriatic lesions was done before and after treatment for both groups. All biopsied tissues were fixed in 10% formalin, routinely processed and embedded into paraffin. Five-micron thick sections were cut from the paraffin blocks and then stained with haematoxylin and eosin for routine histopathological evaluation. The tissue sections were observed under light microscope for the detection of histopathological changes in both pre- and post-treatment specimens.

INVITROSTUDY

Size and Morphology: In vitro studies often involve characterizing the size and morphology of invasomes using techniques such as Dynamic light scattering (DLS) and transmission electron microscopy (TEM). These studies help in understanding the physical characteristics and uniformity of the vesicles.



Encapsulation Efficiency: This involves determining the amount of drug encapsulated on the vesicles by using high performance liquid chromatography (HPLC).

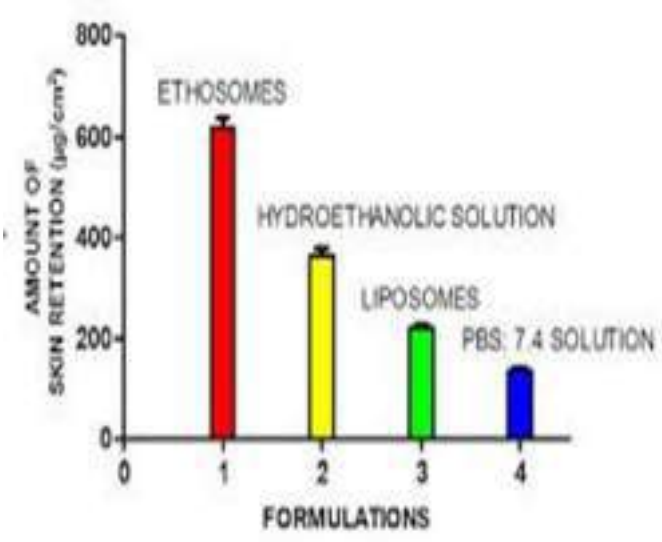
Drug Release Kinetics: In vitro release studies help to calculate the controlled release properties of the vesicles by dynamic dialysis method, fluorescence spectroscopy methods.

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Stability studies: Stability is a crucial factor for study under various storage conditions, including temperature and humidity variations. Dynamic light scattering (DLS) or Laser diffraction techniques are often used.

Cellular Uptake Studies: This helps in understanding the interaction with skin cells and provides insights into the potential mechanisms of drug delivery. Confocal Laser Scanning Microscopy (CLSM) provides high resolution images and allows for the visualisation of cellular uptake in different layers of cells.

Skin Retention Study: The amount of drug retained in the skin is determined at the end of the 12 hours in-vitro permeation studies. The formulation remain in the in-vitro permeation experiment is removed by washing with distilled water. The receptor content is replaced by 50% v/v ethanol and kept for further 12 hours with stirring and the drug content was estimated. This receiver solution diffused through the skin, disrupting any liposome and Ethosomes structure and extracting deposited drug from the skin.



Vesicular stability. The abilities of the formulations to retain the drug content and shape are analysed at different temperatures I.E., 25 ± 2°C (Room Temperature, Rt), 37 ± 2°C And 45 ± 2°C For Different Periods of Time (1, 20, 40, 60, 80 And 120 Days). Nitrogen gas was flushed and was kept in sealed vials. Stability can be found by analysing the size and structure of vesicles over time and the mean size is measured by DLS while structural changes are estimated by making use of transmission electron microscopy.

Percent entrapment efficiency: The %EE of vesicles was determined by ultracentrifugation method. Required volume of the vesicular dispersion was centrifuged at 20,000 rpm for 3 h at a temperature of 4 °C (Remi cooling centrifuge CPR-30). The supernatant solution containing unentrapped drug was withdrawn and measured the concentration by UV spectrophotometer at 226 nm against the pH 7.4 phosphate buffer. The amount of drug unentrapped in liposomes and Ethosomes were determined by the Ex: %Entrapment Efficacy(%EE) = (Cd−C)Cd×100

Where Cd is total drug concentration and C is unentrapped drug concentration. The % EE of test gels was determined by ultra dialysis method. The free drug was removed from the gels by ultra dialysis using dialysis membrane. The dialyzed formulation was lysised with required quantity of methanol and it was further diluted with pH 7.4 phosphate buffer. The samples were analysed spectrophotometrically at 226 nm.

IN VIVO STUDY

In vivo evaluation could supply vital knowledge of fate of Ethosomes inside the biological systems Ethosomes can be evaluated in biological mediums that is blood, plasma, cells or primary culture In vivo methods,

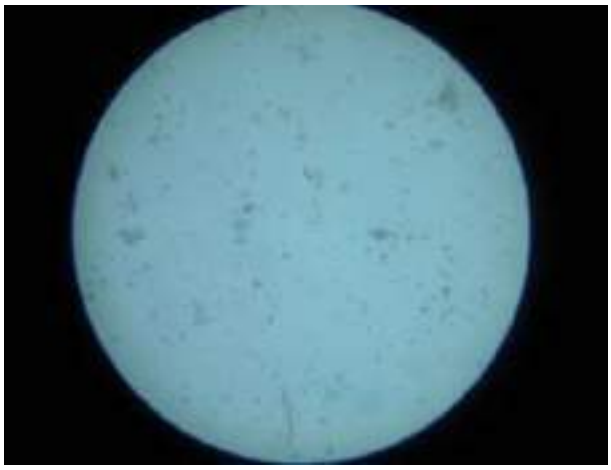
Skin Irritation Test: To evaluate and compare the skin irritation of the Tβ-4 Ethosomes gel and blank Tβ-4 gel, the study was carried out on New Zealand rabbits. Weighed rabbits were anesthetized with 10% chloral hydrate in the ear vein, and the back hair of New Zealand rabbits was removed by mild hair removal cream at 24 h prior to application of the formulations. The exposed back skin was cleaned with saline and confirmed to show no damage. The back skin was scratched with a scalpel to ooze blood and was divided into three groups as follows: Tβ-4 Ethosomes gel, Tβ-4 gel and gel (control). Using the same body control method, both the intact skin of rabbits and damaged skin of rabbits were given 0.5 g of Tβ-4 Ethosomes gel, Tβ-4 gel and blank gel. The presence or

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absence of irritation and redness was observed at 1, 24, 48, and 72 hrs after administration. The Draize scale was applied to evaluate the skin irritation, and irritation scores between 0 and 4 were used to grade the stimulus intensity, which ranged from no response to a severe response.

Pharmacokinetic Study: The mice were anesthetized, and the skin was confirmed to be intact after 24 hrs. The circular filter paper with a diameter of 0.6 cm infiltrated with 5 mol/L of sodium hydroxide was placed on the back skin of mice for 30 s, and then the back skin was cleaned with saline to remove residual sodium hydroxide solution to form a deep second-degree burn model. Each mouse was scalded in three places to put up control experiments and three scald parts of each mouse were daily given different preparations: Tβ-4 Ethosomes gel, Tβ-4 gel and blank gel. The wound area was measured every day. Meanwhile, the wound inflammatory reaction, wound scarring time, healing time and rate of scar formation were recorded. After all the treatments, the mice were sacrificed, and the skins of the mice were removed and were immediately fixed in 10% formaldehyde solution for 24 hrs. The sample was then dehydrated and transparent using ethanol and xylene, embedded in paraffin, and then stained with haematoxylin and eosin (H&E). Finally, the skin was sliced with a paraffin slicer and analysed.

Physical Examination: All the prepared formulae were inspected and assessed visually for their colour, homogeneity, consistency, spread ability, and phase separation.



Optical microscopy observation: The morphological aspects of the hot method of preparation of Ethosomes vesicles were assessed by means of visual inspection and observation under an optical light microscope. Small quantities of the prepared formulae were placed on a clean glass slide with a slipcover followed by the observation at 40x magnification under room temperature conditions. Zeta potential determination and particle size analysis: The Malvern Zeta sizer was used to determine the zeta potential of the selected formula. Dilution of the selected formula with distilled water was done to obtain a clear specimen for further analytic studies on the zeta sizer. The zeta potential was determined at ± 25°C using a clear disposable zeta cell in which the measurements took place in duplicates. The zeta sizer apparatus was used to analyse the vesicle size of formula in which 3 drops of the formula were diluted in distilled water and placed in zeta sizer cuvette followed by the blank cuvette for particle size analysis. The measurement was done in duplicates for both zeta potential and particle size analysis.

CONCLUSION

The Ethosomes formulation was prepared easily, economically and successfully. The characterization of the vesicles was that they were spherical, homogenous, spreadable, transparent, and washable. The formulation had excellent stability zeta potential score which indicated no clumping. The release from the formulation satisfied the sustained release goal, while the permeation of the formulation satisfied the penetration enhancement goal.

All in all, the Ethosomes nanoparticles were truly promising as a novel drug delivery system in terms of enhancing the penetration, so as sustaining the release of drugs. It has been almost 2 decades since the invention of Ethosomes, and during this period these nanocarriers have proven their unique ability to deliver therapeutic agents of different physicochemical properties through the skin for local and systemic use. Continuous extensive research has led to the introduction of a new generation of Ethosomes systems called transethosomes, which have been found to have better properties over the classical Ethosomes in terms of vesicular properties and skin-permeation abilities. Transethosomes provide the highest flexibility to the formulator to change the Ethosomes properties according to the required research criteria by changing the edge activators and/or penetration enhancers. The incorporation of Ethosomes systems in suitable vehicles such as gels, patches, and creams represent an important step to get better skin-permeation and therapeutic results. However, more studies are required to enhance the stability of the Ethosomes system. The results of the in

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vivo studies and clinical trials are reflecting the potential of Ethosomes systems in dermal and transdermal delivery of therapeutic and cosmetic agents.

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EFFECT OF INTERVAL TRAINING ON SKILL RELATED PHYSICAL FITNESS VARIABLES AMONG KHO-KHO PLAYERS

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ABSTRACT
The purpose of this study was to find out the effect of interval training on skill related physical fitness variables among Kho-Kho players. To achieve the purpose of the present study, thirty Kho-Kho players were selected as subjects at random and their ages ranged from 21 to 25 years. The subjects were divided into two equal groups. The subjects (n=30) were randomly assigned to two equal groups of fifteen kho-kho players each. The interval training group participated the training for a period of eight weeks and the post-tests were conducted. The subjects were tested prior to and after the experimentation on Reaction Time, Cardio Vascular endurance and agility. Dependent 't' test was used to test the treatment effect of the training programmes on all the variables used in the study. It was observed that the eight weeks of interval training have significantly improved the selected skill related physical variables of kho-kho players.

KEYWORDS: Interval Training, Kho-Kho, Physical Variable and Fitness

INTRODUCTION

Kho-Kho is one of the most popular traditional sports in the country. Some of the interesting facts about the game. The position of the players sitting is random; one will never find the same set of players sitting in the same order as when the game starts. The game requires immense stamina and speed. Kho-Kho is played on a rectangular court with a central lane connecting two poles which are at either end of the court. Its origins are as old as Mahabharata, with strategies and tactics likely derived from Mahabharata itself. On the 13th day of the war, the Kaurava Guru Dronacharya planned the unique tactics Chakraviyu a special military defensive strategy breached by the expert warrior Abhimanyu. He died as he had to fight alone against 7 other warriors and he received heavy casualties. His style of fighting reflects the concept of ring play: a defensive tactic in the game. This game fosters many desirable traits such as sportsmanship, teamwork, loyalty, competitiveness, and self-esteem as well as speed, agility, strategy and quick thinking. This game in itself is a personal development tool for the athlete that takes up the challenge.

The modern-day game was invented in the Indian state of Maharashtra. The Deccan Gymkhana of Pune tried to lend a sense of reliability and recognition to the game by introducing certain rules and regulations to make it more formal. As a result, countries such as Pakistan, Bangladesh, Nepal, Sri Lanka, and the Maldives also participated in the game. Sports training are especially focused on optimal performance in a particular sport. Its main aim is to develop the performance capacity of sports persons, so that they achieve the highest possible performance. To do so, it is essential to be mentally strong. The ability to manage stress and anxiety associated with different sports need to be strengthened. Competition in sports makes the participants face varied situations which require the individuals to be mentally fit. It is a particular type of training designed to improve fitness and abilities to perform in a given sport. It includes strength in training, corrective and restorative exercises, conditioning and cardiovascular training. It also includes mental and psychological training and advise on nutritional values. The investigator tries to incorporate the Kho-Kho skill training with pranayama practices to promote the playing performance in the modern era.

STATMENET OF THE PROBLEM

This experimental study was to find out the Effect of Interval Training on Skill Related Physical Fitness Variables among Kho-Kho players.

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METHODS

Experimental Approach of the Problem

The study was formulated as pre-test and post-test randomized group design, based on the voluntary response to participate in, 30 male Kho-Kho players selected and they were divided into two equal groups namely interval training group and control group. The selected subject (n=15) was divided into two groups (n=15) of which group I underwent interval training for a period of 8 weeks and group II was considered as control group (CG). After Pre-test, Group I was treated with interval training, group II was not treated with any training but they were doing their regular activity.

TRAINING PROGRAM

During the training period the experimental group underwent the interval training of selected suitable conditioning exercise for eight weeks of period in addition to their daily routine activities as per the curriculum. Experimental group underwent training program on four alternate days per week for eight weeks of period. All the subjects involved in this study were carefully monitored throughout training program. They were questioned about their physical fitness status throughout the training program, none of them reported with any tear and muscle soreness.

The total duration of interval training is one hour. The load was increased one in two skill training progress and lasted for 45 minutes. During the training period the subject were treated with effects of interval training for three alternative days (Monday, Wednesday, Friday) per week.

PHASE I

During the 1st to 3rd weeks of interval training, the subjects were treated with warm up for 10 minutes. Followed by Interval training exercises namely 15mts sprint, 20mts sprint, 25mts sprint, 30mts sprint 5 repetition with 1 set. Further the session ended with cool down for 10 minutes.

PHASE II

During the 4th to 6th weeks of interval training the subjects were treated with warm up of 10 minutes. Followed by Interval training exercises namely shuttle run from 1st to 8th line, 8th to 1st line, 1st to 3rd line 3,6, end line, 1,4,8, end line, 3 repetition 1 set. Further the session ended with cool down for 10 minutes.

PHASE III

During the 7th & 8th weeks of training, the subjects were treated with warm up for 10 minutes. Followed by Interval training exercises namely 150mts run 4 repetition 1 set, 200mts run 3 repetition 2 sets, 300mts run 2 repetition 3 sets, 400mts run 1 repetition 4 sets. Further the session ended with cool down for 10/minutes.

STATISTICAL ANALYSIS

As the purpose of the study was to find out the effect of interval training on skill related physical fitness variables among kho-kho players, the collected data prior to treatment and after of treatment period were tested using statistically dependent 't' test. It was considered as appropriate for this study.

RESULTS

Table 1: Computation of 't' ratio between pre and post-test means of Experimental group on Performance Variables

EXPERIMENTAL GROUP					
Performance variables	**Pre / Post test**	**Mean**	**Std. Deviation**	**Std. Error Mean**	**'t' ratio**
Reaction Time	Pre test	0.41	0.03	0	7.33*
	Post test	0.38	0.03		
Cardio Vascular Endurance	Pre-Test	36.20	5.49	0.58	8.62*
	Post test	41.21	4.45		
Agility	Pre test	20.36	1.09	0.145	8.48*
	Post test	19.13	0.71		

*Significant at 0.05 level of confidence df = 14(2.14).

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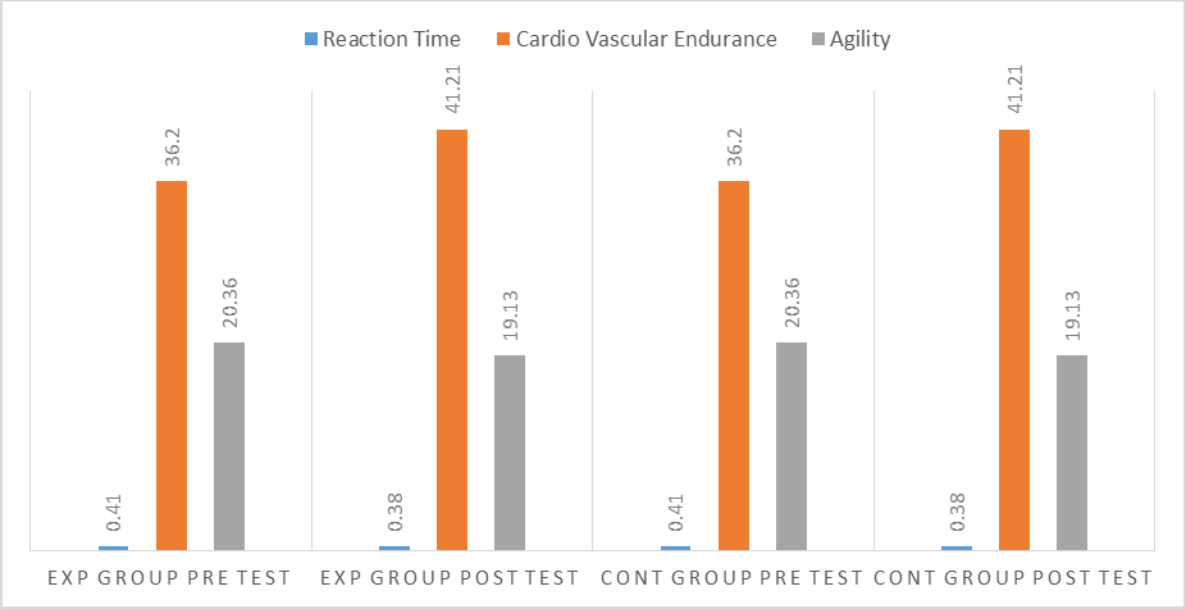
Table 1 reveals the computation of 't' ratio between pre and post-test means of experimental group on Performance Variables. The 't' ratio on speed, speed endurance and agility are 7.33, 8.62, 8.48 respectively. The required table value was 2.14 for the degree of freedom 14 at 0.05 level of significance. Since the obtained 't' ratio values were greater than the table value, it was found statistically significant.

Table 2: Computation of 't' ratio between pre and post-test means of Control group on Performance Variables

CONTROL GROUP					
Performance variables	**Pre / Post test**	**Mean**	**Std. Deviation**	**Std. Error Mean**	**'t' ratio**
Reaction Time	Pre test	0.44	0.03	0	1.35
	Post test	0.43	0.03		
Cardio Vascular Endurance	Pre-Test	35.10	6.52	0.27	0.69
	Post test	35.29	6.81		
Agility	Pre test	22.26	2.25	0.35	0.18
	Post test	22.33	1.99		

*Significant at 0.05 level of confidence df = 14(2.14).

Table 2 reveals the computation of 't' ratio between pre and post-test means of experimental group on Performance Variables. The 't' ratio on speed, speed endurance and agility are 1.35, 0.69, 0.18 respectively. The required table value was 2.14 for the degree of freedom 14 at 0.05 level of significance. Since the obtained 't' ratio values were lower than the table value, it was found statistically not significant.



DISCUSSION ON FINDINGS

The results of the study indicated that the physical fitness variables like agility, reaction time and cardio vascular endurance were improved significantly after undergoing interval training. The changes in the selected parameters were attributed with proper planning, preparation and execution of the training package given to the players.

The interval training is a fantastic training which has been found to be beneficial for the kho-kho players. To study the interval training on physical fitness variable of kho-kho players it was tested under, to differentiate between interval training group and control group. The interval training includes on agility, reaction time and cardio vascular endurance. The interval training exercises were namely,15mts sprint,20mts sprint,25mts sprint,30mts sprint, shuttle run form 8th to 1st lane,1st to 8th

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lane,1st to 3rd lane,3,6,end lane,1,4,8,end lane, 150mts race,200mts race,300mts race,400mts race are helps to improve physical fitness components are namely agility, reaction time and cardio vascular endurance. The obtained result proved positively the interval training group significantly improved. The result of the present study showed that the interval training has significant improvement of kho-kho players. The following studies was revealed that Stankovic et al., (2023) summarized the effects of High Intensity Interval Training (HIIT) on physical performance in female team sports athletes. The review included longitudinal studies, elite, sub-elite, and college female athletes, and measured primary outcome measures such as maximal oxygen uptake, repeated sprint ability, speed, explosive strength, and body composition. Han, Z et al., (2023) concluded A study examining the impact of high-intensity interval training on young handball players' physical fitness was conducted. The study involved 46 players, divided into two groups: the experimental group, who engaged in regular physical activity, and the control group, who engaged in interval training.

The result of the study supports the result of the present study. These finding had not been previously replicated for a sample of college students. The result of the study showed that the control group was not significantly improved.

CONCLUSION

Based on the findings and within the limitation of the study, it was noticed that practice of interval training helped to improve agility, reaction time and cardio vascular endurance ability of kho-kho players. It was also seen that there was progressive improvement in the selected criterion variables of interval training group of kho-kho players after eight weeks. Further, it also helps to improve agility, reaction time and cardio vascular endurance.

1. It was concluded that individualized interval training group showed a statistically significant positive sign over the course of the treatment period on physical fitness variables of kho-kho players.
2. It was concluded that individualized effect of control group showed a statistically insignificant over the course of the period on physical fitness variables of kho-kho players.
3. The results of comparative effects lead to conclude that the interval training group had better significant improvement on physical fitness variables (agility, reaction time and cardio vascular endurance) of kho-kho players as compared to their performance with control group.

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A STUDY FOR IMPACT OF DIGITAL TECHNOLOGY IN EDUCATION

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ABSTRACT

Digitaltechnologyhasaffectedalmost everyaspectoflifetoday. andteaching- learning isno exception. Thedigitaltechnologies such as ICT based (Mobile phone, Tablet, not book, Computer, laptop, Smart TV,projector, etc) and programmed learning (online courses, SWAYAM, Swayam Prabha, Mooc etc) havebecome increasinglypopular inrecent years. Learning inhighereducationhasseenaparadigmshift withtheonset of COVID-19. The Sudden closure of all the campuses in India led to the unprecedented Situation ofcompletely shifting the teaching learning process to the online mood. India is a global leader in informationand Communicationtechnologyinother cutting edge domains, suchas space . The digitalIndia campaign ishelping to transform the entire nation into a digitally empowered Societyand knowledge economy.

The effect of Digital technology on teaching and learning is examined in this article, which is based onanalysis. The Objective of this Study Is to Understand Impact of Digitization in Education Sector and tohighlight how it works. This Is Descriptive Study and this study is based on the analysis of secondary dataonly. All schools, colleges and universities today are focusing more on digital education. Especially sincethe time of Covid-19, the demand for this technology-based education has been strong. Online courses nowhave more demand than the traditional face-to-face courses.

KEYWORDS: *Technologyuse,enhance learning,digitizationineducation.*

INTRODUCTION

The contemporaryera is mostly regardedas the technologicalera. In the field o feducation Technology is the application of scientific knowledge about learning and the conditions of learning to improve the effectiveness and efficiency of teaching and learning. When the whole country was underlockdownforCovid-19,e-learningwasthebest and only alternative for studentsto learn.Inpresent time,technology is playing a vitalrole in everyaspect of human life. According to current situation, India hasbeen reached to the highest place in the field of education. Digitalization is advancing into the education system of India and is replacing the conventional classroom practice. Indian education framework has received creative aptitudes in order to arrive at the final destination and making reformist methodology towards problem related phenomenon.

OBJECTIVES OF THE STUDY

The main objective softhisstudy.arsas follows-

I. To understand the impact of digitalization in education sector.

II. TounderstandtheimpactoftechnologyineducationandtechnologyofEducationinteaching-learning;

III. To understand the digital education initiatives and bridging the Digital Divide.

RESEARCH METHODOLOGY

As per the requirements of the study descriptive nature is being adopted in research design. The research study is totally based on descriptive nature. Secondary source and published articles were extensively used for the collection of data. Distinctively used sources were various web articles.

DATACOLLECTION

Theresearch paperdependsupon thesecondary source of information.Toprepare theresearch paper, therequired data is extensively used, as it is descriptive in nature.

Type of technology used in education

- Smartbords
- Classroompc
- Projectors
- television
- CDS,VCD,DVD
- E-learning
- Slides
- DigitalDevice

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Impact of digital Technology

i) Enhanceteachingandlearning
ii) Globalization
iii) No geographycalLimitations
iv) Flexibleinlearning
v) Upgradelearning,
vi) Knowledgegathering
vii) Practicallearning
viii) Classengagement

Digital Technology in education

The digital divide in India is challenging the nation's current educational methods across its entire studentbody. Digitalconnectivity is more necessarythan ever before in guaranteeing that students can sustain theirstudies while schools remain physically closed. Following are the key initiatives/ways taken by theGovernment of India to enhance and facilitate digital technology education activities.

1. NationalDigitalLibrary(NDL)

In May2016, The NationalDigital libraryof India is a project under Ministryof Education, Government ofIndia. The target is to gather and collate metadata and supply full text index from several national andinternational digital libraries, furthermore as other relevant sources. It's a digital repository containingtextbooks, articles, videos, audio books, lectures, simulations, fiction and every one different kinds oflearning media. The NDLI provides freed fromcost access to severalbooks within the Indian languages and English.

2. EPGPathshala

In 2015, e-PG Pathshala is an initiative ofthe MHRD under its National Mission on Education through ICT(NME-ICT) being executed by the UGC. The content and its quality being the key component of educationsystem, top quality, curriculum-based, interactive e-content in 70 subjects across all disciplines of socialsciences, arts, fine arts and humanities, natural & mathematical sciences, linguistics and languages aredeveloped bythe topic experts working in Indian universities and other R & D institutes across the country.Every subject had a team of man of science, paper coordinators, content writers, content reviewers,Language editors and multimedia team.

a. e-Adhyayan

e-Adhyayan could be a repository of e-Books for the Under-Graduate & Post-Graduate Courses. The e-Books are being derived fromthe e-text of e-PG Pathshala. The project is initiated bythe University GrantsCommission and Ministry of Human resource Development, Government of India. The author / coursecoordinator of books is Indian experts. Currently, e-Adhyayan has 50 e-Books in Sociology, Library &informatics, engineering Science & IT. It's available in open access under Creative Common platform. Theplatform of e-Books is pressbook which is open source. It's been deployed and customised by theINFLIBNET Centre. Italso facilitatese-bookpublishingoff-line, whereauthor canwriteandpublish his/herown book.

b. UGC-MOOC

UGCMOOCs- AverticalofStudyWebsof ActiveLearning for YoungAspiringMinds(SWAYAM) portal,UGC has launched MOOC initiated by the govt. of India with an aim to enable access, equity and qualitywithin the domain of education for the aspirants.

c. e-Pathya

e-Pathya (Offline Access) is another vertical of e-Pathshala which is a software driven co package which helps students pursuing education (PG level) through distance learning yet as campus learning mode. This vertical also allows offline access to course content.

3. Shodhgangaplatform

in June 2009, The Shodhganga@INFLIBNET Centre provides a platform for research students to deposit theirPh.D.thesesand make it availabletotheentirescholarlycommunityinopenaccess. Therepositoryhas the power to capture, index, store, disseminate and preserve ETDs submitted bythe researchers.

4. e-ShodhSindhuplatform

e-Shodh Sindhu was formed with merger of three consortia, namely UGC-INFONET Digital LibraryConsortium, NLIST and INDEST-AICTE Consortium in December 2015. The most objective of the e-Shodh Sindhu: Consortia for instruction E-Resources is to supply access to qualitative electronic resourcesincluding full-text, bibliographic and factual databases to academic institutions at a lower rate ofsubscription.

5. e-yantra The genesis of e-Yantra was within the teaching of the Embedded Systems course at IITBombay throughthe space Education ProgramofIIT Bombay from2003 to 2006. The goal is to harness thetalent of young engineers to resolve problems using technology across a spread of domains such as:agriculture, manufacturing, defence, home, smart-city maintenance and repair industries. Within the contextof e-Yantra there are such a large number of initiatives, such Internship Program, e-Yantra Lab SetupInitiative, Based Training, etc. e-Yantra Robotics Competition, e-Yantra Summer antra Ideas Competition,e-Yantra Symposium, Task

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6. Virtual Labs

The Government of India introduced a pilot virtual lab in 2009 and the main one in 2010 to enableundergraduate and post-graduate students (pursuing science and engineering courses) remotely access thelabsand enhancetheir studyexperience. The virtuallabsoffer studentsaLearning Management Systemandvarious study aides such as video lectures, web resources, self-evaluate on and animated demonstrate ones.

7.Vidwanportal

In the year 1999, VIDWAN is the premier database of profiles of scientists/researchers and other facultymembers working at leading academic institutions and other R & D organisation involved in teaching andresearch in India. It provides important information about expert's background, contact address, skills andaccomplishments.

8. National Digital Educational Architecture(NDEAR)

In the Union Budget 2021-22, the Indian government established the National Digital EducationalArchitecture (NDEAR). National Digital Education Architecture (NDEAR) is federated, unbundled,interoperable, inclusive, accessible, evolving which aims to create and deliver diverse, relevant, contextual,innovative solutionsthat benefit students,teachers, parents,communities, administratorsand result intimelyimplementation of policy.

9. PMeVIDYA Programme

The e-Vidya program begun in May 2020 in response to the COVID-19 pandemic. The Pradhan MantrieVidya is an initiative by the Ministry of Education that will help in facilitating access to digital/onlinelearning as well as teaching materials of various types among students and teachers.

10. DIKSHA

In September 2017, the government introduced DIKSHA. DIKSHA is an initiative of the National Councilof Educational Research and Training (NCERT) under the aegis of the Ministry of Education, Governmentof India. DIKSHA is a unique initiative which leverages existing highly scalable and flexible digitalinfrastructures, while keeping teachers at the centre. It is built considering the whole teacher's life cycle -from the time student teachers enrol in Teacher Education Institutes (TEIS) to after they retire as teachers.DIKSHA can be accessed free of cost by anyone. It also offers more than 100 microservices as buildingblocks for the development of platforms and solutions. It is designed to support multiple languages andsolutions. At present, it supports 18+ languages and various curricula of NCERT, CBSE and SCERT panIndia.

11. SWAYAM

WAYAM is a programme initiated by Government of India on 2017 and designed to achieve the threecardinal principles ofEducation Policy viz., access, equityand quality. The objective ofthis effort is to takethe best teaching learning resourcesto all, including the most disadvantaged. SWAYAM seeksto bridge thedigitaldivide forstudentswho have hitherto remaineduntouchedbythedigitalrevolutionand have not beenable to join the mainstream of the knowledge economy.

12. SWAYAMPRABHA

In2017,TheSWAYAMPRABHAisagroup of22DTHchannelsdevoted totelecastingofhigh-qualityeducational programmes on 24X7 basis using the GSAT-15 satellite.

13. OnAirShiksha Vani

OnAirShikshaVani, DAISY byNIOS fordifferently-abled, e-PathShala- Radio broadcasting is beingusedfor children in remote areas who are not online (especially for grades 1 to 5).

14. Gyandoot

Gyandoot is an Intranet-based Government to Citizen (G2C) service delivery initiative started in the Dhardistrict of Madhya Pradesh in January2000 with the twin objective of providing relevant information to therural population and acting as an interface between the district administration and the people.

15. InternetSaathiProgram

Internet Saathi Program - The Internet Saathi Program was launched in 2015 by Google India and TataTrusts. The aim of this project is to facilitate digital literacy among rural Indian women.

CONCLUSION

Overall, study on the effect of computing and emerging technology on teaching-learningconsistently finds favourable outcomes. Apart from teaching, there is a touch of technology in every aspectof human life today. Today society is constantly changing. This variability is the law of nature. Due to thechange in the flow of this rule, people have adopted this technology today. Technology

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has taken place inevery corner of the society today. Today technology is giving a chance to the backward students to moveforward today. The positive steps taken by the Government of India have made the education system ofstudents easier. This study will be very informative to the readers. Analysis of secondary information willinfluence the reader's mind towards technology-based learning. The progress of society is not a meremeasure. Proper use of technology symbolizes the progress of society

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USING THE PROJECT METHOD IN ENGLISH LESSONS AT A CHEMICAL-TECHNOLOGICAL UNIVERSITY AS A WAY TO DEVELOP THE INDEPENDENCE OF STUDENT TECHNOLOGISTS.

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ANNOTATION
This article discusses issues related to the use of the project method in English lessons conducted by teachers of the Tashkent Institute of Chemical Technology, which contributes to the development of independence of future technologists.
KEY WORDS: *English language, project method, communicative competence, speech activity, independence skills, task.*

Использование метод проектов на уроках английского языка в химико-технологическом вузе как способ развития самостоятельности студентов – технологов

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Аннотация
В данной статье рассматриваются вопросы, связанные с использованием метода проектов на уроках яанглийского языка, проводимые преподователями Ташкентского химико-технологического института, которые способствует развитию самостоятельности будуших технологов.
***Ключевые слова**:английский язык,метод проектов, коммуникативная компетенция, речевая деятельность, навыки самостоятельности,задание.*

When learning English, the project method has a certain place. Thanks to this method, an atmosphere of creativity is created in the lessons, each student takes an active part in the program, collaborates with each other, and interacts with other students.

The goal of teaching a foreign language is to develop communicative competence, therefore the teacher must teach students the methods of speech activity. Thus, the teacher must not only explain new material and give all kinds of exercises to practice and consolidate it, but also develop the mental activity of students.

The project method can guide students into research activities, they will discuss, talk, express their opinions and ideas.
The project method appeared at the beginning of the 20th century in America. It includes the main ideas, a system of actions, both on the part of the teacher and on the part of the student, evaluation criteria and the result of the activity.

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Projects are divided into individual, pair, and group. Group projects are most often used, however, when teaching independence, the leading one will be the individual project, which the student must complete independently, without the help of classmates.

At the end of working on the project, the student must draw a conclusion and obtain a result, which will be assessed by the teacher and other students.

Students independently obtain information, analyze, compose, conduct research, draw conclusions and logical conclusions. While performing tasks, he must think creatively, plan his actions, predict possible results and their reflection on the tasks that he set at the beginning of his research.

The teacher here acts only as a consultant, a source of information. The teacher should not just convey knowledge, he should teach how to work with it.

Such projects can be used in final lessons on certain topics in foreign language lessons. For example, after the topic Sights of England, you can give the task: to create an individual project on the main attractions of England, depending on the student's preferences.

The educational and methodological complex "English Language", edited by the senior teacher of our department, Dzhumaniyazova Malokhat Rikhsievna, examines the countries of Great Britain, talks about their symbols, flags, and traditions. At the final lesson, you can assign tasks to students to independently create a project about a country. Based on the texts that were analyzed in class and using the studied lexical and grammatical units, he will have to draw up a project, the result of which will be the presentation of his statement on the topic in class.

The student can use additional reference materials, and the role of the teacher will only be that of a mentor or assistant. While working on this task, the student must independently analyze the material, carry out its synthesis, draw conclusions and lead to a certain result.

Thus, he can use both the material that was covered in the lesson and additional material that he can find on his own. He analyzes all the material, compiles it, draws the main conclusions, and then independently presents it to defend projects in class.

The mini-project allows students to develop their thinking, develop independent work skills, the student learns to independently remember and reproduce information, and apply the knowledge received from the teacher in class and in practice.[4]

To work with projects, students must be able to work well with text, with reference material, conduct a discussion, listen and hear the interlocutor, express their thoughts and analyze the results obtained.

While working with the project, students go through a number of stages:

- Organizational stage, which determines the theme of the project.
- Preparatory stage, where the student is informed of the main goal of the project and its content. Here the main role is assigned to the teacher, who must explain the main goals and objectives of the project.
- Defense of the project occurs only by students, and the teacher is a spectator. He should not comment, correct or express his opinion on the project.
- At the last stage, reflection is carried out, that is, summing up the results of projects and drawing a conclusion.

Such mini-projects are widely used in practice after completing a topic.
The project method is training that is aimed at developing the personality of students. According to the results of this work, students' motivation increases and stress is relieved.

The project method is aimed at ensuring that students firmly grasp the knowledge that was previously acquired in class. In the project method, the role of independent work is great. It can be high, both in an individual project and in a pair or group project, because even in a group, tasks are divided between students, and each is responsible for his own. As a result of the project method, students learn to work in a team, express their opinions, and listen to others.

An important condition for the success of educational activities is the development of attention. But in order to develop attention, students must clearly understand the task that the teacher sets for them, receive an algorithm of actions that will lead them to certain results.

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For example, you can give independent tasks when learning new vocabulary and consolidating it. For example, fill in the gaps in sentences with words that make sense.

Will you_____our society of young scientists?
Look at his dirty shirt. He has just_____ with Sam
What_____of people are they?
Have you ever heard of the London Zoological_____?

The teacher must give clear instructions to students, namely: read the sentences, understand the meaning without inserting a word, try to select words from those previously studied, read the entire resulting sentence, draw a conclusion about whether the sentence was received correctly or not.

Students can analyze their answers themselves, and then independently complete tasks using the same algorithm, but without the need for the teacher to repeat it.

Next, students may be offered a variant of exercises, where they will need to select from the presented lexical units those that will fit into a certain gap. But the execution algorithm will be exactly the same.

Fill in the blanks with words read/go/watch/play/listen
1)*My parents_____to classical music.*
2)*Do you_____music magazines?*
3)*We_____to the beach every weekend.*
4) *I often_____DVDs on Sundays.*
5) *My brother and I_____computer games.*

The teacher will need to create special developments that will help in organizing students' independent work. With their help, students will perform operations that will be aimed at developing attention, thinking and memory.

But the material that is presented in the Educational and Methodological Complex for a Foreign Language is often not enough, so the teacher should independently compile handouts that will be aimed at training and consolidating the studied lexical and grammatical material.

P.V. Sysoev notes that exercises aimed at developing students' independence should include memorizing poems or songs, listening to authentic songs, and reading aloud [2].

You can also use exercises in foreign language lessons, for example: Listen and make a plan, find inconsistencies with the text after listening to the audio material. That is, students must learn to predict results. They must learn to analyze and synthesize the received material.

For example, listen to the beginning of a phrase, then finish it. Come up with the ending of the story, or the main part if the beginning and end of the story are given.

Listen and repeat Ikram's actions on Monday. And then give a brief overview of it. Ikram usually gets up at 8am every Monday. He goes to the bathroom and takes a shower at 8.10 am. He gets dressed and has breakfast at 8.20 and 8.30. he brushes his teeth after breakfast, at 8.40. at 8.45 she meets her friends and they go to college together. Today the first couple speaks English. The lesson is taught by teacher Muqaddas opa Musakhanova. She is very strict. Classes end at 16:00. After them, she goes home and has dinner with her parents at 19.00. He does his homework from 7.30 to 9.00. and then she goes to bed.

Arkusova I.V. in his work "Modern pedagogical technologies in teaching a foreign language (structural and logical tables and practice of application)" says that the creative level of students helps them develop the skills and abilities to carry out the necessary search and solution of communicative problems that are complex.

For example, students are given the task of listening to a text and expressing their opinion on a given problem, or answering problematic questions about the content of this text [1, p. 128].

Listen to Ikram's average Monday and then briefly describe your day.

In foreign language lessons, independent work, according to E.I. Passov and N.E. Kuzovleva goes through four interconnected and mutually deriving stages:

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1. Preparatory (the teacher must give the task to the students, explain the basic requirements, advise students on this problem, and help in searching for additional literature).
2. Independent work of students (the teacher's task is to interest students, encourage them to complete the assigned task. Students must move from simple tasks to more complex ones, be able to use reference materials, dictionaries, and their imagination).
3. Final (at this stage, students transfer work in class to homework, analyze all the material, generalize it, and draw conclusions).
4. The final stage is the selection of creative tasks [3, p. 640].

However, independent work in the classroom also has a number of disadvantages. These include:

- students do not always know their psychological characteristics of memorization, and teachers, in turn, do not want to compose their own didactic materials, but use only the tasks and exercises given in the Educational Methodological Complex, which most often are not enough for students to develop good skills in given topic. Teachers cannot teach students to work with dictionaries and reference books that are given either in the Educational Methodological Complex or in additional literature;
- students often do not see the purpose of independent work, do not understand its significance, do not understand why it is needed and how it will be assessed in the conclusion. If a student during his school years only completed the tasks assigned to him by the teacher, now it is difficult for him to immediately switch to independent work, especially if he does not know its basic principles and laws.

The teacher's task is to explain to each student the goals and objectives of independent activity, show the results that are required of them, help them get started, and then mentor them;

- Most often, independent work either repeats the class work or is not connected with it at all. Thus, it is difficult for students. In modern educational and methodological complexes, the role of independent work is assigned to a very small role. Therefore, the teacher's task is also to distinguish between independent work in class and at home. Show students what they should do in class, and how much material they should be given for independent study at home;
- Some teachers do not have clear criteria for checking students' independent work. And they, in turn, understanding this, do not try to perform it efficiently. Often independent work can be checked using tests that can be found on the Internet and done using an interactive whiteboard. Therefore, if the class has the necessary equipment, knowledge testing can take place quite quickly, however, if in a secondary school there is no opportunity to use computer technology in the classroom, the teacher must independently find ways to test work that will be correct so that students see their assessment. activities.

To ensure the interest and attention of students, all materials for independent work should be interesting and entertaining, aimed at self-development and increasing motivation among students.

Thus, the project method is one of the most accessible and good methods that are aimed at developing students' independence in foreign language lessons, since the main goal of the method is the development of independence, creativity, abilities for self-realization, independent thinking and self-decision making.

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FUNCTIONAL-SEMANTIC FEATURES OF ADJECTIVES WITH THE MEANING OF CHARACTERISTICS OF A PERSON IN THE GERMAN LANGUAGE

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ANNOTATION
This article examines German functional-semantic adjectives with the meaning of human characteristics. The mechanism of word-formation means used to form functional-semantic adjectives characterizing a person is established, and the characteristics of the lexical-semantic groups (LSG) that produce their bases are also highlighted. It is noted that the main specific features of adjectives lie not so much in the field of syntax, but in the field of semantics and pragmatics.
KEY WORDS: *adjective; adjectives meaning characteristics of a person; functional semantics, specific features of adjectives, communicative-cognitive, syntactics.*

ФУНКЦИОНАЛЬНО-СЕМАНТИЧЕСКИЕ ОСОБЕННОСТИ ПРИЛАГАТЕЛЬНЫХ СО ЗНАЧЕНИЕМ ХАРАКТЕРИСТИКИ ЧЕЛОВЕКА В НЕМЕЦКОМ ЯЗЫКЕ

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Аннотация
В данной статье исследуются немецкие функционально-семантические прилагательные со значением характеристики человека. Установливается механизм средств словообразования, используемых для образования функционально-семантических прилагательных характеризующих человека, выделяется и характеристика лексико–семантических групп (ЛСГ) их производящих основы. Отмечается, что основные специфические особенности прилагательных лежат не столько в области синтаксиса, сколько в сфере семантики и прагматики
Ключевые слова: *имя прилагательное; прилагательные со значением характеристики человека; функционально-семантика, специфические особенности прилагательных, коммуникатив-когнитив, синтактик.*

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FUNKTIONAL-SEMANTISCHE MERKMALE VON ADJEKTIVEN MIT DER BEDEUTUNG VON MERKMALE EINER PERSON IN DER DEUTSCHEN SPRACHE

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Anmerkung

Dieser Artikel untersucht deutsche funktional-semantische Adjektive mit der Bedeutung menschlicher Merkmale. Der Mechanismus der Wortbildungsmittel zur Bildung funktional-semantischer Adjektive, die eine Person charakterisieren, wird aufgeklärt und die Merkmale der lexikalisch-semantischen Gruppen (LSG), die ihre Grundlagen bilden, werden ebenfalls hervorgehoben. Es wird darauf hingewiesen, dass die wesentlichen Besonderheiten von Adjektiven weniger im Bereich der Syntax als vielmehr im Bereich der Semantik und Pragmatik liegen.

Schlüsselwörter: *Adjektiv; Adjektive, die Merkmale einer Person bedeuten; funktionale Semantik, spezifische Merkmale von Adjektiven, kommunikativ-kognitiv, Syntaktik.*

В системе морфологических ресурсов прилагательному отводится видное место как категории, в семантике которой доминирует понятие качества и которая определяет имя существительное. Основные специфические особенности прилагательных лежат не столько в области синтаксиса, сколько в сфере семантики и прагматики.

В задачи данной статьи входит установление инвентаря словообразовательных средств, используемых для образования десубстантивных прилагательных характеризующих человека, выделение и характеристика лексико–семантических групп (ЛСГ) их производящих основы.

В немецком языке для образования прилагательных от существительных используется прежде всего суффиксация, которая представляет, по мнению М.Д.Степановой [1] и В.Фляйшера [2], один из наиболее продуктивных способов словообразования прилагательных [3].

Десубстантивные прилагательные, характеризующие человека, образуются с помощью как немецких суффиксов *-ig, -isch, -haft, -lich, -sam, -bar* так и суффиксов заимиствованных прилагательных *-os/-ös, -ant/-ent, -iv, -al/-ell, -ar/-är, -abel/-ibel* [4].

Значение наличия чего-либо при характеристика внешних признаков, внутренных свойств, состояний, склонностей, поведения человека придают рассматриваемым прилагательным суффиксы ***-ig****, (bärtiger Mensch, fleischige Nase, haarige Beine, mutiger Mensch, geduldiger Patient),* ***-isch,*** *(launisches Mädchen, ironischer Unterton, neidische Reden),* ***-haft,*** *(tugendhaftes Benehmen, nahmhafter Dichter, sündhafte Augen),* ***-lich,*** *(grämlicher Mann, ängstliches Mädchen, glückliches Gesicht),* ***-sam,*** *(sittsames Enkelkind, friedsamer Mensch),* ***-bar,*** *(dankbarer Klient, schandbare Tat),* ***-iv,*** *(aggresiver Fahrer, impulsive Worte, initiatives Benehmen),* ***-ant/-ent,*** *(arrogante Person, oharmante Frau, eloquenter Politiker),* ***-ös,*** *(ambitiöser Sportler, nervöse Frau),* ***-abel*** *(räsonables Benehmen),* ***-är,*** *(illusionärer Charakter)* [5].

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Значение наличия признака, связанного с болезнью, придает прилагательным суффикс *-ös/-os, (tuberkloser Mann, kavernöse Lungen).*

Значение характеристики человека орнативности выражают также прилагательные-сращения на базе субстантивных словосочетаний с суффиксом *-ig*, определяемый компонент которых обозначает части тела человека и животных или части предметов: *blauäugeriges Mädchen.*

Таким образом, можно отметить, что суффиксальные десубстантивные прилагательные немецкого языка характеризующие человека образуются в основном с помощью суффиксов *-ig, -isch, -haft, -lich, -os/-ös, -ant/-ent, -iv* (7 суффиксов). В изученных словарях и лингвистических текстах встречены лишь отдельные лексемы, образованные путем присоединения к производящей основе суффиксов *-sam, -bar, -al/-ell, -ar/-är, -abel/-ibel.*

Наряду с десубстантивными прилагательными, образованными путем суффиксации, в немецком языке представлены так называемые псевдопричастия или отименные прилагательные, образованные от основ существительных по модели причастий II слабых глаголов префиксально-суффиксальным способом (*gestiefelt, bebrilltt* и.т.п.) [6].

Как представляется, к исследуемой группе десубстантивных прилагательных можно отнести псевдопричастия первого семантического типа, т.е. лексемы с орнативным значением в буквальном смысле слова, выражающие снабженность кого-либо или чего-либо каким-то предметом, наличие признака, обозначающего внутренние свойства, состояния человека.

В результате проведенного исследования были установлены следующие варианты модели псевдопричастий, характеризующие человека (*s* – основа проиводящего существительного): *ge+S+t (gestiefelter Reiter), be+S+t (bebartetes Gesicht), ver+S+t (verfruchte Stirn), durch+S+t (durchädertes Gesicht), S+ier+t (livrierter Diener, talenteirter Künstler*). Основная масса псевдопричастий образована по моделям: *be+S+t, ge+S+t, ver+S+t, S+ier+t* [7].

Среди исследуемых суффиксальных прилагательных и псевдопричастий можно выделить лексемы, образованные от имени, называющего один и тот же предмет: *bebartetes Gesicht – bärtiger Greis, behaarte Hände – haarige Beine* и т.п.

В качестве производящих основ префиксально-суффиксальных десубстантивных прилагательных со значением характеристики человека в немецком языка выступают существительные, среди которых были выделены пять лексико-семантических групп. Следует отметить, что среди рассматриваемых суффиксальных прилагательных представлены в основном те же лексико-семантические группы производящих основ, что и среди префиксально суффиксальных лексем. В изученных словарях и лингвистических текстах не было отмечено суффиксальных прилагательных, производящие основы которых обозначают названия – имена родства. Существительные остальных лексико-семантических групп производящих основ соединяются с рассматриваемыми суффиксами, образуя суффиксальные прилагательные.

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Таким образом, по суффиксальными и префиксально-суффиксальным моделям прилагательных образуются лексические единицы, производящие основы которых относятся к следующим лексико-семантическим группам:

1. Названия частей тела людей: *bärtiger Mensch, haarige Beine, beleibte Männer, durchädertes Gesicht, blausäugiges Mädchen, dickbäuchiger Gesicht* и т.п.
2. Абстрактные имена, обозначающие внутренние свойства, черты характера, склонности, состояния человека: *gut gelaunter Mann, talentierter Künstler, gesittete Menschenheit, mutiger Mensch, geduldiger Patient, launisches Mädchen, ängstliches Mädchen, sittsames Kind, dankbarer Klient, kapriziöses Mädchen, ambitiöser Sportler, arrogante Person, aggressiver Fahrer* и т.п.
3. Абстрактные существительные, обозначающие время: *bejahrte Frau, betagter Rentner, jähriges Kind.*
4. Названия живых существ (антропонимы): *egoistischer Mensch,* и т.п.
5. Названия болезней и связанного с ними состояния: *verkrebster Körper, tuberkuloser Mann,* и т.п.

Следует отметить, что суффиксальные прилагательные чаще всего образуются от производящих основ лексико-семантической группы, обозначающей внутренние свойства, черты характера, склонности, состояния человека. С существительными рассматриваемой лексико-семантической группы соединяются 11 из 12 суффиксов.

Проведенное исследование позволяет сделать вывод о том, в немецком языке десубстантивные прилагательные характеризирующие человека образуются двумя способами: суффиксальным и префиксально-суффиксальным, однако их соотношение при образовании описываемых лексем различно. В немецком языке десубстантивные прилагательные образуются в основном с помощью 7 суффиксов и 4 префиксов в соединении с суффиксами. Таким образом, в немецком языке широко представлен префиксально-суффиксальный способ образования исследуемых лексем, т.к. отыменные префиксально-суффиксальные прилагательные являются специфической чертой западногерманских языков.

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GAME TECHNOLOGIES IN TEACHING ENGLISH AT CHEMICAL-TECHNOLOGICAL UNIVERSITY

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ANNOTATION
This article discusses issues related to teaching English at a chemical engineering university.
KEY WORDS: *English language, chemical terminology, educational technology*.

ИГРОВЫЕ ТЕХНОЛОГИИ В ПРЕПОДАВАНИИ АНГЛИЙСКОГО ЯЗЫКА В ХИМИКО-ТЕХНОЛОГИЧЕСКОМ ВУЗЕ

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Аннотация.
В данной статье рассматриваются вопросы, связанные с преподаванием английского языка в химико- технологическом вузе.
Ключевые слова: *английский язык, химическая терминология, педагогическая технология.*

Обучение основам английского языка с химической терминологией является одним из составляющих элементов химико-технологического образования в Узбекистане.

Главные цели преподавания дисциплины – подготовить терминологически грамотно химиков-технологов высшего звена, сформировать его профессиональную языковую культуру.

В настоящее время изучение английского языка в нашем вузе продолжается в течение двух семестров. Программа учебной дисциплины «Английский язык » включает основы языка:

- Правила чтения и постановки ударения;
- Склонение имён существительных;
- Согласование имён прилагательных с существительными;
- Терминологическое словообразование;
- Частные отрезки в названиях химических средств;
- Лексический минимум (глоссарий);
- Необходимо отметить, что изучение английского языка в нашем вузе носит практическую направленность. Так, в процессе изучения общепрофессиональных и специальных дисциплин студенты сталкиваются с терминами, понимание которых тесно связанных со знанием английского языка. Например, не знания языка, очень сложно поставить все слова химического термина типа

- *carbon dioxidey - глекислый газ*
- *Energy - энергия*

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- *Diamond- алмаз*
- *Electron- Электрон*
- *Hydrogen- водород*
- *Isotope- изотоп*
- *Geology - геология*
- *atomic nucleus - атомное ядро*

в нужную падёжную форму и на нужное место. Для того чтобы грамотно разбираться в таких химических терминах, необходимо знания английского языка.

Привлечение игры как приёма обучения есть действенный инструмент управлению учебной деятельностью по овладению иностранным языком, в том числе и английским. В отличии от игр вообще, педагогическая игра - это вид деятельности, характеризующим ей педагогическим результатом, а также учебно-познавательной деятельностью.

Цель игры – проявить интерес к познанию, науке, учению. В игре воссоздаются предметное и социальное содержание деятельности, моделируются системы отношений, адекватные условия формирования личности. Как педагогическая технология интересна тем, что создаёт эмоциональный подъем, делает процесс обучения занимательным, создаёт у студентов бодрое рабочее настроение, облегчает преподавание трудностей в усвоении материала. Игра рационально дополняет традиционные формы и методы обучения, позволяя более эффективно достигать поставленной цели и задачи конкретного занятия и всего учебного процесса.

Игра повышает интерес обучающихся к занятиям, стимулирует рост познавательной активности, что позволяет студентам получать и большое количество информации. Игровая технология обеспечивает единство эмоционального и рационального в обучении, поскольку представляет собой «цепочку проблемных вопросов практического, коммуникативного характера. В игру познавательного, включаются викторины, проблемные ситуации, элементы мозгового штурма. С помощью игры можно снять психологического утомление, ее можно использовать для мобилизации умственных усилий студентов, для развития у них организаторских способностей, привития навыков самодисциплины, создания ситуации успеха на занятиях. Для участия в игре не требуется репетиций, иначе теряется новизна предстоящей игровой деятельности. Это является источником постоянного интереса играющих к событиям в игре.

Учитывая вышесказанное, следует цели преподавателя:

- Заинтересовать студентов;
- Повысить мотивацию к изучению английского языка;
- Выбрать наиболее эффективные методы и поисков обучения, способствующие активизации познавательной деятельности обучаемых, развития мышления и активности.

Один из путей решения – внедрение игровых технологий в учебный процесс.
Рассмотрим отдельные примеры игр и игровых упражнений, которые целесообразно применять на знаниях по английскому языку.

1. Игра «собери буквы» Цель – закрепить знание химических терминов на английском языке. Группа делится на 2 команды. Каждая получает набор «шаров» (цветных кружков) с буквами английского алфавита. Задача – разместить «шары» химических терминов в алфавитном порядке . Выигрывает та команда, которая закончит выполнение задачи первой.

2. Игра « перепутанные слова» Цель – отобрать лексические единицы по теме « Названия химических терминов» (возможны варианты). Оборудование: список слов с переставляемыми буквами, карандаши и бумага, проектор и доска. Студентам даётся список перепутанных слов на доске, проекторе или бумаге. Предлагается расшифровать слово. Первый, кто справится со всеми

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словами, побеждает. Длина списка зависит от времени, выделенного на игру. Слова должны быть знакомыми. Список можно ограничиться категорией значения слов, например, только химические или технологические термины, названия растений, препаратов, белков и т.д..

Glycoprotein	*Nucleoproteins*
Lipoproteins	*Myosin*

Таким образом, использование игровых технологий и элементов проблемного обучения на занятиях стимулирует личностную активность студентов развивает познавательные процессы, способствует формированию компетенции, которыми должны обладать студент-технолог:

- Способность и готовность к использованию знаний химической терминологии в профессиональной деятельности.
- Умение использовать на практике терминологию по естественнонаучным, биологическим и химическим наукам в различной деятельности;
- Готовность к формированию системного подхода к анализу химико-технологической информации из различных источников;
- Готовность к самостоятельной и индивидуальной работе, принятию ответственных решений в рамках своей профессиональной компетенции. Химиком известна пословица:«Кальций – это не пустяк:образует известняк.» (Calcium is not a trifle: it forms limestone.”). Именно поэтому изучение английского языка в химико-технологическом вузе является необходимым.

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DEVELOPMENT OF PROFESSIONAL FOREIGN LANGUAGE COMMUNICATIVE COMPETENCE OF THE FUTURE CHEMIST TECHNOLOGIST

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ANNOTATION
The proposed article represents scientific views, the main goal of which is to stimulate the written and oral speech of students of chemical engineering universities, as well as to develop their professional competence.
KEY WORDS: *English language, terminological nomenclature, foreign language component, principles, scientific discourse, communicative intentions.*

РАЗВИТИЕ ПРОФЕССИОНАЛЬНОЙ ИНОСТРАННОЙ ЯЗЫКОВОЙ КОММУНИКАТИВНОЙ КОМПЕТЕНТНОСТИ БУДУЩЕГО ХИМИКА-ТЕХНОЛОГА

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Аннотация
Предлагаемая статья представляет собой научные взгляды автора, основной целью которой является стимулировать письменную и устную речь студентов химико-технологического вуза, а также развить их профессиональную компетенцию.
Ключевые слова: *английский язык, терминологическая номенклатура, иноязычный компонент,принципы, научный дискурс, коммуникативные интенции.*

Knowledge of English as a language of international communication is dictated by the challenges of today. Uzbekistan is strengthening scientific, trade and cultural ties with foreign countries. In many professions, one inevitably has to deal with the need to communicate in English and use English-language literature when working in one's specialty. This fully applies to the chemical branch of knowledge with its own terminological nomenclature. A chemical specialist must be able to read specialized literature and translate chemical-technological texts.

Professionally oriented teaching of foreign languages in chemical engineering universities is aimed at developing professional foreign language communicative competence in students, which involves ensuring the ability to adequately interpret information presented in oral/written texts and effective communication in accordance with professional tasks.

The content of foreign language education at the Tashkent Institute of Chemical Technology is based on the following provisions:
- modeling in the educational activities of students the content of their professional activities in a specific area;
- joint activities of subjects of the educational process (teacher and students);
- pedagogically sound combination of innovative and traditional pedagogical technologies.

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The basis for the formation of the professional competence of a chemical-technological specialist, which includes a foreign language component, is the involvement of the student's educational activity in mastering a foreign language in the prototype of his future professional activity, which is associated with the use of a foreign language. With such training, production processes are modeled using foreign language tools, with which future specialists can be associated in various communicative situations. The formation of professional foreign language communicative competence of the future chemical technologist is carried out by integrating:

- subject content/teaching special disciplines and a foreign language;
- real foreign language professional activity of a specialist modeled during the training process;
- creative and reproductive activity of a specialist in professional communicative situations, which allows one to learn a foreign language in the context of real professional activity.

Thus, the general professional competence of the future chemical engineer is an integration of foreign language and professional subject components. According to N.P. Khomyakova, it is foreign language vocational education, carried out on the basis of the integration of a foreign language and special subjects, and not professionally oriented foreign language training that can ensure the formation of professional foreign language communicative competence, which contributes to the formation of a specialist's overall professional competence [1]

The basis for the implementation of the concept of teaching foreign languages to chemical and technological specialists used at the Tashkent Institute of Chemical Technology is the following principles:

- the principle of communicative orientation;
- the principle of professional orientation.

These principles are applied both in the process of organizing the educational process for mastering the above-mentioned competence, and in the formation of the content of the curriculum in the discipline "Foreign Language" (its linguistic component: teaching materials, structural organization of teaching aids). The principle of communicative orientation presupposes the development of prepared and spontaneous response speech in students in the process of communication, while speech and creative tasks dominate over tasks aimed at practicing certain lexical phenomena or grammatical structures. When selecting educational materials, the principle of communicative orientation is implemented through pre-text tasks that prepare for the perception of information on a certain topic, and post-text tasks that allow you to present the studied language units in speech and determine the level of performance of speech tasks by students.

The principle of professional orientation involves the introduction of elements of analysis of scientific discourse that accumulates specialized knowledge in a specific foreign language. Thus, a general scientific text/scientific and technical text representing scientific discourse is analyzed, first of all, from a pragmatic point of view. Students are asked to determine the genre of the text and highlight the main characteristics of this genre, identify the features of the semantic organization of the text, determine the communicative intentions of the author and the means of speech influence on the potential addressee, whose discursive activity is focused not only on the adequate interpretation of the text read, but also on the formation of their own text.

The recipient's interpretation of the discursive activity of the author of a text of a specific genre largely depends on the priority presentation of significant pieces of information. Pragmatically important information during verbalization receives a communicatively highlighted design using linguistic means, mainly expressive syntactic means (syntactic parallelism, antithesis, anaphora, lexical repetition, etc.), evaluative lexical means. The specificity of the implementation of the principles of communicative and professional orientation in the selection of educational material lies in the selection of multi-genre scientific texts as the object of training and, accordingly, the identification of their linguistic and extralinguistic characteristics in terms of the genre features of the language implementation in the text of the main pragmatic factors - the addressee.[2]

It should be taken into account that the communication process for a specific field of knowledge has its own specificity, namely that the functional type of language that ensures communication between specialists in a certain field of knowledge includes special concepts belonging to this field of knowledge, which allow communication of a professional nature within a certain field of knowledge. It is the thematic criterion for selecting lexical material, in our opinion, that is most significant in the context of teaching a professional language. At the same time, professionally relevant vocabulary should include not only lexical units that allow one to perceive and understand scientific texts, but also lexical units that allow one to interpret the information presented in the texts and produce one's own texts in the specialty being studied.

Thus, following the principles of communicative and professional orientation, joint activities of teachers and students, integration of teaching special disciplines and a foreign language in the process of foreign language education contributes to the formation of professional foreign language communicative competence of students of chemical engineering specialties.

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CHILDREN'S FOLKLORE IS THE BASIS OF FOLK SPIRITUALITY

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ANNOTATION
This article discusses issues related to the development of children's folklore in Uzbekistan and analyzes examples of the children's folklore genre.
KEY WORDS: *Folklore, literature, fairy tale, Alla, riddle, children.*

ДЕТСКИЙ ФОЛЬКЛОР - ОСНОВА НАРОДНОЙ ДУХОВНОСТИ.

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Аннотация
В данной статье рассматриваются вопросы, связанные с развитием детского фольклора в Узбекистане, анализируется образцы детского фольклорного жанра.
Ключевые слова: *Фольклор, литература, сказка, алла, загадка, дети.*

Children's folklore is the works of the children themselves, learned by tradition; works of traditional folklore of adults that have passed into the children's repertoire; works created by adults especially for children and adopted by tradition. G.S. Vinogradov emphasized that “Children’s folklore is not a random collection of incoherent phenomena and facts, representing a “small province” of folklore, of interest for psychologists and others. a purveyor of scientific pedagogical thought or a practical teacher and educator; children's folklore is a full member among others that have long been called upon departments of folklore"

In the 21st century, our society is faced with an acute problem of the spiritual and moral education of the younger generation. In our opinion, this is due to the weakening role of the family as a social institution. Our fathers and grandfathers, as you know, for various reasons, did not receive a secular education, like, say, the current generation, but thanks to folklore thinking they were distinguished by a highly moral consciousness, a sharp mind, the ability to speak beautifully, get along in society, etc.

All this is sorely lacking at the present stage of our youth, who from year to year are losing the culture of communication in their native language, and this can ultimately lead to the erosion of ties with the customs and traditions of the people that have been established over the centuries.

Oral folk art, in particular children's oral poetry, can provide serious assistance here. Through the potential of folklore works, the artistic and imaginative thinking of children was and should be formed in the past, because folklore has a cleansing effect on the child.

Chechen children's folk poetry is one of the areas of folk art, without which the spiritual and moral development of the individual is impossible. With age, children's view of the world changes, therefore, this is reflected in children's worldview. In recent decades, social, moral, historical changes in the life of the Chechen people have affected both adult and children's folklore equally. Despite the fact that in the course of historical development, patterns have developed in children's folklore that are unique to it, children's and adult folklore are connected by strong ties.

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Without a doubt, children's oral poetry of any nation, first of all, must correspond to the culture of the people in whose environment it exists.

Folk oral creativity as a phenomenon manifested in various literary types and genres is a multifunctional verbal art that has social and aesthetic significance in the history of human society. It has always expressed the dreams and aspirations of the people who are its creator, and also serves as an important educational tool not only for the nation itself, but also for the spiritual and moral development of children. Children learn the life experience of their ancestors, the science of labor and struggle from folk art. Their great ancestors Tomaris, who fought for the freedom and freedom of the country in the form of love, sincerity, humanity, patience, dedication, and most importantly, the perception of the Motherland, where their fathers lived and flourished, from folk songs, epics, legends and stories., Chirac, Spitamen, Mukanna, Temur Malik, Jaloliddin Manguberdi, Mahmud Torobi and Amir Temur learn from their courage, feeling the romance of life and creation. Therefore, from ancient times to the present day, folk art has been a lesson for children to value goodness and hate evil; over the centuries, reflecting the national spirit, it has provided the spiritual and moral heritage of generations, demonstrated the wisdom, talent and language of the people as an example of collective creativity, and has become a means for people to understand themselves and love their history, they remained, and most importantly, they served as the genetic basis for the creation of written literature. Children's folklore also played its own role in this process.

Children's folklore is a unique branch of folklore, which has become an integral system of games, songs and musical and poetic genres, formed as a result of the interaction of the world of children with the world of adults.

Due to the nature of the samples of Uzbek children's folklore, according to their genetic basis, it can be considered as a phenomenon consisting of three parts:

I. Adults always thought about their children - they were busy with work and creativity. This process took the form of a deepening desire to care for the child and his destiny, which led to the creation of many songs. In particular, the responsibility of caring for an infant was enormous. Mothers took on this difficult responsibility: for their sharp mind, enterprise and unparalleled human kindness, they brought up the future history of the country, and therefore the world, by raising children. On the way, the song helped them: with the song they put the children to sleep, cried and caressed them, caressed them and even performed rituals associated with the baby with the song. This is how “Alla”, applause, caresses, oddities and repetitions arose. In them, pampering was the leitmotif. Therefore, it is appropriate to summarize and characterize these examples of folk oral poetry in the form of folk poetry.

Samples of caress poetry are divided into two groups according to purpose, place and age of the child. The songs of the first group are closely related to the period of a child’s cradle, which is why they are called lullabies. “Alla” and ethnographic rhetoric have this character.

Lullabies are sung up to three years of age, and songs of the second group are sung from birth to 6-7 years, but in fact these are badihi of maternal love, not associated with the cradle. These are love songs consisting of endearments, nonsense, curiosities and repetitions.

II. Adults also take an active part in shaping children's attitudes towards nature. As a result, a children's calendar and ritual songs were created. Some of these songs, related to the spring, summer, autumn and winter seasons, due to the requirements of socio-political development, lost their place in the adult repertoire and either died out or turned into the children's repertoire. saved.

Among them are “Boychechak”, “Chittigul”, or Ramadan and Eid al-Adha. In addition, the genres of nudity and condemnation, formed on the basis of the animistic and totemistic beliefs of our primitive ancestors, have now lost their essence and are still active in children's repertoire.

III. Songs and games, which are the product of children's creativity and performance, form the basis of Uzbek children's folklore. Based on the relationship between words and actions, they can be divided into two main groups:

1. Children's home songs.
2. Children's game-folklore

"Alla." There are different opinions about the origin of the term “alla”. Some say that it is a phonetically modified form of the Arabic word "Allah", while others try to explain that it comes from the Uzbek word "aldamok", which means to trick a child into falling asleep. Clearly these comments are false and do not reflect the truth. L.Z. Budagov noted that “allala” means the back of the head, i.e. "neck". Indeed, when he lies on his back, the back of his head presses against the pillow, so he sleeps. The baby sleeps on a cradle, a swing, only with the back of his head on his back. Its use to euthanize a child is related to this function.

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"Alla" is usually used during breastfeeding of children - until they reach the age of 3 years. They are strongly associated with children of this age, which has led to their description as a lullaby. This is why "alla" is sanctified by associating it with mother's milk as "a song soaked in milk and full of love."

Proverbs are a common independent genre of oral creativity as a rare example of folk wisdom. Conventionally, they can be called the rules of international morality. Proverbs are the result of a very concise, concise, succinct and figurative expression of the socio-political, spiritual, cultural, moral and philosophical views of the people, proven over the centuries. Proverbs are not created on purpose, but are judged as a moral assessment of conclusions drawn from life experience, tested under certain circumstances. Although the proverbs of each people express the heart and views of that people, their idea belongs to the whole people. Thanks to these features, proverbs acquired both national and universal significance.

Riddles arose as an expression of folk life and ancient beliefs. They were at a period when the primitive animistic and totemistic views of our ancient ancestors began to take shape as a result of conventional speech.

It began to manifest itself in those times when human consciousness was just beginning to ignite (F. I. Buslaev). Because of their weakness in the face of natural disasters, our ancient ancestors did not call things, people, animals, birds by their proper names, but began to pronounce them in other words in order to protect them from harm from supernatural forces, people and disasters. There are riddles, traces of which can be traced in modern Uzbek riddles, for example, in the name of the father - nor, grandmother - camel, goat - Abdukarim, rabbit - eared, dog - turtle, eye - window, wheat - red are signs of that mystery.

Fairy tales are the most ancient, popular genre of folk art, large in volume, equally interesting to both adults and children. They appeared in the distant past on the basis of the mythological worldview, ancient traditions and rituals of our primitive ancestors. In fairy tales, people's dreams about everyday life and the noblest human qualities are usually expressed through imaginary and real fiction.

In conclusion, we note that the genres listed above are the source of children's folklore - Uzbek literature. If we introduce such tendencies into the minds of our children, they will inevitably become perfect people in the future.

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DESIGN AND CHARACTERIZATION OF DUTASTERIDE NANOPARTCILES

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ABSTRACT

It has recently become possible to treat alopecia with the 5-reductase inhibitor Dutasteride, a 4-aza-3-oxosteroid that was initially used to treat benign prostatic hyperplasia. The goal of the research was to develop a novel dosage form, gel-loaded nanoparticles using PLGA, which uses slight modification of the nanoprecipitation method, in order to increase drug bioavailability and improve drug penetration at the target location.

Preformulation studies, which concentrate on the physicochemical characteristics of the drugs and excipients that could influence drug performance and the development of an effective dosage form, are the main stage of a product's development.

Drug excipient investigations, and solid state characterization, including solubility, pH, partition coefficient, and flow properties of the drug, were evaluated duringpreformulation studies. Particle size, entrapment efficiency, and in vitro drug release profile were all evaluated for the formulations.

The findings demonstrated the compatibility of all the chosen excipients, which were used in the prepared nanoformulation, which produced the highest degree of entrapment efficiency and the smallest possible particle size of 245.4nm, 90.45 % EE and drug release of
% 85.87. This nanoformulation may offer a potential means of administering drugs to treat alopecia at the hair follicle.

KEYWORDS: *alopecia, nanoparticles, pre-formulation, Dutasteride*

I: INTRODUCTION

The 5 alpha-reductase inhibitor Dutasteride prevents testosterone from being converted to dihydrotestosterone (DHT). The endogenous androgen testosterone, which regulates libido,is made in the adrenal glands[1, 2].Body hair is produced by the conversion of testosterone to DHT by the enzyme 5 alpha reductase in the skin, liver, and prostate. Type I and type II ofthe 5 alpha reductase enzymes are present in human tissues[3, 4].The hair follicle's outer sheath contains type I, and the prostate and seminal vesicles contain type II enzymes[5,6].

The 5-reductase inhibitor Dutasteride is a 4-aza-3-oxosteroid molecule. It was first made available for the treatment of benign prostatic hyperplasia (5 mg/day), and it was also given orally once a day in a dose of 1 mg for androgenic alopecia[7]. Following oral administration of 1 mg, the bioavailability varies from 26% to 70%, with a mean of 65%[8].

Other treatments for alopecia, such as topical viprostol, and anti-androgens like oestrogen, and cioteronel, have had varying degrees of success. The first drug chosen to treatAGA is dutasteride, a more strong medication that works by blocking 5 alpha type II enzymes. Alopecia is a prevalent cause of hair loss, affecting 5 percent of guys under the age of 20 and >50 percent of men over the age of 40. And in women over 30 years old, roughly30 percent is shown[9, 10].

The biopharmaceutical classification system (BCS) class II drug Dutasteride is a lipophilic molecule with limited permeability and high solubility. Adverse effects from oral medication administration include sexual dysfunction, mental impairment, gynecomastia, lowering of temperature, weight gain, etc. Because the stratum corneum (SC), a lipid barrier that makes up the skin, is poorly permeable to DS, these innate characteristics prevent DS from permeating the skin[11,12].

A nanoparticle is a particle of materials with a dimension between one and one hundred nanometers (nm). In large part because of

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their tiny size and enormous surface area, nanoparticles frequently display unusual size-dependent characteristics[13, 14].
Compared to other drug delivery techniques generally, nanoparticles have a numberof advantages[15,16]. They are utilized to (i) make highly hydrophobic pharmaceuticals more soluble (by chemical or physical techniques); (ii) enable continuous and regulated release of encapsulated drugs; and (iii) boost the stability of therapeutic substances. (iii) Used an enhanced permeation and retention (EPR) effect to deliver greater drug concentrations to the targeted locations[17].

Before developing a pharmaceutical formulation, research was doneon each drug's inherent chemical and physical qualities. This characteristic offers a framework for combining drugs with pharmaceutical components to create dosage forms[18].

The goal of the pre-formulation study is to create a dosage form that is elegant, stable,safe, and effective by determining the interaction with other ingredients, and physicochemical parameters of new therapeutic compounds[19]. Drug solubility, partition coefficient, dissolving rate, and stability are among these characteristics and play a significant role in pre-formulation investigation[20].

The current work aims to increase drug permeability by creating a novel carrier system, i.e.nanoparticles dispersed in mucoadhesive gel via topical application[21], which results in a decrease in adverse effects and an increase in drug pharmacokinetic parameters like drug absorption, bioavailability, and drug retention for a longer period of time[22].

II: MATERIALS AND METHODS

Dutasteridewas procuredfrom Sun Pharma Pvt. Ltd., Hyderabad, India. Dimethylsulfoxide, methanol, ethanol, chloroform, n-octanol obtained from S.D. Fine Chemicals Ltd., India. PLGA was procured from Nomisma Healthcare. Carbopol 940 was procured from S.D. fine chemicals.Polaxomer 407 was purchased from Sigma Aldrich (Mangalore, India).

III: EXPERIMENTAL STUDIES A: SOLUBILITY DETERMINATION

Drug solubility was evaluated by dissolving extra amounts of the drug in the chosen solvents. The absorbance was calculated using UV-visible spectrophotometry at 215 nm after the supersaturated drug was added to 2 ml of solvent, the sample was vortexed for 5–10 min, and 100µL of supernatant was collected and properly diluted with methanol[23, 24]. To calculate solubility, three measurements in each solution were made.

B: pH

A digital pH meter was used to determine the drug sample's pH. The pH of the sampledrug dispersion at 1% by weight was determined[25]. Data was in triplets.

C: True density

The true density of DS was determined using the liquid displacement method. It is calculated using the amount of incursion fluid (toluene) that a specific quantity of powder displaces in the pycnometer[26].

$$D = \frac{M}{Vp - Vi}$$

Vp = total volume of the pycnometer, Vi is the volume of intrusion fluid in the pycnometerM= mass of the powder

D: Determination of bulk density and compressibility index

The three tap method was used to determine the bulk density of DS. The graduated cylinder holding 100 ml of DS powder was slowly filled with 5g of the powder. For two minutes, the cylinder was dropped from a height of one inch onto a wooden surface [27]. By dividing the sample's weight by its volume inside the cylinder, the bulk density was calculated. The bulkiness was caused by the reciprocal of bulk density or the particular bulk volume.The formula below was used to calculate the percent compressibility index

$$\text{Compressibility Index} = \frac{Vo - VF}{Vo}$$

Vo = Unsettled apparent VolumeVF = Final Tapped Volume

E: Angle of repose

The highest angle of descent or dip in relation to the horizontal plane at which granular material can be poured without collapsing is known as the angle of repose or critical angle of repose. The measurement procedure employed a fixed funnel method[28].Graph paper was laid on a flat, horizontal surface and a funnel was secured with its tip 2 cm above the paper. Until the peak of the cone that was thus produced just touched the funnel tip, the powders were gently poured down the funnel. The following equation was used to compute the tangent of the angle of repose andthe average diameters (D) of the powder cone bases:

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$$\theta = \tan - 1\frac{h}{r}$$

Where h = height of pileD = Diameter of pile
The data presented here is obtained from triplicate determinations.

F: Determination of Partition Coefficient:
In a separating funnel, 10 mg of the drug was added to a solvent made up of 50 mL of n-octanol and a 7.4 pH phosphate buffer. Using a mechanical shaker, the mixture was shaken for 24 hours. As a result, two phases are separated[29]. Three millilitres of each phase were thencollected, and the absorbance was determined using a UV-visible spectrophotometer.

$$\text{Log P} = \frac{Concentration\ of\ drug\ in\ n-octanol}{concentration\ of\ drug\ in\ pH\ 7.4\ buffer}$$

G: Percentage of moisture loss
The nanoparticles moisture loss percentage was assessed. The initial weight of the produced nanoparticles was measured, and they were stored for 24 hours at 37 °C in calcium chloride-based desiccators. The following equation was used to determine the percentage lossof moisture by dividing the final weight of the sample by its initial weight[30].

$$\%\ \text{moisture Content} = \frac{Initial\ \text{weight} - final\ \text{weight}}{Initial\ \text{weight}}\ \text{X}\,100$$

IV: SOLID STATE CHARACTERIZATION

A: Infrared spectroscopy
FTIR spectroscopy (ATR-FTIR; Bruker Alpha; Germany) was used to do study of the interactions between drugs and polymers. The spectrum deviation of the formulations was contrasted with that of the pure drug sample, including PLGA, Polaxomer 407, DS-NPs, and Carbopol 94031. The frequency range used in the study was 4000 to 400 cm-1

B: Differential Scanning Calorimetry
Differential scanning calorimetry (DSC) was used to study the thermal characteristics of drug, PLGA, polaxomer 407, and DSnanoparticles (Netzsch, Selb, Germany). A 5 mg sample was placed in an aluminium pan and sealed with a perforated lid32. Dry nitrogen carrier gas was used to heat the sample at a rate of 10 oC/min from 30 to 250 oC and 30 K/min.

V: PREPARATION OF NANOPARTICLES LOADED GEL

The nanoprecipitation process with modest modifications was used to develop DS nanoparticles33. The needed amount of drug and polymer are dissolved in acetone in the aqueous phase, and polaxomer 407 is used in water for the organic phase. The drug and polymer mixture is gradually put into the aqueous phase while being stirred with a homogenizer at 3000 rpm for 10 min34.
A magnetic stirrer was used to heat the resulting dispersion until the solvent had evaporated. The filtrate was centrifuged two times in a cooling centrifuge (made by Remi Equipment, India) for 15 minutes at 10,000 rpm. In a 1 percent Carbopol 940 solution, nanoparticles were further mixed with contact stirring at 300 rpm for one hour using a magnetic stirrer. Two percentage of benzylkonium, which serves as preservatives, was added to the gel after it had been freed from air bubbles for 24 hrs, and the pH was adjusted with triethanolamine35,36.

VI: CHARACTERIZATION OF NANOPARTICLES

A: Particle size distribution
The diameter of nanoparticles and their particle size distribution were measured by laser diffractometry with the mastersizer 2000 (Malvern Instruments, Malvern, UK). In order to produce the sample, 10 mg of nanoparticles were added to a nonidet P40 solution that contained 0.1% distilled water. The nanoparticle suspension was added to the compact recirculation device and circulated at a speed of 3500 rpm. Values are presented as mean standard deviation37.

B: Entrapment Efficiency
5 mg of DS-equivalent nanoparticles were dissolved in 2 ml of ethanol. A UV-visible spectrophotometer set to 285 nm was used to measure the sample's absorbance after centrifuging the aliquot at 5000 rpm for 10 minutes.

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$$EE = \text{total drug} - \frac{\text{unentraped drug}}{total\ drug} \ x\ 100$$

C: Percentage of drug release

5mg equivalent drug was placed in a dialysis bag consisting of 10 ml 6.8 pH phosphate buffer maintained at constant temperature of 37 0C and 50 rpm. At predetermined time intervals sample was withdrawn by marinating sink condition. The collected sample was filtered, diluted and absorbance was determined using UV-visible spectrophotometer38.

VII: RESULTS AND DISCUSSION

The results of solubility, true density, bulk density, compressibility index, Angle of repose, moisture content, pH, partition coefficient, and melting point determination are given in Table 1.

Table1: Physicochemical Properties of Drug

SI. No	Parameters	Results
1	Description	Off–white crystalline powder, odorless powder
2	Solubility	Freely soluble in chloroform, ethanol, DMSO, slightly soluble in water
3	pH	7.2+0.34
4	True density	1.21 + 0.15
5	Bulk density (g/cc)	0.305 + 0.18
6	Compressibility Index (%)	13.41
7	Angle of repose (^{0})	37 + 0.61
8	Moisture content	7.31 + 0.55
9	LogP	3.01
10	Melting point	253 °C
11	pKa	4.85
12	Biological half-life	5hrs

A: Particle size distribution

The size distribution of drugs has influence on bulk properties such as bulk density,true density, cars index, flow properties, etc. The size distribution is given in table 2.

Table:2 Particle size distribution of drug

S .No	Size range (µm)	No. of particles
1	0-30	40
2	30-60	100
3	60-90	150
4	90-120	250
5	>120	45

Table: 3 Physical Characteristics of Individual Components

S.No	Name of the sample	Initial colour	Final colour
1	DS	Off –white powder	No changes
2	PLGA	White crystalline powder	
3	DS-PLGA	White powder	
4	Polaxomer 407	Fine white powder	
5	Carbopol 940	Fine white powder	

Table: 4 Chemical characteristics of drug-excipients

S.No	Name of the sample	Percentage purity at initial time	Final time
1	DS	99.87	99.60
2	PLGA	99.47	99.15
3	Polaxomer 407	99.77	99.65

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B: Drug excipient compatibility studies by FTIR

The results of ftir studies of the drug and mixture of drug and mixtures showed no deviation in the position of functional groups, which confirm that there are no compabailtiy problem with the selected chemicals. The results are shown in fig 1,2,3.

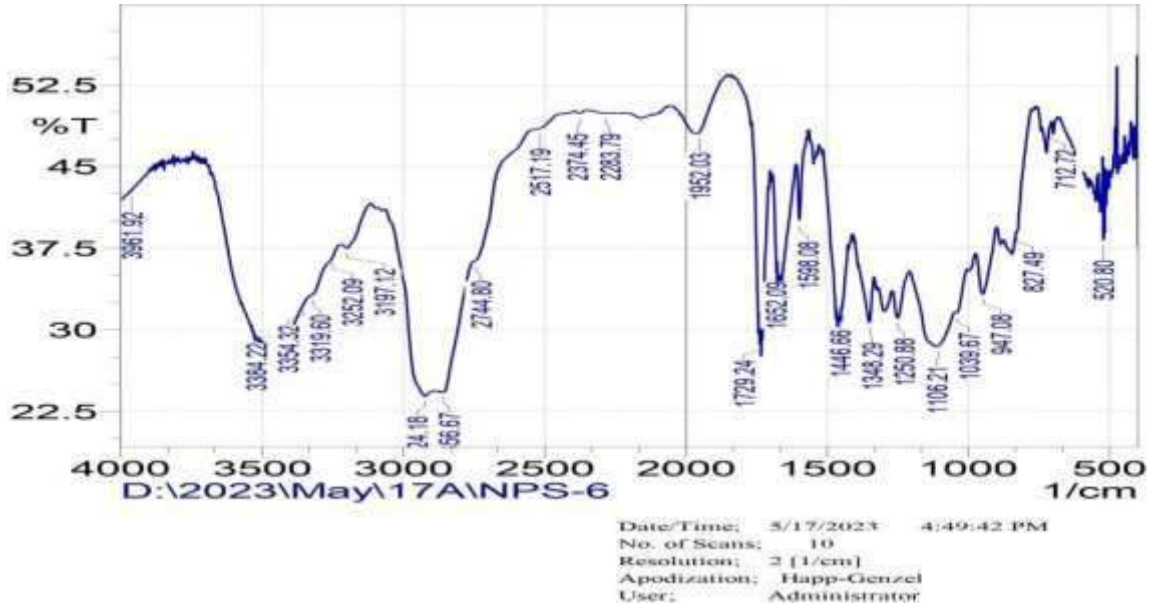


Fig: 1 FTIR spectrum of poloxamer 407

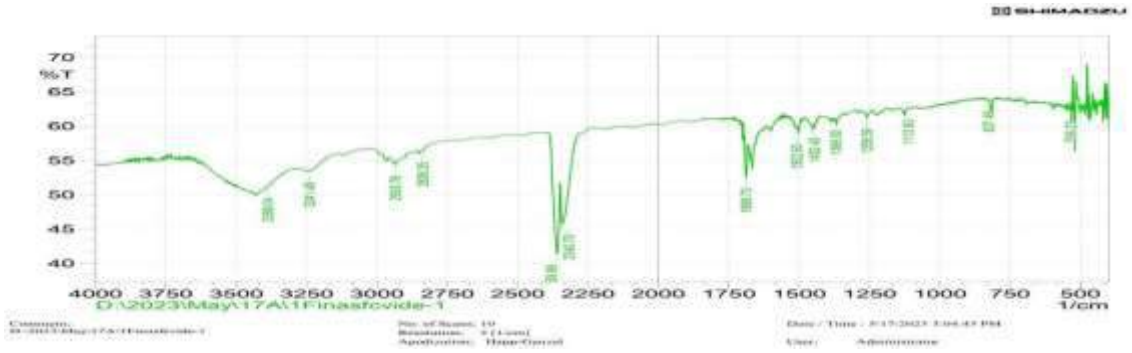


Fig: 2 FTIR spectrum of Dutasteride

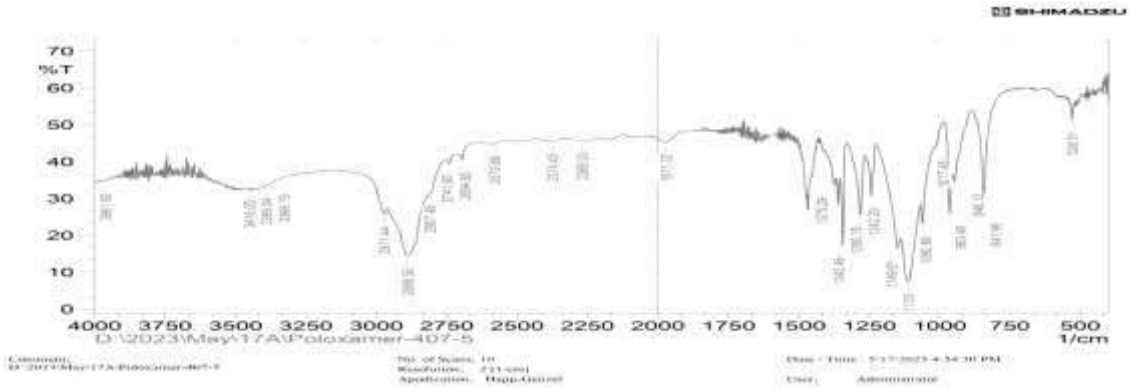


Fig: 3 FTIR of the nano formulation

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C: Differential scanning calorimetry (DSC)

DS displayed a strong FIN displayed a strong endothermic peak at 258.64°Cdemonstrating its distinctive crystalline form. The peak of the drug in nanoparticles is disappreated because the drug molecule was completely dissolved in the polymer matrixshown in fig 4.

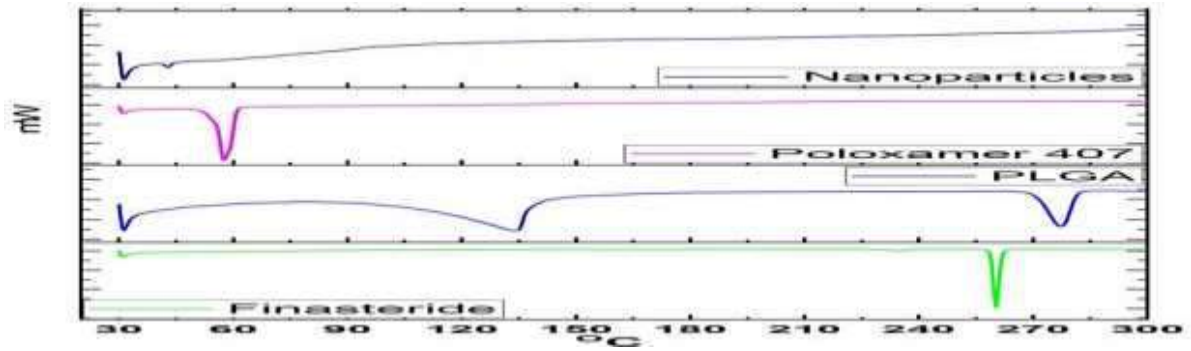


Fig: 4 DSC thermograph of drug, polaxmoer 407 and nanoformulation

D. Evaluation of nanoparticles

The prepared nanoparticles were evaluated for the following parameters. Particle size,entrapment efficiency, percentage drug release and percantage yield.

Table: 5Evaluation of PLGA- DS nanoparticles

Formulation	(PS) nm	%(EE)	% (drug release)	%(Practical yield)s
DS-PLGA NP	245.4	90.45	85.87	90.45

CONCLUSION

Preformulation studies strengthen the scientific basis in the drug development and evaluation process, enhance product quality, raise public safety standards, and make it easier to use new technologies. The results of this study's data collection could help this specific drug delivery system's future development. In this work, we finished characterizing drug physicochemical properties, including determining its particle size, solubility, flow property, solid state characterization, drug excipient interaction studies ,and drug release.This information can be helpful in developing targeted drug delivery formulations, particularly for Dutasteride nanoparticle formulation. PLGA is used act as an ideal carrier for predation of nanoparticles and poloxamer 407 which acts as a surfactant shows an effect the dependent variables like particle size, drug release, and entrapment efficiency. The results showed that this data can be used further for optimization.

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EPIDEMIOLOGICAL ASSESSMENT OF THE COVID-19 SITUATION AMONG THE SPORTS COMMUNITY

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In 2020, the world community faced a problem that affected all aspects of human life, first of all, his health. The pandemic has led to the temporary suspension of people from their normal professional activities, as well as the transition of many processes online. Big-time sports were no exception: since the beginning of 2020, professional athletes have massively refused to travel to competitions, and some organizers have closed access to spectators [1,5].

The spread of the coronavirus has had a strong impact on the global sports movement. Many international competitions and tournaments have been discontinued, canceled or postponed indefinitely, including the French Open tennis tournament, the Masters Golf tournament in Augusta, the Olympic Games in Tokyo, the European Football Championship (Euro 2020), the Winter Universiade, Formula 1 stages, the NBA season, the World Curling Championship, New York and Berlin marathons, etc. [2,6]. This led to significant financial losses for the sports industry. This was especially felt by Japan, which invested at least 12.6 billion US dollars in the organization of the Olympic Games [1,3].

Uzbek athletes were unable to take part in 248 international competitions, of which 31 were to be held in Russia. Most of Uzbekistan's athletes were also under strict quarantine, and some (boxing, weightlifting) were at training bases in a closed mode of complete isolation in compliance with all quarantine measures.

The spread of the coronavirus has definitely had a negative impact on the global sports movement. This has particularly affected the economic component of the sports industry, the global value of which is estimated at $756 billion annually [3,5]. Due to the current situation in terms of the prevalence of the disease, not only athletes, both professional and beginners, but also most of the organizers, coaches, all structures including tourism, sports infrastructure, transport, catering, and media broadcasting were seriously affected. Professional athletes are faced with the need to review and organize the training process, maintain physical fitness in isolation, and risk losing sponsors who provide full support in terms of material support. All this contributed to the emergence of social, emotional excitement, followed by a decrease in physical fitness, which also burdened the psychological state of athletes [5].

In terms of Covid-19 prevention, which is also crucially necessary and essential in the sports environment, several measures have been taken. First and foremost, competitions and sports events have been cancelled at all levels. Second, quarantine measures have been implemented, and the mandatory use of masks and respirators has been introduced. Wearing masks is recommended as face protection to prevent the spread of respiratory droplets in the air when people sneeze, cough, or talk. This includes the use of respirators indoors when in contact with others. Third, frequent handwashing with antiseptics is advised to prevent virus transmission. Fourth, strict social distancing is required with athletes keeping a minimum distance of one meter apart from each other regardless of their health status. Fifthly, visits to crowded places should be minimized. This includes restricting access for spectators and fans at competitions, or holding events without spectators. The sixth point relates to travel bans. Flights on planes and other modes of transportation contribute to the spread of the virus, so it is important to minimize travel. The seventh point concerns maintaining athletic fitness during self-isolation, whether at home or in training facilities. This clause aims to maintain the athlete's physical fitness while observing strict quarantine measures. [4,5].

As shown by the epidemiological data presented above, all preventive measures taken were justified and helped to protect the health of athletes and all personnel involved in sports activities, despite their significant impact on sports both economically and socially. This is an epidemiological assessment of the coronavirus situation in world sports, based on statistical data collected from various sports and countries around the world on March 25th, 2020, from the official website https://chempionat.com.

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Due to the lack of official data on the prevalence of the virus among athletes, this website was used as a source for analysis [4,5]. The total number of athletes who became sick by March 25, 2020 was 145. Of these, representatives from Spain (22.8%), Italy (20%), and Great Britain (9.7%) were most severely affected. Countries such as Germany, the United States, Russia, and France had slightly lower numbers of cases, while Germany and the United States (5.5%) and Russia (4.1%) had the lowest rates. The countries with the fewest athletes affected were Argentina (2.1%), Brazil (1.4%), Turkey (1.4%) and Iran (1.4%). Other countries with low numbers include Poland (1.4%), South Korea (1.4%), Portugal (1.4%), Australia (0.7%), Denmark (0.7%), Greece (0.7%), Colombia (0.7%), Serbia (0.7%), Gambia (0.7%), Sweden (0.7%), Norway (0.7%), Estonia (0.7%) and Finland (0.7%). Japan (0.6%), China (0.5%), Mexico (0.4%), Belgium (0.3%) also had low numbers of affected athletes (Fig.1).

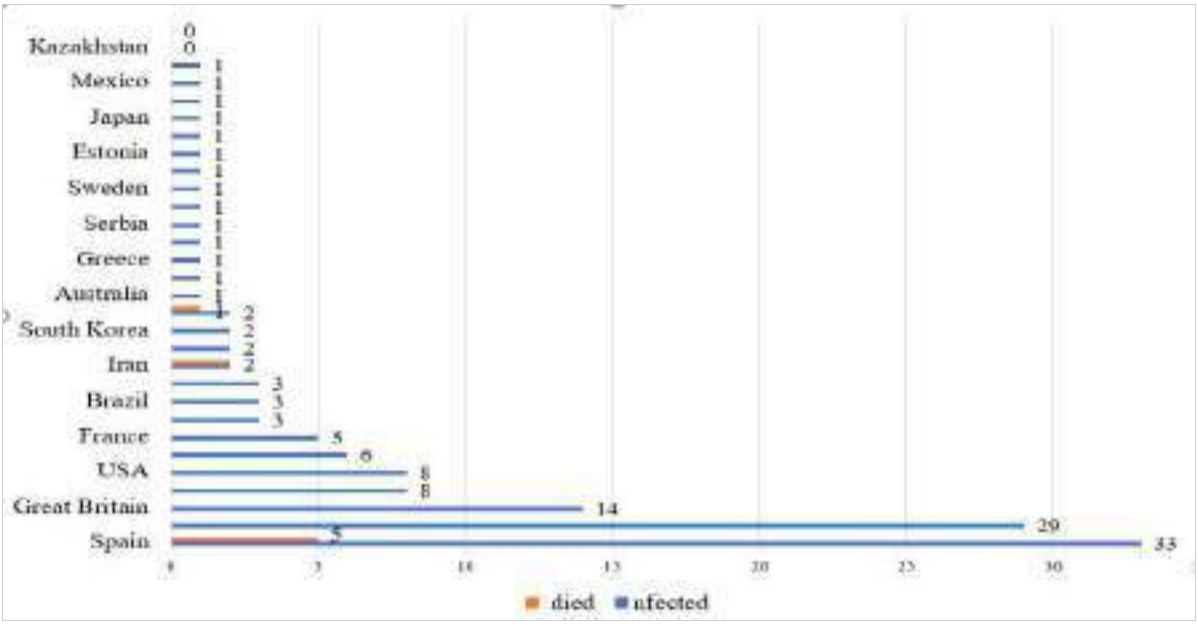


Figure 1. Distribution of Covid-19 athletes affected by country of the world

During this period, 8 patients died, including 2 coaches from Spain and Iran; two sports journalists from Spain were also lost. Losses were noted at Real Madrid, where the former club president, Lorenzo Sanz, died from Covid-19 on March 21st, 2020, at the age of 67. On March 23rd, Espanol goalkeeper Benito Joanega, aged 84, also died [5,6]. As can be seen from the data obtained, those who died were in the older age group with the presence of various chronic conditions, and among younger active athletes, the fatal outcome appeared to be associated with increased infection levels due to team sports or the presence of other chronic foci and infections [3,4,5]. By sports, the distribution was as follows: football players were most noted - 71.0%, followed by basketball players at 15.2%, and cyclists at 4.1%. The following sports were also distributed: hockey at 2.1%, Formula 1 at 1.4% and boxing at 1%, with tennis, cross-country skiing, track and field, volleyball, and handball all at 0.7%. (Fig. 2)

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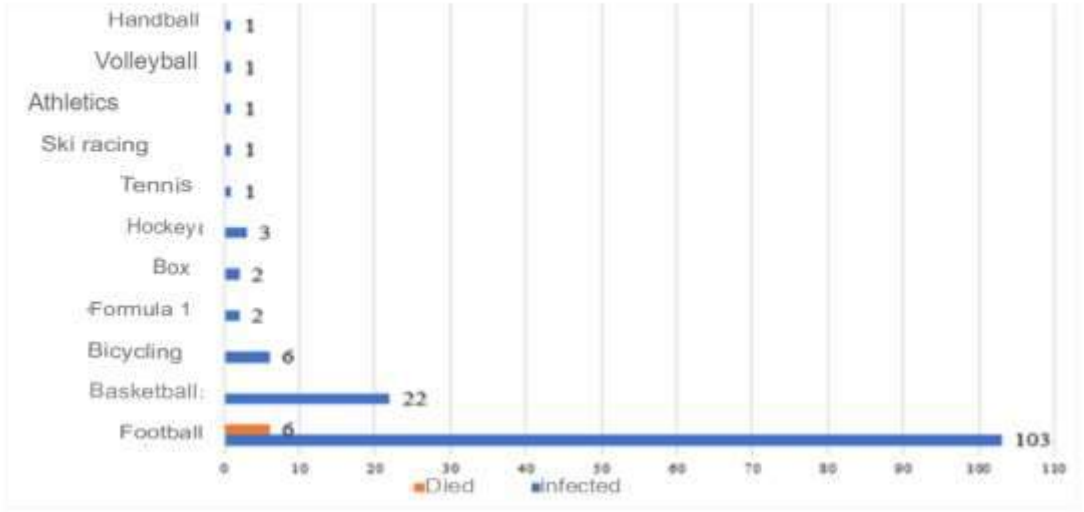


Figure 2. Distribution of Covid-19 athletes affected by sports

There is no publicly available information on athletes who have fallen ill in Uzbekistan or Central Asia. At present, there are no clearly identified materials that can be referenced, so any other data presented later were not included in this analysis. It seems that this information is not disclosed because it represents a "medical secret" in sports. According to WHO, in May 2023, the end of the Covid-19 pandemic was announced [7,9]. Despite this, and the formation of population immunity, the virus continues to circulate and be identified in all countries of the world, albeit in a rather varied form. According to recent epidemiological data, there are significantly fewer cases of serious course and high mortality. In 2022, a new strain of Omicron, Aerys and Pirola, was identified. EG-5 accounted for more than 26% of cases, and it is highly contagious. The nature of the disease's clinical course is mild, with minor throat pain, cough, and runny nose over a short period. These same symptoms characterize the Pirol strain. The Kraken strain is particularly dangerous, as it has an asymptomatic onset and resistance to the immune response, making it difficult to diagnose and differentiate from influenza and SARS viruses. According to WHO, the Airi virus has been found in 57 countries worldwide, and its danger lies in its ability to affect people with weak immune systems and chronic illnesses. In July 2023, a new coronavirus strain called Pirola was identified. It has a large number of spike protein mutations, making it one of the most infectious strains, and it also has the ability to bypass the immune system gained from vaccination or previous illness. The risk group includes patients with weakened immunity, as well as those with diabetes, cardiovascular and oncopathology, asthma, and obesity [10]. A variety of Covid-19 strains have led to an increase in coronavirus cases worldwide - by 52%, with 850,000 cases reported. In this regard, the WHO called on states to ensure guaranteed access to testing, vaccines, and sequencing services for Covid-19 to track new mutations. The WHO also warned of «Disease X», which is as yet unknown but potentially dangerous, and could cause a new epidemic or pandemic even more dangerous than the coronavirus [11,12].

In order to protect against potential risks of infection, scientists are conducting research to develop diagnostic methods and vaccines that can be used as preventative measures and to predict the main characteristics of potential pathogens. According to N. Dubinin, a medical prevention specialist, vaccination will be the primary measure for protecting against coronavirus. Non-specific measures to prevent coronavirus infection include frequent handwashing, the use of antiseptics, avoiding touching the face with unwashed hands, self-isolation if symptoms of infection appear, and following mask protocols. During the Covid-19 pandemic, athletes around the world have faced significant challenges that have affected all aspects of their professional lives [7,8,9,13]. An epidemiological analysis of the current situation reveals that athletes are vulnerable due to their need for close physical contact and interaction, which can contribute to the spread of the virus. To combat the spread of the disease, it is essential to implement widespread testing for the virus among athletes. This will enable the identification of infected individuals, even those who are asymptomatic, and prevent further transmission. Regular testing aids in the detection of cases early and allows for taking appropriate measures to safeguard the health of both athletes and those in their vicinity. Along with mass testing, providing athletes with access to modern personal protective equipment (PPE) is essential. This includes masks, gloves, and antiseptic solutions. These items should be available during training and competitions to minimize the risk of infection. Athletes should take a proactive approach to their health and well-being by following all necessary safety measures to prevent the spread of COVID-19, including social distancing, isolating if symptoms arise, getting vaccinated on time, and being trained in hygiene rules [1,13]. It's also important for athletes to monitor their health regularly to ensure they are healthy and able to compete safely. Sports organizations and coaches should work closely with athletes to educate them about the risks of the virus and how to take

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appropriate precautions. This will help ensure that athletes are well-informed and prepared to protect themselves and others from the virus. It is also essential to pay attention to the mental well-being of athletes during this challenging time. The pandemic can have a significant impact on their mental health, and coaches and support staff need to be prepared to offer emotional support and counseling when needed. By adopting a holistic approach to athlete health and safety, we can ensure that sports can continue to be enjoyed in a safe and responsible manner. In conclusion, the COVID-19 pandemic has highlighted the challenges that athletes face at the moment. Nevertheless, by taking appropriate preventive measures and following strict protocols, we can reduce the risk of infection and protect athletes. International cooperation and the sharing of experiences are essential in effectively addressing the pandemic and supporting sport during this challenging period.

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UNDERSTANDING JALODARA: ASCITES IN AYURVEDA – A COMPREHENSIVE ANALYSIS

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ABSTRACT

Jalodara is a disease afflicting Udakavaha srotas. In Ayurveda, Ascites aligns with the concept of Jalodara. Ascites, characterized by the accumulation of free fluid in the peritoneal cavity, is commonly observed in decompensated cirrhotic states. Despite contemporary medical treatments offering temporary relief, ascitic pathology remains largely unresolved. Ayurvedic approaches present a promising alternative for managing ascites, particularly through the lens of Jalodara, a subtype of Udara roga. According to Ayurveda, the management involves Nitya Virechana (purgative therapy), deepana-pachana (enhancing digestive fire), bala vriddhi (strengthening), and correction of hepatic and splenic functions, coupled with dietary regimens. Generalized abdominal distension, a hallmark of Udara roga, is attributed to imbalances in Saman vayu, Apana vayu, Pachak pitta, Ranjak pitta, and Kledaka Kapha, primarily stemming from Mandagni (weak digestive fire). Notably, the progression of Udara roga into Jalodara underscores the significance of addressing underlying factors. While liver dysfunction remains a leading cause of ascites, Ayurvedic principles emphasize the pivotal role of dietary discipline, with milk (Kshira) being advocated as a Pathya-Ahara (therapeutic food) for Jalodara. Integrating Ayurvedic strategies alongside conventional treatments may offer a holistic approach to managing ascites, providing both symptomatic relief and addressing underlying pathology.

KEYWORDS : *Ayurveda, Udakavaha srotas, Udara roga, Jalodara, Ascites, Nitya virechana, Kshira.*

INTRODUCTION

In *Ayurveda*, the concept of ***Ashtamahagada*** highlights eight formidable diseases, among which *Udara roga* holds prominence. *Udara roga* is characterized as a *Tridoshaja Vyadhi*, manifests as a disturbance involving all three doshas, leading to *mala prakopa* (accumulation of waste products) and *sanchaya* (accumulation) in the *udara pradesh* (abdomen). Within this abdominal region, vital organs including the *Amashaya* (stomach), *Yakrita* (liver), *Pleeha* (spleen), *Pittashaya* (gall bladder), *Agnashaya* (pancreas), and *Pakwashaya* (intestine) reside.The foundational cause of *Udara roga* lies in *Mandagni*, denoting impaired digestive fire, which results in *Ama,* the improper digestion of ingested food. This condition culminates in the manifestation of *Udara roga*. The cardinal symptom of this ailment is the generalized distension or enlargement of the abdomen. Vitiation of *Agni dosha* and subsequent *mala vriddhi* leads to the imbalance of *Prana, Agni*, and *Apana vayu*, culminating in the obstruction of the upward and downward channels of circulation. Consequently, *Jalodara,* a subtype of *Udara roga,* manifests as the accumulation of fluid between the layers of *twak*(skin) and *mamsa*(muscle tissue) in the abdominal region. This condition leads to a noticeable increase in abdominal girth, akin to the modern medical condition of Ascites.

The management of *Jalodara* in *Ayurveda* revolves around *Nidana parivarjana* (avoidance of causative factors), *Shodhana chikitsa* (purificatory therapy), *Shamana chikitsa* (palliative therapy), and *Shastra karma* (surgical measures). Additionally, adherence to proper *Pathya-Apathya* (appropriate lifestyle and dietary guidelines) is crucial throughout the treatment process. Among the therapeutic modalities, *Nitya virechana*, a form of purificatory therapy involving regular internal cleansing, stands out as one of the most effective approaches in addressing *Jalodara.*

AIMS AND OBJECTIVES

AIM

To study the Ayurvedic treatment modalities and management strategies for effectively addressing *Jalodara*, focusing on restoring balance to the doshas and promoting overall health and well-being.

OBJECTIVE

- To discuss about *Jalodara* (Ascites) in details.

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- To evaluate the significance of *Nitya virechana, Pathyapathya*, Role of *kshira*(milk) in the management of *Jalodara* (Ascites).

MATERIALS AND METHODS

Various Ayurvedic texts, academic journals, research papers, articles, and authentic websites are referred to study the ayurvedic concept of *Jalodara*. All principles and rules described in Ayurvedic Samhita are compared with modern medical literature to evaluate and elucidate the concept.

CONCEPT OF ASCITES

Ascites is derived from a Greek word "Askites" which means 'bag' or 'sac'. Ascites is a gastroenterological term for an accumulation of fluid in the peritoneal cavity that exceeds 25 ml . Abdominal swelling, a common manifestation encountered in clinical practice, can arise from a myriad of underlying conditions. Patients frequently report sensations of bloating or abdominal fullness, with a progressive increase in abdominal girth, evidenced by the need for larger clothing or belt sizes. This swelling can be attributed to the "5F" : Fat, Fetus, Flatus, Fluid, and Faeces. Among these, the accumulation of fluid within the abdominal cavity, known as ascites, often leads to significant abdominal distention and warrants further investigation.

Types of Ascites

Ascites are categorized into three grades :

Grade 1	Mild, detectable only on USG and CT scan.
Grade 2	Moderate, detectable with flank bulging and shifting dullness upon physical examination.
Grade 3	Severe, directly visible, and confirmed through the fluid wave/thrill test.

Pathogenesis

The pathogenesis of ascites involves a complex interplay of physiological mechanisms and pathological processes.
Ascitic fluid accumulation can occur as either a transudate or an exudate, each with distinct underlying mechanisms.

Transudative ascites typically results from increased pressure within the hepatic portal vein, often exceeding 8 mmHg and commonly observed in conditions such as cirrhosis. In cirrhosis, liver dysfunction leads to portal hypertension, causing fluid to leak from the hepatic vasculature into the peritoneal cavity. Transudates are characterized by low protein levels (<30 g/L), low lactate dehydrogenase (LDH), high pH, normal glucose levels, and a sparse white cell count, typically fewer than 1 white cell per 1000 mm.

In contrast, *Exudative ascites* is actively secreted fluid due to inflammatory or malignant processes. Inflammation or malignancy disrupts the normal vascular permeability, allowing proteins and cellular components to leak into the peritoneal cavity. Exudates are characterized by high protein levels, elevated LDH, low pH (<7.30), decreased glucose levels, and a higher white blood cell count.

Clinically, the ascitic fluid-to-serum albumin gradient is a valuable measure for distinguishing between transudates and exudates. A difference of less than 1 g/dl (10 g/l) suggests an exudative process, while a higher gradient favours a transudative etiology.

Overall, understanding the pathogenesis of ascites is essential for accurate diagnosis and appropriate management of underlying conditions contributing to fluid accumulation in the peritoneal cavity.

Management of Ascites

The management of ascites involves several key strategies:

- **Sodium Restriction:** Limiting sodium intake to 20-30 mEq/day helps reduce fluid retention in the body.
- **Diuretic Therapy:** Oral diuretics, usually a combination of spironolactone and furosemide, promote urine production and decrease fluid accumulation.
- **Water Restriction:** Water restriction is only necessary if persistent hyponatremia (low sodium levels) is present.
- **Therapeutic Paracentesis**: Reserved for patients with tense ascites requiring rapid symptomatic relief, therapeutic paracentesis involves draining excess fluid from the abdominal cavity.
- **TIPS** (Transjugular Intrahepatic Portosystemic Shunt) : It is an interventional radiologic technique that reduces portal pressure and maybe the most efficacious for treatment of patients with diuretic resistant ascites. This procedure consists of inserting a long metal needle from the right jugular vein into the hepatic vein. This is slowly becoming the standard of care in patients with diuretic-refractory ascites.

Overall, these interventions, including sodium restriction, diuretic therapy, and therapeutic paracentesis, form the standard medical management for ascites and are effective in approximately 95% of patients.

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CONCEPT OF *JALODARA*

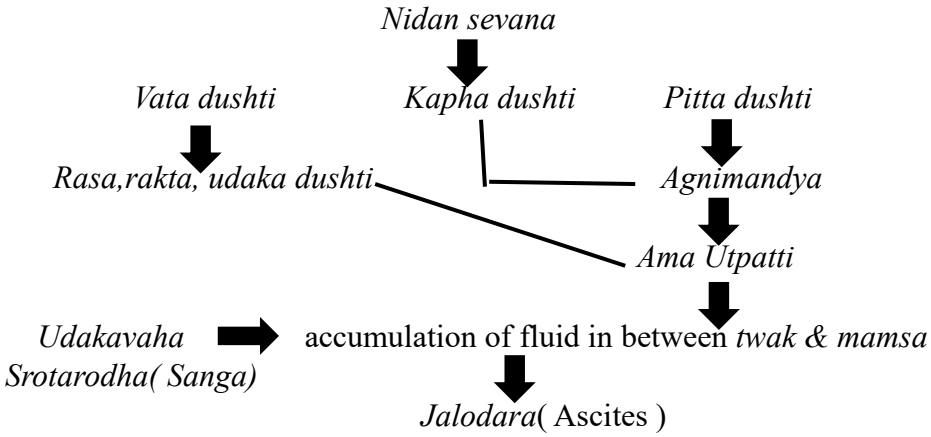
"Yasya vata prakupitah twak mamsantaramasritah.
Sotham sanjanayetam kukshavudaram tasya jayate" (Cha.Su.18/31)

Jalodara is a disease in which there is accumulation of fluid (*jala)* in between *twak*(skin) and *mamsa*(muscle tissue) in the *udara pradesha.*
Synonyms : *Dakodara, Udakodara, Jatodaka*

Nidana
All the diseases are manifested due to the disturbance of Agni.
Jalodara is caused by :

- *Mandagni* (sluggish digestion or low metabolism)
- *Ajeerna*(indigestion)
- *Malina anna sevana* (contaminated and incompatible food)
- *Mala sanchaya* (accumulation of unwanted wastes in the body cells and gut).

Samprapti



Excessive indulgence in causative factors such as *ati-snehpana* (excessive intake of oily or fatty foods), *ati-ambupana* (excessive consumption of liquids), *virrudhashana* (incompatible food combinations), and *samshana* (excessive consumption of spicy or hot foods) leads to the impairment of digestive fire, or *mandagni.* This results in incomplete digestion of food, leading to the formation of either improperly digested, toxic food substances known as *apakva rasa* or undigested food particles known as *Ama*.

In *udara roga*, the vitiated *Prana vayu* and *Apana vayu* disturb their normal functions, leading to obstruction (*avarodha*) in both the *urdhwa (*upper) and *adhomarga* (lower) pathways. Subsequently, the vitiated doshas accumulate in the interstitial space between the *twak*(skin) and *mamsa*(muscle tissue) of the abdomen, resulting in the manifestation of *Jalodara* (ascites).

Samprapti Ghatak

- ***Dosha****:Vata pradhan Tridosha –(Prana, Apana)*
- ***Dushya****: Rasa,,Udaka,Sweda*
- ***Agni****: Jatharagni, Dhatwagni*
- ***Ama****: Jatharagni Mandyajanya, Dhatwagni Mandyajanya*
- ***Srotas****: Rasavaha, Swedavaha, Ambuvaha*
- ***Srotodusti****: Sanga,Vimargagamana*
- ***Udbhavasthana****: Amashaya*
- ***Sancharasthana****: Udara,Twakmamsanthara*
- ***Adhistana****: Udara*
- ***Roga Marga****: Abhyanthara*
- ***Vyadhi Swarupa*** *: Chirakari*
- ***Sadhyasadhyata****- Kasta Sadhya/Asadhya*

Purvarupa

- *Kshut nasha* - Low digestive strength
- *Swadu atisnigdha guru anna pachyate chirat* - Late digestion of food, which is sweet,excessively unctuous and heavy.

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- *Bhuktam vidahyate sarva* - Vidaha of all food and drinks taken by the patient.
- *Jirna-ajirna na veti cha* - Inability to determine between the digestion and indigestion of food.
- *Sahate na ati sauhityam* - Inability to tolerate a little excess of food.
- *Isat sophascha padayo* - Slight swelling in the legs.
- *Bala kshaya* - Constant loss of strength
- *Alpapi vyayame swasa mruchhati* - Shortness of breath even with slight exercise.
- *Vriddhi purisha nichaya ruksha udavarta hetuka* - Excessive accumulation of stool because of unctuousness and udavarta.
- *Basti sandhau rug adhmana* - Pain and *adhmana(*distension) in the *basti-sandhi* (lower part of abdomen).
- *Vardhate patyate api cha–atanyate cha jatharamapi laghu alpa bhojanat* - Even if the patient takes food in small quantity, the size of his abdomen considerably increases. The patient experience bursting pain and the abdomen becomes considerably distended.
- *Raji Janma* – Appearance of network of veins.
- *Vali nasha* – Disappearance of folds in the abdomen increases due to swelling.

Rupa

- *Anannakāṅkṣā* (Anorexia)
- *Pippasa* (Excessive thirst)
- *Guda srava* (Serous discharge from anus)
- *Shoola* (Abdominal pain)
- *Swasa* (Dyspnoea)
- *Kasa* (Cough)
- *Dourbalya* (General debility)
- *Udaka druti kshoba samsparsha* (Fluid thrill)
- *Nanavarna raji sira santata* (Engorgement of vein over abdomen)

***Avastha*(Stages of *Jalodara*)**

1. ***Ajatodaka avastha***- Early stage of *Jalodara*, in which fluid has not yet collected – here the abdomen is red in colour, with gurgling sounds, and a network of veins is visible on the abdomen.

2. ***Picchavastha***-This is second stage, in which serous fluid has started accumulating in abdomen.

3.***Jatodaka Avastha (Jalodara)***- Complete manifestation of *Jalodara* characterized by generalized abdominal distension. The skin over the abdomen is shiny and network of veins can be seen due to engorgement. Fluid thrill and Shifting dullness positive.

Upadrava

Chhardi ,Atisara, Tamaka swasa, Trishna, Sramajanya swasa ,Kasa, Hikka, Dourbalya, Parswashula ,Aruchi, Swarabheda, Mutrasanga.

Sadhyasadhyata

Usually *Jalodara* is *Kasta sadhya* or *Asadhya* but if the patient is strong and early stage (*Ajatodaka Avastha*) is diagnosed which is *Achirotpanna, Anupadrava, Anudakaprapthi* then it can be considered as *Sadhya*.

▪ *Jalodara* with *Upadrava* is *Asadhya.*

▪ If the person is *Balavan, Jatambunavotthitham* is *Yathnena Sadhya*.

Chikitsa Siddhanta of Jalodara

- *Nidana parivarjana*
- All the types of *udara roga* are *tridoshaja -Tridosha samaka chikitsa*
- The main cause of *udara roga* is *mandagni-Deepana & laghu ahara sevana*

"Dosha atimatra upachayat srotamarga nirodhat
Sambhavatyudaram tasmat nityameva virechayet" (Cha. Chi. 13/61)

Udara roga is produced by excessive accumulation of doshas and obstruction to the *srotas*. To eliminate excess doshas and to clear *srota avarodha*, purgative therapy(*Nitya virechana*) should be given.

After purification by *virechana ,Peyadi samsarjana karma* should be given .*Dugdha sevana* is done for regaining the strength.

To treat Jalodara, Nirjala-Nirlavana-Niranna chikitsa is followed.

Apam doshaharanyadou pradadhyatudakodare

Mutrayuktani tikshnani vividha ksharavanti cha

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Dipaniye kaphagnescha tamaharerupacharet

Dravevyascha udakadibhyo niyacheda anupurvashah (Cha. Chi. 13/93-94)

- Intake of fluid is restricted.
- *Gomutrayukta tikshna kshara dravya* is advised.
- *Agni deepana* and *kaphahara chikitsa* is done.
- In case of excessive fluid - AscitesTapping is done.

DISCUSSION

Nidana parivarjana

Poor dietary choices, characterized by the consumption of *Ushna* (hot), *Lavana* (salty), *Kshara* (alkaline), *Vidahi* (spicy), *Amla ahara* (sour), and *Viruddha* (incompatible) foods, can disrupt the body's equilibrium and predispose individuals to various health issues. Similarly, unhealthy lifestyle practices such as *Jalasevana* (excessive fluid intake), *Ashuchibhojana* (consumption of unclean or contaminated food), and *Vegadharana* (suppression of natural urges) can further exacerbate the imbalance of bodily doshas and weaken the body's innate resilience against diseases. Therefore, adhering to *Nidana Parivarjana* involves conscientiously avoiding these detrimental dietary and lifestyle habits to maintain optimal health and well-being.

Correction of Agni imbalance

The concept of *Agni* holds paramount importance in maintaining overall health and well-being. When the *Agni* is impaired, as a result of factors such as poor dietary choices and unhealthy lifestyle habits, it can lead to disturbances in *Jatharagni* (digestive fire) and *Dhatwagnimandya* (impairment of tissue metabolism). This impairment of *Agni*, known as *Mandagni,* is considered a primary factor in the manifestation of *Udara roga.*

To address *Mandagni* and restore optimal digestive function, the correction of *Agni* becomes crucial. This can be achieved through the use of *Vatanulomana Dravyas*, or substances that promote the movement of Vata dosha in the body. Examples of such substances include *Vaishwanara churna, Hingvastaka churna, Triphala Churna, and Haritaki with Gomutra*.

These formulations possess *deepana* (digestive stimulant) and *pachana* (digestive carminative) properties, which help to kindle and strengthen the digestive fire. Additionally, they support *Samprapti Vighatana* by aiding in the proper digestion and metabolism of food substances.

Srota sodhana

When *Srotasanga* occurs, it disrupts the normal flow of vital energies and bodily fluids, leading to various health issues, including *Udara roga*. To address this obstruction and restore the proper functioning of the channels, a therapeutic approach known as *Srota Sodhana* is recommended.

Srota Sodhana involves the cleansing and purification of the body's channels using specific therapeutic measures. In the context of *Udara roga*, the aim of *Srota Sodhana* is to remove the obstruction in the abdominal channels and promote the free flow of energies and fluids. This is achieved through the use of *Teekshna* (sharp), *Ushna* (hot), and *Kshara Yuktha* aushadhis (medicines which are alkaline in nature) that possess penetrating and cleansing properties.

These potent formulations help to dissolve and eliminate accumulated toxins, metabolic wastes, and obstructive substances from the channels, thereby restoring their normal function**.**

Apam Dosha Haranam

Removal of *Apya Dosha*, or accumulated toxins and impurities, from the body's channels. This purification process is typically achieved through the use of *Mutra Yukta Tikshna Ksharadi Aushadhis*, which are herbal formulations containing sharp and alkaline properties. These potent medicines help to dissolve and eliminate *Apya Dosha* from the body, facilitating detoxification and cleansing of the channels.

Furthermore, the presence of *Abaddha Asthira Kapha*, or stagnant and aggravated Kapha dosha, can exacerbate the condition of *Udara roga*. However, when combined with *Udaka* (water), this congested Kapha dosha becomes liquefied and more easily mobilized. The *Ruksha* (dry), *Tikshna* (sharp), and *Ushna* (hot) properties of *Mutra* (urine) act as catalysts in this process, breaking down the stagnant Kapha and enhancing the digestive fire, or *Agni.*

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Nitya Virechana

In *Jalodara,* there are *Dosha atimatra upachayat* (excessive accumulation of Doshas) and *Srotamarga nirodhanat* (obstruction to the opening of srotas).

To address these imbalances, purgation therapy is recommended as a daily treatment regimen (*Nityameva virechayet*). This therapy aims to facilitate the elimination of accumulated toxins and restore the normal flow of bodily fluids.

For this purpose, specific medicines are administered:

i. *Eranda taila* (castor oil) mixed with *cow's urine* or *cow's milk* is given daily for a duration of one or two months.

ii. *Mahisha mutra* (buffalo's urine) mixed with *milk* is administered for a period of seven days.

iii. *Gomutra haritaki prayoga*, a formulation combining *cow's urine* and *haritaki* (Terminalia chebula), is also advised.

Significance of *Kshira*(milk)

"Prayoganam cha sarvesamanu kshiram prayojayet
Doshanubandha raksharth bala sthairyarthameva cha" (Ch. Chi.13/193)

Milk plays a significant role in restoring vital capacity and balancing doshas. *Ushtra Dugdha* (camel milk) is specifically recommended for *Jalodara*, with *Godugdha* (cow milk) as an alternative. *Kshira* is a best J*ivaniya* and *Rasayana Dravya*. Its inherent properties of *Madhura rasa* (sweet taste), *Madhura Vipaka* (sweet post-digestive effect), and *Shita Virya* (cooling potency) contribute to its multifaceted benefits. *Kshira* exerts a *Srishtavinamutra* effect, acting as a diuretic and facilitating the evacuation of accumulated waste products from the body, thereby promoting detoxification.Milk is considered a complete and easily digestible food that promotes strength and vitality, particularly beneficial for patients recovering from drug-induced impairments.

Shastra Karma(Abdominal tapping)

Abdominal tapping is a therapeutic procedure where the left side of the abdomen 4 angula below the umbilicus is punctured using *Vrihimukha shastra* (a specialized instrument). The depth should be of the length of half finger. Subsequently, the accumulated fluid is drained out using *Nadi yantra* (a device for fluid drainage). Once the fluid has been successfully drained, the abdomen is securely bound with a cloth bandage to provide support and prevent further accumulation of fluid. The opening should later be applied with *taila* and *lavana* and later should be cauterized with fire.

Patient should be made to fast after abdominal tapping then he should take Peya (thin gruel) without adding *Sneha* (fat) and *Lavana* (salt). Thereafter, he should take following diet for one year. The dietary regimen typically includes a gradual introduction of milk, starting with :

- ***Ksheeravritti*** (only milk) for **six months.**
- Followed by ***Peya*** (a rice-based recipe) and ***Ksheera*** (milk) for **three months**.
- Then transitioning to a whole diet comprising ***Jeernashyamaaka, Kodrava, Aalpasneha-lavana*** with ***Paya/ Phalaamla/ Jangala mamsa*** for the **remaining three months**.

Additionally, buffalo milk can be consumed for one week, and cereals should be avoided. *Camel milk* with *Trikatu* is advised for one month to reduce sodium retention and water retention. This dietary regimen helps in promoting strength, aiding recovery, and managing symptoms of *Jalodara*, while also considering individual variations in digestive capacity.

Takra

Takra (butter milk) mixed with *Trikatu curna* is beneficial in *Jalodara.*

Ayurvedic formulations mentioned in *Jalodara*(Ascites) :

Rasa	***Vati***	***Churna***	***Kwatha***	***Asava/Arista***	***Lepa***	***Rasayan***
Jalodarari rasa *Icchabhedi rasa* *Varishoshana rasa* *Naracha rasa* *Hridayarnava rasa* *Yakritplihari rasa* *Loknath rasa*	*Arogyavardhini vati* *Abhaya vati* *Katuki vati*	*Narayan churna* *Hapushadya churna* *Patolamuladya churna* *Punarnavadi churna*	*Punarnavadi kwatha* *Dashamooladi kwatha* *Punarnavastak kwatha*	*Kumaryasava* *Punarnavasava* *Arjunarista* *Abhayarista* *Rohitakarista*	*Devadarvyadi lepa*	*Pippali vardhaman rasayan* *Haritaki rasayan* *Shilajit rasayan* *Guggulu rasayan*

Single herb

Gokshura-Punarnava-Jaiphala-Katuki-Manjistha-Markandika-Makoya-Kasani-Mishi-Munakka

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Other medicaments include
Punarnava mandura,Eranda taila with *Gomutra, Eranda taila* with *Godugdha, Aswagandha churna* with *Gomutra, Narayan churna* with *takra.*

PATHYA :(Ahara-vihara)
Rakta Sali- yava- mudga - kodrava- Jangala mamsa rasa- takra- ustra kshira- gomutra- madhu- draksha-sidhu-sura-dadima-trikatu- ajamoda- jeeraka- lasuna- ardraka- ela- patola- karavellaka-punarnava-shigru-haritaki-kulattha- upavasa- nitya kostha suddhi- udaravastrapatt bandhan

APATHYA: (Ahara-vihara)
Anupa mamsa-Patrasaka- pistanna- vidahi-guru anna-abhisyandi drava-tila- snehapana- usna/ lavana/ amla dravya- dushita jala-ati ambu pana- vyayama- divaswapna-dhoomapana-adhwagamana.

CONCLUSION
Udara roga in *Ayurveda* revolves around key principles such as *Nidana Parivarjana*(avoidance of causative factors), *Agnivardhana* (enhancement of digestive fire), *Srotashodhana* (cleansing of bodily channels), and *Nitya Virechana* (daily purgation therapy). When these therapeutic approaches are combined with *Shaman Chikitsa* (palliative therapy) and *Shodhana Chikitsa* (purificatory therapy), and supported by appropriate dietary and lifestyle modifications (*Pathya*), they synergistically promote *Srota Sodhana*, the purification of bodily channels, and elimination of doshas from the body. This comprehensive approach leads to rapid improvement in the condition of *Udara roga*. However, it is essential to acknowledge that managing *Udara roga* can be challenging due to its complex nature and potential complications**.**

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TRANSFORMING EDUCATION: DIGITAL AWARENESS INITIATIVES FOR ALIGARH'S RURAL YOUTH

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ABSTRACT

In the rural expanse of Aligarh district, digital education and awareness among its youth emerge as crucial components for inclusive development. This study delves into the landscape of digital literacy in Aligarh, aiming to understand its current status, challenges, and potential. Through surveys conducted in diverse areas of Aligarh, including Gautam Nagar I.T.I Road, Manzoorgarhi, Nada Azeed, Khair Road, and Ahamatpur, Siya Barioli Road, with a gender-representative sample, the study investigates internet connectivity utilization, existing digital education initiatives, challenges faced, awareness of government programs, and stakeholders' feedback. Ethical protocols are followed throughout. Findings aim to inform comprehensive strategies for empowering Aligarh's youth with digital skills and fostering a culture of innovation, thereby contributing to their socio-economic upliftment and community development.

KEYWORDS: *Digital education, Rural youth, Aligarh district, Internet connectivity, Digital literacy, Socio-economic development, Stakeholder feedback, Government initiatives.*

INTRODUCTION

In the bustling district of Aligarh, nestled amidst the rustic charm of rural landscapes, lies a burgeoning need for digital education and awareness among its vibrant youth population. As technology continues to reshape the modern world, bridging gaps and creating new opportunities, it simultaneously highlights the disparities that persist, particularly in rural areas like Aligarh.

While urban centres often enjoy the fruits of digital advancement, rural communities face unique challenges in accessing and leveraging digital resources effectively. Aligarh, with its rich cultural heritage and agricultural backbone, stands at the cusp of transformation, where the empowerment of its youth through digital education holds the key to unlocking a future of prosperity and inclusivity.

This initiative endeavours to delve into the multifaceted dimensions of digital education and awareness within the rural landscape of Aligarh district. By understanding the existing landscape, challenges, and aspirations of the youth, we aim to devise comprehensive strategies that not only impart technical skills but also foster a culture of digital literacy and innovation.

Through collaboration with local stakeholders, educational institutions, and community leaders, this endeavour seeks to empower the youth of Aligarh with the knowledge and tools necessary to navigate the digital realm confidently. By harnessing the potential of technology, we aspire to cultivate a generation of informed individuals capable of driving positive change and sustainable development in their communities.

OBJECTIVES OF THE STUDY

1. Investigate the utilization of Internet connectivity within Aligarh district.
2. Assess the state of digital education and awareness initiatives in Aligarh district.
3. Identify the primary challenges encountered in accessing digital education resources.
4. Evaluate the level of awareness regarding government initiatives related to digital education in Aligarh district.
5. Solicit suggestions and feedback from stakeholders regarding digital education initiatives in Aligarh district.

METHODOLOGY

The study investigates demographic and socioeconomic characteristics in District Aligarh, focusing on diverse areas including Gautam Nagar I.T.I Road, Manzoorgarhi, Nada Azeed, Khair Road, and Ahamatpur, Siya Barioli Road. The survey was conducted from August 2023 to December 2023.Stratified random sampling ensures gender representation, with 41 samples collected (16 males, 25 females). Surveys gather data on education, occupation, income, and household features. Ethical protocols like informed

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consent and confidentiality are adhered to. Data analysis involves descriptive statistics and inferential methods. Limitations include sample size constraints and potential response bias, impacting generalizability.

SECTION- 1

Investigate the utilization of Internet connectivity within Aligarh district

In District Aligarh, internet connectivity is integral to daily life, education, business, and communication. It empowers students with online resources for education, facilitates business growth through e-commerce, and enhances communication via social media and messaging apps. However, equitable access to reliable internet services remains crucial for maximizing socio-economic development. A study of 41 residents assessed the quality of internet connectivity in various areas of the district.

Table-1

Is it in your area the internet connectivity is good?

	Response	Average Response
Yes	39	95.12
No	01	2.43
Not Know	01	2.43
Total	41	100

The data suggests that the majority of respondents (39 out of 41, or 95.12%) perceive internet connectivity in the area as good, indicating reliable access. This positivity bodes well for activities like education, business, and communication. However, a minority (2.43%) either reported poor connectivity or expressed uncertainty. While this is a small fraction, it underscores the need to address potential pockets with inadequate access. Enhancing connectivity in these areas would maximize the community's ability to benefit from digital opportunities, fostering overall development and inclusivity.

Table-2

How often do you use the internet?

Daily	37	90.24
Once Or Twice a Week	1	42
Once a Week		
Sometimes Grave	3	7.31
Never		
Total	41	100

The data presents some inconsistencies in the frequency of internet usage among respondents in District Aligarh. While the majority (90.24%) reported daily internet usage, a small fraction (approximately 2.43%) indicated using it once or twice a week. However, the option "sometimes grave" received three responses (approximately 7.31%), suggesting irregular or infrequent internet use, though the exact meaning of this category is unclear. Notably, there were no responses indicating internet usage "once a week" or "Never," as listed in the options. This data underscores the widespread integration of digital technology into daily life in District Aligarh, yet it also highlights the need for clearer categorization to accurately assess internet usage frequency among respondents.

Table-3

What do you use the internet for?

	Respondent	Average Respondent
Social Media	6	14.63
Education	27	65.85
Entertainment Video Games	6	14.63
For Online Shopping	Nil	Nil
To Earn Money	1	2.43
Total	41	100

The data from Table 4 indicates that the primary use of the internet among respondents in District Aligarh is for education, with approximately 65.85% utilizing it for this purpose. This underscores the significance of online learning and accessing educational materials in the district's digital education initiatives. Additionally, around 14.63% use the internet for social media and entertainment, demonstrating diverse engagement with online content. A small percentage (approximately 2.43%) reported using the internet for earning money, indicating economic opportunities through digital platforms. Notably, no respondents mentioned using the internet for online shopping. However, this data highlights the importance of promoting digital literacy and educational access, while acknowledging the broader impact of the internet on various aspects of daily life and socio-economic development in District Aligarh.

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Thus in conclusion we can say that the data from District Aligarh demonstrates a strong digital infrastructure, with 95.12% affirming reliable internet services and 90.24% owning digital devices. While a small percentage faces barriers, efforts to address disparities are essential. The majority (90.24%) use the internet daily, highlighting its integral role. Continued investment in digital infrastructure and initiatives to bridge the digital divide are crucial for equitable access to opportunities in education and beyond. Overall, the data underscores the importance of continued investment in digital infrastructure and initiatives to bridge the digital divide, ensuring that all members of the community can fully benefit from the opportunities offered by digital technology and education.

SECTION- 2

Assess the state of digital education and awareness initiatives in Aligarh district

District Aligarh, situated in the northern Indian state of Uttar Pradesh, stands at the confluence of tradition and modernity, representing a microcosm of India's diverse cultural and educational landscape. In recent years, as the world has rapidly transitioned towards digitalisation, the importance of digital education and awareness has become paramount. Aligarh, with its rich heritage and growing population, is no exception to this global trend.

The advent of the digital era has revolutionised the way we learn, communicate, and interact with information. In a district like Aligarh, where access to quality education and resources has historically been a challenge for many, embracing digital education presents a promising avenue for progress and empowerment. It holds the potential to bridge the gap between urban and rural communities, democratise access to knowledge, and equip individuals with the skills necessary to thrive in the modern world.

However, the successful implementation of digital education initiatives requires more than just technological infrastructure. It necessitates a comprehensive approach that addresses not only access to digital tools but also promotes awareness about their potential and fosters a culture of lifelong learning. By fostering digital education and awareness in District Aligarh, we can pave the way for a more inclusive, equitable, and prosperous future for all its residents. This endeavour aligns with broader national and global efforts towards harnessing the power of technology for socio-economic development and empowerment.

Table- 4
Are you taking advantage of digital resources?

	Respondent	Average Respondent
Yes	37	90.24
No	4	9.75
Total	41	100

Out of 41 respondents, 90.24% reported utilizing digital resources, while 9.75% indicated otherwise. This high engagement level reflects the widespread recognition of the utility and convenience of digital tools in modern society. Those utilizing digital resources likely benefit from various online tools, educational materials, communication platforms, and more. Conversely, the minority abstaining from digital resources may cite reasons like limited access, personal preferences, or concerns about privacy and security. Overall, the data underscores the pervasive influence of digital resources in various aspects of daily life, highlighting the need for inclusive access and consideration of individual preferences.

Table- 5
Are you aware of free education resources available?

	Respondent	Average Respondent
Yes	23	56.09
No	18	43.90
Total	41	100

The data indicates that more than half of the respondents (56.09%) are aware of free education resources, suggesting a reasonable level of familiarity with such offerings. This awareness suggests that a significant portion of the population has access to or knowledge of resources that can support their learning needs without financial barriers.

However, the fact that 43.90% of respondents are not aware of these resources highlights a notable gap in knowledge or access. This minority may miss out on valuable educational opportunities that could enhance their skills, knowledge, and career prospects. It's crucial to address this gap to ensure equitable access to education for all members of the community.

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Table- 6
Have you ever taken any online courses or participated in online education?

	Respondent	Average Respondent
Yes	23	56.09
No	18	43.90
Total	41	100

The data reveals a significant uptake in online learning, with 56.09% of respondents participating in such experiences. This popularity is attributed to the accessibility and flexibility of online platforms, offering learning opportunities at reduced costs and personalized pacing. Reasons for engagement include skill enhancement, personal interest, and career advancement. Understanding barriers to online education abstention is vital. Factors like limited technology access, unawareness of available courses, perceived costs, and preference for traditional settings may deter participation. Addressing these barriers is crucial for education providers and policymakers. Strategies include improving internet access, raising course awareness, offering financial aid, and enhancing platform credibility. Such efforts ensure equitable access to online education's benefits for all individuals.

SECTION- 3
Identify the primary challenges encountered in accessing digital education resources
Access to digital education resources in Aligarh district, like many other rural areas, faces several challenges:

1. **Lack of Internet in Rural Areas:** One of the primary challenges is the limited or lack of internet connectivity in rural parts of Aligarh district. This hampers access to online educational resources such as e-books, video lectures, and online courses.
2. **Electricity Issues:** In many rural areas, including parts of Aligarh district, electricity supply is unreliable or non-existent. This poses a significant challenge for students who rely on digital devices for their education but cannot use them due to power outages.
3. **Poor Financial Conditions:** Many families in rural Aligarh district struggle financially, making it difficult for them to afford digital devices like smartphones, tablets, or computers, as well as internet connection fees.
4. **Low Salaries:** Even if digital devices are available in some households, low salaries may prevent individuals, including students, from purchasing or upgrading their devices to ones that are compatible with modern educational resources.
5. **Expensive Mobile Recharge:** The cost of recharging smartphones for internet access can be prohibitively expensive for families with limited financial resources. This can result in students being unable to access online classes, educational apps, or other digital learning materials consistently.
6. **Recharging Difficulties:** Even when students have smartphones, the expense of recharging them regularly can lead to difficulties in accessing online education resources consistently. This inconsistency can impact their learning outcomes and academic performance.

Addressing these challenges requires concerted efforts from government agencies, educational institutions, and non-profit organizations to improve infrastructure, provide subsidies or financial assistance for digital devices and internet connectivity, and implement innovative solutions tailored to the needs of rural communities in Aligarh district.

SECTION- 4
Evaluate the level of awareness regarding government initiatives related to digital education in Aligarh district
Are you aware of any government initiative related to digital education in Aligarh district?

	Respondent	Average Respondent
Yes	8	19.91
No	38	92.68
Total	41	100

Table-10 illustrates a significant gap in awareness of government initiatives related to digital education in Aligarh district. Approximately 19.51% of respondents are aware, while approximately 92.68% lack awareness. This discrepancy highlights the need for improved communication and outreach strategies to ensure all stakeholders are informed. Strengthening communication channels through community meetings, local media, and digital platforms can enhance awareness. Understanding the reasons for this gap is crucial for tailored solutions. Increasing awareness and engagement with government initiatives in digital education can foster a supportive environment for their success, ultimately benefiting rural communities' educational outcomes in Aligarh district.

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SECTION- 5

Evaluate the level of awareness regarding government initiatives related to digital education in Aligarh district

(a) According to the survey, what measure of response can be taken to improve digital education awareness in rural areas?

To improve digital education awareness in rural areas, several measures can be implemented:

1. Improving Network Connectivity: Enhancing internet infrastructure in rural areas is crucial to ensure consistent access to digital education resources. By improving network coverage and reliability, students and community members can access online learning materials more effectively.
2. Integration into Educational Curriculum: Incorporating digital education awareness programs into school and college curricula can help familiarize students with the benefits and importance of digital education. Teaching about digital literacy, online safety, and the use of educational resources can empower students to utilize digital tools effectively for learning.
3. Offering Online Classes and Resources: Providing free online classes and educational resources to students in rural areas can bridge the gap in access to quality education. Additionally, offering online meditation sessions can support students' mental well-being while engaging them in digital learning activities.
4. Conducting Awareness Camps: Organizing awareness camps in rural areas to educate community members about the benefits of digital education can significantly enhance awareness and participation. These camps can provide demonstrations, workshops, and interactive sessions to showcase the potential of digital education in improving learning outcomes and economic opportunities.
5. Promoting Proper Smartphone Usage: Educating individuals on how to utilize smartphones effectively for educational purposes can boost digital education awareness. Guiding accessing online resources, managing data usage, and utilizing educational apps can empower individuals to make the most of available digital tools for learning.

By implementing these measures, stakeholders can work towards improving digital education awareness in rural areas, thereby fostering greater participation and engagement in online learning initiatives.

(B) Many additional tips or suggestions regarding digital education in Aligarh district.

Certainly, here are some additional tips and suggestions to further enhance digital education in Aligarh district:

1. Community Awareness Campaigns: Launching extensive awareness campaigns targeting communities in Aligarh district can help disseminate information about the benefits of digital education. These campaigns can include workshops, seminars, and outreach programs to engage parents, educators, and community leaders in promoting digital literacy and access to educational resources.
2. Integration of Digital Tools in Education: Alongside traditional teaching methods, schools in Aligarh district should integrate digital tools and resources into their curriculum. This can include interactive learning platforms, educational apps, and multimedia content to enhance students' engagement and understanding of various subjects.
3. Subsidized or Free Data for Students: Collaboration with telecom providers or government subsidies can be utilized to provide free or subsidized data plans for students and educational institutions in Aligarh district. This initiative would ensure that students have affordable access to online learning resources without being burdened by data costs.
4. Optimization of Online Classes: To prevent student disengagement and fatigue, online classes in the Aligarh district should be structured to optimize learning outcomes. This can involve keeping class durations manageable, incorporating interactive activities, and providing breaks to maintain student focus and motivation.
5. Teacher Training Programs: Conducting regular training programs for teachers in the Aligarh district on utilizing digital tools effectively for teaching can enhance their ability to deliver engaging and impactful online lessons. Training sessions can focus on instructional design, technology integration, and best practices for online pedagogy.
6. Establishment of Digital Learning Centers: Setting up digital learning centres equipped with computers, internet access, and educational software in rural areas of the Aligarh district can provide students with a dedicated space for accessing online resources and receiving support from trained facilitators.

By implementing these suggestions, Aligarh district can further strengthen its digital education ecosystem, ensuring equitable access to quality learning opportunities for all students.

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NYCTALOPIA (NIGHT BLINDNESS)- AN AYURVEDIC PREVIEW

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ABSTRACT
Nyctalopia commonly called as night blindness is a visual symptom characterised by the reduced ability to visualize at night or in dimly lit area. The person may find harder or may take longer time to visualize in dimly lit area. Night blindness is not a disease itself, but instead is a symptom of some inherited ocular disease like retinitis pigmentosa some syndromes like Wagner syndrome ,congenital stationary night blindness etc. Acquired diseases like vitamin A deficiency, corneal opacities, paracentral lenticular opacities and congenital high myopia. The principle pathology involved in night blindness is rod cell dystrophy. In ayurvedic samhitha's also night blindness is mentioned as a lakshana rather as a separate individual vyadhi, under different drishtigata rogas such as kapha vidagdha Drishti, nakulandhya, doshandhya,rathrandhya, nakthandhya, ushna vidagdha Drishti, hriswa jadya by different acharyas. The pathology involved in all the above mentioned disease is different but have night blindness as common symptom.

INTRODUCTION

Rods are the photoreceptors cells present in second layer of retina. They are insensitive to light.(1) There are approximately 90 million rod cell situated in retina, densely concentrated 15 to 20 degree from the fovea. Rods helps in peripheral vision and dim light vision (Scotopic vision) and peripheral vision.(2)

Photosensitive component of rods- in rods, rhodopsin is formed of opsin protein (scotopsin) and retinal(retinene 1- aldehyde of vit A)=visual purple. Rhodopsin of rods most strongly absorb green-blue light, therefore appears reddish purple. When rhodopsin is in its inactive form, which is 11-cisretinal, it will increase the rods activity with light so that's why the rods are highly sensitive to light. Exposure to light allows isomerisation of retinol into its active all-trans-retinal conformation.*(3)*

NYCTALOPIA (NIGHT BLINDNESS)

It can be congenital or acquired symptom of eye.

- **Acquired causes** like vitamin A deficiency, corneal opacities, paracentral/nuclear lenticular opacities, liver diseases.
- **Congenita**l- CSNB (congenital stationary night blindness), congenital high myopia**,** gyrate atrophy.
- **Inherited** cause like retinitis pigmentosa,

- **Vitamin A Deficiency (Xerophthalmia)-** Vitamin A is the biochemical precursor to rhodopsin, which is essential to the visual cycle in rod photoreceptors. The earliest clinical manifestation of vit-A deficiency in an individual is difficulty in distinguishing objects at night. According to WHO classification of Xerophthalmia(1982) nyctalopia is said as prime symptom with code XN(4). It is recognized in local with the name such as "kwak moin-chicken blindness" in Cambodia, "buta ayam-chicken eye" in Indonesia (chicken lacks rod receptors and have poor night vision). *(4)*. In night blindness the serum retinol level is usually between 10-20mg/dl. It is also found after exposure to bright sunlight in hot countries amongst patients who are debilitated by malnutrition or prolonged fasting; the condition generally improves rapidly if the eyes are protected and the required nutrition is supplied.it also occur in the diseases of the liver, especially cirrhosis of liver which hampers the absorption of vit-A*(5).*
- **Retinitis Pigmentosa(RP)-** RP is the heterogenous group of retinal disease with common attributes. It is defines as genetically determined, bilaterally, symmetrical, progressive degeneration of retinal photoreceptors, usually involving rods first followed by cones. RP is world- wide in distribution with a reported prevalence of 1 in 3,500. It's the common retinal cause of blindness especially in south India. Nyctalopia is said to be the hallmark of RP due to disruption rod cells.*(6)*
- **Congenital stationary night blindness(CSNB)**- is a autosomal recessive disease. The complete form of CSNB is characterised by non progressive night blindness from birth, subnormal visual acuity, myopia and normal fundus. Children may present with nystagmus and subnormal vision . these patients have a negative ERG (electroretinogram),with no demonstrable scotopic rod mediated ERG b-wave. *(7)*

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- **Nuclear/paracentral lenticular cataract**- an obstruction to light in anterior segment of the eye may lead to impaired travel of light energy to retinal receptors, causing blurriness of vision and formation of glares which make the person difficult to visualize during night time. *(8)*
- **Congenital/pathological Myopia**- is a refractive error pathology which can causes nyctalopia as the ray of light converge in front of the retina. This pathology may accentuated in dim light, manifesting night blindness.*(9)*
- **Sorby pseudo- inflammatory macular dystrophy**- is a rare condition characterised by bilateral vision loss typically in late thirties primarily presented with nyctalopia. *(10)*
- **Concentric annular macular dystrophy**- presents with progressive visual loss and nyctalopia, presentation is in adult life with mild impairment of central vision. Prognosis is good in this condition.*(10)*
- **Gyrate atrophy**- is caused by mutation of gene (OAT) encoadinf ornithine enzyme. Deficiency of the enzyme leads to elevated ornithine levels in plasma, urine, CSF, and aqueous humour. The visual prognosis is generally poor, with legal blindness occurring around the age of 50 from geographic atrophy*(11)*.
- **Choroideremia**- also called tapeto-choroidal dystrophy is a progressive diffuse degeneration of the choroid, RPE and photo receptors. Symptoms include nyctalopia, loss of peripheral vision and at the end central vision is also affected*(12)*.
- **Wagner syndrome (V can related vitreo-retinopathy**)- is a rare condition having low to moderate myopia, key abnormal finding is optically empty vitreous cavity lacking structural elements and support to retina.50% of cases devolope retinal detachment often before age of 15 years*(13).*

DRISHTIGATA ROGAS

Drishti-

- Size – $1/7^{th}$ of cornea
- Shape- shape of lentil seed
- Composition- all five mahabutha predominant of tejas
- Appearance- like a spark or glow worm
- Nature- Sheetha guna pradhana
- Covering- covered by patalas of eye from outside *(14)*

Therefore Drishti can be a structural and functional unit of eye taking part in visual pathway. They include lens, refractive media, pupil, retina, macula and optic nerve head*(15).* Any pathology involved in these structure will lead to drishtigata rogas.

Sankhya samprapthi

Night blindness is explained as a symptom under different diseases by different acharyas are enlisted below*:*

According to susrutha-12	According to vagbhata-27
Linganasha-6	Linganasha -6 Aupasargika linganasha-2
Pitta vidagdha Drishti	Pittavidagdha Drishti
Kapha vidhagdha Drishti	Dhoshandha
Dhumadarshi	Dhumara
Hraswajaddya	hriswadrishti
Nakulandhya	Nakulandhya
Gambhirika	Timira-6
	Kacha-6
	Ushna vidhagdha Drishti
	Amla vidagdha drishti

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REFERENCE	DRISHTI ROGAS HAVING NIGHT BLINDNESS AS LAKSHANA	DOSHA	SADYASADYATHA
SUSHRUTHA	Kapha vidagdha Drishti	Kapha	Sadhya
	Nakulandhya	Tridosha	Asadhya
VAGBHATA	Doshandhya	Kapha	Sadhya
	Nakulandhya	Tridosha	Yapya
	Ushna vidhgadha Drishti	Tridosha +Raktha	Sadhya
VIDEHA	Hriswajadya	Pitta	Asadhya
	Nakulandhya	Tridosha	Asadya

KAPHA VIDAGDHA DRISHTI

- Dosha- kapha
- Paryaya-
  Sushrutha-Shleshma vidagda drishti
  Vagbhata- doshandha,rathryandha.
  Madhukosha- Nakthandhya

According to sushrutha-

- In kapha vidagda Drishti the kapha dosha affect all the three patalas of Nethra(trishu shtitho alpa pataleshu dosho).
- Patient see all the objects white in colour (shuklani hi manyathe).
- Not able to visualize at night hours as night is predominant of kapha dosha, instead can see at day time because during day hours (diva suryanugruhitha chakshurishyathe) kapha shamana happens by ushna guna of sun(kapaha alpa bhaavath).

According to vagbhata- (doshandhya)

- During rathri kaala due to sheetha guna pradhanyatha kapha vitiates, covers the Drishti mandala and causes person blind during night hours.
- During the morning hours, the sunrays of raising sun causes liquefaction of kapha and the person can visualize clearly*(17).*

HRISWAJADYA

- Dosha-pitta
- Sadyasadyatha- Asadhya

Acharya Videha-

Has quoted that hriswajadya is one among four types of diseases producing night-blindness and its asadhya.

According to sushrutha –

- Acharya says that due to vitiation of pitta dosha patient feels difficulty to visualize during day time(diwaseshu kruchrat) .
- The objects appear smaller than the normal size(hriswani rupani).

According to yogarathnakara (nethrarogadhikara)-

Due to accumulation of dosha in middle of Drishti the person visualizes objects smaller in size and due to reduction in level of vitiated pitta there is improvement in vision at night time.

Note- hraswajadya is mentioned as a type of night blindness according to acharya Videha, where as according to acharya sushrutha , yogarathnakara has just described it as defective vision only during day time*(18).*

NAKULANDHYA

- Dosha- tridosha
- Sadyasadhyatha-
  Sushrutha,Videha -asadhya
  vagbhata-yapya

According to acharya sushrutha-

- Due to vitiation of tridosha in Drishti it make the eye shinning appearance (vidhyotha) like nakula (mangoose)
- And the person visualizes abnormal colours and texture during day time(chithrani roopani dhiwa sa pashyeth).

According to acharya vagbhata-

- The persons eye looks like mongoose eye due to accumulation of doshas
- As nakula(mangoose) the person visualize in day with difficulty and completely loss of vision during night hours.

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Studies have shown that there are only cone cells in mongoose eyes, making its field of vision restricted and also night blindness*(19).*

USHNA VIDHAGDHA DRISHTI

Dosha - Tridosha+ rakta
Sadhyasadhyatha- Sadhya
Cause- Sudden immersion on cold water after being exposed to heat of sun
Symptoms -

- Daha(burning sensation)
- Osha(increased temperature)
- Muddy coloured conjunctiva(malina shuklam)
- Blurred day vison (ahani avila darshana)
- Loss of night vision(rathrou andhyam)*(20).*

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ADVANCEMENTS IN PERSONALIZED MEDICINE: INTEGRATING PHARMACOGENOMICS INTO CLINICAL PRACTICE

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ABSTRACT

The integration of pharmacogenomics into clinical practice is revolutionizing personalized medicine by tailoring drug therapies to an individual's genetic profile. This approach has the potential to optimize drug efficacy, minimize adverse drug reactions, and streamline the drug development process. This review explores recent advancements in pharmacogenomics, including high-throughput genomic technologies, the discovery and validation of pharmacogenomic biomarkers, and the development of clinical guidelines and decision support systems. Despite the promise of pharmacogenomics, several challenges impede its widespread adoption. These include establishing robust clinical evidence, educating healthcare providers, addressing ethical and legal concerns, managing costs, and integrating pharmacogenomic data into clinical workflows. Solutions to these challenges involve collaborative research, comprehensive education programs, ethical policy development, economic evaluations, and advanced health IT systems. Future directions in pharmacogenomics emphasize the seamless integration of genetic data into electronic health records, the expansion of pharmacogenomic databases, interdisciplinary collaboration, personalized drug development, enhanced clinical decision support systems, and ethical considerations. By addressing these challenges and leveraging future advancements, pharmacogenomics can significantly enhance the precision and personalization of medical treatments, leading to improved patient outcomes and a new era in healthcare.

INTRODUCTION

Personalized medicine represents a transformative approach in healthcare, aiming to tailor medical treatment to the unique genetic profile of each patient. A key component of this paradigm shift is pharmacogenomics, which studies how an individual's genetic makeup influences their response to drugs. The integration of pharmacogenomics into clinical practice holds immense potential to optimize drug efficacy, minimize adverse drug reactions, and streamline the drug development process. This review explores recent advancements in pharmacogenomics, its practical implementation in clinical settings, and the challenges and opportunities that lie ahead.

Pharmacogenomics leverages advancements in genomic technologies, such as next-generation sequencing (NGS) and genome-wide association studies (GWAS), to identify genetic variants that affect drug metabolism, efficacy, and toxicity . These advancements have facilitated the development of clinical decision support systems (CDSS) that provide healthcare providers with real-time, evidence-based recommendations tailored to a patient's genetic profile . Such tools are crucial for translating genomic data into actionable insights that can improve patient outcomes.

Despite these advancements, several barriers remain to the widespread adoption of pharmacogenomics in routine clinical practice. These include the need for robust clinical evidence linking genetic variants to drug responses, education and training for healthcare providers, and addressing ethical, legal, and social implications (ELSI) . Nevertheless, successful implementation examples, such as the U.S. Department of Veterans Affairs (VA) Pharmacogenomics Program and the Mayo Clinic RIGHT Protocol, demonstrate the feasibility and benefits of integrating pharmacogenomics into healthcare systems .

In summary, the integration of pharmacogenomics into clinical practice represents a significant advancement in personalized medicine, offering the potential to enhance drug therapy and patient care. This review will delve into the recent developments, implementation strategies, challenges, and future directions of pharmacogenomics in clinical practice.

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ADVANCEMENTS IN PHARMACOGENOMICS

1) Genomic Data and Drug Response Prediction

Advances in genomic technologies have significantly improved the ability to predict drug responses. High-throughput sequencing and genome-wide association studies (GWAS) have identified numerous genetic variants associated with drug metabolism and efficacy. For example, variations in the CYP450 enzyme family influence the metabolism of a wide range of drugs, including antidepressants and anticoagulants .

2) Implementation of Pharmacogenomic Testing

Pharmacogenomic testing is becoming more accessible and affordable, facilitating its integration into routine clinical practice. Next-generation sequencing (NGS) technologies have reduced costs and increased the speed of genetic testing. Clinical laboratories now offer panels testing multiple pharmacogenomic markers, providing comprehensive insights into a patient's potential drug responses .

3) Clinical Decision Support Systems (CDSS)

CDSS are essential for integrating pharmacogenomics into clinical workflows. These systems provide healthcare providers with real-time, evidence-based recommendations tailored to the genetic profile of patients. For instance, the Clinical Pharmacogenetics Implementation Consortium (CPIC) guidelines assist clinicians in interpreting genetic test results and making informed prescribing decisions .

4) High-Throughput Genomic Technologies

The advent of high-throughput genomic technologies has revolutionized the field of pharmacogenomics. Techniques such as next-generation sequencing (NGS) and genome-wide association studies (GWAS) have significantly accelerated the identification of genetic variants associated with drug metabolism, efficacy, and toxicity. For instance, NGS allows for comprehensive screening of an individual's entire genome, enabling the detection of rare variants that may influence drug response (Ashley, 2016). Similarly, GWAS have identified numerous single nucleotide polymorphisms (SNPs) linked to drug response phenotypes, providing valuable insights for personalized medicine (Bush et al., 2012).

5) Pharmacogenomic Biomarkers

The discovery and validation of pharmacogenomic biomarkers have been critical in translating genetic data into clinical practice. Biomarkers such as CYP2C19, CYP2D6, and TPMT are now routinely tested to guide the use of drugs like clopidogrel, antidepressants, and thiopurines, respectively (Caudle et al., 2014). These biomarkers help predict patient response to medication, allowing for dosage adjustments and alternative therapies to avoid adverse effects and enhance therapeutic efficacy.

6) Clinical Implementation and Guidelines

The integration of pharmacogenomics into clinical practice has been facilitated by the development of clinical guidelines and decision support tools. Organizations such as the Clinical Pharmacogenetics Implementation Consortium (CPIC) and the Dutch Pharmacogenetics Working Group (DPWG) have published guidelines to assist healthcare providers in interpreting pharmacogenomic test results and making informed prescribing decisions (Relling and Klein, 2011). These guidelines are continually updated as new evidence emerges, ensuring they reflect the latest advancements in the field.

7) Cost Reduction and Accessibility

The cost of genomic testing has decreased significantly, making pharmacogenomic testing more accessible to a broader patient population. Advances in technology and increased competition in the market have reduced the cost of tests, allowing more healthcare systems to incorporate pharmacogenomics into routine care (Hresko and Haga, 2012). Additionally, insurance coverage for pharmacogenomic testing is expanding, further facilitating its adoption in clinical practice.

8) Personalized Drug Development

Pharmacogenomics is also playing a crucial role in the development of new drugs. Pharmaceutical companies are increasingly incorporating pharmacogenomic data into clinical trials to identify patient subgroups that are more likely to benefit from a particular drug, thereby improving the drug development process (Trusheim et al., 2007). This approach not only enhances the efficacy and safety profile of new drugs but also reduces the time and cost associated with bringing new therapies to market.

9) Real-World Applications and Success Stories

Several healthcare institutions have successfully integrated pharmacogenomics into their clinical practice, demonstrating its real-world

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applicability and benefits. For example, the Mayo Clinic's RIGHT (Right Drug, Right Dose, Right Time) Protocol preemptively tests patients for multiple pharmacogenomic markers, allowing for personalized medication management and improved patient outcomes (Bielinski et al., 2014). Similarly, the U.S. Department of Veterans Affairs (VA) has implemented a comprehensive pharmacogenomics program, enhancing medication safety and efficacy for veterans (O'Donnell et al., 2012).

CHALLENGES AND SOLUTIONS

Despite significant advancements, several challenges hinder the widespread adoption of pharmacogenomics in clinical practice.

1. Establishing Clinical Utility and Evidence Base-

Challenge:

One of the primary challenges in integrating pharmacogenomics into clinical practice is the need for robust evidence linking genetic variants to clinical outcomes. While numerous pharmacogenomic associations have been identified, translating these findings into actionable clinical recommendations requires extensive validation through clinical trials and real-world studies (Roden et al., 2006).

Solution:

To address this challenge, ongoing research and large-scale clinical studies are essential. Collaborative efforts such as the Clinical Pharmacogenetics Implementation Consortium (CPIC) and the Electronic Medical Records and Genomics (eMERGE) Network are working to build a stronger evidence base by conducting rigorous studies and sharing data across institutions (Relling and Klein, 2011). Additionally, incorporating pharmacogenomic data into electronic health records (EHRs) and leveraging real-world evidence can help validate and refine clinical guidelines (Manolio et al., 2013).

2. Education and Training-

Challenge:

Healthcare providers often lack the necessary training to interpret pharmacogenomic data and integrate it into patient care. This knowledge gap can hinder the effective implementation of pharmacogenomics in clinical practice (Hresko and Haga, 2012).

Solution:

Integrating pharmacogenomics into medical and pharmacy school curricula is crucial for educating future healthcare professionals. Continuing education programs and workshops for current practitioners can also enhance their understanding and ability to apply pharmacogenomic information. Initiatives like the Pharmacogenomics Research Network (PGRN) provide resources and training to support healthcare providers (Stanek et al., 2012).

3. Ethical, Legal, and Social Implications (ELSI)-

Challenge:

The implementation of pharmacogenomics raises several ethical, legal, and social concerns, such as patient privacy, data security, and the potential for genetic discrimination. Ensuring the ethical use of genetic information is vital for maintaining patient trust (Evans and Burke, 2008).

Solution:

Developing robust policies and guidelines to address these issues is essential. The Genetic Information Nondiscrimination Act (GINA) in the United States provides a legal framework to protect individuals from genetic discrimination in employment and health insurance. Additionally, transparent communication with patients about the benefits and risks of pharmacogenomic testing can help build trust and promote ethical practice (Hudson et al., 2008).

4. Cost and Reimbursement-

Challenge:

The cost of pharmacogenomic testing and the lack of consistent reimbursement policies can be significant barriers to widespread adoption. High upfront costs can deter both healthcare providers and patients from utilizing pharmacogenomic services (Hresko and Haga, 2012).

Solution:

As the cost of genomic sequencing continues to decline, pharmacogenomic testing is becoming more affordable. Additionally, demonstrating the cost-effectiveness of pharmacogenomics in reducing adverse drug reactions and improving therapeutic outcomes can help justify reimbursement from insurance providers. Economic evaluations and health technology assessments can support the case for

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broader insurance coverage (Phillips et al., 2014).

5. Integration into Clinical Workflow-
Challenge:
Integrating pharmacogenomics into existing clinical workflows can be challenging due to the complexity of genetic data and the need for timely decision-making. Ensuring that pharmacogenomic information is readily accessible and interpretable for healthcare providers is crucial (Hresko and Haga, 2012).

Solution:
Developing and implementing clinical decision support systems (CDSS) that integrate with EHRs can facilitate the use of pharmacogenomic data in clinical practice. These systems can provide real-time, evidence-based recommendations based on a patient's genetic profile, aiding healthcare providers in making informed prescribing decisions (Tonk et al., 2017). Collaboration between IT professionals, geneticists, and clinicians is essential to design user-friendly and effective CDSS.

SUCCESSFUL INTEGRATION EXAMPLES

Several health systems and initiatives have successfully integrated pharmacogenomics into clinical practice, demonstrating its feasibility and benefits.
1) The U.S. Department of Veterans Affairs (VA) Pharmacogenomics Program
The VA has implemented a comprehensive pharmacogenomics program that includes genetic testing, CDSS integration, and provider education. This program has improved medication management and patient outcomes, particularly in managing psychiatric and cardiovascular conditions .

2) The Mayo Clinic RIGHT Protocol
The RIGHT (Right Drug, Right Dose, Right Time) Protocol at the Mayo Clinic preemptively tests patients for multiple pharmacogenomic markers. This approach allows clinicians to make informed prescribing decisions at the point of care, significantly reducing adverse drug reactions and improving therapeutic efficacy .

Future Directions

The future of pharmacogenomics in personalized medicine is promising, with several areas poised for further development.
1. Integration with Electronic Health Records (EHRs)-
Future Direction:
Seamlessly integrating pharmacogenomic data into Electronic Health Records (EHRs) will be crucial for the future of personalized medicine. This integration will ensure that genetic information is readily accessible to healthcare providers at the point of care, facilitating more informed decision-making.

Development:
Advances in health IT infrastructure and interoperability standards are essential for achieving this integration. EHR systems need to be equipped with capabilities to store, retrieve, and interpret pharmacogenomic data effectively. Collaborations between software developers, geneticists, and clinical informaticians will drive the development of robust EHR systems that can handle complex genomic information (Tonk et al., 2017).

2. Expanding Pharmacogenomic Databases-
Future Direction:
Building comprehensive, diverse pharmacogenomic databases will enhance our understanding of genetic variability in different populations and its impact on drug response. This is particularly important for addressing health disparities and ensuring that personalized medicine benefits all demographic groups.

Development:
Efforts should be made to include diverse populations in pharmacogenomic research to ensure that findings are broadly applicable. Initiatives such as the All of Us Research Program aim to create a rich, diverse dataset that can inform personalized medicine on a global scale (All of Us Research Program, 2019). Increased participation from underrepresented populations in genetic research will lead to more equitable healthcare outcomes.

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3. Collaboration and Interdisciplinary Research-

Future Direction:
Fostering collaboration between geneticists, pharmacologists, clinicians, and bioinformaticians is essential for advancing pharmacogenomics. Interdisciplinary research can accelerate the translation of genetic discoveries into clinical applications.

Development:
Establishing collaborative research networks and consortia can facilitate the sharing of data, resources, and expertise. Programs like the Pharmacogenomics Research Network (PGRN) exemplify the benefits of such collaborative efforts (Relling and Klein, 2011). These collaborations can lead to the development of new pharmacogenomic tools, guidelines, and therapies.

4. Personalized Drug Development-
Future Direction:
Pharmacogenomics will play a pivotal role in the future of drug development by enabling the design of drugs tailored to specific genetic profiles. This approach can improve drug efficacy and safety, reducing the trial-and-error nature of current prescribing practices.

Development:
Pharmaceutical companies are increasingly incorporating pharmacogenomic data into clinical trials to identify patient subgroups that may benefit most from new treatments. This stratified medicine approach can enhance the precision of drug development and lead to more successful clinical outcomes (Trusheim et al., 2007). Regulatory frameworks need to evolve to support these innovative drug development strategies.

5. Development of Clinical Decision Support Systems (CDSS)-
Future Direction:
Advancing Clinical Decision Support Systems (CDSS) that integrate pharmacogenomic information will be vital for translating genetic data into actionable clinical insights. These systems can provide healthcare providers with real-time, evidence-based recommendations tailored to individual patients.

Development:
Investments in artificial intelligence (AI) and machine learning can enhance the capabilities of CDSS, making them more intuitive and effective. These technologies can analyze vast amounts of genetic and clinical data to offer precise treatment recommendations (Tonk et al., 2017). Continuous updating of these systems with the latest research findings will ensure their relevance and accuracy.

6. Ethical, Legal, and Social Implications (ELSI)-
Future Direction:
Addressing the ethical, legal, and social implications of pharmacogenomics will be crucial for its successful implementation. Ensuring patient privacy, informed consent, and equitable access to pharmacogenomic testing are essential considerations.

Development:
Developing comprehensive policies and guidelines to protect patient rights and data security is necessary. Engaging with stakeholders, including patients, ethicists, and policymakers, will help create frameworks that support ethical pharmacogenomic practices (Evans and Burke, 2008). Public education campaigns can also raise awareness about the benefits and limitations of pharmacogenomics, fostering trust and acceptance.

CONCLUSION

The integration of pharmacogenomics into clinical practice represents a significant advancement in personalized medicine, including establishing clinical utility, educating healthcare providers, addressing ethical concerns, managing costs, and integrating genetic data into clinical workflows. While challenges remain, ongoing research, technological advancements, and collaborative efforts are paving the way for more effective and individualized healthcare. By leveraging pharmacogenomic data, clinicians can optimize drug therapy, minimize adverse effects, and improve patient outcomes, marking a new era in precision medicine.

The future of personalized medicine through the integration of pharmacogenomics is promising, with significant advancements on the horizon. Seamless integration with EHRs, expanding pharmacogenomic databases, fostering interdisciplinary collaborations,

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personalized drug development, advanced CDSS, and addressing ethical concerns will drive the field forward. Through high-throughput genomic technologies, validated biomarkers, clinical guidelines, cost reductions, and personalized drug development, pharmacogenomics is increasingly integrated into clinical practice. These advancements promise to improve drug efficacy, minimize adverse drug reactions, and optimize therapeutic outcomes, marking a new era in personalized medicine.

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MODELS AND APPROACHES TO PROFESSIONAL DEVELOPMENT IN TEACHER EDUCATION: A COMPARATIVE STUDY

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ABSTRACT

This comparative study explores the efficacy of various professional development (PD) models for teacher educators in New Delhi, focusing on in-service training, knowledge-for-practice, and knowledge-in-practice approaches. Through a comprehensive mixed-methods research design, data were collected from 150 teacher educators using surveys, with additional qualitative insights gathered from 30 in-depth interviews. The research aims to determine which PD models are most effective in enhancing professional competencies and improving instructional practices among teacher educators. The findings reveal distinct differences in the effectiveness of these PD models. In-service training, characterized by its theoretical and foundational approach, was deemed less effective due to its limited practical application and lack of ongoing support. Conversely, knowledge-for-practice models provided a strong theoretical foundation but were similarly constrained by insufficient practical integration. Knowledge-in-practice models emerged as the most effective, significantly improving teaching practices through practical, experiential learning and direct classroom application. Quantitative results demonstrated substantial improvements in lesson planning, instructional strategies, student assessment, and classroom management among educators engaged in knowledge-in-practice PD. Qualitative data reinforced these findings, with educators reporting increased confidence, enhanced student engagement, and better classroom management skills. This study underscores the critical need for PD programs that are continuous, collaborative, and closely aligned with the practical realities of teaching. The insights gained from this comparative analysis provide valuable recommendations for educational institutions and policymakers to design and implement PD initiatives that effectively enhance teacher educators' professional growth and contribute to improved educational outcomes. These findings advocate for a more integrated approach to PD, ensuring it remains relevant, practical, and supportive of sustained professional development.

KEY WORDS: *Professional Development Models, Teacher Education, In-Service Training*

NEED AND JUSTIFICATION OF STUDY

Professional development (PD) for teacher educators is crucial for educational reform and improving teaching standards. This study compares different models and approaches to PD, aiming to identify the most effective strategies for enhancing teacher educators' professional competencies in New Delhi. The quality of teacher education is a critical determinant of the overall quality of education in any country. Teacher educators, who are responsible for training pre-service teachers, need continuous professional development to stay updated with the latest educational trends and methodologies. This study seeks to compare various PD models to determine the most effective approaches for teacher educators in New Delhi. Professional development models can be broadly categorized into traditional in-service training, knowledge-for-practice, and knowledge-in-practice. Traditional in-service training often involves workshops and short courses, while knowledge-for-practice emphasizes theoretical understanding. Knowledge-in-practice focuses on practical, experiential learning (Cochran-Smith & Lytle, 2001). The development of PD models has evolved significantly over the past few decades, influenced by educational reforms and the growing recognition of the need for continuous professional growth among educators. In the early stages, PD was largely characterized by in-service training, which focused on providing teachers with additional skills and knowledge through workshops and seminars. Effective PD models share several key characteristics. They are typically ongoing rather than one-time events, involve active participation and collaboration, and are closely aligned with the actual work and challenges faced by educators. Studies have shown that PD programs that integrate these characteristics tend to be more effective in improving teaching practices and student outcomes (Garet et al., 2001).

The conversation above suggests that researchers have made efforts to look into teacher educators' professional growth. The majority of research papers concentrate on how teacher professional development affects classroom instruction, student success, etc. The professional development models and approaches in teacher education has been the subject of very few recorded studies. There is a lack of research on the professional development models and approaches in general and teacher education in particular. On the basis of above need and justifications the present study is stated as "*Models and Approaches to Professional Development in Teacher Education: A Comparative Study*".

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OBJECTIVE OF THE STUDY

The study was conducted by keeping in mind the following objective:

- To compare the effectiveness of different professional development (PD) models on teacher educators' professional efficiency.

RESEARCH QUESTION

From the need and justification of the study, the study will be answered the following question.

- How do different professional development (PD) models and compare in terms of their effectiveness in enhancing teacher educators' professional efficiency?

METHODOLOGY

The study utilizes a comparative analysis framework, examining PD programs across several teacher education institutions in New Delhi. Data were collected through surveys, interviews, and document analysis to assess the design, implementation, and outcomes of different PD models. A comprehensive comparative analysis was conducted, involving both quantitative and qualitative data collection methods. Surveys were distributed to teacher educators to gather quantitative data, while interviews and document analysis provided qualitative insights. Participants included teacher educators from various institutions who had undergone different types of PD programs. A total of 150 educators participated in the survey, with a subset of 30 participating in in-depth interviews.

For the comparative study, model-specific questionnaire, in-depth interviews and document analysis of training materials were employed to assess the differential impacts of knowledge-in-practice, knowledge-for-practice, and in-service training PD models. These instruments collectively ensured a robust and multi-dimensional evaluation of the PD programs' effectiveness. The questionnaire included both quantitative (Likert scale) and qualitative (open-ended) questions. Interview questions focused on the strengths and weaknesses of each PD model, the applicability of the training, and suggestions for improvement. Analysis of training materials, session plans, and instructional content provided during the PD programs to understand the curriculum and instructional strategies used.

Techniques of Data Analysis

Both qualitative and quantitative techniques were used in the analysis of data. The data collected through structured tools were analysed with the help of simple quantitative analysis to supplement and substantiate qualitative analysis. The quantitative data were analysed using percentage only. The qualitative data were transcribed and analysed using thematic analysis. This involved coding the data to identify recurring themes and patterns. Thematic analysis allowed for the organization of qualitative data into meaningful categories, revealing deeper insights into the impact of the PD programs. Document analysis of PD program materials, including training manuals, session plans, and instructional content, complemented the survey and interview data. By triangulating data from multiple sources—surveys, interviews and document analysis—the study ensured a robust and multi-dimensional evaluation of the PD programs' impact

RESULTS

Quantitative Analysis

Professional development (PD) is essential for teacher educators to enhance their teaching practices and professional competencies. Quantitative data revealed significant improvements in various areas of professional efficiency for different PD models. Here investigator tried to know the effectiveness of PD models on teacher educators' professional efficiency on the basis of questionnaire.

Table 1: Improvements of Professional efficiency for PD Models

PD Model	Confidence Increase (%)	Instructional Strategies Improvement (%)	Classroom Management Enhancement (%)	Student Engagement Improvement (%)
In-Service Training	20	25	25	25
Knowledge-for-Practice	30	35	35	35
Knowledge-in-Practice	50	55	60	55

From the Table 1 indicates the comparative analysis of different professional development (PD) models reveals significant variations in their effectiveness across several key areas. Knowledge-in-practice models showed the highest increase in confidence at 50%, compared to 30% for knowledge-for-practice and 20% for in-service training. This indicates that experiential learning modules significantly bolster educator confidence, which is crucial for effective teaching.

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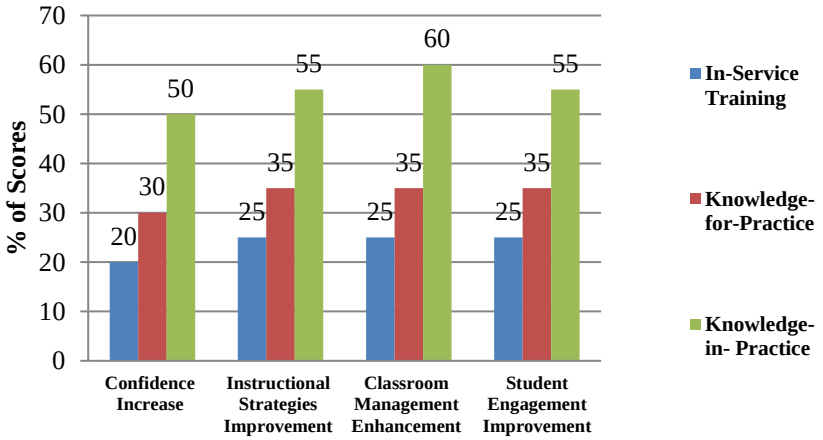
In terms of instructional strategies, knowledge-in-practice models led to a 55% improvement, surpassing the 35% improvement seen in knowledge-for-practice and the 25% in in-service training. The practical application inherent in knowledge-in-practice models ensures that educators are better prepared to implement effective teaching methods, directly enhancing their instructional capabilities.

Classroom management skills exhibited the greatest enhancement with knowledge-in-practice models, showing a 60% increase. This is markedly higher than the 35% improvement in knowledge-for-practice and 25% in in-service training. These findings underscore the importance of practical training in developing effective classroom control techniques, which are vital for maintaining a productive learning environment.

Finally, student engagement improved by 55% with knowledge-in-practice PD, compared to 35% for knowledge-for-practice and 25% for in-service training. This suggests that immersive, practice-based PD is most effective in equipping educators with strategies to actively engage students, thereby improving academic outcomes and overall classroom dynamics.

Overall, the data highlight the superior effectiveness of knowledge-in-practice PD models in enhancing various aspects of professional efficiency among teacher educators. This underscores the need for educational policymakers and institutions to prioritize practical, hands-on learning experiences in their PD programs to achieve the best results.

Figure 1: Improvements of Professional efficiency for PD Models



Qualitative Analysis

Qualitative data from interviews and document analysis provided deeper insights into the impact of different PD models. Educators who participated in knowledge-in-practice programs shared specific examples of how PD had influenced their teaching practices, including improved lesson planning, more effective instructional strategies, and better classroom management.

Table 2: Comparison on Effectiveness of PD Model

PD Model	Effectiveness	Strengths	Weaknesses
In-Service Training	Moderate	Provides foundational knowledge and skills	Lacks practical application, limited follow-up
Knowledge-for-Practice	High	Strong theoretical foundation, research-based	Limited practical integration
Knowledge-in-Practice	Very High	Practical, experiential learning, direct application	Resource-intensive, time-consuming

The findings reveal significant differences in the effectiveness of various PD models. In-service training programs were found to be less effective due to their lack of practical relevance. In contrast, knowledge-in-practice models showed higher effectiveness, with educators reporting substantial improvements in teaching practices and student outcomes.

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Table 3: Key Themes from Qualitative Data

Theme	Description
Improved Confidence	Educators reported increased confidence in their teaching abilities
Better Classroom Management	More effective strategies for managing classroom dynamics
Enhanced Student Engagement	Greater ability to engage and motivate students

The qualitative analysis identified key differences in the efficacy of various PD models. Knowledge-in-practice PD was the most effective, with participants appreciating the hands-on, experiential learning approach. Practical exercises and simulations mirrored real classroom scenarios, facilitating deeper understanding and practical application of new teaching strategies. Knowledge-for-practice PD provided valuable theoretical foundations but lacked practical applications, limiting its immediate impact. In-service training was the least effective, perceived as generic and disconnected from specific teaching contexts, leading to lower engagement. Collaboration and peer support were crucial across all models, with participants valuing the opportunities to network and share experiences. This sense of community enhanced the overall impact of the training. The analysis underscores the superiority of knowledge-in-practice models and the importance of context-specific, interactive, and collaborative PD programs.

Synthesis of Findings

Knowledge-in-practice models emerged as the most effective, providing practical, experiential learning directly applicable to classroom teaching. In-service training was least effective due to its lack of practical application.

DISCUSSION

The comparative study of various professional development (PD) models provides comprehensive insights into their respective impacts on the professional efficiency of teacher educators. The comparative analysis highlights the importance of aligning PD programs with the practical needs of teacher educators. Programs that integrate experiential learning and ongoing support are more likely to result in meaningful improvements in professional practice. The study also identifies the need for a more coherent and integrated approach to PD.

Increased Confidence: Among the different PD models, knowledge-in-practice emerged as the most effective in increasing the confidence of teacher educators. This model's emphasis on practical, hands-on learning experiences allows educators to directly apply new skills in their classrooms, thereby reinforcing their confidence. Educators who participated in knowledge-in-practice PD reported feeling more assured in their teaching abilities and more willing to experiment with innovative teaching strategies. This finding supports the work of Guskey (2002), who emphasized the importance of immediate application and feedback in PD programs.

Better Classroom Management: Effective classroom management is crucial for creating a productive learning environment. The study found that educators who underwent knowledge-in-practice PD showed significant improvements in their classroom management skills. These educators adopted more effective strategies for handling classroom disruptions, organizing activities, and maintaining student engagement. The qualitative data highlighted that practical training in classroom management techniques was particularly beneficial, as it provided educators with concrete tools and methods they could implement immediately.

Enhanced Student Engagement: Student engagement is a key indicator of successful teaching practices. The study found that PD models focusing on practical application, such as knowledge-in-practice, had the greatest impact on student engagement. Educators reported using more interactive and student-centered teaching methods, which led to higher levels of student participation and enthusiasm. This aligns with the findings of Desimone (2009), who noted that PD programs that involve active learning and are closely aligned with classroom practices tend to produce the best outcomes for student engagement.

EDUCATIONAL IMPLICATIONS

The study's findings have significant implications for the design and implementation of PD programs. Firstly, the emphasis should be on practical, experiential learning. PD programs that offer opportunities for hands-on practice and immediate application of new skills are more likely to be effective. Policymakers and educational institutions should consider incorporating knowledge-in-practice models into their PD offerings to maximize impact.

Secondly, ongoing and sustained PD is crucial. One-off training sessions are less effective than continuous, iterative learning experiences that allow educators to refine their skills over time. Institutions should create structures that support continuous professional growth, such as regular workshops, peer mentoring, and collaborative learning communities.

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Thirdly, relevance and alignment with educators' needs and contexts are essential. PD programs should be tailored to address the specific challenges and opportunities within the educators' environments. This ensures that the training is directly applicable and meets the educators' immediate needs.

LIMITATIONS OF THE STUDY

While the study provides valuable insights, it also has several limitations. The research was conducted within a specific geographical area, and the findings may not be generalizable to other regions with different educational contexts. Additionally, the study relied on self-reported data, which can be subject to biases such as overestimation of improvements or socially desirable responses. Future research should aim to include more objective measures of professional efficiency, such as classroom observations and student performance metrics.

RECOMMENDATIONS FOR FUTURE RESEARCH

Future research should focus on exploring the long-term impacts of different PD models. Longitudinal studies that track educators' professional growth and student outcomes over extended periods would provide deeper insights into the sustained effects of PD. Additionally, comparative studies across diverse educational contexts would help identify the factors that contribute to the success of various PD models. Research should also investigate how different PD models can be adapted and scaled to suit different regions and educational systems. Furthermore, it would be beneficial to explore the integration of technology in PD programs. As educational technology continues to evolve, understanding how digital tools and platforms can enhance PD will be crucial for developing innovative and effective training programs for teacher educators.

CONCLUSION

The comparative study highlights the effectiveness of knowledge-in-practice PD models in enhancing teacher educators' professional efficiency. These models, emphasizing hands-on, experiential learning, were more effective than theoretical or in-service training models. Participants reported significant improvements in practical application and teaching strategies. The findings advocate for the adoption of context-specific, practical PD programs that foster collaboration and ongoing professional growth, ultimately leading to better educational outcomes.

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DETERMINANTS OF STRATEGY IMPLEMENTATION AT THE COUNTY GOVERNMENT OF TAITA TAVETA

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ABSTRACT

Strategy management is an important aspect in organizations today considering the diverse, fragile and very competitive business environment currently obtaining globally. Consequently, most business and government entities have formulated strategies aimed at enhancing streamlined achievement of their goals and objectives. Regrettably, some of these strategies either fail or are not implemented successfully as envisaged. This research intended to explore the elements impacting the successful execution of initiatives within the County Government of Taita Taveta. The specific objectives were: to assess the impact of organizational structure on strategy implementation, to examine the role of communication in influencing strategy implementation, to investigate the influence of finances on strategy implementation, and to evaluate the impact of employees' technical capacity on strategy implementation at the County Government of Taita Taveta. The study drew upon four theoretical frameworks: Institutional theory, Communication Theory, Resource Based View (RBV), and McKinsey's 7-S model. The study addressed a population consisting of County Executive Committee members (CECMs), Heads of Departments (HODs), senior officials, and members of the county assembly (MCAs), totaling 87 persons. Utilizing the complete population sample approach (census), all identifiable people were included in the research. Data gathering involved the distribution of questionnaires and conducting interviews. Descriptive statistics such as means, frequencies, and percentages, as well as inferential statistics like Pearson and regression analysis, were employed to evaluate the data collected using the Statistical Package for Social Scientists. Meanwhile, information from oral interviews was subjected to content analysis. The findings of the study demonstrated a substantial association between the implementation of strategic plans at the Taita Taveta County Government and the independent variables, including organizational structure, communication, finances, and workers' technical competence. Strong positive associations were discovered, with correlation values ranging from 0.830 to 0.924, all statistically significant at $p<0.01$. The significant regression coefficients ($p<0.05$) offered further evidence, demonstrating that the independent variables play a crucial role in influencing the effective execution of strategic plans in the County. Understanding and addressing these variables could lead to improved strategic plan implementation at the County Government. Policymakers and stakeholders could consider investing in these aspects to enhance the overall effectiveness and successful implementation of strategic plans.

KEYWORDS: *Strategy implementation, organizational structure, communication, financial resources, Employee technical capacity*

INTRODUCTION

The importance of strategy management in today's dynamic and competitive business environment cannot be overstated. A crucial element and action that helps a company reach its corporate goal is strategy implementation (Fuertes et al., 2020). There are three distinctive procedures that make up strategic management which are interconnected and impact each another. These include strategic planning, strategy implementation and strategy control. According to corporate research, strategic implementation is both the most crucial but mostly undervalued component (Rani, 2019). In the earlier days researchers concentrated their focus on factors contributing to successful formulation of strategies, however, in the recent years researchers are becoming more interested identifying the factors that determine or the influencers of successful implementation of strategies. (George et al., 2022)

For a plan to be properly executed, it requires concerted and purposeful support from all stakeholders (Kabui, 2020). Many executives and academics feel that good strategy execution is just as crucial as, if not more critical than, establishing a brilliant strategy (Fuertes et al., 2020). To achieve an effective strategy implementation process, it is essential to find out if performance exceeds expectation, or if there are any shortfalls(Narikae, Namada, & Katuse,2017). A gap exists between paper and realization (Ajemba & Chinwe, 2022).

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Several factors have been identified as key in the implementation of strategic plans. These differ between business entities and government bodies (Vanneste, 2017). Some of the most important factors include, but not limited to effective Communication, organizational structure, adequate finances, and employee's technical capacity among others (Mutuku & Misango, 2020; Chwira, 2021).

Organizational structure, according to Fuertes et al. (2020) assists organizations in implementing their strategies successfully and gain competitive advantage over their competitors. This is evident in that, after organizations develop their strategic plans, the leadership develops organizational structures defining and allocating duties and responsibilities to enable successful implementation of the strategic plans. In Nigeria, telecommunication firms demonstrated that structure influenced strategic plan implementation. According to Tawse & Tabesh (2021), centralized structures impede strategy implementation while specialization structures accelerated strategy implementation.

For a plan to be properly executed, it needs persistent and purposeful backing from every party involved (Kabui, 2020). It is noted that Communication is critical component or tool in an organization and can be used effectively and efficiently to cascade information contained in the strategy to all employees and relevant stakeholders ensuring that they understand their roles, tasks and responsibilities envisaged in the plan, and are able to efficiently execute their mandate to ensure that the Organization achieves its broad goals, strategies, and objectives (Chirwa & Boikanyo, 2022). Lekisima et al. (2022) found that organizational communication had a favorable and substantial impact on successful strategy implementation among energy generation enterprises in Kenya. The study, however, suggested more flexible communication arrangements to allow for the flow of ideas and expertise among people in the business. Furthermore, the study advocated better communication of the strategy to all employees and the emphasis should be on the company's vision and goals for successful strategy implementation.

Shillingi (2017) demonstrates that human and financial resources have an influence on the success of strategic plan implementation. As a result, procedures such as financial controls should be implemented to ensure revenue utilization efficiency (Korir, 2019). Employees, on the other hand, are the ones who must carry out the strategy, according to Smith (2018). Although top management may establish the strategy, it is important that deliberate and concerted efforts are made to disseminate and publicize the strategy to the managers and employees whose are responsible for its implementation. It is important to note that failure to involve or inform the prospective implementors of the plan will lead to failure in its implementation.

Successful plan implementation is crucial for reaching desired performance levels in any firm. Zaribaf and Bayrami (2015) underline that institutions cannot fulfill their aims without a realistic strategy and an efficient implementation method. The implementation of organizational plans relies on numerous variables, including organizational culture, communication features, top management commitment, and individual duties. Despite the necessity of strategy execution for organizational performance (Srivastava & Sushil, 2017), prior research suggest that a majority of strategy implementations are unsuccessful, with success rates average between 10 to 30 percent (Srivastava & Sushil, 2017).

PROBLEM STATEMENT

The journey of devolution started with the enactment of the promulgation of the constitution of Kenya (CoK2010). The General Elections of March 2013 marked the beginning of the devolved governance landscape in Kenya. Every county government aimed for excellent performance and exemplary implementation of its projects and plans, through efficient and effective delivery of service to its citizenry. The devolved structure of governance was premised on the framework and a rallying call of bringing services closer to the citizens by promoting political, economic, social and independence of the counties while putting an end to over centralization of power and authority at the National Government. According to Daritsu (2022), many people are dissatisfied with service delivery in county governments. Mule cites lack of advancement, broken campaign pledges, nepotism/ethnicity/corruption as the main sources of citizens dissatisfaction with service delivery by county governments. It is evident that county governments in Kenya have not been able to successfully achieve their objectives despite having in place well formulated five-year strategic plans (Abdi, Mbithi & Kithinji, 2021).

According to Wynn and Olayinka (2021), while 80% of businesses have the appropriate strategy, only 14% of them implement them to the letter. The study by Mwende (2018) focused on Nairobi County and established that County's ability to provide excellent services was eroding due to a lack of a defined strategic plan and insufficient leadership; an aspect of top management. Kavindu, (2021) focused on Nairobi County and established that the involvement of all employees in the strategy formulation as well in the implementation process played a major role towards successful implementation of strategy. The study by Njogu (2016) concluded that

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some of the challenges faced by Nairobi City County in implementing strategic plans were loopholes in revenue collection, outdated technology, an aging and unskilled workforce, lack of job descriptions and schedules of duties, lack of supervision and accountability, little or lack of contribution by employees in making or taking important decisions, poor communication within the organization, a dysfunctional organizational structure, culture, transactional leadership style, and political interdependence. Mutuku and Misango (2020) pointed to internal factors as determinants that limit strategy implementation.

OBJECTIVE

To identify determinants of strategy implementation at the County Government of Taita Taveta.

RESEARCH QUESTIONS

How does organizational structure, communication, financial resources and employee technical capacity influence implementation of strategic plans at the Country Government of Taita Taveta?

THEORETICAL FRAMEWORK

This study drew upon institutional theory to elucidate how the structure of an organization guided the activities, programs and decisions of the county government. It also delved into the realm of communication theory to shed light on the pivotal role that communication plays in the exchange of information among different stakeholders within the County Government of Taita Taveta. It also tapped into Resource-Based Theory to ascertain the profound impact of financial resources and the technical prowess of employees (human resources) in the execution of strategic plans and also tapped into McKinsey's 7S model to expound the influence wielded by organizational structure and technical skills of employees in navigating the progress of strategy implementation.

EMPIRICAL LITERATURE

The study's empirical review is presented in this section.

Organizational Structure and Strategy Implementation

Moruff, Benneth, and Kazeem (2019) studied how organizational structures in Nigeria affected organizational strategy and concluded that organization's structure had a positive and substantial impact on strategy implementation, and that it accounted for 53% (adjusted $R2 = 0.5312$) of the variation in a company's strategy.

Waribugo and Etim (2016) evaluated the effect of organizational structure on strategy execution among telecoms enterprises in Nigeria and found that a centralized structure displayed an insignificant positive link with the implementation of budgetary programs and resource control ($r = 0.117$ and 0.111, respectively).

In their study, Waiganjo et al. (2017) concluded that the type of organizational structure influenced implementation of County Strategy plans.

Communication for Effective Strategy Implementation

Communication is important as it enables flow of information in an organization. Zorlu and Korkmaz (2021) conducted research on the connection between effective organizational communication and strategy implementation in Turkey and found that effective organizational communication developed into a phenomenon that was essential for organizations to successfully fulfill their organizational goals.

Mapetere (2021) conducted an empirical investigation on the communication methods that were utilized in communicating the execution of strategy in Zimbabwe. The results were analyzed using ANOVA and it was observed that communication strategies that were utilized during the implementation of the strategy were successful due ineffective communication which led to slow reactions to changes in the business environment, absence of receptiveness to organizational goals and objectives and little interest to implementation of the strategy. `

Daniel (2020) conducted research to investigate the of effective communication techniques on the overall performance of public organizations in Nigeria. According to the findings organizations' overall performance could be significantly improved by implementing communication tactics that are both efficient and effective.

In research exploring the influence of communication on strategy execution within the Administration Police Service, Ishaq et al. (2018) targeted a total of 450 Senior and Junior Police Officers stationed in Lamu County. Their research demonstrated a favorable

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and substantial association between communication and strategy implementation, leading to the conclusion that communication had a noticeable beneficial influence on strategy implementation.

Finances and Strategy Implementation

Jock (2019) carried out a study on implementation of strategic plans in small and medium enterprises (SMEs) in Khartoum, Sudan. Path analysis showed that financial resources played a significant and positive role in the implementation of strategic plans (β=0.355, t-value =3.438 $p<0.05$).

The study by Shilingi (2017), examined how resources influence strategy implementation in five (5) firms in Tanzania. 67% agreed that human and financial resources influenced the successful implementation of strategic plans.

Tele and Gachunga (2019) explored the factors impacting the execution of strategic plans in the energy industry, especially focused on the Geothermal Development Company (GDC) in Kenya. Both descriptive and inferential statistical procedures were applied to examine the acquired data. The results demonstrated a statistically significant association between resources (both financial and non-financial) and the implementation of the strategic plan ($p < 0.05$).

Ngui and Maina (2019) performed a study evaluating the link between organizational resources and strategy execution in non-profit organizations, concentrating on the Kenya Medical Research Institute (KEMRI). The study was anchored in resource-based perspective and learning organization theories, employing questionnaires issued to all 60 management staff. The research highlighted financial resources among other criteria as crucial in the execution of strategy at KEMRI.

Employees' Technical Capacity and Strategy Implementation

Hamdan (2020) did study in Turkey to analyze the impact of including low-level workers in both the development and implementation of organizational strategy, with the purpose of assuring their understanding of the organization's strategic direction. The results underscored the crucial importance of employee capacity in strategy implementation, stressing that allocating duties and responsibilities to low-level workers without aligning them with the organization's vision and goal might lead to unsuccessful strategy implementation.

Ngui and Maina's (2019) study, as previously noted, evaluated the link between organizational resources and strategy execution in non-profit organizations, utilizing the Kenya Medical Research Institute (KEMRI) as a case study. The study found among other elements impacting successful execution of strategic plan, the capacity of personnel played a major role, with their engagement in everyday operations contributing considerably.

Mutuku and Misango (2020) evaluated the extent to which internal variables impacted the execution of strategic plans in the County Government of Machakos and the findings underlined that employee technical skills, together with internal considerations, had a vital influence in determining the implementation of strategic goals.

RESEARCH FINDINGS AND DISCUSSIONS

Questionnaires were distributed to 67 officials of the county government, and interviews carried out with 20 Members of County Assembly (MCAs). Among the selected 20 MCAs, only 11 participated in the interviews. The overall response rate for the study was 73.6%, considered satisfactory for analysis according to Fincham's (2008). The study included a diverse representation of gender, education levels and period of working at the County Government. The results showed 56.6% of the respondents being male and 43.4% being female, while 56.6%, held Bachelor's Degrees, 41.5% possessed Master's Degrees and 1.9%, held a PhD, in addition to 69.8% had a work history of 2 to 5 years, followed by 26.4% who had worked for 6 to 10 years. A smaller percentage, 3.8%, had 10years work experience at the County Government. This distribution suggested that the respondents possessed adequate academic qualifications and work experience enabling them to provide informed insights into the subject of investigation.

The respondents were prompted to rate how much they agreed with several statements on the determinants of implementation of strategic plans at the County Government of Taita Taveta which were guided by a Likert scale of 1-5, where 1-to a very low extent; 2-to a low extent; 3- to a moderate extent; 4-to a high extent and; 5-to a very high extent.
The results were provided in tables 1-4

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Table1: Descriptive statistics results on impact of Organizational Structure on Implementation of Strategic Plans

	N	Min	Max	Mean	Std. Dev.
Organizational structure in the county affects the implementation of strategic plans?	53	4	5	4.77	0.42
A centralized system of structure enhances implementation of strategic plans	53	4	5	4.55	0.80
A specialized system of structure enhances the implementation of strategic plans	53	4	5	4.68	0.78
Organizational structure is clear and employees know what their roles are which enhances the implementation of strategic plans	53	4	5	4.62	0.86
There is a clear structure and resources are well distributed to enable employees perform their tasks and this enhances the implementation of strategic plans	53	3	5	4.60	0.84
There is synchronized operations among departments and employees to ensure that the similar tasks are grouped together and backed with the right resources which checks conflict of interest in the implementation of strategic plans	53	1	5	4.68	0.70
There is flexibility of structure to allow the county to work with strategic alliance partners at county, national and global levels which strengthens the implementation of strategic plan	53	2	5	4.74	0.59

Source: Survey data (2023)

Table2:Descriptive Statistics results on influence of Communication on Implementation of Strategic Plans

	Min	Max	Mean	Std. Dev.
Communication influences the entire strategic planning process from strategic plan formulation to implementation	4.00	5.00	4.91	0.30
Timely communication affects implementation of strategic plans	4.00	5.00	4.77	0.42
The ability of the Country Government to communicate well with stakeholders is an important factor in strategy implementation	4.00	5.00	4.68	0.47
Presence of adequate communication strategies backed by adequate equipment and personnel influences strategic plan implementation process	3.00	5.00	4.60	0.53
Direct engagement by MPs, County Women Representatives, Senators and MCAs through clear communication influences the implementation of the strategic plans in the county	2.00	5.00	4.79	0.53

Source: Survey data (2023)

Table3:Descriptive statistics results on impact of Finances on Implementation of Strategic Plans

	N	Min	Max	Mean	Std. Dev.
Financial considerations significantly impact the execution of strategic plans.	53	4.00	5.00	4.85	0.36
Inconsistent financing from the National Treasury affects the successful implementation of strategic plans.	53	1.00	5.00	4.79	0.63
The sufficiency of financial resource allocation for different county government functions plays a role in influencing the implementation of strategic plans.	53	1.00	5.00	4.57	0.87

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The timely allocation of financial resources affects the implementation of strategic plans.	53	3.00	5.00	4.68	0.51
Effective financial management influences the execution of county strategic plans.	53	3.00	5.00	4.81	0.44
The adequacy of financial resources for employee remuneration has an impact on the implementation of strategic plans.	53	4.00	5.00	4.77	0.42

Source: Survey data (2023)

Table4:Descriptive statistics results on impact of Employees' Technical Capacity on Implementation of Strategic Plans

Statement	N	Min	Max	Mean	Std. Dev.
Employees' technical capacity plays a vital role in executing strategic plans.	53	4	5	4.77	0.75
The educational background of employees impacts the implementation of strategic plans.	53	1	5	2.77	1.32
The professional experiences of employees, both within the government and related organizations, affect the execution of strategic plans.	53	2	5	4.51	0.70
Effectively managing the various competencies of employees within the organization is crucial for strategy implementation.	53	2	5	4.51	0.72
Developing the technical capacity of employees is essential for the successful execution of strategic plans.	53	2	5	4.47	1.07
Hiring skilled personnel in the county government is instrumental in determining the successful implementation of strategic plans.	53	3	5	4.66	0.62
Recognizing gaps in technical expertise within the county and engaging external experts to provide specialized services is important for the implementation of strategic plans.	53	3	5	4.55	1.07

Source: Survey data (2023)

Implementation of Strategic Plans

Finally, the study at evaluated the extent and results of the implementation of strategic plans within the Taita Taveta County Government.

Table5: Descriptive statistics results on Implementation of Strategic Plans

	N	Min	Max	Mean	Std. Dev.
There is successful implementation of strategic plans in the County	53	1.00	5.00	4.77	0.75
The County achieves its Mission, vision and goals	53	2.00	5.00	2.77	1.32
Strategic Plans have led to better service delivery	53	3.00	5.00	4.51	0.70
The various targets in the strategic are implemented in a timely manner	53	2.00	5.00	4.51	0.72
There is positive feedback on the achievement of the goals and objectives stipulated by strategic plans	53	2.00	5.00	4.55	1.07
Strategic activities are achieved within the set budget lines	53	2.00	5.00	4.62	0.74

Source: Survey data (2023)

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The relationships between the study variables were examined using Pearson Correlation and regression analysis.

Correlation Analysis

A Pearson correlation analysis revealed significant associations between the implementation of strategic plans in Taita Taveta County and the independent variables as indicated below (Organizational Structure, r=0.830, p<0.01; Communication, r=0.911, p<0.01; Finances, r= 0.918, p<0.01; and Employees' Technical Capacity, r=0.924, p<0.01) as shown below

Table 4

Correlations

		Structure	Communication	Finances	Employees' Technical Capacity	Implementation of Strategic Plans
Structure	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	53				
Communication	Pearson Correlation	.766**	1			
	Sig. (2-tailed)	.000				
	N	53	53			
Finances	Pearson Correlation	.763**	.885**	1		
	Sig. (2-tailed)	.000	.000			
	N	53	53	53		
Employees' Technical Capacity	Pearson Correlation	.792**	.868**	.877**	1	
	Sig. (2-tailed)	.000	.000	.000		
	N	53	53	53	53	
Implementation of Strategic Plans	Pearson Correlation	.830**	.911**	.918**	.924**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	53	53	53	53	53

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

Regression Analysis

Regression analysis was conducted to ascertain the impact of the independent variables (organizational structure, communication, finances, and employee technical capacity) on the dependent variable (implementation of strategic plans) within the County Government of Taita Taveta.

Coefficient of Determination

Table 6 provides a condensed overview of the results indicating that the independent variables (organizational structure, communication, finances, and employees' technical capacity) collectively accounted for 92.7% of the variation in the implementation of strategic plans in Taita Taveta County (R squared = 0.927). This signifies a highly robust regression model.

Table6: Coefficient of Determination

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.963[a]	.927	.921	.23366

a. Predictors: (Constant), Structure, communication, Finances, Employees Technical Capacity ,

Analysis of Variance

Table 7 encapsulates the results, demonstrating that the independent variables exerted a statistically significant influence on the implementation of strategic plans in the County Government of Taita Taveta, as evidenced by a significant F test ($F(4, 48) = 151.985$, $p < 0.001$).

Table7:Analysis of Variance

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ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	33.191	4	8.298	151.985	.000[b]
	Residual	2.621	48	.055		
	Total	35.811	52			

a. Dependent Variable: Implementation of Strategic Plans
b. Predictors: (Constant), Structure, Communication, Finances, Employees' Technical Capacity

Regression Coefficients

The results additionally reveal that the implementation of strategic plans in the county government of Taita Taveta (dependent variable) was anticipated by the organizational structure, communication, finances, and employee technical skills (independent variables), as indicated by the presence of significant regression coefficients ($p < 0.05$). The standardized coefficients for the fitted regression model were as follows:

*Implementation of Strategic Plans = 0.157*Structure + 0.244*Communication + 0.288* Finance + 0.336* Employees' Technical Capacity*

Table8: Regression Coefficients

Coefficients[a] Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.070	.076		-.922	.361
	Structure	.189	.080	.157	2.361	.022
	Communication	.221	.085	.244	2.610	.012
	Finances	.328	.109	.288	3.003	.004
	Employees' Technical Capacity	.344	.096	.336	3.579	.001

a. Dependent Variable: Implementation of Strategic Plans

Conclusions and recommendations

Based on the findings, it was evident that there were significant relationships of the variables under study namely: organizational structure, communication, finances, and employees' technical capacity (dependent variables) and implementation of strategic plans (independent variable). The study found strong positive correlations between the implementation of strategic plans (dependent variable) and each of the independent variables (organizational structure, communication, finances and employee technical capacity), with correlation coefficients ranging from 0.830 to 0.924, which are significant at $p<0.01$. Significant regression coefficients ($p<0.05$) strengthened the evidence that independent variables played a crucial role in the successful implementation of strategic plans in the county government. In conclusion, the findings indicated that organizational Structure, Communication, finances and employee technical capacity played a critical role in the successful implementation of strategic plans. Taking consideration and ensuring a well-defined organizational structure, ensuring clear lines of communication, availing required financial resources and hiring employees with the necessary technical skills could lead to improved strategic plan implementation in the county government. Policymakers and stakeholders could consider investing efforts to restructure and streamline these aspects to enhance the overall effectiveness and success of strategic implementation efforts.

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OTG (ON-THE-GO) LEARNING: USING OTG FLASH DRIVE AS AN ALTERNATIVE MODE OF LEARNING DELIVERY IN SCIENCE FOR SELECT GRADE 8 STUDENTS

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ABSTRACT

The OTG Learning is a proposed pedagogical project which aimed to improve the submission rate and academic performance among Grade 8 students at Mamplasan National High School through the use of video lessons installed in an OTG drive. Forty identified Grade 8 students who had a low submission rate were selected to participate in the study. The participating students were assessed based on their submission rate and academic grade from second and third quarters comparing their fourth quarter submission rate and academic performance after using the OTG Learning. The results showed that there were significant improvements on the submission rate and academic performance of the students after OTG intervention. This indicates the effectiveness of the facilitating tool in enhancing students' submission rate and academic performance.

KEYWORDS: *OTG learning, submission rate, academic performance, pedagogical intervention*

INTRODUCTION

The COVID-19 pandemic has brought challenging situations for educational institutions to continually provide meaningful and significant learning for the students across all nations (Bayod, 2020). Most countries around the world have temporarily closed educational institutions to contain the spread of the COVID-19 pandemic and reduce infections (UNESCO, 2020). This closure has affected more than 1.2 billion learners worldwide with more than 28 million learners in the Philippines (UNESCO, 2020). In response to this threat, educational leaders around the globe decided to adopt with the socalled "education in the new normal".

In the Philippines, the Department of Education (DepEd) provides mechanisms to address the pressing educational challenges brought by COVID-19. DepEd Order Number 12, Series of 2020 (D.O. 12, S. 2020) on the "Adoption of the Basic Education Learning Continuity Plan for School Year 2020-2021 in Light of the COVID-19 Public Health Emergency" is a package of education interventions that will respond to the basic education challenges brought by COVID-19 pandemic. Furthermore, the DepEd is committed to provide various alternative learning modalities replacing the conventional face-to-face in support to the proclamation of the President of the Republic of the Philippines not to have face-to face classes until it is safe to do so. (-Rogelio P. Bayod 2020).

In the Philippine educational system, public secondary schools as led by the Department of Education implemented modular distance learning modality. This shift of mode of instruction does not only pose struggles to the students but also to the teachers who play an integral part in the new normal education (Castroverde, F., & Acala, M. 2021). Learning in times of covid-19 pandemic requires extra innovation and creativity of the teachers. Teachers must have fundamental mastery of technology, from the simplest technology to the more complex ones. (Etheldredha TW., Yuliana S. 2020). The use of technology in learning is directed at helping students to develop technological skills. The use of technology should be maximized and used to education system now in time of new normal as part of innovation. On-the-Go (OTG) is the improvement and supplement of USB innovation. OTG's capacity is to trade learning between OTG gadgets with the necessity of no-PC. OTG usage is a part of the USB Implementation.

Despite of all these adjustments to education system experiencing today, Mamplasan National High school (MNHS), on the other hand, commits to support the DepEd's "newfound purpose" of the Sulong EduKalidad campaign in providing quality standards of education in the continuity of learning amid this crisis. In accordance with the Learner Enrollment Survey Form (LESF) result and such considerations, he best-fit school learning delivery of MNHS is Modular Distance Learning (MDL). Modular Distance Learning involves individualized instruction that allows learners to use selflearning modules (SLMs) in print format. The modules are either delivered at

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home or picked up from the school. Students are not required to have internet connections but are encouraged to contact their teachers online or through text messages when needed.

From the previous quarters of this school year, the researcher, who handles Grade 8 students in Science subject, monitored the compliance of the students in submitting outputs. Based on the monitoring sheets 12 % of the students cannot submit their outputs regularly and have a very low
submission rate.

In lieu with the monitoring of submission rate, the researcher found out the struggles of the students in answering questions because they lack of interest in studying by themselves because they cannot understand most of the lessons. To address this pedagogical setback, teachers should engross in
interventions and alternative mode of learning.

The use of available technology at home should be maximize and utilize in the learning process of the students. The use of OTG (On-the-Go) flash drive is one of the alternative modes that can be used since it does not require internet connection. The flash drive contains digitized self-directed modules and video broadcast editions and can be used in cellphones, laptops, desktop computers, tablets, and smart televisions (Hallare K. 2020).

METHODOLOGY

This action research introduced the use of OTG flash drive as an alternative mode of learning delivery to improve students' submission rate. The project is called OTG (on-the-Go) Learning. It is a self-conceptualized alterative mode of learning delivery which conducted a quarterly distribution of OTG flash drive that contained video lessons and instructions for the whole quarter period.

The research adopted the Solution Strategy Flowchart in order to conduct the study following a strict implementation of its process.

Figure 1. Solution Strategy Flowchart



From the figure above, the flow of the research started with the monitoring of the submission rate. The researcher utilized a checklist to easily identified the students who are seldom submitting their outputs. In worst cases, there were students that totally did not submitted any output for the whole quarter.

After the monitoring of the submission rate of students' outputs, there were 37 students identified from different sections in grade 8 level and recommended to participate in the OTG Learning as an alternative learning modality to increase their submission rate. The consent from the parents of the participating students were secured by the researcher. Survey also conducted to determine the availability of the gadgets that the students can be used.

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For the whole fourth quarter, the students utilized the OTG where they watch the installed videos in the OTG flash drive that helped them understand the lesson and be able to answer the learning tasks. No pressure to students since they had the all time to watch the videos from the OTG and answer the given tasks depend on their most available time.

When the students were done and completed doing their outputs, parents submitted the outputs to the researcher. Parents were not required to come in school every week for submission. This lessen the effort, time and cost for fare among parents.

Parents and students were asked about their feedback for the implementation of the OTG Learning as an alternative learning modality were sought. Positive feedbacks were given by the parents and students regarding the use and implementation of the project.

RESULTS

After gathering the necessary data, the researcher statistically analyzed percentage of submission rate before and after the implementation of the OTG Learning. The significant difference was also determined.

1. Submission Rate of Grade 8 Students in Science Before the Implementation of OTG Learning

The submission rate of grade 8 students in Science before the implementation of OTG Learning. Grade 8-Admas submitted only 5 outputs over 16 expected consolidated outputs which is only 31.25% submission rate; Grade 8-Everest submitted only 24 outputs over 80 expected consolidated outputs which is only 30.00% submission rate; Grade 8-Olympus submitted only 25 outputs over 104 expected consolidated outputs which is only 24% submission rate; and Grade 8 -Rushmore submitted only 26 outputs over 96 expected consolidated outputs which is only 27.08% submission rate.

The result indicates that the submission rate in science of select students from four (4) sections in Grade 8 is low. There are only 80 total submitted outputs over 296 expected consolidated outputs which is only 27.03% total submission rate before the implementation of OTG Learning.

2. Submission Rate of Grade 8 Students in Science After the Implementation of OTG Learning

The submission rate of grade 8 students in Science after the implementation of OTG Learning. Grade 8-Adams submitted 16 outputs over 16 expected consolidated outputs which is 100% submission rate; Grade 8 -Everest submitted 80 outputs over 80 expected consolidated outputs which is 100% submission rate; Grade 8 -Olympus submitted 104 outputs over 104 expected consolidated outputs which is 100% submission rate; and Grade 8 -Rushmore submitted 96 outputs over 96 expected consolidated outputs which is 100% submission rate.

The result indicates that the submission rate in science of select students from four (4) sections in Grade 8 improved. There are 296 submitted outputs over 296 expected consolidated outputs which is 100% total average submission rate in science after the implementation of OTG Learning.

3. Difference Between Second Quarter Submission Rate and Fourth Quarter Submission Rate

The difference between second quarter submission rate and fourth quarter submission rate of outputs. Grade 8 – Adams improved the submission rate from 31.25% of second quarter to 100% after implementation of the OTG Learning on the fourth quarter with 68.75% submission rate difference; Grade 8- Everest improved the submission rate from 30.00% of second quarter to 100% after implementation of the OTG Learning on the fourth quarter with 70.00% submission rate difference; Grade 8 -Olympus improved the submission rate from 24.04% of second quarter to 100% after implementation of the OTG Learning on the fourth quarter with 75.96% submission rate difference; Grade 8- Rushmore improved the submission rate from 27.08% of second quarter to 100% after implementation of the OTG Learning on the fourth quarter with 72.92% submission rate difference.

The result indicates that the submission rate in science of select students from four (4) sections in Grade 8 improved. The total percentage of submission rate improved from 27.03% average of second quarter to 100% average after the implementation of OTG Learning on the fourth quarter with 72.97% submission rate difference.

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DISCUSSION

OTG Learning is the proposed alternative mode of learning delivery in science of the researcher during distance learning. The focal point of the researcher's problem concentrates on enhancing students' submission rate of outputs. It aimed to address the problem in poor submission rates of the 21% (37 students) of the total enrollment in grade 8. Henceforth, since the students could provide complete outputs, it improves their academic performance as well using the OTG Learning.

Students need be reminded in completing their outputs if teachers want them to improve the submission rate of the outputs. Of course, teachers should also note that supervision is still important in assuring the submission of the outputs among the students. With that being said, OTG Learning be an effective alternative learning modality to aid the students' poor submission rate. Given their learning setup during the distance learning, though it can still also be used as intervention tool now in face-to-face learning, the students were able to do self-learning and answer their learning tasks since video lessons were available and installed in the OTG flash drive.

In a nutshell, the result of this action research proves that the use of OTG Learning as alternative learning modality has a significant difference and can improve the submission rate of the students and improve as well their academic performance. This shows that when students are given accessible resources in self-learning, with adequate guidance and concrete plan, they are going to cope with the low submission rate of their outputs.

CONCLUSIONS

Based on the relevant findings of the study, the following conclusions were drawn:

1. Participating students in the OTG Learning improved their submission rate of outputs in science.
2. After the implementation of OTG Learning the data shows that the action research indicates a significant increase in the submission rate of the student in science.
3. OTG Learning is effective as an alternative learning modality in science that enhance the submission rate of the students and the academic performance as well.

RECOMMENDATIONS

Based in the findings and recommendation, the following are offered as recommendations for possible actions:

1. To make partnership with stakeholders to support the OTG Learning that can help provides OTG flash drives.
2. To conduct a related research using the OTG learning to determine the significant difference not only in the improvement of submission rate but also the improvement in the academic performance of the students.

REFLECTION

OTG Learning is the proposed alternative mode of learning delivery in science of the researcher during distance learning. The focal point of the researcher's problem concentrates on enhancing students' submission rate of outputs. It aimed to address the problem in poor submission rates of the 21% (37 students) of the total enrollment in grade 8. Henceforth, since the students could provide complete outputs, it improves their academic performance as well using the OTG Learning.

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IMPACT OF THE STUDY

As a researcher, I look forward for this action research to be useful for other researchers as reference for their related studies. This study can also be useful to teachers. They can use the OTG Learning in improving the submission rate of their students, an alternative learning modality and an intervention tool.

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PROJECT PROBEX (PROJECT-BASED EXPLORATION): UTILIZATION OF PROJECT BASED-LEARNING AS A TEACHING APPROACH IN FOOD AND BEVERAGE SERVICES (FBS) LESSONS

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ABSTRACT
The Project ProBEx or Project-Based Exploration is a proposed exploratory research project which aimed to determine if project-based learning is an effective teaching approach to improve the performance task results in Food and Beverage Services (FBS) lessons among Grade 8 students of Mamplasan National High School. There were two sets of forty Grade 8 students from heterogenous sections randomly selected to participate in the study. Under quasi-experimental study, the two groups of participating students were assessed based on their performance tasks output using the performance tasks from Learning Packet and the project-based learning activity alternatives by the researcher. Using T-test statistical tool, the results showed that there was a significant difference on the performance task results of the two groups of participating students using performance tasks from LeaP and project-based learning activities. Based on the result, project-based learning activity alternatives by the researcher is more effective tool to use than the performance tasks from Leap to improve the performance tasks results of the students in Food and Beverage Services (FBS) lessons.
KEYWORDS: *Project-based activity, Performance task, Teaching approach, Learning Packet*

INTRODUCITON

Performance task is any learning activity or assessment that asks students to perform to demonstrate their knowledge, understanding and proficiency. In the K-12 educational system, performance based-learning is the way of learning that is being encouraged and incorporated to the curriculum. As to John Dewey as the proponent of learning by doing – rather than learning by passively receiving. He believed that each child was active, inquisitive, and wanted to explore. Children are encouraged to learn through experience, clarify the key points and apply the lessons to get practical results. Thus, performance tasks yield a tangible product and/ or performance that serve as evidence of learning. This presents a situation that calls for learners to apply their learning in context (Magsino, 2017).

Meanwhile, in the Philippines, the implementation of the K to 12 Basic Education Program had caused significant changes in the curriculum, instruction, and assessment practices. The Republic Act (RA) 10533 (2013), otherwise known as the Enhanced Basic Education Act of 2013, required that the curriculum shall employ pedagogical approaches that are constructivist, inquiry-based, reflective, collaborative, differentiated, and integrative. The use of performance task assessment to measure students' learning and skills in accomplishing practical tasks in and dealing with real-life problems is also highlighted in the act Republic Act No 10533, 2013, as cited by Retna (2016).

The Policy Guidelines on the K to 12 Basic Education Program (DepEd Order No. 21, s. 2019) mandated school teachers in the Philippines to facilitate a responsive learning environment and to provide students with relevant learning experiences (Albay & Eisma, 2021).

However, when our country is facing the most difficult time due to the threat of the virus, as stated by Montemayor (2020), delivery of education in the country has greatly changed because of the coronavirus disease 2019 (Covid-19) pandemic.

Asuncion (n.d.) also stated that in our current situation, teaching is hard. We need to find alternative ways and solutions that will help us deliver quality education and overcome these trials posed by the pandemic. Due to COVID-19 pandemic, the traditional face-to-face learning in classroom is not allowed. Therefore, different learning delivery modalities were introduced so that schools have options depending on the COVID-19 restriction and particular context of learners in the school or locality. This then brought discomfort and offered a different level of challenge, especially to teachers teaching skill-based subjects like Technology and Livelihood Education (T.L.E.). It requires the skills of the students rather than the knowledge that they process. It may be a bit common but T.L.E. can be a difficult subject at times. For this reason, teachers struggle in finding the easiest possible way in

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delivering the skills even without face to face.

Mamplasan National High School (MNHS), on the other hand, has implemented the Modular Distance Learning (MDL) Printed based on the result of Learner Enrollment Survey Form (LESF) to continue delivering quality and relevant education amidst pandemic. Modular Distance Learning involves individualized instruction that allows learners to use self-learning modules (SLMs) in print format. This modality has brought a big problem to the learners in doing their hands-on activities in Technology & Livelihood Education (TLE) which is a skill-based subject.

The researcher who handles the Grade 8 students in TLE subject, provided four (4) performance tasks for the second quarter. Unfortunately, based on their performance tasks result, she found out that 62.5% of her students had difficulty in doing the performance task and 37.5% showed no difficulty in doing hands-on activities. The result shows that most of the leaners struggle a lot in doing their performance tasks in TLE lessons in the new normal. To address this problem, the researcher proposed the project-based exploration project to improve the performance tasks results of the students in TLE subject.

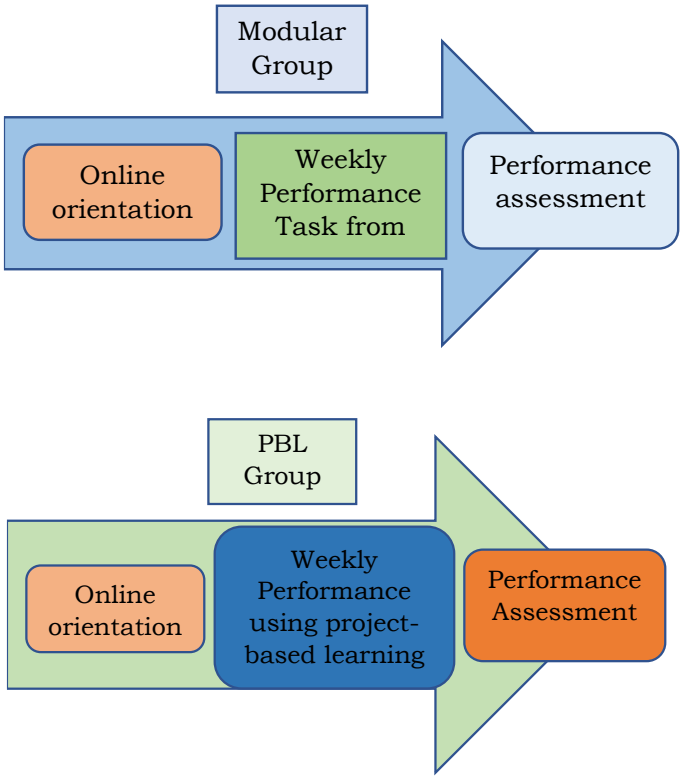
Project-Based Learning has been the leading strategy used by most of the top educational systems in the world. Authentic learning that addresses the 21st century skills is what PBL offers.

Project-based learning refers to the theory and practice of utilizing real world work assignments on time-limited projects to achieve mandated performance objectives and to facilitate individual and collective learning (Smith and Dodds, 1997). The use of projects for both learning and task achievement is most typically associated with action learning, which assumes that people learn most effectively when working on real- time problems that occur in their own work setting (DeFellippi, 2001).
Project-based learning (PBL) is an active student-centred form of instruction which is characterized by students' autonomy, constructive investigations, goal setting, collaboration, communication, and reflection within real-world practices (D Kokotsaki, V Menzies, A Wiggins, 2016).

METHODOLOGY

This action research is a project-based exploration wherein the two groups of participating students were given a performance task weekly. The modular group performed the performance tasks from the LeaP while the PBL group performed the project-based activity alternatives by the researcher. Their output was assessed by the two TLE teachers using Likert scale.

The researcher adopted the Solution Strategy Flowchart in order to conduct the study following the strict implementation of its process.



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From the figure above, the flow of the research started with the conduct of online orientation via Google Meet by the researcher wherein all participating students from the two groups synchronously joined. Afterwards, they were given different performance-based activities weekly. The modular group used the performance tasks from the LeaP while the ProBEx group utilized the project-based learning activity alternatives by the researcher.

For the whole quarter, the students crafted their projects, and submitted them weekly. They submitted their output in Google drive every Friday.

Aside from the researcher, she also asked two TLE teachers from her school to evaluate the students' performance task results using the Likert Scale. The researcher gathered all the scores and input them using Microsoft Excel.

The respondents for this research were the enrolled Grade 8 students at Mamplasan National High School for school year 2021-2022. All grade 8 students were under Modular Distance Learner. They utilized self-learning printed modules as their primary learning materials.

Each section in grade 8 was heterogeneously grouped. This means that the students were sectioned diversely.

The primary research instrument used by the modular group was the weekly performance tasks from LeaP. On the other hand, the project-based learning activity made by the researcher used by the ProBEx group. The researcher-made tool includes the following: interview/survey, simulation, and promotional video.

To describe the students' performance task result quantifiably, this research used the Likert Scale. This rating scale measured students' performance task results during their performance-based activities. Thus, it was a 4-level scale to avoid the neutrality of the performance task results.

RESULTS

After gathering the necessary data, the researcher statistically analyzed their performance task results through the help of her statistician. They transcribed the scores of the students and used the Likert scale to verbally interpret the data. This was conducted to prove which performance-based activities is more effective to use as teaching approach in improving the students' performance tasks result.

The Mean was used to compute for the average score of the students' performance task results. The T-test was utilized to compare the performance tasks results of the two groups of participating students based on the average score and as well as to know if there is a significant difference in using the two different performance-based activities.

After the thorough analysis, the following results are discussed below:

1. **Average Mean of Students' Performance Task Results Using Performance Tasks from LeaP**

Based on the given data, the average mean of performance task results of participating students using performance tasks from LeaP is 13.525 with a verbal interpretation of Emerging. This means that they were infrequently demonstrated adequate level of clinical skill. The result shows that they were very often to ask directions, guidance, prompting, support, and supervision in the completion of the tasks.

2. **Average Mean of Students' Performance Task Result Using Project-Based Learning Activity Alternatives by the Researcher**

From the statistical data gathered, the participating students acquired an average mean of 30.2 with a verbal interpretation of Exemplary. This means that the participating students were almost always demonstrate excellent standard of the clinical skill. The result shows that they were almost never require directions, guidance, prompting, support, and supervision in the completion of the tasks.

3. **Significant difference on Students' Performance Task Results After Using Performance Task from Leap and Project-Based Learning Activity**

There was a significant difference between the Performance Task Result of the select Grade 8 students who undergone modular distance learning and Project Probex. A weighted mean of 13.525 and 30.2 were obtained by the modular group and ProBEx group respectively with a mean difference of 16.675. A computed t statistics of 42.801 means that there is a significant difference between the performance tasks results of the two groups.

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DISCUSSION

The Project ProBEx or Project-Based Exploration is a proposed exploratory research project which aimed to determine if project-based learning is an effective teaching approach to improve students' performance task results in Food and Beverage Services (FBS) lessons during distance learning. To address the problem, the two groups of participating students were given a different performance-based activity weekly. Modular group used the performance tasks from the LeaP while the PBL group used the project-based learning activity alternatives by the researcher. Based on the result, project-based learning is an effective teaching approach in Food and Beverage Services (FBS) lessons to improve the performance task results of the students.

The result of this action research proves that students are indeed "learning by doing". Although the performance tasks outputs of the students were still not on a par with perfection, significant improvement on the performance task results are highly recognized. This shows that when students are given freedom to explore on the real-world situations, they are going to acquire deeper knowledge and improve in their targeted skill.

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FORMULATION AND EVALUATION OF HERBAL BURN HEAL CREAM FROM *JATROPHA CURCAS LATEX*

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ABSTRACT

Burn injuries continue to be a significant global health concern, often resulting in severe morbidity and mortality. Traditional herbal remedies have long been utilized for wound healing, with Jatropha curcas emerging as a promising candidate due to its reported anti-inflammatory, antimicrobial, and wound healing properties. In this study, we aimed to formulate and evaluate herbal burn healing cream using Jatropha curcas latex. The cream formulation was developed using a combination of Jatropha curcas latex extract, along with compatible excipients to optimize stability, texture, and therapeutic efficacy. The formulated cream was subjected to various physicochemical, rheological, and pharmacological evaluations to assess its suitability for burn wound management.

Physicochemical analysis revealed the cream to be stable with desirable pH, viscosity, spreadability, and consistency. Rheological studies demonstrated indicating ease of application and spreadability on the skin. Furthermore, in vitro antimicrobial assays exhibited significant inhibition of common wound pathogens by the formulated cream. It has been reported that this latex has several biological activities such as antibacterial, antioxidant, anti-inflammatory, and wound healing.

KEYWORDS: *burn healer, Herbal cream, Jatropha curcas latex, Formulation, Evaluation, etc.*

INTRODUCTION

Burn injuries represent a significant public health challenge worldwide, causing substantial morbidity and mortality, particularly in developing countries where access to advanced medical care may be limited [1].Despite advancements in burn management, including surgical techniques, wound dressings, and pharmaceutical interventions, effective treatment options remain elusive, often leading to prolonged healing times, increased risk of infection, and impaired quality of life for affected individuals. In recent years, there has been a growing interest in the utilization of natural remedies, particularly herbal therapies, for wound healing and burn management[2].Traditional medicinal plants have been valued for their therapeutic properties for centuries, offering potential advantages such as cost-effectiveness, accessibility, and fewer adverse effects compared to synthetic pharmaceuticals. Among these medicinal plants, *Jatropha curcas L.*, commonly known as physic nut or Barbados nut, has gained attention for its diverse pharmacological activities, including anti-inflammatory, antimicrobial, and wound healing properties.

Jatropha curcas is a perennial shrub belonging to the Euphorbiaceae family, indigenous to tropical and subtropical regions [3,4]. Various parts of the plant, including the leaves, seeds, and latex, have been traditionally used in folk medicine for the treatment of various ailments, including wounds, ulcers, and skin disorders. The latex obtained from the plant has been reported to possess significant wound healing potential, attributed to its rich phytochemical composition, which includes alkaloids, flavonoids, tannins, and saponins [6,7]. In light of the therapeutic properties attributed to *Jatropha curcas latex*, there is a growing interest in exploring its potential application in the development of novel formulations for burn wound management [5]. The present study aims to formulate and evaluate a herbal burn healing cream utilizing *Jatropha curcas latex* extract, along with compatible excipients, with the goal of harnessing its therapeutic potential for enhanced wound healing and tissue regeneration.

Advantages of herbal burn heal cream

1. Anti-inflammatory Properties

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2. Antimicrobial Activity
3. Wound Healing Effects.
4. Analgesic Effects.
5. Natural Source.
6. Availability
7. Cost-Effectiveness.
8. Cultural and Traditional Use.

MATERIAL AND METHODS

Materials

Collection, identification and processing of plant:

The *Jatropha curcas* plant latex was collected from Amolak Botanical Garden, Kada, Beed, Maharashtra. The botanical identification and authentication of the plant material were conducted by Dr. Sayyad I.G., Head of the Department of Botany at Gandhi College, Kada, Ashti, Beed, Maharashtra, India.

Jatropha curcas

Jatropha curcas could be a small tree or shrub belonging to family Euphorbiaceae. Medic. *J. curcas Linn*. The different types plant name are present like parsa erand,mogli Erand aratanjot .The leaf and latex extracts of *J. curcas* contained appreciable amounts of secondary metabolic compounds a loss or breaking of cellular and anatomic or function a process that's initiated by trauma and infrequently occurs in numerous phases like coagulation, epithelization, granulation, collegenation from this plant are reported to own remarkable anti [6,7] hemostatic [8], antioxidant, and anticancer formation of latest tissue and other is protections from microbial invasion during the healing process. On the physiology of wound healing, the injuries antibiotic compounds are utilized in heavy untoward effect like carcinogenesis compounds are alkaloids, saponins, flavonoids, and tannins the process of wound healing that affects migration and proliferation of fibroblast cells accelerate the method of repair of epithelial surfaces promote restoration .Unfortunately, there's a these growth factors [11,12]. The bioactive. Flavonoids, saponins, and tannins play a job within burn heal property.



fig.1: ***Jatropha curcas shrub***

Chemical constituents

a) phenolic acids
b) lignans
c) flavonoids
d) coumarins
e) alkaloids
f) terpenes

Medicinal uses

a) Antioxidant activity
b) Cytotoxic activity
c) anti-cancer activity
d) antimicrobial activity
e) antifungal activity

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f) Anti-inflammatory activity

Following are the excipients used in the formulation of the herbal burn heal cream:

EXCIPIENTS

Steric acid

Chemical Structure: Stearic acid is a long-chain carboxylic acid. Its molecular structure consists of a straight-chain hydrocarbon with 18 carbon atoms bonded to a carboxyl group (COOH) at one end.

Physical Properties:

Appearance: Stearic acid appears as a white, waxy solid at room temperature.

Melting Point: It has a relatively high melting point of around 69-71°C (156-160°F), which makes it useful in various applications.

Solubility: Stearic acid is insoluble in water but soluble in organic solvents like ethanol, ether, and chloroform.

Occurrence: Stearic acid naturally occurs in various animal and vegetable fats and oils. It's particularly abundant in fats like cocoa butter, shea butter, and palm oil.

Industrial Production: Stearic acid can be produced through the hydrolysis of fats and oils. It's often derived from vegetable oils such as palm oil, coconut oil, or soybean oil. The process involves the saponification of the oil to form soap, followed by acidification to separate the fatty acids. Stearic acid is then purified through processes like distillation or crystallization.

Uses:

- **Cosmetics and Personal Care:** Stearic acid is commonly used in cosmetics and personal care products as an emulsifier, emollient, and thickening agent. It helps stabilize emulsions and provides a smooth, creamy texture in products like lotions, creams, and soaps.
- **Pharmaceuticals:** It's used in the production of various pharmaceutical formulations, including ointments, creams, and suppositories.
- **Candles:** Stearic acid is often added to candle wax to increase hardness and improve burn time.
- **Food Industry:** In the food industry, stearic acid and its salts are used as emulsifiers, stabilizers, and thickeners in various food products.
- **Plastics and Rubber Industry:** It's used as a lubricant and release agent in the production of plastics, rubber, and other materials.
- **Textile Industry:** Stearic acid is used as a softening agent and lubricant in the textile industry during the manufacturing process of fabrics and yarns.

Safety: Stearic acid is generally considered safe for use in cosmetics, food, and pharmaceuticals when used in accordance with regulations. It's non-toxic and non-irritating to the skin. However, like any chemical, it should be handled with care, and exposure to large amounts may cause irritation.



Fig.2: Steric acid

Wool fat

Wool fat, also known as lanolin, is a natural substance derived from sheep's wool. It's a complex mixture of esters, fatty acids, and alcohols that serves various purposes industries ranging from cosmetics to pharmaceuticals.

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Composition: Wool fat primarily consists of esters of high-molecular-weight lanolin alcohols and fatty acids. It also contains small amounts of free lanolin alcohols, lanolin acids, and lanolin hydrocarbons.
Extraction: Lanolin is obtained as a byproduct of wool washing. After shearing sheep, the wool is washed to remove impurities like dirt, sweat, and grease. During this process, lanolin is extracted from the wool fibers.
Properties:
Emollient: Lanolin has excellent emollient properties, meaning it softens and moisturizes the skin by forming a protective barrier that prevents moisture loss.
Occlusive: It forms a protective barrier on the skin's surface, which helps retain moisture and protect the skin from environmental factors like wind and cold.
Water-in-Oil Emulsifier: Lanolin can act as a stabilizer and emulsifier in cosmetic formulations, particularly in water-in-oil emulsions.
Hydrophilic-Lipophilic Balance (HLB): Lanolin has a relatively high HLB value, making it suitable for formulating water-in-oil emulsions and oil-in-water emulsions.
Applications:

- Cosmetics
- Pharmaceuticals
- Baby Care Products
- Industrial Applications
- Textiles

Safety: Lanolin is generally considered safe for topical use, although some individuals may be allergic to it. It's important to use lanolin products from reputable sources to ensure purity and minimize the risk of impurities or contaminants.



Fig.3: Wool fat

Hard Paraffin
Hard paraffin, also known as paraffin wax, is a type of wax derived from petroleum or other natural sources. It's a versatile substance with various industrial, cosmetic, and therapeutic applications.
Composition: Paraffin wax is a mixture of hydrocarbon molecules, primarily straight-chain alkanes. The carbon chain length typically ranges from about 20 to 40 carbon atoms.

Production
Petroleum-derived Paraffin: The most common method of producing paraffin wax involves refining crude oil. Crude oil is distilled to separate various fractions, and paraffin wax is obtained from the heavier fractions through a process called solvent dewaxing or by crystallization.
Natural Sources: Paraffin wax can also be derived from other natural sources, such as shale oil or coal.

Physical Properties
Appearance: Paraffin wax typically appears as a white or colorless, odorless solid at room temperature.

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Melting Point: Paraffin wax has a relatively low melting point, usually between 46°C to 68°C (115°F to 154°F), depending on the grade and purity.
Hardness: Paraffin wax can vary in hardness, ranging from relatively soft to hard and brittle, depending on factors such as the molecular weight distribution and additives.

Applications
- Candle Making:
- Cosmetics and Personal Care
- Food Industry
- Industrial Applications

Safety: Paraffin wax is generally considered safe for its intended uses.





Fig.4: Hard paraffin

Cocoa butter
Cocoa butter, derived from the cocoa bean, is a versatile and beneficial ingredient for formulating burn healing creams. Its unique properties make it a popular choice in skincare products, especially those designed to treat burns. Here's a detailed breakdown of cocoa butter and its role in burn healing cream formulations:

Composition
Cocoa butter is primarily composed of fatty acids, including oleic acid, stearic acid, and palmitic acid. These fatty acids give cocoa butter its solid texture at room temperature.
It also contains natural antioxidants, such as vitamin E, which can help protect the skin from oxidative stress and promote healing.

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Moisturizing Properties
Cocoa butter is a highly effective moisturizer. It forms a protective barrier over the skin, locking in moisture and preventing dehydration, which is crucial for burn healing. The emollient properties of cocoa butter help to soften and smooth the skin, reducing dryness and discomfort associated with burns.

Skin Repair and Regeneration
Cocoa butter contains compounds that support skin repair and regeneration. These compounds enhance the skin's natural healing process, promoting faster recovery from burns.

Anti-inflammatory Effects
Burn injuries often result in inflammation, which can exacerbate pain and delay healing. Cocoa butter possesses anti-inflammatory properties that help reduce swelling and discomfort associated with burns. By calming inflammation, cocoa butter creates a more favorable environment for the skin to repair itself.

Enhanced Formulation Stability
In burn healing cream formulations, cocoa butter can improve the stability and consistency of the product. Its solid texture at room temperature contributes to the cream's thickness and spreadability.

Compatibility with Other Ingredients
Cocoa butter is compatible with a wide range of other skincare ingredients, including soothing agents like aloe vera and chamomile, as well as antimicrobial agents like honey or silver sulfadiazine. By combining cocoa butter with complementary ingredients, burn healing creams can offer multifaceted benefits, such as pain relief, infection prevention, and scar reduction.

Application
- Moisturizing Agent
- Skin Softening and Smoothing
- Skin Conditioning
- Healing and Soothing Properties
- Antioxidant Benefits
- Fragrance and Aesthetic Appeal



Fig. 5: Cocoa butter

Triethanolamine
Triethanolamine, often abbreviated as TEA, is an organic compound that belongs to the class of ethanolamines. It is a colorless to pale yellow viscous liquid with a mild ammonia odor. Triethanolamine is widely used in various industrial, cosmetic, and pharmaceutical applications.

Chemical Structure: Triethanolamine has the chemical formula C6H15NO3 and molecular weight of 149.19 g/mol. It consists of a tertiary amine group (-N(CH2CH2OH)3) attached to three hydroxyethyl groups.

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Synthesis: Triethanolamine is typically synthesized through the reaction of ethylene oxide with ammonia, followed by the addition of ethylene oxide to ammonia to form monoethanolamine, then diethanolamine, and finally triethanolamine.

Physical Properties
Appearance: Triethanolamine is a clear to slightly yellow viscous liquid at room temperature.
Odor: It has a characteristic ammonia-like odor.
Solubility: Triethanolamine is miscible with water and soluble in alcohol and ether.
Uses:

- Pharmaceuticals
- Cleaning Products
- Textiles
- Metalworking Fluids
- Pesticides

Safety Considerations
Prolonged or repeated exposure to triethanolamine vapor or mist may cause irritation to the respiratory tract, eyes, and skin. Triethanolamine should be handled with care, and proper ventilation should be provided when working with it in enclosed spaces.

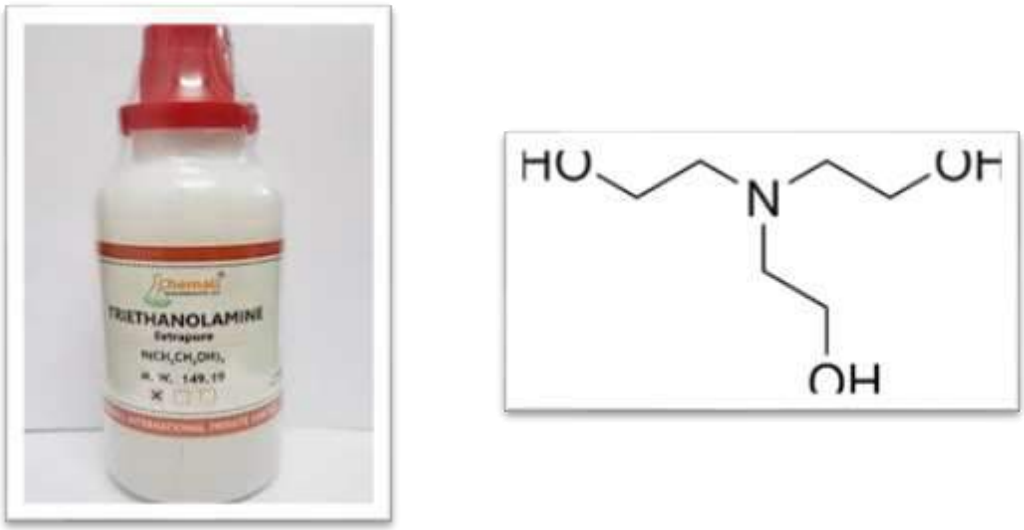


Fig. 6: triethanolamine

Methyl Paraben
Methyl paraben is a commonly used preservative in the cosmetic, pharmaceutical, and food industries. It belongs to the group of chemicals known as parabens, which are esters of para-hydroxybenzoic acid. Methyl paraben specifically is the methyl ester of para-hydroxybenzoic acid.

Chemical Structure: Methyl paraben has the chemical formula C8H8O3 and the IUPAC name methyl 4-hydroxybenzoate. Its molecular structure consists of a para-hydroxybenzoic acid molecule with a methyl group (-CH3) attached to the ester functional group (-COO).

Synthesis: Methyl paraben is typically synthesized through the esterification reaction between para-hydroxybenzoic acid and methanol in the presence of an acid catalyst.

Physical Properties:
Appearance: Methyl paraben is usually a white crystalline powder or colorless crystals.
Odor: It is odorless or may have a faint odor.
Solubility: Methyl paraben is soluble in alcohol, ether, and other organic solvents, but only sparingly soluble in water.

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Preservative Properties

Methyl paraben is widely used as a preservative in cosmetics, personal care products, pharmaceuticals, and food products. It inhibits the growth of bacteria, yeast, and mold by disrupting their cellular functions and metabolism, thereby extending the shelf life of products and preventing spoilage. Methyl paraben is effective over a wide pH range and is compatible with a variety of formulations.

Applications

- Cosmetics and Personal Care Products
- Pharmaceuticals
- Food Industry

Safety Considerations

Methyl paraben has been extensively studied for its safety and is generally recognized as safe (GRAS) for use in cosmetics and food products by regulatory authorities such as the U.S. Food and Drug Administration (FDA) and the European Food Safety Authority (EFSA).



Fig. 7: Methyl paraben and Structure of methyl paraben

Water

Water is a key ingredient in many cream formulations, serving as a solvent, diluent, and vehicle for active ingredients. Creams are semisolid emulsions consisting of water and oil phases stabilized by emulsifiers.

METHOD OF PREPARATION

Collection of latex

Collecting latex from *Jatropha curcas* involves following steps -

Selecting the Plant: A mature *Jatropha curcas* plant with well-developed seeds was choosen by ensuring that the plant is healthy and free from diseases.

Preparation: appropriate protective gear such as gloves and goggles were weared to prevent direct contact with the latex, which can cause skin irritation.

Harvesting: The latex was obtained by cutting the leaf stalk and the collected latex was immediately stored at 4 °C until further use

Collection: Suitable containers was selected such as small buckets or bowls, beneath the incisions to collect the latex as it drips out by ensuring that the containers were cleaned and free from any contaminants.

Allowing Latex to Drip: The incisions were leaved open to allow the latex to drip freely. The time required for latex collection varies depending on factors such as the weather, plant health, and the size of the incisions. Latex collection took several hours to a day.

Processing: The latex was collected, carefully removed the container without spilling the latex and transferred the collected latex to a suitable storage container for further processing or use.

Cleaning Up: The harvesting tools and equipment were cleaned thoroughly to prevent contamination and ensure their longevity by disposing of any leftover latex properly according to local regulations.

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Fig. 8: Collection of latex

FORMULATION TABLE

Table 1: Formulation table of curcus *Jatropha curcas* Cream

Ingredients	F1	F2	F3
Wool fat	1gm	1 gm	1gm
Hard paraffin	1gm	1gm	1gm
Steric acid	0.48 gm	-	0.48gm
Cocoa butter	13gm	13gm	12gm
Jatropha plant latex	5ml	5ml	5ml
Triethanolamine	0.5ml	0.5ml	0.5ml
Methyl paraben	0.02gm	0.02gm	0.02gm
Water	Q. S	Q.S.	Q.S.

Formulation of herbal burn heal cream

The latex of *Jatropha curcas* has been used in traditional medicine to alleviate various conditions. It has been reported that this latex has several biological activities such as antibacterial, antioxidant, anti-inflammatory, wound healing and burn healing.

a) Accurately weighing all the ingredients



Fig. 9: Weighing of ingredients

Preparation of oil phase and water phase

- Steric acid, wool fat, hard paraffin and white soft paraffin were melted to make oil phase and methyl parabens, triethanolamine and water were also melted to make water phase.
- After making both phases, water phase was added in the oil phase with introduction of *Jatropha curcas* latex with constant stirring until cooling of emulsifier in the china dish.

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Fig. 10: Preparation of oil phase and water phase.

Prepared formulation: Prepared the cream stored in the container and performed evaluation tests.





Fig.11: Prepared formulation

Performance of evaluation tests

Phytochemical Screening

Phytochemical screening was carried out to determine the secondary metabolites contained in the 96% ethanol extract. These secondary metabolites that have been qualitatively tested include alkaloids, flavonoids, saponins, tannins.

a. **Flavonoid Test:** A total of 0.5 grams of sap is dissolved in 2 ml of 96% ethanol and 3 drops of NaOH solution are added. A change in the intensity of the color to yellow with the addition indicates the presence of flavonoid compounds.
b. **Saponin Test:** A total of 0.5 grams of sap dissolved in 20 ml of aquades gives rise to foam of up to 1 cm indicating the presence of saponin compounds.
c. **Tannin Test:** A total of 0.5 grams of sap is dissolved in 2 ml of 96% ethanol, simmered in 10 mL of aquades in a test tube then filtered. 3 drops of 0.1% ferric chloride solution were added and the formation of a brownish-green or bluish-black color was observed, indicating the presence of tannins.

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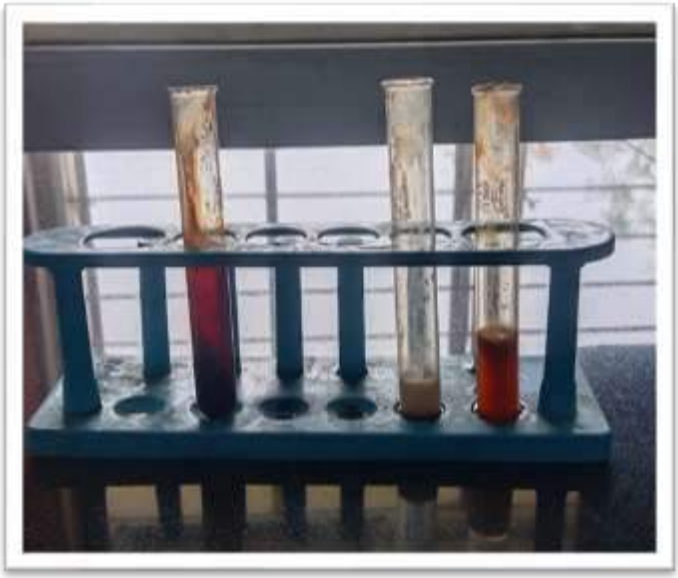


Fig. 12: Phytochemical screening

Evaluation Tests

a. Physical Properties: The Cream was observed for color and odor cream in white color observed

- **Appearance:** The appearance of the cream was judged by its color, pearlescence Roughness and graded.
- **After feel:** Emolliency, slipperiness and amount of residue left after the application of fixed amount of cream was checked.
- **Type of smear:** After application of cream, the type of film or smear formed on the skin were checked.
- **Ease of Removal:** The ease of removal of the cream applied was examined by washing the applied part with tap water.
- **Irritancy test:** Mark an area (1sq.cm) on the left-hand dorsal surface. The cream was applied to the specified area and time was noted. Irritancy, erythema, edema, was checked if any for regular intervals up to 24 hrs. and reported.

b. Organoleptic Test

Organoleptic testing carried out includes observation of the color, aroma, and texture of gel preparations. The criteria for a good organoleptic gel preparation are the soft, color and aroma of the gel according to the extract used.

c. pH test

Done by dipping the pH meter electrode into each gel preparation that has previously been dissolved with aquadestilata. After the electrode is dipped, it is then allowed to stand until the screen on the pH meter shows a stable number. The pH requirement for topical preparations is between 5-10, or gel preparations must match the skin pH of 4.5- 6.5.

d. Viscosity Test

The viscosity test is carried out by means of the rotor mounted on the test equipment, arranged until the rotor is immersed in the gel. The tool is activated; the indicated scale is read until it shows a stable number. Gel viscosity measurements were performed using a Brookfield Viscometer using spindles 5 and 4 at a speed of 50 rpm.

Spread Power Test Dispersion testing is carried out to determine the speed at which the gel spreads on the skin when applied to the skin. A total of 1 gram of gel preparation is carefully placed on a glass measuring 20x20 cm. then covered with another glass and used ballast on it until the weight reaches 125 grams and measured in diameter after 1 minute. The dispersion requirement is between 5-7 cm.

Phytochemical Investigation

A series of chemical tests was conducted to identify various compounds within a sample, using specific reagents that yield distinct indicators for each substance.

- In the Saponin test, distilled water (Aquadest) was used. Shaking the sample with Aquadest produced stable foam, indicating the presence of saponins due to their surfactant properties.
- For the Tannin test, ethanol and ferric chloride ($FeCl_3$) were employed. The sample turned brownish-green, confirming the presence of tannins, which react with $FeCl_3$ to produce this color.
- The Flavonoids test used ethanol and sodium hydroxide (NaOH). A yellow color appeared, indicating the presence of flavonoids, which show this color change in alkaline conditions.

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- In the Alkaloids test, hydrochloric acid (HCl) and Mayer's reagent were used. A yellow precipitate formed, confirming the presence of alkaloids, which react with Mayer's reagent to produce this precipitate.

Table 2: Phytochemical Investigation of *Jatropha curcas*

Sr. No	Test	Reagent	Inference	Result
1	Saponin test	Aquadest	Formed Foam (+)	Present
2	Tannin test	Ethanol + $FeCl_3$	Brownish green color (+)	Present
3	Flavonoids test	Ethanol + NaOH	Yellow color (+)	Present
4	Alkaloids test	HCl+ Mayer Reagent	Yellow Precipitate (+)	Present

The phytochemical analysis of *Jatropha curcas* was confirmed by different tests. These tests confirmed the presence of saponins, tannins, flavonoids, and alkaloids in the sample, each identified by specific color changes or precipitate formation with the respective reagents.

Organoleptic Evaluation

The table 3 outlines the results of organoleptic tests conducted on *Jatropha curcas* cream preparations, assessing sensory characteristics such as smell, phase, and color. For the smell test, all three formulations (F1, F2, and F3) exhibited a characteristic smell, suggesting consistency across the preparations in terms of olfactory properties. In terms of phase, all formulations appeared as semisolid, indicating uniformity in texture and consistency. Additionally, for color evaluation, all three formulations exhibited a white hue, further indicating consistency in appearance across the samples. Overall, these organoleptic tests indicate that the cream preparations share similar sensory attributes, including smell, phase, and color, suggesting uniformity and standardization in their preparation process.

Table 3: Organoleptic Evaluation of *Jatropha curcas*

Sr. No.	Test	F1	F2	F3
1	Smell	Characteristics smell	Characteristics smell	Characteristics smell
2	phase	semisolid	semisolid	semisolid
3	color	White	White	white

pH test

The table 4 presents the pH values obtained from pH testing conducted on *Jatropha curcas* different cream formulations. Formulation F1 exhibited a pH of 6.1, while F2 and F3 had pH values of 6.9 and 6.7, respectively. These pH measurements are crucial as they indicate the acidity or alkalinity of the cream preparations. The pH values fall within a slightly acidic to neutral range, which is typically desirable for skin care products to maintain compatibility with the skin's natural pH. These results suggest that all formulations are within acceptable pH ranges, ensuring their suitability for topical application without causing irritation or discomfort to the skin.

Table 4: pH test of *Jatropha curcas* formulations

Cream Dosage Formulation	pH
F1	6.1
F2	6.9
F3	6.7

Spreadability test

The table 5 presents the results of a spreadability test conducted on different cream formulations, assessing their ability to spread under varying loads. The load imposed, ranging from "Glass only" to "300 gr," represents the weight applied to the cream during the test. For each load level, the spreadability measurements (in millimeters) are recorded for formulations F1, F2, and F3. As the load increases, indicating greater pressure applied to the cream, the spreadability measurements generally increase across all formulations. The average spreadability values for F1, F2, and F3 are calculated as 6.45 mm, 6.62 mm, and 7.12 mm, respectively. These results suggest that formulation F3 exhibits the highest spreadability among the three formulations, making it more conducive to application and distribution on the skin's surface.

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Table 5: Spreadability test of *Jatropha curcas* formulations

Load imposed	F1	F2	F3
Glass only	5.74	5.84	6.2
100 gr	6.11	6.43	6.81
200 gr	6.87	7.09	7.87
300 gr	7.11	7.12	7.89
average	6.45	6.62	7.12

Viscosity test

The table 6 provides the results of viscosity tests conducted on different cream formulations, measuring their resistance to flow. Formulations F1, F2, and F3 exhibited viscosity values of 0.4 Pa. s, 0.2 Pa. s, and 0.3 Pa. s, respectively. These viscosity measurements are crucial indicators of the consistency and thickness of the creams. Lower viscosity values, such as those seen in F2, suggest a thinner consistency, allowing for easier spreading and absorption into the skin. Conversely, higher viscosity values, as observed in F1, indicate a thicker consistency, which may provide greater moisturizing and protective properties. Formulation F3 falls between the other two formulations in terms of viscosity, offering a balance between spreadability and richness. Overall, these viscosity tests help assess the texture and application characteristics of the cream formulations, aiding in determining their suitability for various skin care needs.

Table 6: Viscosity of *Jatropha curcas* formulations

Formulation	Viscosity
F1	0.4 Pa. s
F2	0.2 Pa. s
F3	0.3 Pa s

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

CONCLUSION

Based on the results of the research that has been carried out, it can be concluded that Jatropha *curcas* can be formulated as a cream preparation using additives such as steric acid as a binder, hard paraffin as a lubricant, white soft paraffin as ointment base, methyl paraben as anti-fungal agent, triethalonamide as pH maintainer for hair and skin and wool fat as a emollient.

There are some characteristic and physical properties of *Jatropha curcas* plant latex cream formulation with semisolid dosage form having characteristic smell but there are some color differences with differences in concentrations like white, creamy white, etc. The pH test showed that 6.8, 6.9 and 7.2 of the 1st, 2nd and 3rd formulation respectively.

There is an effectiveness of *Jatropha curcas* cream with the best burn healing effect given by cream with 25% of latex of *jatropha curcas* plant gives 100% of bioavailability within 10-12 days.

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THE IMPACT OF SOCIAL MEDIA ON STUDENTS' ACADEMIC ACHIEVEMENT IN HIGHER EDUCATION: LITERATURE REVIEWED AND ANALYZED SYSTEMATICALLY

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ABSTRACT
The intent of this systematically reviewed literature was to assess the impact of social media on students' academic achievement. The researcher gathered previously conducted articles from Scopus data base. He examined papers that were released in the years from 2008-2023. To guide the review, the researcher performed six actions; systematic literature review using PRISMA method (Mihret, G. et al., 2024). Among 30 scrutinized articles, the researcher retained 10 articles. The researcher used key words: Academic Performance, Social Media, Students, Academic Achievement, Academic Achievements, and Higher Education. The retrieval date for articles was 20 of May 2024. The publication stage that the researcher used was final articles not article in press and the document type was articles which were published in English language. Predominantly, the subject areas he used were Social Sciences, Arts and Humanities and Computer Sciences. The results showed that the positive impacts of social media among higher education settings appeared to be higher as compared to negative impacts. This means, there was a positive impact of using social Medias towards their academic achievement (Mushtaq and Benraghda).

KEY WORDS: *Academic Performance, Social Media, Students, Academic Achievement, Academic Achievements, and Higher Education*

1. INTRODUCTION

In order to eliminate discrepancies between the literature on the use of digital media for education and its effects on students' academic achievement in higher education institutions, this systematic literature review aims to develop a model that would identify essential aspects that are predicted to continue to play a large role for learning, which could be used to improve academic performance in higher education. Technological, task, and social characteristics were found to have a substantial association for using digital media sites for academic purposes, which had a favorable impact on satisfaction and educational achievement. Similar to this, a significant relationship between online communication, reasons for communicating, communication self-efficacy, and attitude toward using features was found to exist for utilizing digital media sites for educational purposes that positively impacted satisfaction as well as academic performance. Digital media enhance students' active learning and give them the ability to effectively exchange knowledge, data, and discussions. In order to further their educational objectives, the students have to make use of digital media platforms. Additionally, educators in higher education institutions need to be convinced to use digital media platforms in their lessons (W. M. Al-Rahmi et al.).

Social Media are growing rapidly among the young generation all over the world. University age students widely engaged using Social Media. So, they will affect students personal and professional live. Despite of public views concerning the misuse of social media among students in the society, most of the students were interested to use social media positively for their educations. The positive impacts of social media among the undergraduates appeared to be higher as compared to negative impacts. However, some previously conducted researches showed that there are no statistically significant differences between positive and negative impact of social media and students' academic achievements. Educators and students can use social media as informational and communicational tools to ease and improve learning process (Mushtaq and Benraghda).

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2. OBJECTIVE

Systematic literature review on the impacts of social media on students' academic achievements in higher education.

3. RESEARCH QUESTIONS

What are the impacts of Social Medias on students' academic achievements in higher education?

4. SYSTEMATIC REVIEW

Technology enhanced learning has become a common feature of Higher Education. However, research has been hindered by a lack of differentiation between usage and engagement and not recognizing the heterogeneity of technology enhanced learning applications. Technology enhanced learning was broken down by type, the use of social media groups was a significant predictor of grade, whereas reviewing lecture slides/recordings, reading additional content and using course blogs/discussion boards were not. We conclude that a sole focus on usage of technology enhanced learning is misleading (Dunn and Kennedy).

Social media networks are utilized to supplement or enrich classroom environment on the academic achievement and social network usage behaviors of higher education students. Obviously, using social media networks to supplement or enrich classroom setting increases student academic achievement. This increment is higher when the social media network is used to supplement classroom setting instead of using social network as enriching medium (Çimen and Yilmaz).

Social media as a technological tool has recently come to support learning in both academic and public use. Students typically use social networks to enhance their education by discussing and exchanging academic content. However, its impact that needs carefully study to the vast inroads that social media has made into the academic sphere (Abdalgane).

Social media for learning will affect technology, task, and social characteristics that in turn improve students' satisfaction and students' academic performance. It also posits that the behavioral intent to use social media for learning will affect comprehension efficiency, ease of use, and enjoyment, all of which also improve students' satisfaction and students' academic performance (Al-Maatouk et al.).

Previously, conducted researches explore the students' behavioral intention to use social media and actual social media use in higher education, specifically the perception of their academic performance and satisfaction. Those studies were theoretically based on the technology acceptance model with evaluation information system success models. Therefore, we encourage students to use social media for educational purposes and encourage more interactions with peers at higher education institutions (A. M. Al-Rahmi et al.).

Social networking use puts students at risk who are generally lower academic achievers; in particular their performance is lower across the least difficult levels of learning performance with greater Facebook use. In contrast the performance of higher academic achievers is not significantly impacted. Some previous findings on the area highlight the importance of considering students' general academic achievement as a moderator of the relationship between social networking use and learning performance, and also the importance of considering the impact on specific levels of learning (Wakefield and Frawley).

Social media has significantly impacted students' academic success in recent years. These networks offer plenty of chances and dangers for students from a range of backgrounds. In order to investigate the link between the mediation roles of social contact, social engagement, and collaborative learning on the academic performance of students in higher education, researchers conducted some researches and developed a new framework based on social cognition and constructivism theories. The study's findings demonstrated how social connection and engagement have always had a significant impact on social impact, support networks, social identity, social presence, and social space. Similarly, it was discovered that social engagement and interaction have always been significantly impacted by collaborative learning and social media use. So, higher education settings, collaborative learning and practical social media use have a strong and considerable impact on students' academic achievement (W. M. Al-Rahmi et al.)

5. METHODOLOGY

Systematic literature review using PRISMA method (Getachew, M., et al., 2024). Extraction of data: in the data extraction stage, 10 papers were retrieved and limited to the following requirements.

1. Articles must be either original, review papers or published reports.
2. The reviewed article must be in English and from the fields of social sciences, arts and humanities and computer Science.
3. Systematically reviewed articles were published between the ranges of 2008-2023.
4. The extracted paper was from all countries.

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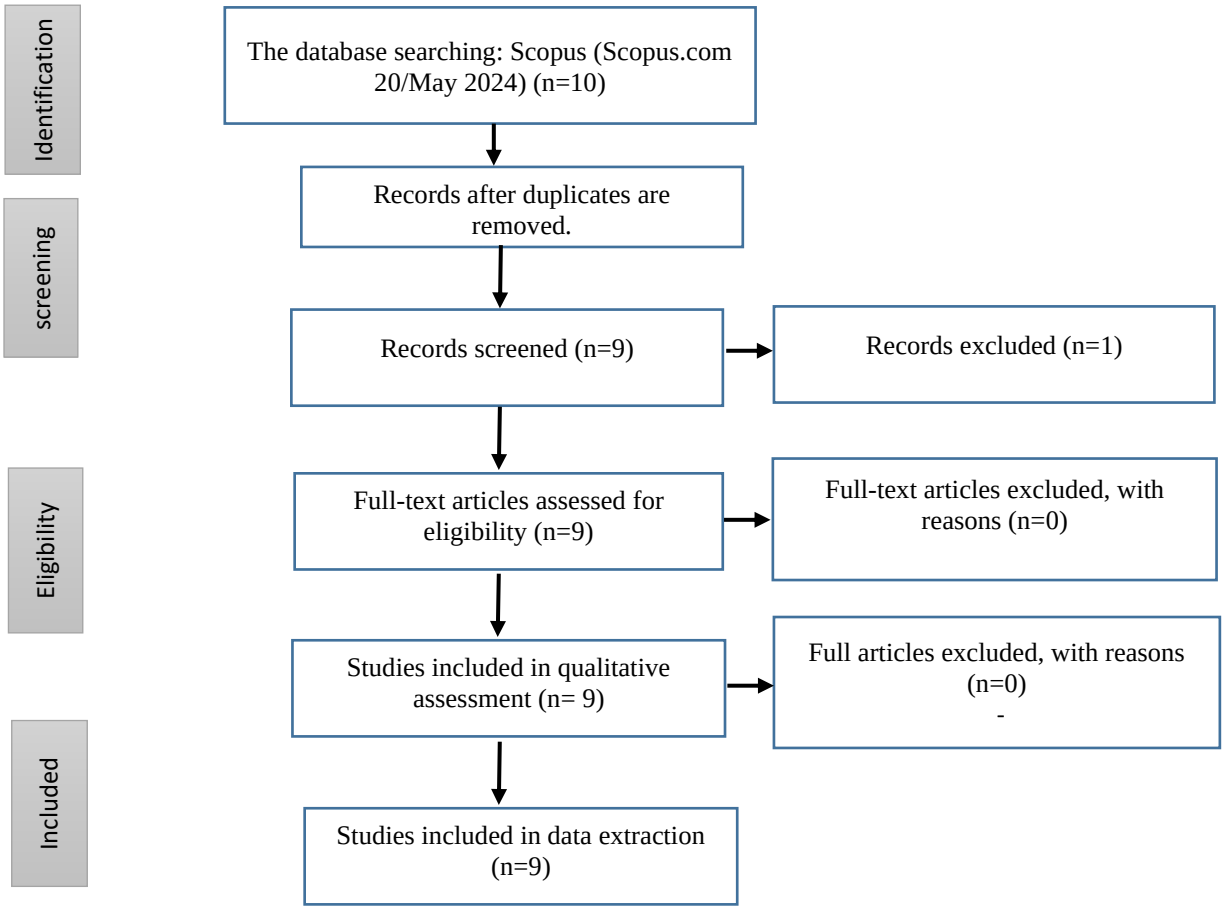
5. The database used to extract the articles was “Scopus database”.
6. Keywords used to extract the articles are Academic Performance, Social Media, Students, Academic Achievement, Academic Achievements and Higher Education.

6. DATA COLLECTION TOOLS

The researcher took the data for this study in textual form; in other words, he used the secondary data. On 20 May 2024, data from the Scopus academic search engine (https://www.scopus.com) were obtained. Additionally, ‘Advance’ search terms were used through TITLE-ABS-KEY (impacts AND social AND media AND students AND academic AND achievement AND higher AND education) AND (LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "COMP") OR LIMIT-TO (SUBJAREA , "ARTS")) AND (LIMIT-TO (EXACTKEYWORD , "Students") OR LIMIT-TO (EXACTKEYWORD , "Academic Performance") OR LIMIT-TO (EXACTKEYWORD , "Social Media") OR LIMIT-TO (EXACTKEYWORD , "Higher Education") OR LIMIT-TO (EXACTKEYWORD , "Academic Achievements") OR LIMIT-TO (EXACTKEYWORD , "Academic Achievement")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (LANGUAGE , "English"))

PRISMA Diagram

The information flow across the various phases of a systematic review is shown in the flow diagram. It shows how many records were found, whether they were included or not, and why they weren't. Further explanation of reviewed documents is displayed on the diagram below.



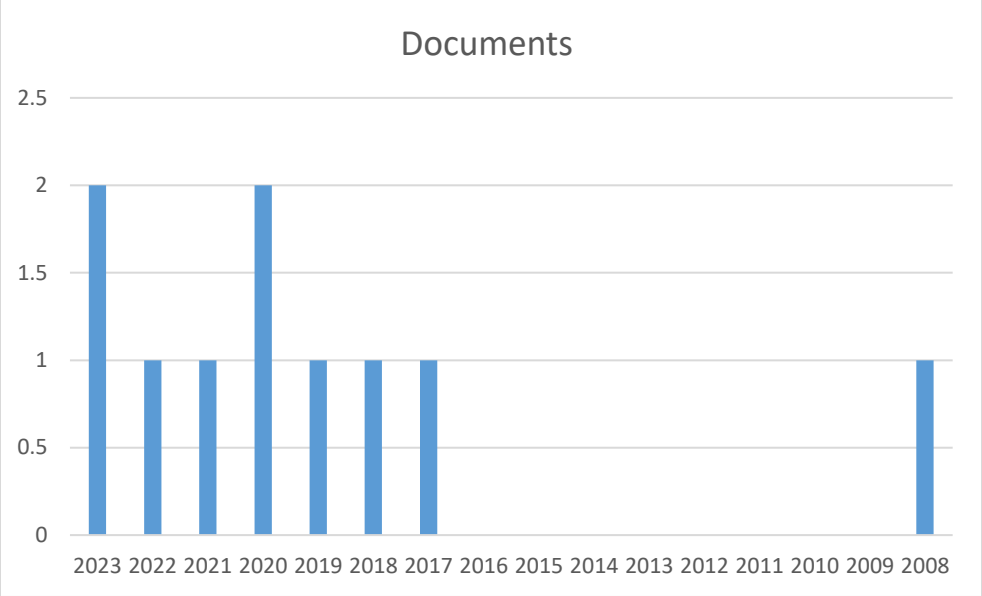
Source: (Getachew, M., et al., 2024)

Fig1: PRISMA Diagram

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7. ANALYSIS

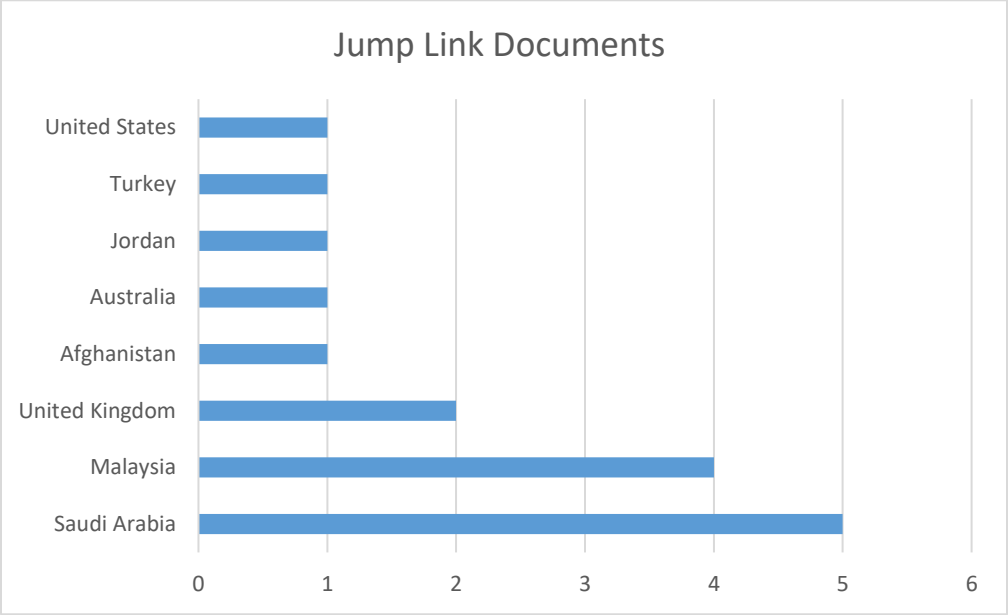
Reviewed Documents by Year



(Source: Scopus database academic search engine (https://www.scopus.com.
(Specifically, Advanced Search through TITLE-ABS-KEY)

Fig 2 Depicts Reviewed Articles by Year

Reviewed Documents by Country/Territory

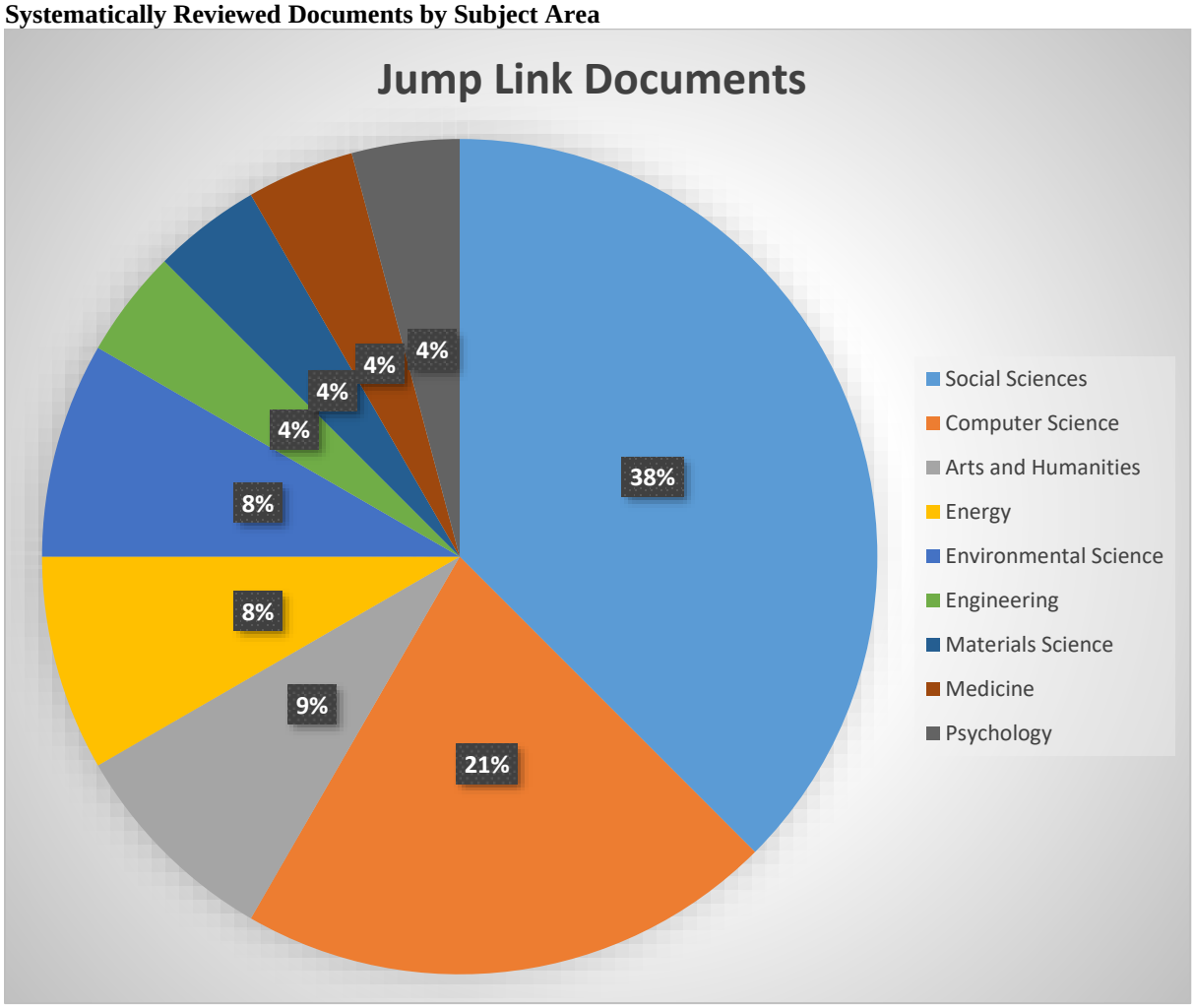


(Source: Scopus database academic search engine (https://www.scopus.com.
(Specifically, Advanced Search through TITLE-ABS-KEY)

Fig3 Displays Reviewed Documents by Country/ Territory

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Systematically Reviewed Documents by Subject Area



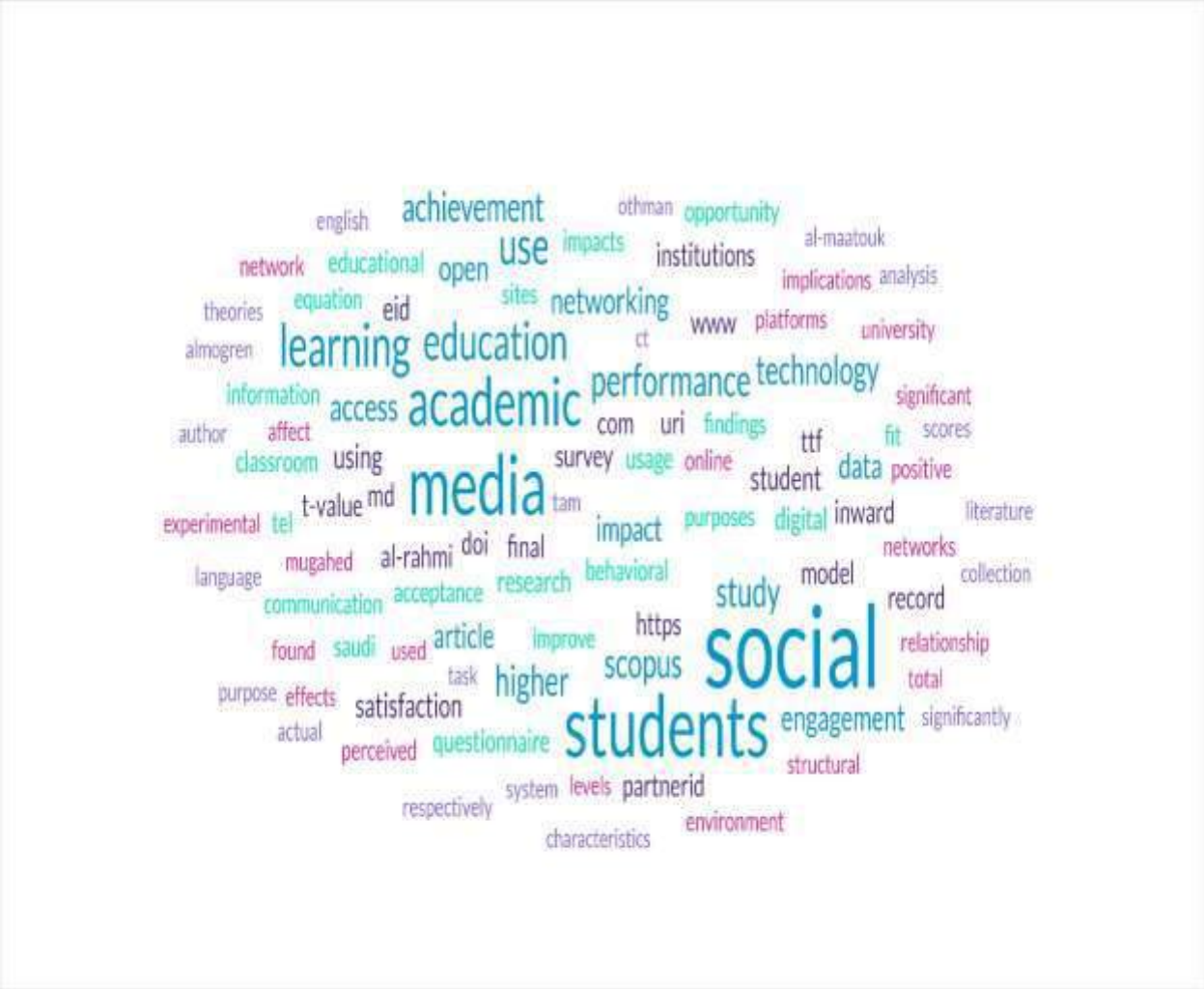
(Source: Scopus database academic search engine (https://www.scopus.com.
(Specifically, Advanced Search through TITLE-ABS-KEY)

Fig 4: Document Analysis by Subject Area

8. WORD CLOUD

The word cloud analysis, as indicated in **Fig. 5,** focusing on the topic "The impacts of social media on students' academic achievement in higher education," reveals key thematic elements. Words such as "social," "learning," "media," "achievement," "academic," "students," "performance" "technology," "education," "higher," "use," and "networking," prominently stand out. The prevalence of these terms underscores the central focus on "The impacts of social media on students' academic achievement in higher education". The word cloud highlights the significance of topics related to the title, 'The impacts of social media on students' academic achievement in higher education'.

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Source: online word cloud generator by using reviewed articles

Fig. 5: Word Clouds or tag clouds depicting graphical representations of word frequency that give greater prominence to words that appear more frequently in a source text

9. FINDINGS AND CONCLUSIONS

The study was conducted to examine the impact of students' use of social media on their academic performance. The study revealed that most of the students had mobile phones with internet facility and had knowledge of the existence of social media. As a result, the Students who have spent between 5 - 6 Hours a day on the social media sites have more academic performance than the counterpart. In addition, the study revealed that the Students who have used Spare Moment on the social media sites have more academic performance than the counterpart. It reveals that the Students who have used WhatsApp have more academic performance than the counterpart. It reveals that the Students who have used for Academic Purpose have more academic performance than the Non Academic purpose. The Students who have used Social Media positively, it impacts on Students' Education. The study further revealed that most students use the social media sites to chat for academic purpose and it helped to improve their academic performance.

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FORMULATION OF POLYHERBAL ANTIACNE AND ANTI- WRINKLE GEL

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ABSTRACT

The study's goal was to create and assess a polyherbal anti-wrinkle and anti-acne gel that contains powdered papaya extracts for treating these conditions.[1] Using papaya, green tea, honey, rose water, carbapol, glycerine, coconut oil, lactic acid, trimethylamine, and the necessary amount of distilled water, the polyherbal anti-acne and anti-wrinkle gel composition was created.Papaya is utilised to lessen dark circles and irritation.1-2 papaya pills, followed by 8–12 days of dry and mixed Prepare a powder by heating 2 grammes of papaya powder and 2 millilitres of distilled water in a beaker. Add a small amount of gelling agent and trimethalamine, and combine in other ingredients.[2] Keep swirling until a homogenous gel is achieved, at which point a gel formulation is formed.

KEYWORDS: *Anti- acne, semisolid Gel , Anti wrinkle, Green tea.*

INTRODUCTION

Skin diseases typically result from blood toxins building up as a result of blood impurities, poor eating habits, and lifestyle choices. The majority of teenagers going through puberty suffer from acne vulgaris, a skin condition brought on by hormonal changes that alter physiologic variables.[3] The disorder is linked to follicular distention abstraction and the inflammatory response being activated, resulting in open or closed comedones, inflammatory papules, and nodules.[4] These days, 80% of people rely on herbal therapies for acne vulgaris, which typically affects skin areas with denser sebaceous follicles, such as the face, upper chest, back pain, tenderness, or erythema skin illness.[5]

In the current skin disease treatment landscape, herbal cosmetics are becoming more and more important due to recent developments in the creation of novel formulations for the treatment of skin disorders, particularly chronic skin illnesses.[6]



FIG NO 1: Acne Infection

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Adolescence is afflicted by acne, a common inflammatory skin ailment that affects 85% of teenagers.more frequently observed in women than in men. Acne mostly affects adolescence and is most common in those between the ages of 18 and 25.Individuals between the ages of 35 and 40 are often less affected by this condition. Acne vulgaris is a common adolescent inflammatory sebaceous gland condition. In addition to redness, swelling, and occasionally the formation of pus, this condition may be painful. The study's objectives are to create a polyherbal gel of papaya extra with varying gelling agent concentrations and examine the impact of applying the gel topically with papaya extracts on acne healing.[7]

3].Drugs and excipient used profile

A]. papaya[8]

Common name :-papaya, pawpaw,
Family :- caricaceae.
Synonyms:- carica posoposa
It has powerful antioxidant effect .
Papaya has a fight inflammation and help to remove dead skin cells. Have to reduce acne.



Fig 2.: Papaya

B]Green Tea

Family:- Theaceae
Scientific name:- camellia sinensis. Acne reduce inflammation.[9]
Help reduce the production of Sebum. Reduce acne.
Health inhibit the growth of bacteria.



Fig.3.Green Tea

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C].Coconut Oil

Scientific name :-cocos nucifera.

Family:- palmae.

Common name:- coconut oil.

It is a reach source of vitamin E that keeps the skin healthy and clear. Coconut oil helps to reduce scares and repairs damage skin.[10]



Fig.4.Coconut oil

D]Honey[11]

Scientific name:-Honey Bee

Family:- Apidae

Honey is an effective natural acne treatment it has antibacterial and healing properties that can improve the appearance of pimples and the reduce their frequency.



Fig.5.Honey

E]Rose Water

Family: Rosaceae

Scientific name:-Rosa lamascena mill

Rose Water is a natural toner that cleanses your pores, removes excess oil, and reduce the size of acne[12].

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Fig.6.Rose water

F]Carbapol

Synonyms:-Acrypol, Carbomera.
Chemical name:- Carbomer(9003-01-4)
Functional category(uses):-bio adhesive material ,controlled reduce agent emulsiflying agent,gelling agent, suspending agent.[13]



Fig.7.Carbapol

G].Glycerine

Non proprietory names. BP -glycerol
Europe-glycetol Usp- glycerine synonyms- crodetol
Chemical name:- propane1,2,3triol and category number[56-81-5]4 molecular weight- 92.095
Formula -C3H8O3
Uses-Antimicrobial preservative ,cosolvent, sweetening agent ,Tonivity agent

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Fig 8.Glycerine

H] Trimethylamines
Synonyms- n,n dimethanamin
Formula- N(CH3)3
Uses-Ph adjust



Fig.9.Trimethylamine

I]. lactic acid
Formula C3H6O3
Synonyms- 2 hydroxyproponic acid.
Uses-To treat hyperpigmentation agents spots, and dull skin.
It helps promote the Shading of date skin cells ,soft and smoothness.

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Fig.10.Lactic acid

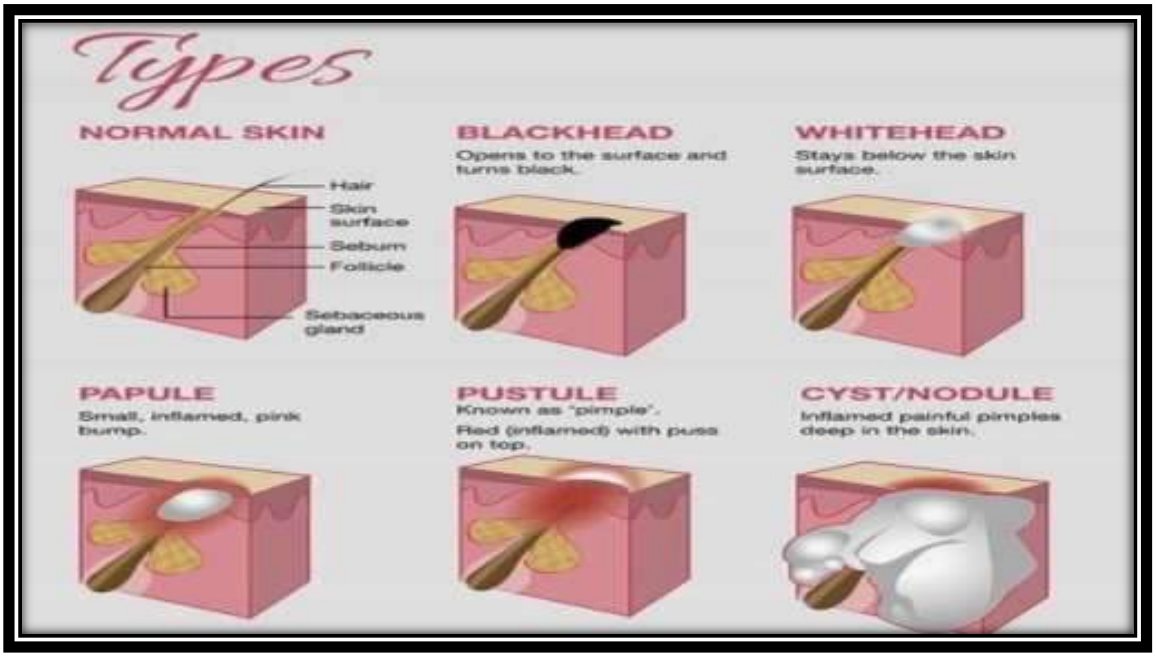


Fig.11.Type of Acne

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Fig.12.Causes of Acne

Symptoms :--Whiteheads blackheads
Crusting of skin bumps redness Papules

 # Formulation material and Requirements

Sr.No.	Ingredients	Quantity Taken	Category
1	Papaya	2 gm	Brightness
2	Green tea	10 ml	Glowing
3	Carbopol	1 ml	Gelling agent
4	Honey	5 ml	Antibacterial
5	Glycerine	10 ml	Skin repellant
6	Coconut oil	10 ml	Anti inflammatory
7	Trimethylamine	1.2 ml	Buffer
8	Rose water	10 ml	Flavouring Agents
9	Lactic Acid	10 ml	Antibiotics
10	Distilled Water	Upto 100 ml	Solvent

Procedure

1)Take a papaya pill was washed and dried 8 to12 days and size reduce to find powder.
2)The find powder was passed to the sieve number 80.
3)Then make a papaya pill powder using 2 ml distill water+2gm papaya powder mix and boil for the beaker 10 to 15 min cool the solution then filter the paper using the filter solution in one small beaker then adding some gelling agent carbapol[1gm] trimethylamines [1.2ml],glycerin [10ml] ,Rose Water[10ml],honey[5ml],coconut oil[10ml],lactic acid [10ml],green tea[10 ml] these total are mixed and continously strring until homogeneous gel your then finally obtained polyherbal gel formulation.[14]

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Fig.13.Papya powder



Fig.14. 5.65 gram of Papya powder



Fig.15. Filtration Processes

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Fig.16.Antiacne and Anti wrinkle gel

EVALUATION PARAMETERS

PHISICAL EVALUATION

Physical parameters such as colour, odour and consistency were checked visually

COLOUR: The colour of formulation was checked by visual inspection. CONSISTANCY:: The consistency of formulations was checked by applying on skin.

ODOUR:: The odour of the formulations was checked by mixing the gel in water and observing the smell. Physical evaluations of gel formulations were reported

PERCENTAGE YEILD :

Weight the empty container in which the gel formulation was stored then again weigh the container with gel formulation. To obtain the practical yield subtract the weight of empty container with the container with gel formulation. Then the percentage yield was calculated by the formula given below:

Percentage yield = (practical yield/theoretical yield) × 100 Percentage yield of gel formulations were reported

Observation Table:

Sr.No.	Parameter	Observation/Results
1	Colour	Yellow
2	Odour	Mildly aromatic
3	Texture	Smooth
4	Appearance	Semi-solid
5	Spreadability	6.3 cm
6	Washability	Easily washable
7	PH	7.32
8	Viscosity	3405 cps
9	Homogeneity	Good
10	Skin irritation	No

CONCLUSION

Given that natural therapies have fewer adverse effects and are safer than synthetic medications, they are more widely accepted. Herbal formulas are becoming more and more popular on the global market these days. The attempt to create a herbal gel using papaya extract is excellent.The study's data showed that the development of mixed herbal gel formulations was a substantial, therapeutically appropriate, effective, low-cost, and potentially highly promising drug delivery method.The results indicate that the newly developed herbal gel formation, when combined with safe and stable dosages, has good antibacterial and anti-inflammatory properties, making it an excellent choice for treating acne and wrinkles.

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IN SILICO STUDY OF COMPUTER ADDED DRUG DESIGN FOR CHLOROQUINE AS ANTI-VIRAL AGENT

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ABSTRACT

A significant amount of research has been done recently to find medications that can effectively treat the coronavirus illness 2019 (COVID-19). New approaches to enhancing the sufficiency of these medications were sparked by the uncertainty around the use of chloroquine to treat this sickness. Significant attention has been paid to the efficient use of zinc complexes as an adjuvant to chloroquine in the treatment of COVID-19. Density functional theory (DFT) was used to examine molecule electrostatic potential, electrical characteristics, and geometries at the 6LU7. This work studied the interaction of quinoline-based antimalarial drugs with the peptidase domain of ACE2 receptor. The X-ray crystal structure of human ACE2 receptor was downloaded from Protein Data Bank.

KEYWORDS: *COVID-19, Chloroquine, molecular docking, Molecular dynamics, Remdesivir.*

1) INTRODUCTION

The pandemic's rapid global spread was caused by human-to-human transmission. The World Health Organization (WHO) states that as of April 2020, there were more than two million documented instances of infection and suspicion across several nations. Researchers from a variety of scientific domains have been spurred by the crisis to develop a vaccine against this unusual illness. Chloroquine (CQ) has long been mentioned as a possible treatment for pneumonia exacerbations(1). This paper's primary contribution is the molecular docking study's determination of the chloroquine derivatives potency of inhibition against the COVID-19 virus(2).

German company Bayer developed the antimalarial medication chloroquine in 1934 to take the role of natural antimalarial medications. Patients with SARS-CoV-2 infection have shown good response to this medication. The broad range of antiviral activity of this medication may be explained by the potential disruption of sialic acid production caused by chloroquine(3).

Nevertheless, it is unclear how chloroquine works as an antiviral against 2019-CoV. Angiotensin-converting enzyme 2 (ACE2) serves as 2019-nCoV's entrance receptor into host cells, according to a recent research. The host cell is bound by the S protein's receptor binding domain (RBD)(3).

1.1 PubChem

A public chemical database hosted by the National Institutes of Health (NIH) is called PubChem. "Open" indicates that you are able to upload your scientific data to PubChem and allow other users to utilize it. PubChem is now a vital source of chemical knowledge for scientists, students, and the general public, having launched in 2004. The programmatic services on our website and for several million consumers globally supply data each month(4).

Larger molecules including nucleotides, carbohydrates, lipids, peptides, and chemically altered macromolecules are also present in PubChem, although they are predominantly tiny molecules. We gather data on a wide range of topics, including identifiers, chemical and physical characteristics, biological activity, patents, health, safety, and toxicity(4).

1.2 RCSB PDB

The global Protein Data Bank (PDB) repository of 3D structural data for big biological molecules (proteins, DNA, and RNA) is housed at RCSB PDB (RCSB.org), the US data center for the archive. This data is crucial for basic biology research as well as health, energy, and biotechnology education(5).

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The first digital data repository in biology and medicine to be made available to the public was the Protein Data Bank (PDB). Currently, it is a preeminent worldwide repository for experimental data essential to scientific advancement[5].

1.3 Molinspiration

A wide range of cheminformatics software tools are available from Molinspiration to support the manipulation and processing of molecules. These tools include the conversion of SMILES and SDfiles, normalization of molecules, tautomer generation, molecule fragmentation, calculation of various molecular properties required for QSAR, drug design and molecular modeling, high-quality molecule depiction, and molecular database tools that support substructure and similarity searches. Additionally supported by our solutions are data visualization, bioactivity prediction, and fragment-based virtual screening. Since the Molinspiration tools are designed in Java, they are essentially compatible with all computer platforms[6].

1.4 Molecular Docking Vina

In the modern era of pharmaceutical research, many methods of molecular modeling have been employed to study complex chemical and biological systems in a variety of programs of drug discovery. It is very important to integrate experimental strategies into computational approaches in the identification, characterization, and development of novel and propitious compounds. Small molecular compounds (ligands) are docked into the binding site of the receptor, following which the binding affinity of the complex is estimated. This constitutes a significant part of the structure-based drug design process[7].

1.5 Molecular Docking

Every docking experiment used the optimized model as the docking target and the AutoDock Vina program. Molecular docking is the only screening approach used molecular dynamics simulation has not been performed. RdRp antagonists include ribavirin and Remdesivir. Ribavirin is ineffective against the novel coronavirus, however Remdesivir could be. To investigate the binding differences between the two compounds, molecular docking was utilized.

Before the ligands were examined in relation to the SARS-CoV-2 target proteins, the structures of the small molecules were optimized using the classical MM2 force field; the active site aspartates of targets were treated as rigid. By removing all water molecules, allocating Gasteiger partial charges, and adding polar hydrogen, the 6lu7 protein structure was created. The grid coordinates for the ligand position in the Mpro protein were X = -41.1626, Y = 1.88447, and Z = 36.7796. The parameters of the Genetic Algorithm (GA) were assigned at the 100 GA run and 150 population size. Autodock 4.2 was utilized to perform docking calculations for molecules, with the assistance of Auto Dock Tools 1.5.7.

1.6 Ligand and Target Preparation

All compounds' ideal structures are depicted. Both CQ and HCQ are widely used as antimalarial medications and have a broad range of in-vitro action against viruses. Numerous investigations revealed that the primary COVID-19 protease, Mpro (PDB ID 6LU7), is essential to the virus's ability to replicate. This makes it a strong candidate for medications that act as inhibitors [1].

1.7 Ligand and Protein Preparation

The RCSB PDB database provided the 3D structures of the COVID-19 protein. There are thousands of protein structures in the Protein Data Bank (PDB) collection that were discovered using NMR or crystallographic X-ray analysis. In terms of ligands, the online PubChem database provided the 2D structures of chloroquine. The MDL Mol file format was used to store the ligands. Then, they were transformed with Accelrys Discovery Studio Visualizer into a PDB file format[2].

1.8 BIOVIA Drug Discovery Studio

Many molecular modeling techniques have been used in the current era of pharmaceutical research to explore intricate chemical and biological systems in a range of drug discovery projects. In order to identify, characterize, and develop new and promising molecules, it is critical to include experimental procedures with computational approaches. Molecular docking is a widely utilized method in contemporary drug design and research that investigates ligand conformations within the macromolecular target binding site and yields an estimate of the free energy of receptor-ligand binding for each conformation.

- **Software**

Table no: 1 Used tools in molecular docking

Sr.no	Software
1	RCSB database
2	Pubchem
3	Pymol
4	Autodock tool
5	Autodock vina
6	Uniport

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7	Protein plus server
8	Biovia drug discovery studio

2) AIMS AND OBJECTIVE

2.1 Aims In Silico Study Of Computer Added Drug Design For Chloroquine As Anti-Viral Agent.

2.2 Objectives

1. To carry out a comprehensive literature survey and selective drug.
2. To make the drug discovery process cost effective.
3. To reduced time required for drug development.
4. Summarize the mechanism of action of chloroquine.
5. To obtained the PDB files of targets from RCSB PDB website.
6. To carry out molecular docking study for the prediction of activity to compare with standard drug molecule.
7. Target identification and understanding of mechanism.
8. Identify the most common adverse effects of chloroquine.
9. Review the appropriate monitoring of patients treated with chloroquine.
10. Outline the importance of collaboration and coordination among the interprofessional team that can enhance patient care when prescribing and monitoring chloroquine to improve patient outcomes for patients receiving prophylaxis and treatment with chloroquine.

3) RECEPTOR AND LIGAND PROFILE

3.1 Receptor profile: (RCSB PDB Database)

1. **Receptor name:** The crystal structure of COVID-19 main protease in complex with an inhibitor N3.

- **PDB DOL:** https://doi.org/10.2210/pdb6LU7/pdb
- **Classification:** viral protein
- **Organism(s):** Severe acute respiratory syndrome coronavirus 2, synthetic construct
- **Expression system:** Escherichia coli BL21(DE3)
- **Mutation(s):** No

Experimental data

- **Method:** X-RAY DIFFRACTION.
- **Resolution:** 2.16 Å.
- **R-Value Free:** 0.235.
- **R-Value Work:** 0.202.
- **R-Value Observed:** 0.204.

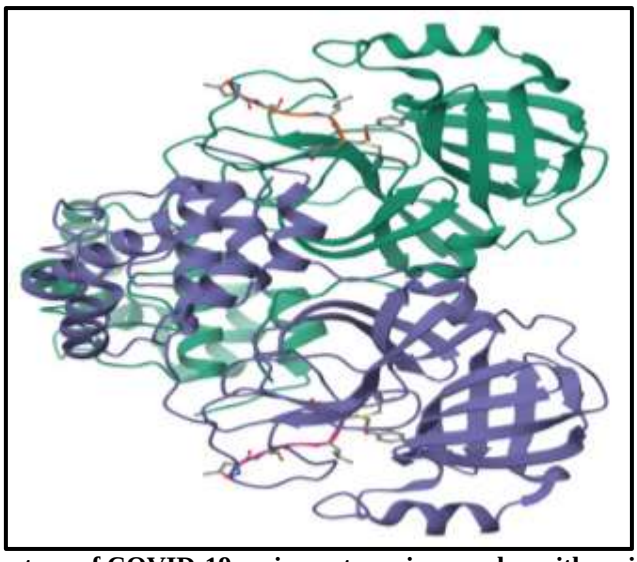


Figure No 1: The crystal structure of COVID-19 main protease in complex with an inhibitor N3(PDB ID:6LU7).

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2. **Receptor name:** Structure of SARS-CoV-2 chimeric receptor-binding domain complexed with its receptor human ACE2.

- **PDB DOI:** https://doi.org/10.2210/pdb6VW1/pdb
- **Classification: CELL INVASION**
- **Organism(s):** Homo sapiens, Severe acute respiratory syndrome-related coronavirus, Severe acute respiratory syndrome coronavirus 2
- **Expression System:** Spodoptera frugiperda
- **Mutation(s):** No
- **Membrane Protein:** Yes.

Experimental data

- **Method:** X-RAY DIFFRACTION
- **Resolution:** 2.68 Å
- **R-Value Free:** 0.229
- **R-Value Work:** 0.197
- **R-Value Observed:** 0.199

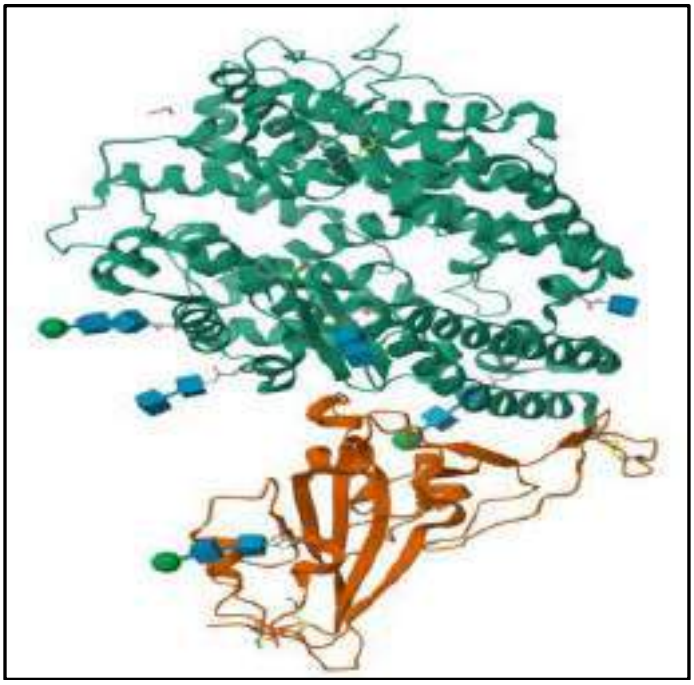


Figure No: 2 Structure of SARS-CoV-2 chimeric receptor-binding domain complexed with its receptor human ACE2 (PDB ID:6VW1).

3.2 Ligand profile

PubChem: 2719
Drug name: Chloroquine
Classification: Anti-malaria, Anti-viral.
Molecular formula: $C_{18}H_{16}CIN_3$
Structure:

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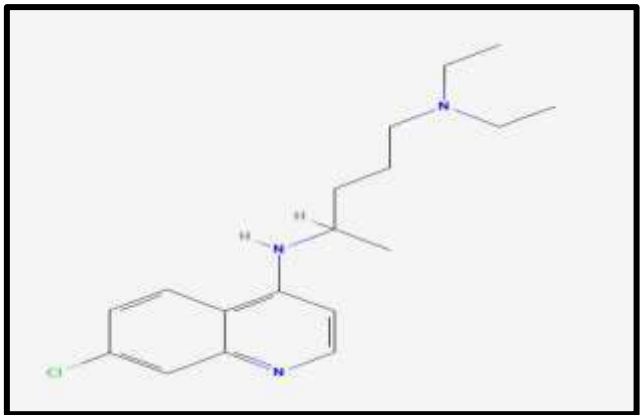


Figure no: 3 Structure Of Chloroquine

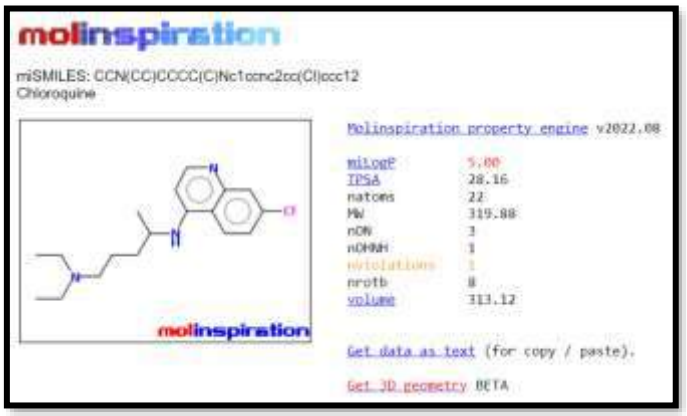
IUPAC Name: 4-*N*-(7-chloroquinolin-4-yl)-1-*N*,1-*N*-diethylpentane-1,4-diamine
Molecular weight: 319.9 g/mol
Canonical smile format: CCN(CC)CCCC(C)NC1=C2C=CC(=CC2=NC=C1)Cl
Melting point: 87-89.5 °C
Mechanism of action: Chloroquine inhibits the action of heme polymerase in malarial trophozoites, preventing the conversion of heme to hemazoin. _Plasmodium_ species continue to accumulate toxic heme, killing the parasite. Chloroquine passively diffuses through cell membranes and into endosomes, lysosomes, and Golgi vesicles where it becomes protonated, trapping the chloroquine in the organelle and raising the surrounding pH. The raised pH in endosomes, prevent virus particles from utilizing their activity for fusion and entry into the cell. Chloroquine does not affect the level of ACE2 expression on cell surfaces, but inhibits terminal glycosylation of ACE2, the receptor that SARS-CoV and SARS-CoV-2 target for cell entry.

4) EXPERIMENTAL WORK

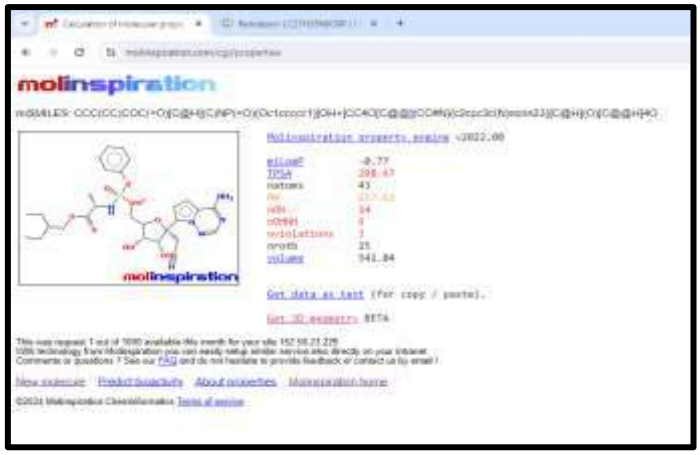
4.1 Molinspiration

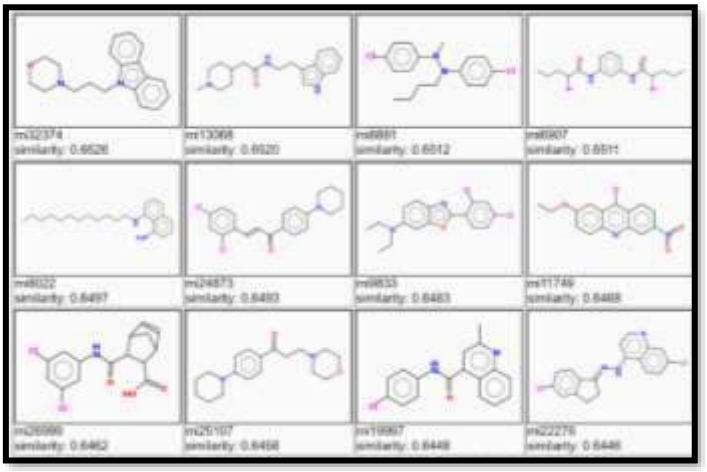
Material and method

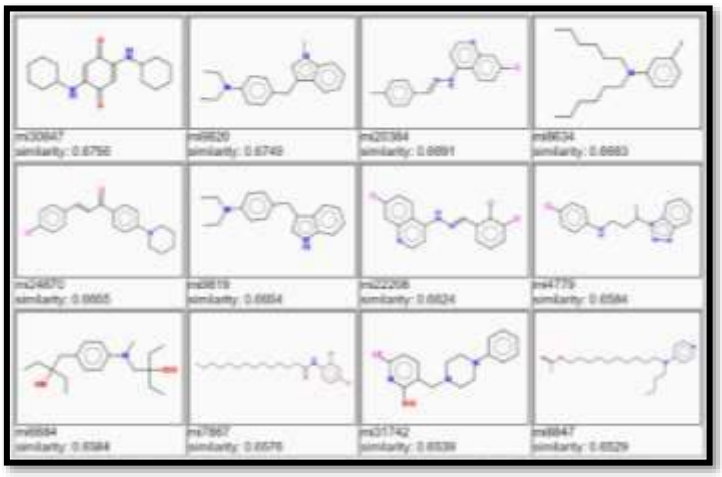
It well be use for the determination or observation of bioactivity and property of drug compounds. It also shows there molecular weight and many properties.



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Results: Molinspiration

Table no 2: Properties of chloroquine

Sr no	Drug name	miLogP	TPSA	natoms	Molecular weight	nON	nOHNH	nviolations	nrotb	Volume
1	Chloroquine	5.00	28.16	22	319.88	3	1	1	8	313.12
2	Remdesivir	-0.77	208.67	43	617.62	14	6	3	15	541.84

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Table no 3: Predict Bioactivity of Chloroquine

Sr no	Drug name	GPCR ligand	Ion channel modulator	Kinase inhibitor	Nuclear receptor ligand	Protease inhibitor	Enzyme inhibitor
1	Chloroquine	0.32	0.32	0.38	-0.19	0.05	0.11
2	Remdesivir	0.18	-0.40	0.21	-0.34	0.31	0.17

- **Discussion**

A) Molecular Property

In this study, drug activity predictions had shown for test and standard drugs using the Molinspiration platform results had shown in Table no 2. The observed Lipinski's nú of five scores indicated good drug-likeness. The MiLogP values of these pounds were below 5, ranging from 5.00 to -0.77 suggesting their good permeability cell membranes. the Topological Polar Surface Area (TPSA) of the compounds, which provides information about their polarity. All the selected drugs had TPSA values below 160 except for Chloroquine, which had lower values is 28.16 and higher TPSA values ranging from 208.67 for standard drug. The TPSA value is an important parameter for analyzing ang transport properties and their ability to cross cell membranes.

The molecular weight (MW) of the selected drugs was within an acceptable range 319.88), except for Remdesivir, which had a higher MW (617.62). Lower molecular weight compounds are typically more easily absorbed, diffused, and transported compared high molecular weight compounds. Beyond a certain limit, an increase in molecular wright can lead to increased bulkiness of the molecules. The number of atoms and non- hydrogen atoms (nON) for all the selected drugs were less than 10 respectively. Molinspiration results indicated that the number of rotatable bonds and violations (nOHNH and n-violations) were less than 5 respectively, within acceptable ranges, implying appropriate molecular flexibility and compliance with chemical rules. The molecular volume (MV) was also calculated to assess the transport properties of the molecules, including blood-brain barrier penetration. Most compounds had an MV value within the acceptable range (≤500), except for Remdesivir, which had a higher MV (541.84)

B) Bioactivity Scores

Bioactivity scores of the compounds based on their interactions with GPCR ligands, ion channel modulators, kinase inhibitors, nuclear receptor ligands, protease inhibitors, and enzyme inhibitors results has shown in Table 3. Among the selected compounds, Chloroquine, and Remdesivir demonstrated lower bioactivity scores (<<5-0) toward GPCR ligands. For ion channel modulators, Chloroquine, and Remdesivir exhibited higher properties (0) than other compounds (<0).

In the case of kinase inhibitors and nuclear receptor ligands (score <0) Chloroquine, and Remdesivir showed higher activity.

Overall, the predictions based on Molinspiration provide valuable insights into the drug-likeness and potential bioactivity of the selected compounds. However, it is important to remember that these are computational predictions and munt be validated through studies before drawing definitive conclusions about their pharmacological properties.

- **Conclusion**

In conclusion, the drug activity predictions using the Molinspiration platform for a set of test and standard drugs provided valuable insights into their molecular properties and potential bioactivity. The observed Lipinski's rule of five scores indicated that all the selected compounds demonstrated good drug-likeness, as they complied with the acceptable ranges for various properties.

The MiLogP values, which represent the lipophilicity of the compounds, were below for all the drugs, suggesting good permeability across cell membranes. The Topological Polar Surface Area (TPSA) values indicated the polarity of the compounds, with most of them having TPSA values below 160 A, except for a few compounds with higher values. TPSA is an important parameter for understanding drug transport properties and cell membrane penetration. The molecular weight (MW) of the selected drugs was generally within the acceptable range (≤500), except for moenomycin, which had a higher MW. Lower molecular weight compounds are typically more favorable for absorption, diffusion, and transport.

4.2 Molecular Docking

4.2.1 Material

In the present work following tools have been used to carry out the molecular docking of proposed compound.

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Table no 4: Tools for molecular docking.

Sr.No	Tool Name	About Tool
1	Autodock Vina (Molecular Docking Sofware)	Version: 1.1.2 Developed By: The Scripps Research Institute
2	Glide (Schrodinger Inc., USA)	Version: 2.2 Developed By: Schrodinger LLC
3	Mgl Tool (Required For File PDBQT File Generation)	Version: 1.5.7 Developed By: The Scripps Research Institute
4	The Pymol Molecule Graphics System	Version: 2.3.4 Developed By: Schrodinger LLC
5	Discovery Studio Visualizer (BIOVIA)	Version: 21.1.0.20298 Developed By: Dassault System Biovia Corp.

- **Auto Dock Vina**

Molecular docking is a computational procedure that attempts to predict noncovalent binding of macromolecules or, more frequently, of a macromolecule (receptor) and a small molecule (ligand) efficiently, starting with their unbound structures, structures obtained from MD simulations, or homology modeling, etc. The goal is to predict the bound conformations and the binding affinity[8]. AutoDock Vina, a new program for molecular docking and virtual screening, is presented.

AutoDock Vina achieves an approximately two orders of magnitude speed-up compared to the molecular docking software previously developed in our lab (AutoDock 4), while also significantly improving the accuracy of the binding mode predictions, judging by our tests on the training set used in AutoDock 4 development.

➢ **Producer**

4.2.2 Steps of protein preparation

i. Open the PDB format of receptor 6lu7 in auto dock vina by clicking vina by clicking “file in subsection read molecule”.

ii. Go to edit and delete water molecule, select from string as shown in Fig no: 4.

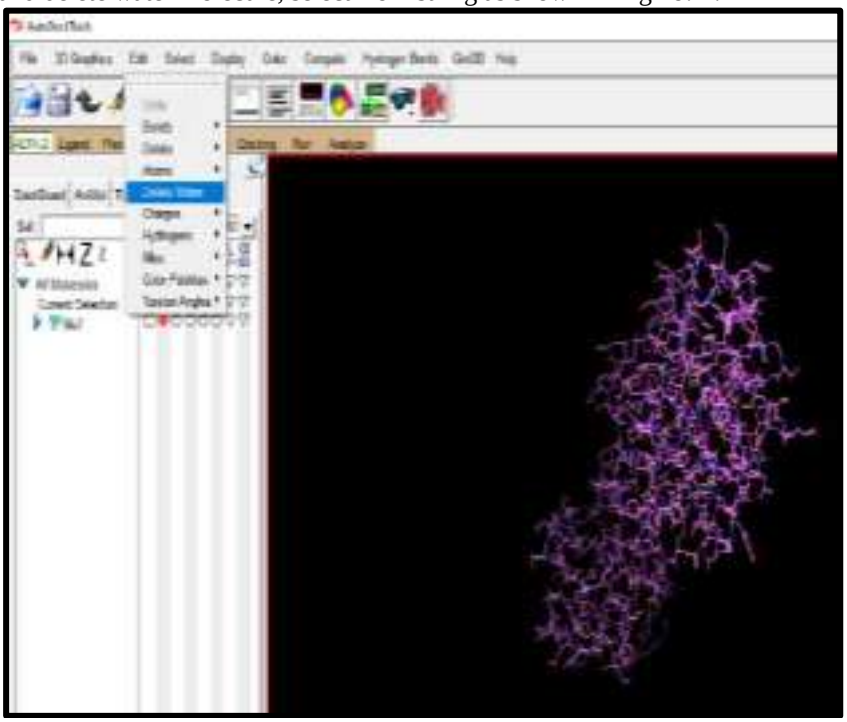


Figure no 4: Protein preparation.

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iii. Then go to select and click on select from string and add hetatm atom as shown in Fig no: 5.

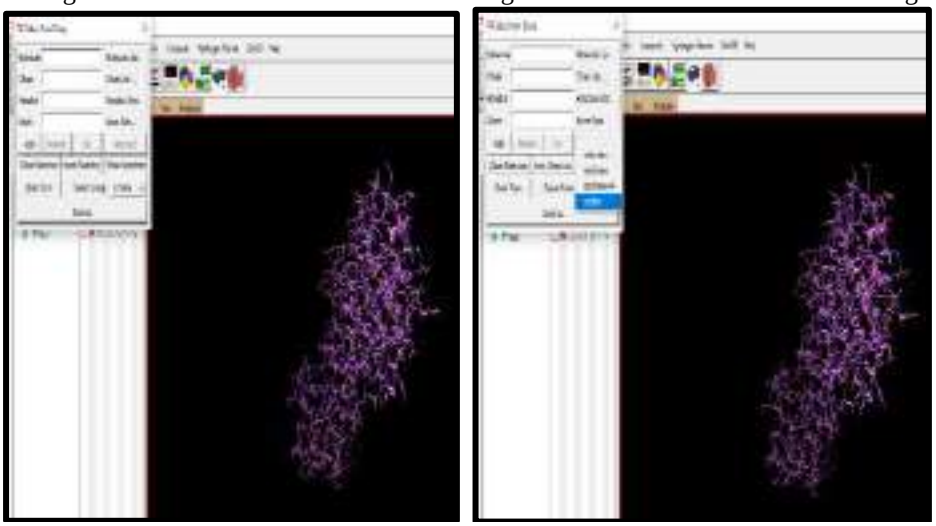


Figure no 5: Select & click select from string and add hetatm.

iv. Then go to edit and click on Delete Selected Atoms as shown in Fig no: 6.

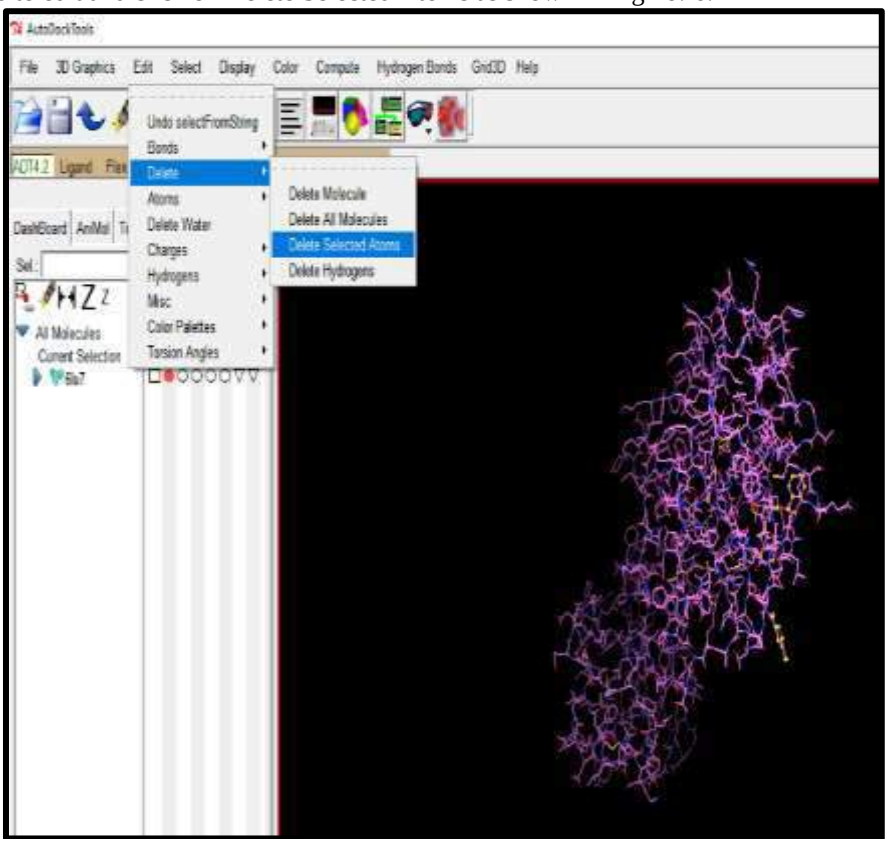


Figure no 6: Delete selected Atom.

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v. Then go to edit and click on "add hydrogen (polar only) as show in Fig no: 7.

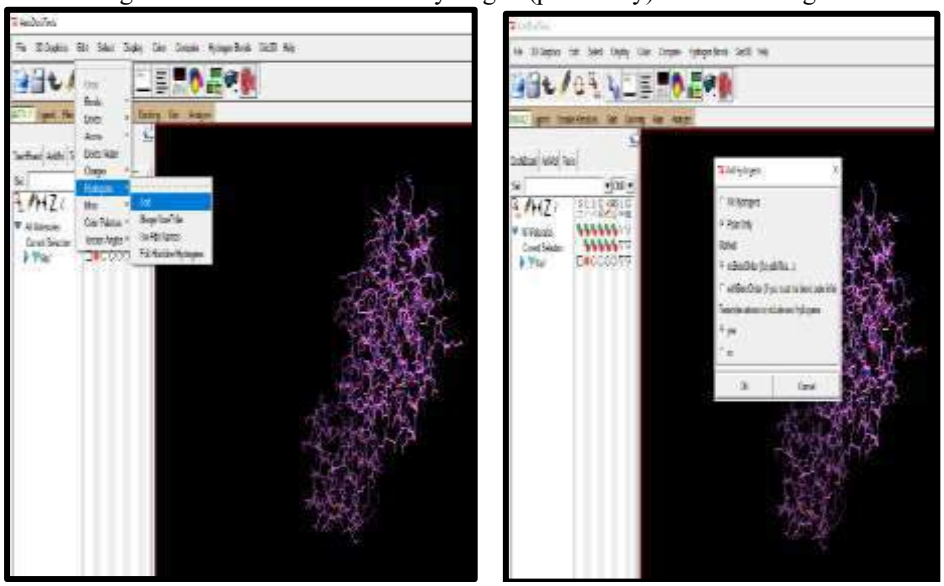


Figure no 7: Add hydrogen (polar only)

vi. Then go to edit and "add kollman charges" as shown in Fig no: 8.

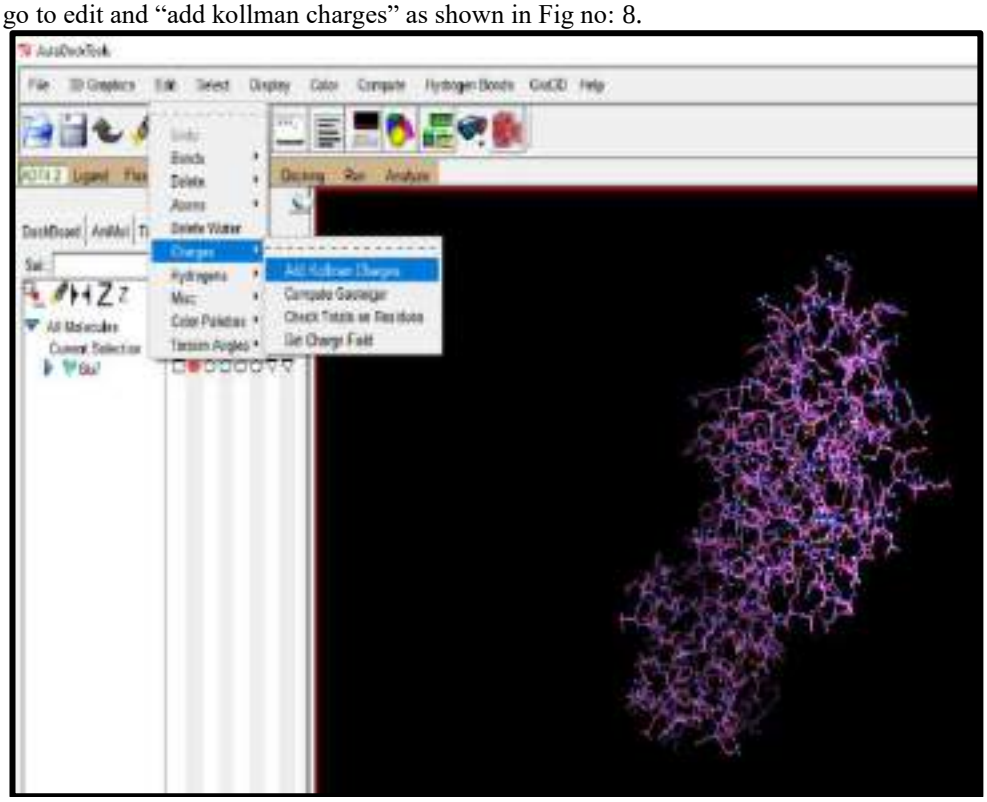


Figure no 8: Add Kollman Charges.

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vii. Then go to edit and click on atoms chose "Assign AD4 type".as shown in the Fig no: 9.

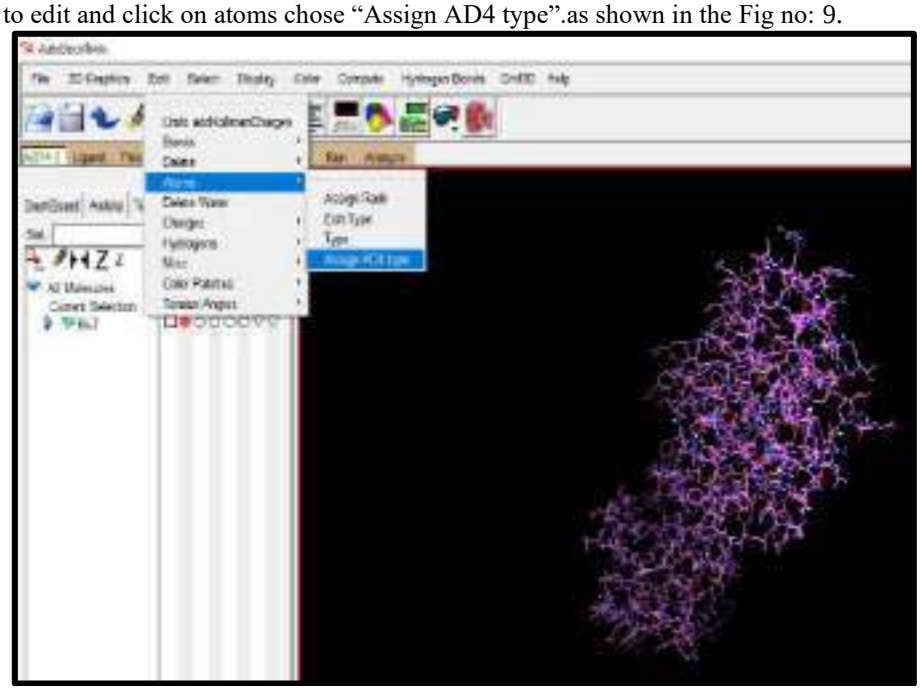


Figure no 9: Assign AD4 type.

viii. Then go to the file section and save bottom then select PDBQT format to save & select the END and add molecule, as shown in Fig no: 10.

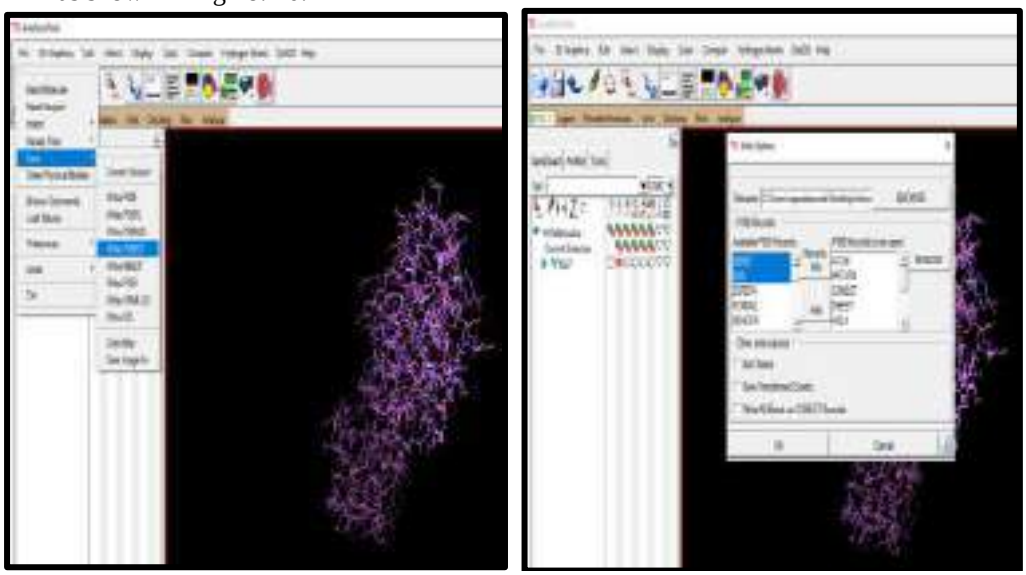


Figure no 10: Save as PDBQT.

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4.2.3 Ligand Preparation

i. the ligand section then choose input add click on the open option. As shown in fig no: 11.

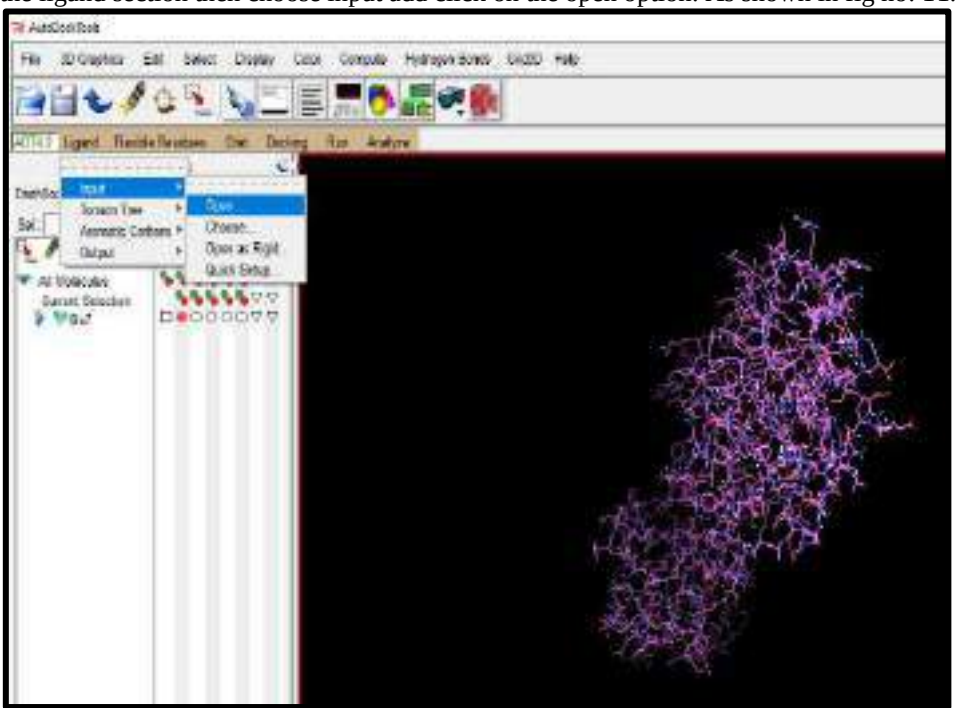


Figure no 11: Click the ligand section then choose input add click.

ii. After loading the molecule click the on-torsion tree under the same ligand section and click on choose root then detect root. as shown in Fig no: 12.

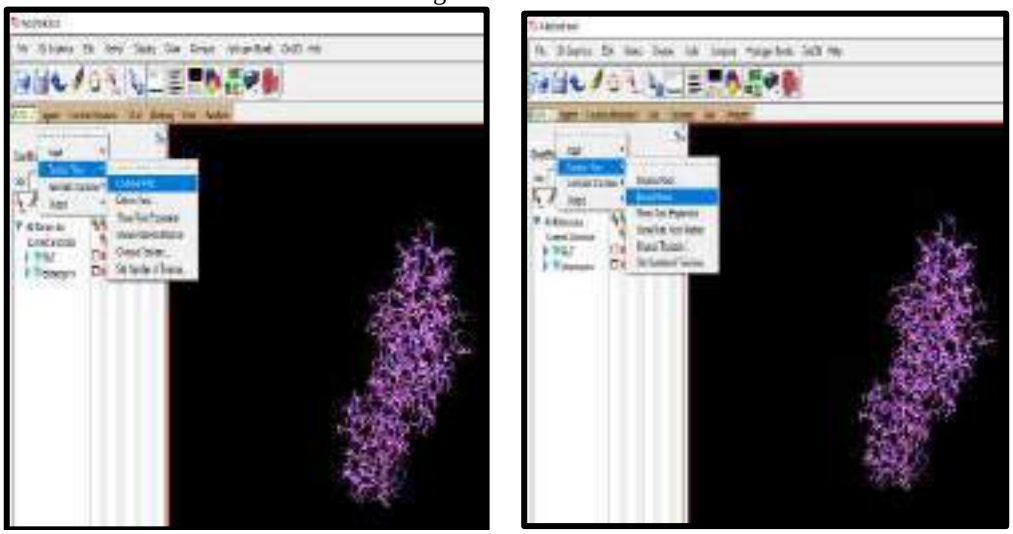


Figure no 12: Choose root then detect root.

iii. Then go to the output option and save it in PDBQT format. As shown in fig no: 13.

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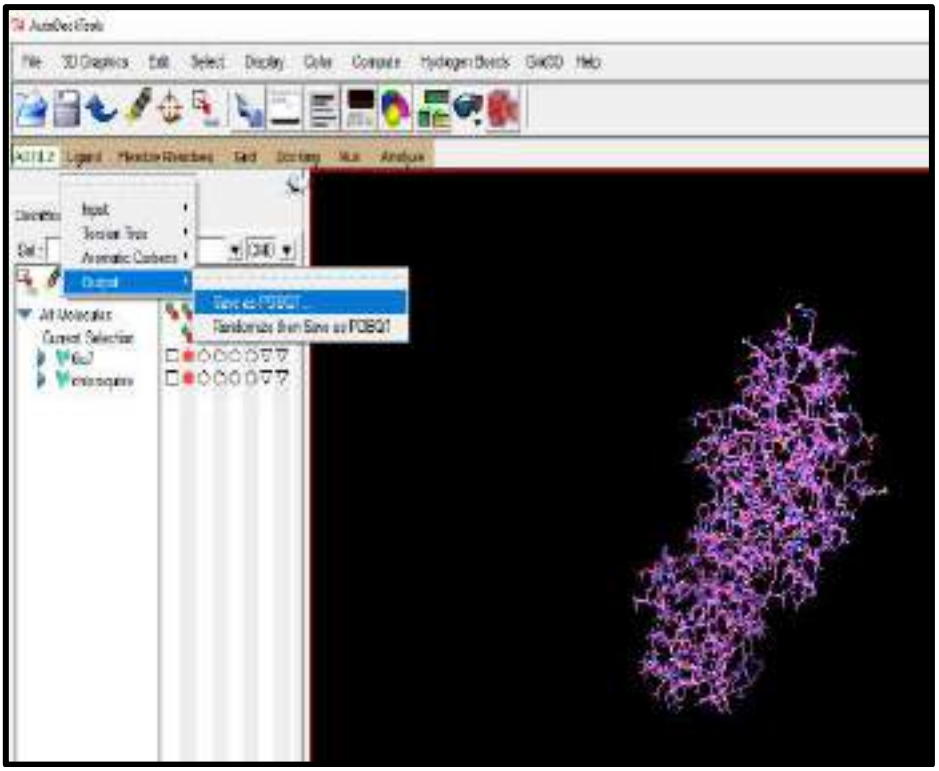


Figure no 13: Save as PDBQT.

4.2.4 Grid generation:

i. Open PDBQT of 6lu7 receptor which is saved in an earlier step. then the grid and choose and choose a receptor as a macromolecule. Then select the 6lu7 receptor molecule and click No for reserve change as shown in Fig no: 14.

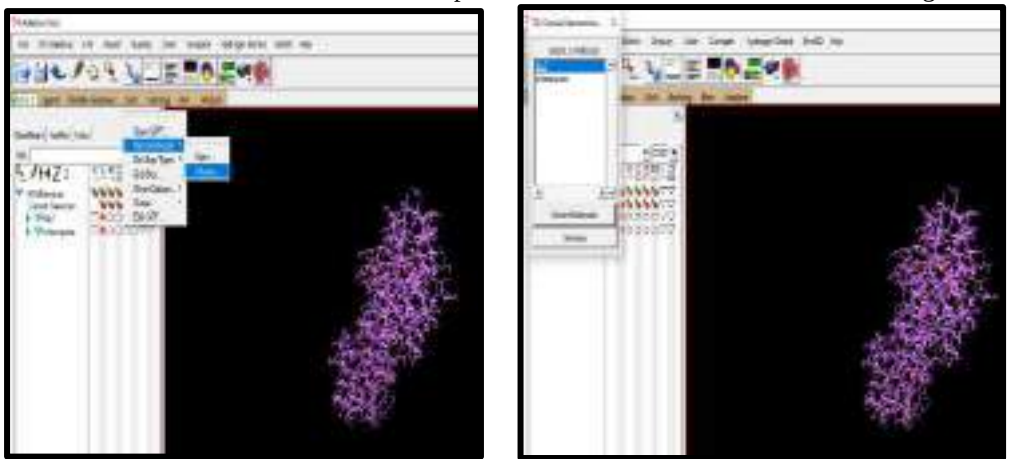


Figure no 14: Choose ligand.

ii. Then click on the grid box Adjust the grid box using the grid box coordinates so that the receptor molecule is enclosed within the box then click the button in the grid option and select "output grid dimension file" as shown in Fig no: 15.

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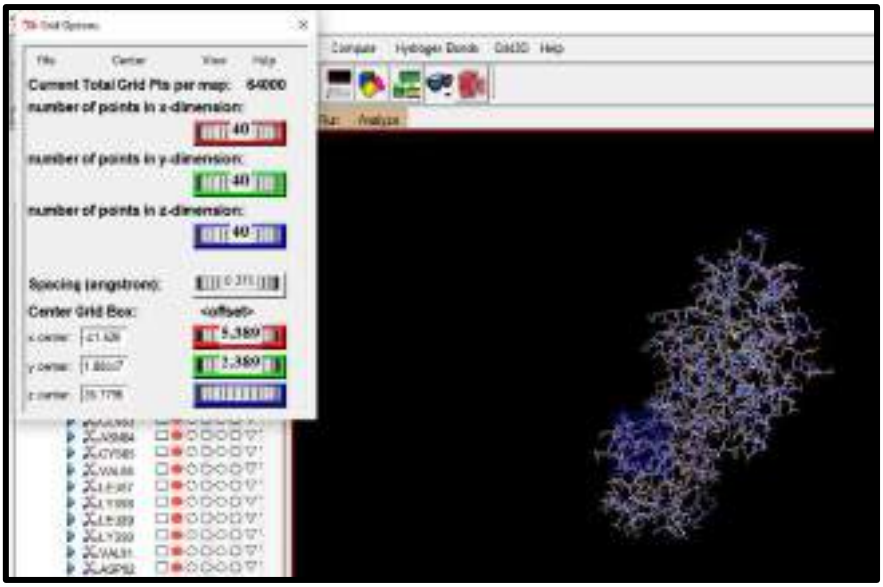


Figure no 15: Output Grid Dimension File.

4.2.5 Config file:

Open a new document file and enter the configuration details of the grid box, receptor name, ligand name, energy range and exhaustiveness as given in picture not as shown in Fig no: 16.

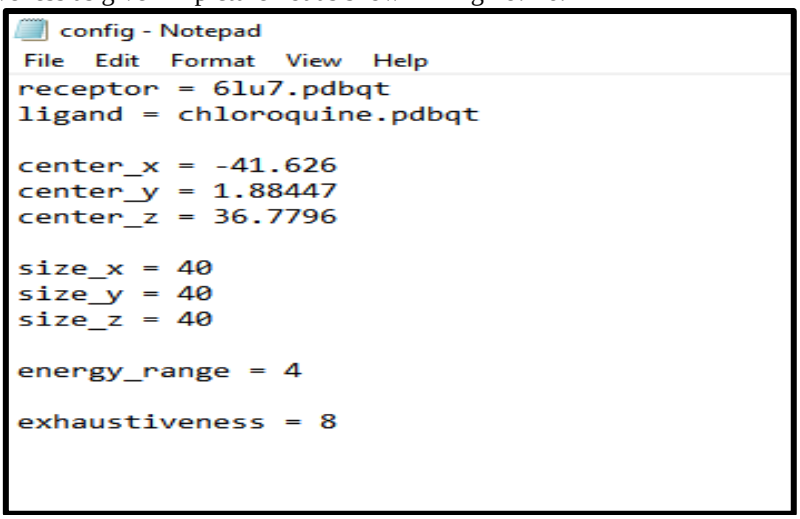


Figure no 16: Config file.

4.2.6 Command Prompt

1) Search for command prompt in your laptop or computer.
2) Then enter, followed by 'cd' Paste the folder location in which all require are present them press enter.
3) Then run docking vina copy address "vina search --receptor 6lu7.pdbqt --ligand chloroquine.pdbqt --config config.txt --log log.txt --out output.pdbqt as shown in Fig no:17.

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Figure no 17: Command prompt.

4) Then run docking vina copy address "vina search --receptor 6lu7.pdbqt --ligand chloroquine.pdbqt --config config.txt --log log.txt --out output.pdbqt as shown in Fig no:18.



Figure no 18: Run Docking Vina Copy Address "Vina Search-Receptor"

5) After that it will take some time and give us the result of docking as shown in Fig no: 19.

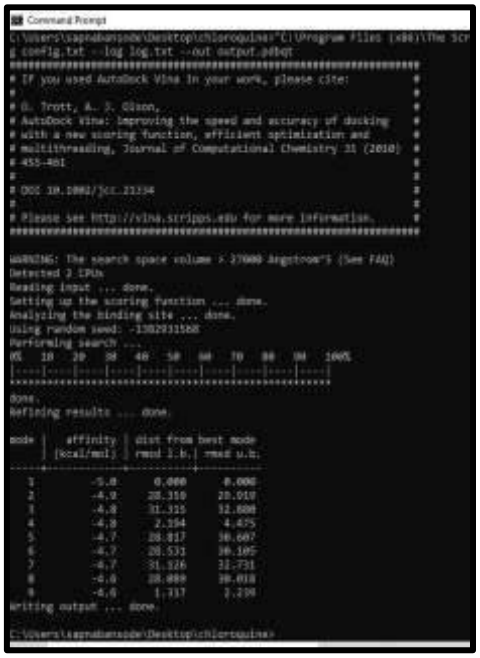


Figure no 19: Final result

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6) Then Output file of the result will automatically save in the command folder, which can be read by using notepad as shown in Fig no: 20.

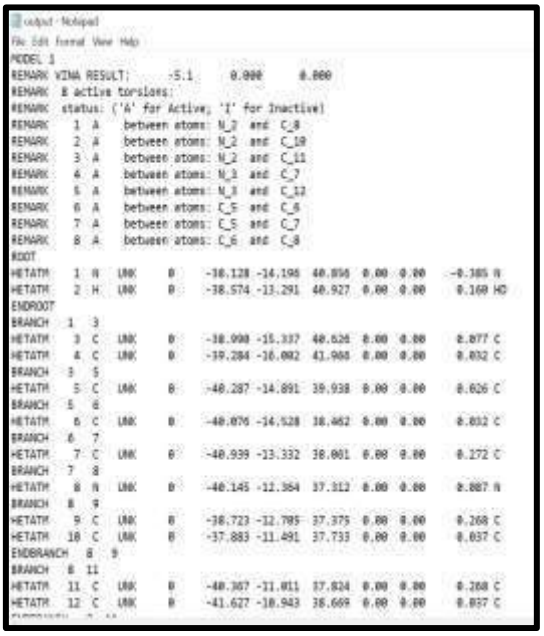


Figure no 20: Out file from command folder.

4.2.7 Visualization Of Docking Result (Docking Complex):

1. For the visualization of result we use "discovery studio 2021 BIOVIA" terminal look like as shown in the Fig no: 21

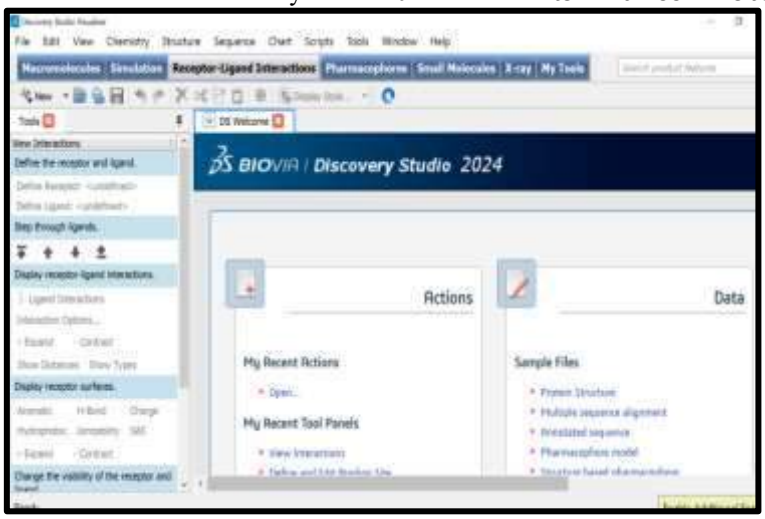


Figure no 21: Terminal of discovery studio 2021 BIOVIA

2. Open out file obtained from docking by click on file section. Then delete all poses by clicking on it except best pose which will be 1 in all case, as shown in Fig no: 22.

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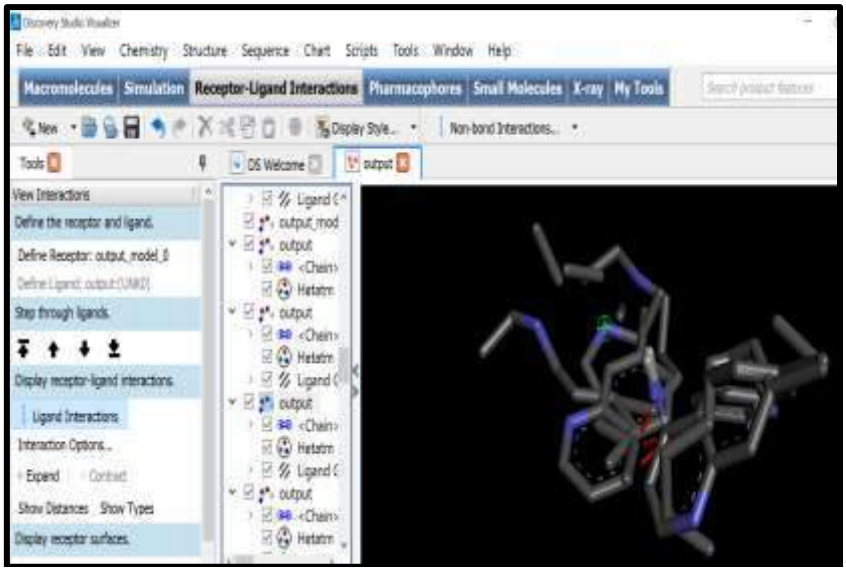


Figure 22: Terminal after load out result file

3. Now go to file section and open 6lu7 receptor PDBQT file in new terminal of Biova software. From this terminal copy receptor and paste it in ligand terminal. As shown in the Fig no: 23

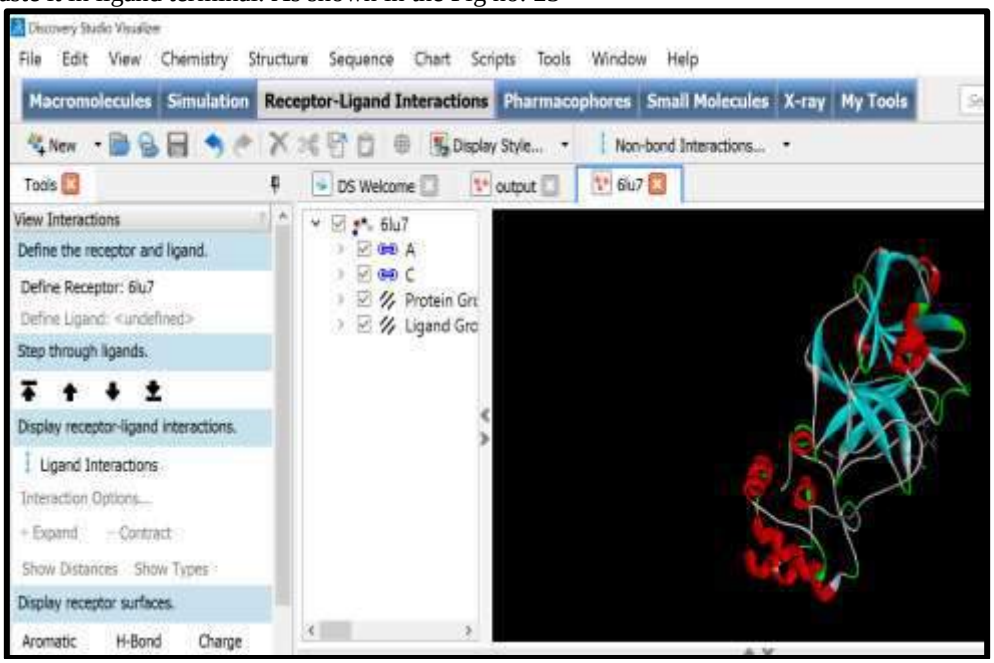


Figure no 23: Complex of ligand with receptor with suitable pose

4. After define receptor and ligand from the complex, then click on "ligand -receptor complex" as shown in the Fig no: 24

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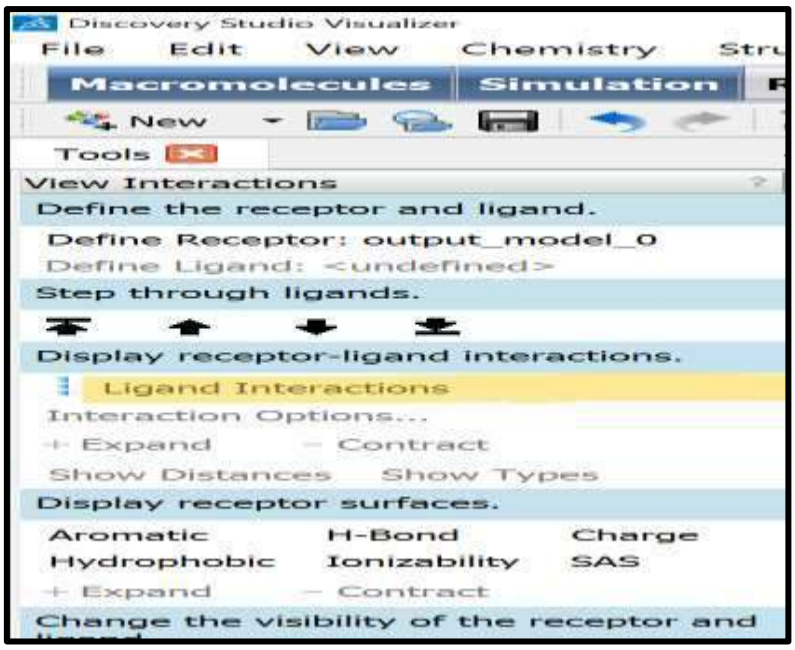


Figure no 24: Ligand interaction option

5. In 'Show' receptor-ligand interaction in 3D diagram, click on 'show 3D diagram, where you will get image of amino acid attached to ligand in 3D format Fig no: 25

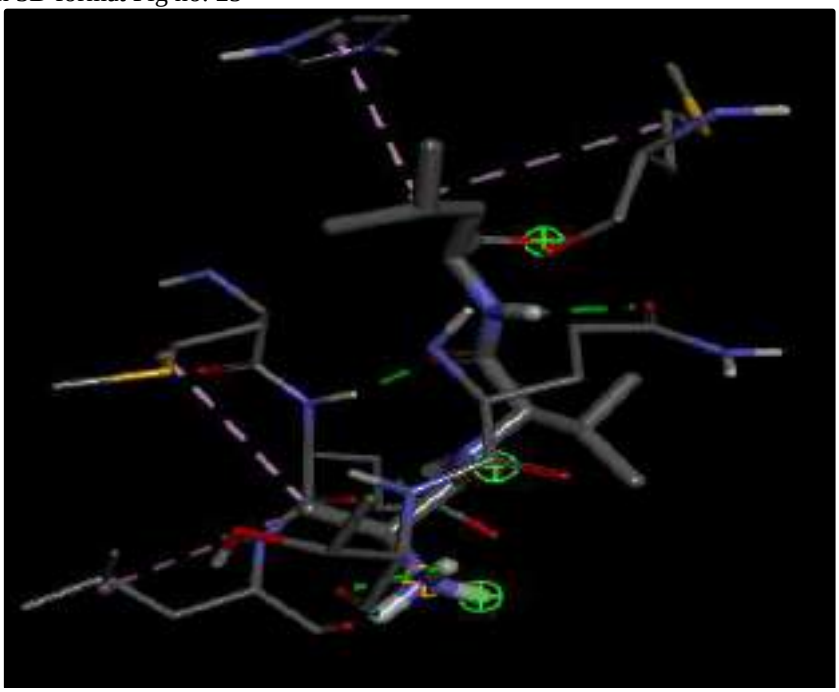


Figure no 25: 3D structure of ligand.

6. In Show receptor-ligand interaction in 2D diagram, click on 'show 2D diagram", where you will get image of amino acid attached to ligand in 2D format Fig no: 26

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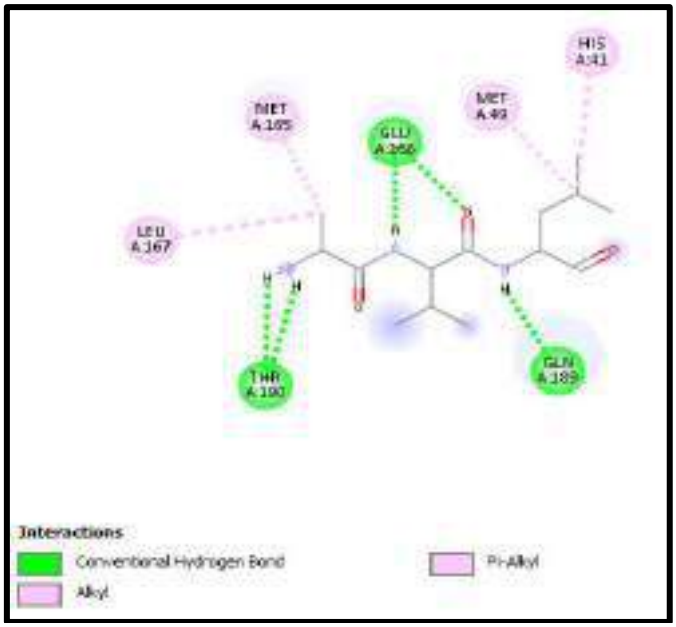
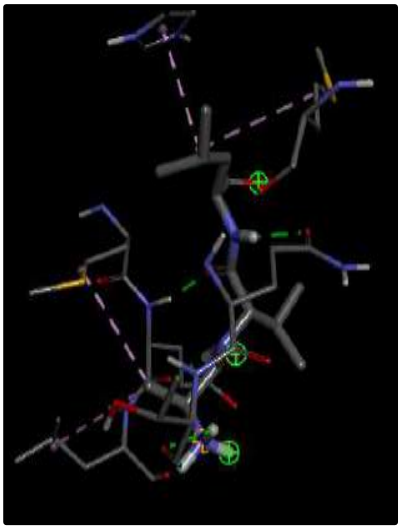
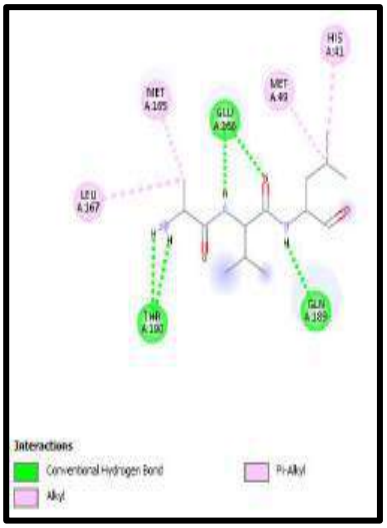


Figure no 26: 3D structure of ligand.

Sr no	Ligand name	3D Orientation	2D Orentation
1	**Chloroquine**		

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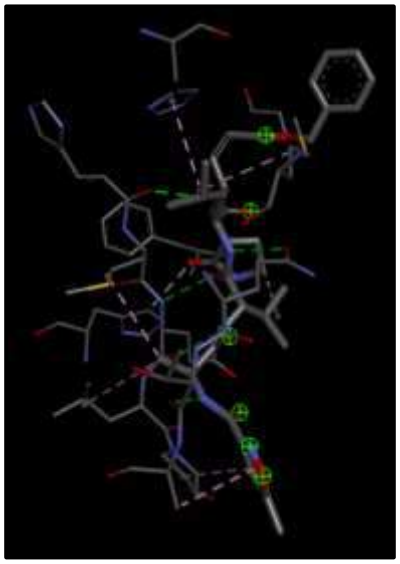
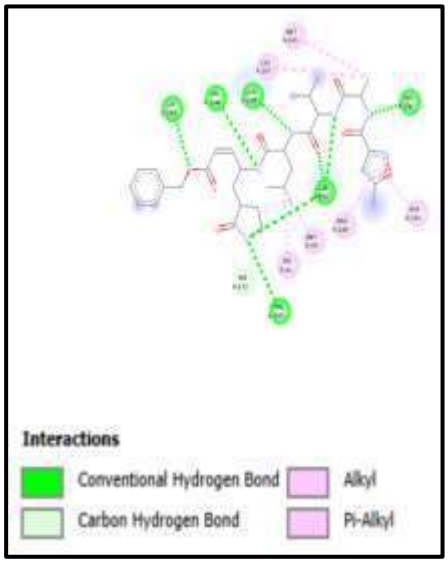
2	Remdesivir		

Table No 5: 2D And 3D Oreantation Of Standard And Test Drug

Table 5 Result of molecular docking

Sr no	Ligand name	Binding energy	Amino acid attached
1	Chloroquine	-5.5	LEU A:165, JLU A:166, LEU A:167, JEN A:189, GLN A:189, MET A:49, THR A:90
2	Remdesivir	-5.8	TRP A:218, ARG A:217, LEU A:220, ARG A:222, ASN A:221, PHE A:223

4) RESULT DOCKING

4.1 Docking Result of chloroquine

The result of test drug chloroquine and their target viral protein, PDB ID binding energy and standard drug like a Remdesivir for comparative study have been summarised as below table by autodock vina tool.

Sr.no	Target name	Viral name	PDB ID	Binding energy of test drug	Binding energy of standard
1	Acute respiratory syndrome	Escherichia coli	6lu7	-5.5	-7.4
2	Homo sapiens	Spodoptera frugiperda	6vw1	-5.8	-7.2

5) DISCUSSION

Molecular docking studies have been performed on chloroquine (test drug) and Remdesivir (standard drug) to understand their binding mechanisms and potential interactions with target proteins. chloroquine is a anti-viral drug used for the treatment of various viral infections caused by viruses (Escherichia coli, Spodoptera frugiperda). Remdesivir, on the other hand, is an vaccine use in covid-19 for the treatment of corona virus. It's known for its effectiveness, but it can also have side effects including fever, nausea, vomiting, sweating, and shivering symptoms.

6) CONCLUSION

Combining the DFT approach with molecular docking simulations, chloroquine derivatives have been explored due of their remarkable efficacy in treating the COVID-19 pandemic. It will also you as anti-malarial agent. Remdesivir is use as standard drug in COVID-19 pandemic and shows more effectiveness than chloroquine. But it also have major side effects. Chloroquine shows minor effects on peoples.

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APPLICATION OF TEWL IN FORMULATION OF SOAPS

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ABSTRACT
Transepidermal water loss (TEWL) is the most widely used objective measurement for assessing the barrier function of skin in healthy individuals but also patients with skin diseases that are associated with skin barrier dysfunction, such as atopic dermatitis. TEWL is the quantity of condensed water that diffuses across a fixed area of stratum corneum to the skin surface per unit time. The water evaporating from the skin is measured using a probe that is placed in contact with the skin surface and contains sensors that detect changes in water vapor density. TEWL can be measured using an open-chamber, unventilated-chamber, or condenser-chamber device. It is a sensitive measure that is affected by properties of the surrounding microclimate such as environmental humidity, temperature, and airflow and should be measured under controlled conditions. TEWL varies significantly across different anatomical sites and also depends on sweat gland activity, skin temperature, and corneocyte properties. Here we describe how to optimally use TEWL measurements as a skin research tool in vivo and in vitro.

KEYWORDS: *Moisturizing Properties, Barrier Function, Sensitive Skin, Humectants, Emollients, Occlusives, pH Balance, Surfactants, Natural Ingredients.*

1.INTRODUCTION

Transepidermal water loss (TEWL) is an objective measurement of skin integrity measured as the amount of water lost across the stratum corneum. TEWL varies greatly across variables such as age and anatomic location, and disruptions in the skin barrier have been linked to inflammatory trematodes such as psoriasis and atopic dermatitis. Impact of environmental conditions and pollution on TEWL has yet to be determined. Accordingly, this review summarizes effects of environmental conditions and pollution on TEWL.[1]

TEWL is an amount of water per unit area of skin and per unit of time exiting the body through the skin into the atmosphere through diffusion and evaporation. The normal value of TEWL in children is 0-15 g/m2/h (gram / square meter / hour).[2]

Transepidermal water loss (TEWL) is the most widely used objective measurement for assessing the barrier function of skin in healthy individuals but also patients with skin diseases that are associated with skin barrier dysfunction, such as atopic dermatitis. TEWL is the quantity of condensed water that diffuses across a fixed area of stratum corneum to the skin surface per unit time. The water evaporating from the skin is measured using a probe that is placed in contact with the skin surface and contains sensors that detect changes in water vapor density. TEWL can be measured using an open-chamber, unventilated-chamber, or condenser-chamber device. It is a sensitive measure that is affected by properties of the surrounding microclimate such as environmental humidity, temperature, and airflow and should be measured under controlled conditions. TEWL varies significantly across different anatomical sites and also depends on sweat gland activity, skin temperature, and corneocyte properties. Here we describe how to optimally use TEWL measurements as a skin research tool in vivo and in vitro.[3]

1.1.WHAT IS TEWL?

The measurement of transepidermal water loss or skin surface vapor loss is a good indicator of the integrity of the skin barrier function which inherently refers to the skin's ability to retain moisture.[4]

1.2.TEWAMETER TM 300 :Assessing the Skin Barrier Function

The measurement of transepidermal waterloss (TEWL) the most important parameter for evaluating the efficiency of the skin water barrier. Even the slightest damage in the skin water bamer can be de- termined at an early stage. The Tewameter" is the most accepted and best selling TEWL measurement device worldwide.[5] Many international scientific studies demonstrate its importance in dermatological and cosmetological fields. There are various fields of application. Besides efficacy testing and claim support for cosmetics and pharmaceuticals, and objective clinical diagnosis in dermatology, there is a large application in occupational medicine, medical consultancy, observation of the newborn, the food industry and many more fields.[6]

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2.MATERIAL AND METHOD

TEWL and SSWL were measured utilizing an Evaporimeter (Servo Med, Sweden) (8). Thehand-held probe samples atmospheric hydration at two points above skin surface; evaporation is calculated from the detected water gradient. A clip containing a screen and spacing ring was attached to the probe, minimizing sensor contamination from formulations on the skin. Additionally, a 10-mm tall polyethylene chimney was fabricated and added to the probe's open chamber. This, in conjunction with the time constant filter "10 on the instrument, helped dampen air-current induced measurement fluctuations.[7] While the water loss measurement is stable utilizing the chimney and clip attached to the protective Teflon chamber, in vivo TEWL measurements register higher than when the bare hygrosensors are placed at a similar position above the skin; actual TEWL is possibly overestimated with our probe arrangement, but the stability makes small relative changes detectable. Skin temperature was recorded with a skin surface temperature probe (Telethermometer, Yellow Springs, OH, USA). All TEWL were corrected to a common temperature of 30°C (9). Increasing relative humidity decreases TEWL (10, 11). While uncontrolled in this study, relative humidity and room temperature were recorded, respectively, with another Evaporimeter and a mercury thermometer. Relative humidity fell between 40-55% and room temperature 18-24°C. Relative humidity fluctuations were too small to detect a corrrelation considering measurement variability.[8]

2.1. Instrumentation (hydration)

SC water content was directly sampled with the dielectric water content probe. This instrument consists of a coaxial cable attached to a Wavetek 1005 (Indiana) microwave generator and detector.[9]

A signal swept several megahertz about 1 gigahertz resonates in the cable; a charged grid at the cable-end (probe-tip) limits the depth of emitted electric field. When the probe (emitting less than 1 microwatt of (energy) contacts the skin, cutaneous water absorbs energy and produces a standing-wave phase shift, the detection of which is adjusted to be linearly proportional to the hydration level.[10] The instrument output is processed electronically and graphed on a chart recorder or interpreted with a minicomputer. The probe, attached to a flexible arm, contacts the skin through gravity which produces a constant probe pressure. While measuring almost instantaneously, the probe must rest on the skin surface for about 3s. This allows the probe to settle producing a more stable reading (if left on longer, the probe senses increasing hydration due to occlusion). Five measurements are taken per site and averaged. The DPR unit is a percentage based on the skin probe's response against that for a drop of water. While not a true hydration percentage (liquid water and water bound to the SC show different dielectric constants), this basic unit remains useful for relative comparisons.[11]

TEWAMETER



Fig.1. : Open Chamber Tewameter

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3.ADVANTAGE

- ✓ The open chamber measurement is the only method to assess the TEWL continuously. which is necessary for most applications set hut influencing the ok ernartace. Numerous
- ✓ Plausibility of measurement of one largo area with higher precision and reproducible
- ✓ The valued out be slowed single values or as average The probe hoods can easily be acute with high Taxability. [12]

4.APPLICATION

✓ Trans epidermal water loss (TEWL) is the most widely used objective measurement for assessing the barrier function of skin in healthy individuals.

✓ Skin diseases in which the skin barrier is disturbed, such as atopic dermatitis (AD), contact dermatitis, and psoriasis, are associated with elevated TEWL.

✓TEWL measurements are used as a skin research tool in vivo and in vitro.

even slight deficiencies in the balmoral of the indispensable in efficacy testing and artisan support for and pharmaceuticals

- ✓ Termagant Objective in cat sis of smear improve merit and mechanisms of product behaviour Seest studies cant-per-spirant efficacy test Demonstrative pergie to specialization azad interesting applications in veterinary methodology and sociology. [15]

4.1. Regulatory Affairs of Trans-Epidermal Water Loss (TEWL)

Trans-epidermal water loss (TEWL) is a key parameter used to assess the integrity and functionality of the skin barrier. It is widely used in dermatological research, cosmetic product development, and regulatory evaluations to determine the effectiveness of skin care products and treatments. Regulatory affairs concerning TEWL involve the standardization of measurement methods, ensuring the safety and efficacy of products claiming to influence TEWL, and compliance with relevant regulations and guidelines.[16]

4.2. Standardization of TEWL Measurement

1. ISO Guidelines: The International Organization for Standardization (ISO) provides guidelines for measuring TEWL to ensure consistency and reliability across different studies and product evaluations. ISO 19402:2018 outlines the specific methods and equipment to be used for TEWL measurements.
2. Equipment Calibration and Validation: TEWL measurement devices, such as open-chamber and closed-chamber instruments, must be regularly calibrated and validated to ensure accurate readings. Regulatory bodies may require proof of calibration and validation during product evaluations.[17]

4.3. Regulatory Requirements for Skincare Products

1. Product Claims: Products claiming to affect TEWL, such as moisturizers, barrier creams, and anti-aging treatments, must provide scientific evidence to support their claims. This often involves conducting clinical trials or studies that measure TEWL before and after product use.
2. Safety and Efficacy: Regulatory agencies, such as the U.S. Food and Drug Administration (FDA) and the European Medicines Agency (EMA), require comprehensive safety and efficacy data for products intended to modulate TEWL. This includes toxicity studies, allergenicity tests, and long-term use effects.
3. Labeling and Advertising: Claims related to TEWL must be clear, substantiated, and not misleading. Regulatory bodies scrutinize product labels and advertising materials to ensure compliance with regulations.[18]

4.4. Compliance and Regulatory Oversight

1. Good Manufacturing Practices (GMP): Manufacturers of skincare products must adhere to GMP guidelines to ensure product quality and consistency. This includes maintaining detailed records of TEWL measurements and other testing procedures.
2. Post-Market Surveillance: Regulatory agencies may conduct post-market surveillance to monitor the ongoing safety and efficacy of products that claim to influence TEWL. This can involve collecting data on adverse reactions and conducting periodic reviews of product performance.
3. Third-Party Testing and Certification: Independent testing and certification by third-party organizations can provide additional assurance of a product's ability to affect TEWL. Regulatory bodies may recognize these certifications as part of the product approval process.[19]

5.KEY REGULATORY DOCUMENTS AND STANDARDS

1. ISO 19402:2018: Provides guidelines for TEWL measurement methods and equipment.
2. FDA Guidance for Industry: Offers recommendations for the submission of safety and efficacy data for skincare products.
3. EMA Guidelines on the Evaluation of Medicinal Products for Skin Conditions: Outlines the requirements for clinical trials and product evaluations affecting the skin barrier function.[20]

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6. DISCUSSION

The findings of this study reveal significant factors influencing TEWL and, consequently, skin barrier function. High humidity environments contribute to lower TEWL, emphasizing the role of external moisture in maintaining skin integrity. This insight is crucial for individuals in dry climates or those exposed to artificial heating or cooling, which can reduce ambient humidity and increase TEWL. The study also highlights the efficacy of skincare products, especially occlusive agents, in reducing TEWL. This supports the use of specific formulations in skincare routines to enhance barrier function and retain skin moisture. The significant reduction in TEWL with moisturizers aligns with previous research, validating the protective role of these products.

7. CONCLUSION

Trans-epidermal water loss (TEWL) is a vital parameter for assessing skin barrier function and hydration status. This study demonstrates the significant impact of various factors on TEWL, including environmental conditions, skincare products, and physiological states.
Environmental Humidity: High humidity environments are associated with lower TEWL, indicating better skin barrier function in moist conditions. This finding emphasizes the importance of maintaining adequate ambient humidity to support skin health, particularly in dry climates or artificial environments.

Skincare Products: The application of moisturizers, especially those containing occlusive agents, significantly reduces TEWL. This suggests that these products enhance skin barrier function and improve hydration. The results support the use of specific formulations in skincare routines to protect and restore the skin barrier.

Age: TEWL tends to increase with age, reflecting the natural decline in skin barrier function over time. This suggests the need for targeted skincare interventions for older populations to support and maintain skin barrier function.

8. IMPLICATIONS FOR DERMATOLOGY AND SKINCARE

Environmental Control: Maintaining appropriate environmental conditions, particularly humidity levels, is essential for supporting skin barrier function. This is particularly relevant for individuals living in dry climates or working in controlled environments with artificial heating or cooling.

Product Development: The efficacy of skincare products in reducing TEWL highlights the importance of ingredient selection in product formulation. Occlusive agents and other barrier-enhancing ingredients should be prioritized in the development of moisturizers and treatments for compromised skin barriers

Hydration: Ensuring adequate hydration, both internally and externally, is crucial for maintaining healthy skin. This includes drinking sufficient water and using hydrating skincare products.[21]

9. FUTURE DIRECTIONS

Further research is needed to explore the long-term effects of various environmental factors, skincare products, and physiological changes on TEWL. Additionally, studies investigating the molecular mechanisms underlying TEWL and barrier function can provide deeper insights into developing more effective skincare treatments.

In summary, TEWL is a critical indicator of skin barrier health. Understanding the factors that influence TEWL can guide dermatological practices and skincare product development, ultimately leading to improved skin health and protection.

10. RESULT

TEWL, or Transepidermal Water Loss, is a measure of the amount of water that passes from inside a body through the epidermal layer to the surrounding atmosphere. This measure is often used to assess the integrity of the skin barrier function. Here's how to interpret the results of a TEWL measurement:

Low TEWL: Indicates a well-functioning skin barrier. This suggests that the skin is effectively retaining moisture and preventing water loss, which is typical of healthy, hydrated skin.

Moderate TEWL: Indicates a moderately functioning skin barrier. The skin is retaining some moisture but is also losing some water. This could be normal for some skin types or conditions.

High TEWL: Indicates a compromised skin barrier. The skin is losing more water than normal, which can be a sign of dryness, irritation, or underlying skin conditions such as eczema, psoriasis, or other dermatological issues.

Very High TEWL: Indicates a severely compromised skin barrier. This can be a sign of significant skin damage or severe dermatological conditions. Immediate attention to skin hydration and barrier repair is usually necessary.

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Low TEWL: < 10 g/m²/h
Moderate TEWL: 10 - 15 g/m²/h
High TEWL: 15 - 25 g/m²/h
Very High TEWL: > 25 g/m²/h
If you have specific TEWL results and need help interpreting them, please provide the values, and I can offer a more detailed analysis.

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FORMULETION AND EVALUATION OF ALOE VERA SOAP

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ABSTRACT

Aloe vera, a succulent plant species in the Alliaceae genus, is pronounced /aero(i) vr, v r-. It is widely dispersed and regarded as an invasive species in many parts of the world. Its usefulness in treating wounds and burns is debated, with some evidence suggesting it may alleviate skin disorders symptoms, but potential allergic reactions may occur. As a result of enhanced hygiene producers meant to lower the population of harmful micro-organism, soap consumption is rising in modern developed nations. Formulating and evaluating aloevera soap involves several steps, including ingredient selection, the soap-making process, and testing for quality and efficacy.

1.INTRODUCTION

Aloe vera, a succulent plant species in the Aloe genus, is pronounced /ˈaeloʊ(i) vɛrə, vɪər-/[1].It is widely dispersed and regarded as an invasive species in many parts of the world.[2]

Scientific Classification

Kingdom:Plantae
Clade:Tracheophytes
Clade: Angiosperms
Clade :Monocots
Order: Asparagales
Family: Asphodelaceae
Subfamily: Asphodeloideae
Genus:Aloe
Species A.Vera

This evergreen perennial is native to the Arabian Peninsula and grows wild in tropical and semi-tropical regions all over the world.[2]
This species looks good inside and is a potted plant that does well.[4]
Acemannan, a polysaccharide gel found in aloe vera leaves, has topical application benefits.[5]
Products including skin lotions, cosmetics, ointments, and gels for minor burns, skin abrasions, bug bites, and windburn include aloe vera's acemannan.[6]
Because of the unknown effects that aloe vera extracts may induce, consuming them might be dangerous.[3,7]
Even when aloe vera is administered only topically, pregnant women are more susceptible to adverse responses.[3,7]

2.ETIOLOGY

Verus which means "true" in Latin, is the source of the particular adjective vera.[9,11]

Common Names

Common names for aloe include those that reflect the location in which it is found, including Chinese aloe, Cape aloe, or Barbados aloe.[3,12,13]

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2.1. TOXONOMY

Aloe barbadensis Mill., Aloe indica Royle, Aloe perfoliata L. var. vera, and Aloe vulgaris Lam are some of the synonyms for the species.[14,16]
Aloe perfoliata var. vera was the species that Carl Linnaeus originally described in 1753.[19]
Aloe vera was dubbed Aloe barbadensis by Philip Miller after Nicolaas Laurens Burman had titled it in Flora Indica in 1768.[20]
Aloe vera and the Yemeni native Aloe perryi may be closely related, according to DNA comparison methods.[21] Chloroplast DNA sequence comparison and inter simple sequence repeat profiling suggest Aloe species are closely related to Aloe forbesii, inermis, scobinifolia, sinkatana, and striata, native to Yemen, Somalia, and Sudan.[22] Because there are no distinct natural populations of Aloe vera, several experts speculate that the plant may have hybrid origins.

2.2. Description

Because there are no discernible natural populations of the species, some experts speculate that aloe vera may be a hybrid.[2]

LEAVE

Thick and meaty, the leaves are green to grey-green in color, with some types having specks of white on the upper and lower surfaces of the stems.

FLOWER

The flowers are produced in summer on a spike up to 90 cm (35 in) tall, each flower being pendulous, with a yellow tubular corolla 2–3 cm (¾–1+¼ in) long.

ROOTS

Like other Aloe species, Aloe vera forms arbuscular mycorrhiza, a root symbiosis that allows the plant better access to mineral nutrients from the soil.

3.DISCRIPTION

Aloe vera is thought to be indigenous to just the southeast. One important area in the region is the Arabian Peninsula, which is situated in the Hajar Mountains in eastern United Arab Emirates and northeastern Oman.The plant has been widely grown around the world and has naturalized in the Canary Islands, Cape Verde, Madeira Islands, North Africa, Sudan, and surrounding nations.[14]
Additionally, the species has established itself in Portugal's Algarve wild places around Spain.
On temperate continents, this plant has been widely naturalized in tropical, temperate, and dry environments.[2]

4.CULTIVATION

Modern gardeners use aloe vera, a popular decorative plant, as a topical therapeutic herb.
The plant is well-known for its distinctive shape, blossoms, and succulence, which enable it to flourish in areas with little rainfall and make it appropriate for low-water gardening. The plant can withstand severe cold and snowfall, however it is hardy in zones 8 through 11Although the species is usually resistant to most insect pests, certain types of aphids, mealy bugs, spider mites, and scale insects may be harmful to plants.[15] The Royal Horticultural Society has awarded this plant its Award of Garden Merit.

Before rewatering, potted plants should dry fully since puppies can overwhelm them. Reorganize densely populated plants or ignore the puppies. Since aloe vera can become dormant in the winter, heated glasshouses or indoor environments are ideal.

5.USES

Commercial solutions for skin diseases and constipation treatment employ aloe vera's clear gel and yellow latex; the gel is used for topical medicines and the latex is for individual usage.[7,].

Aloe vera's effectiveness in treating wounds and burns is debated, with some evidence suggesting it may alleviate skin disorders symptoms, but potential allergic reactions may occur.

Although its usefulness in healing burns and wounds is up for discussion, aloe vera has been shown to help ease the symptoms of a few other skin conditions.[7,24]

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6.TOXICITY

It's debatable if aloe vera works well for burns and wounds, although it has been proposed that it helps with some skin conditions. [7,11]

7.HISTORY

A fatty acid's alkali salt is the chemical component of soap. a frequently used skin 'cleaning product. Ancient Babylonians are the first people in thousands of years to have used

When animal fat was cooked with an alkali called ye, which was generated, From woody ashes, an agressive, foul-smelling substance known as soap was created for the first time. Since then, there have been numerous variations and the addition of other components to make soap more aesthetically pleasing. The term "soap" understates the complexity of modern skin cleanser , which also cause skin conditions. Ingredients in addition to the surfactant [1].

soap about 600 BC. The word "soap" originates from the animal sacrifice on mount soap . Roman Ladies laundered their clothing with soap. Gau's colored their with soap.

Using olive oil. the skill of producing soap emerged in spain, Italy and France during the 7th century. by the thirteenth century, Britain manufacturing of soap had destroyed forest, rendering it a luxury ✓ good available only to aristocrats - Royal households in Europe began to utilize castile soap. which is allowed pure white soap. Glad stone removed the soap tar in 1853, lowering the it, cost. Nicolas leblanc, a french scientist, developed. alkali soda ash in 1791.

soop's original use was cleaning, but it eventually gained usage for its health and beauty properties surface-active substances called surfactants Cause foaming and cleaning lower surface tension and harm the stratum corneum. Mild and moisturing cleansers have been made possible by the development of newer technology. Both natural and synthetic surfactant are utilized in making of soap. syndet bar contain emollients for moisture and gentler, surfactant to reduce irritation.

7.1. ANCIENT MIDDLE EAST

No one knows for sure who invented soop first
A sumerian clay tablet from about 2500 BC contain a soup recipe for heating oil and wood ash the first known chemical reaction, which was used to wash woolen garments.
According to Ebers papyrus, which dates back to 1550 BC, the ancient Egyptians mixed vegetable or animal rats trona, a materials made of coda ash, to make soap .
Barillo plant ashes, such as those from salsola, saltwort, and anabolise, were used in the southern levant to make potash, or soap

7.2. Roman Empire

In his works from the early centuries, Pliny the elder describes soap as a Gaulish innovation.[12]
The lain word "sebum", which mean follow is connected to the latin word "sapo" which means soap. It most likely come from/ an early Germanic language. .
Then were more likely than women naturalise tallow and as her to make soap, which was employed in Historia Naturalist to heal scrofulous sore and radden hair in the culture.
In the second century Ad, the celts known of the Gouls are mentioned by the historian Aretaeus of Cappadocia as using soap, an alkaline material .

The Roman liked to massage oil into their skin which they would then remove with a strigil along with any debris.
The metal grip and curved blade are elements of the conventional design.

Galen, a physician from the second century Ad, recommended creating and washing soap for personal hygiene and named Germanic and Gaul soaps of the best soapmaking was also documented by zosimos or panopolis .

Islamic Golden Age

Using instruction from Muhammadibh zakariya al-Razi soap-making in the middle east developed into a thriving business during the Islamic Golden Age. In syria, ratty oils, fats. Alkali and lime were used to make soap, which was then sold to Europe and other muslim nation

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The main component alkali. which is derived from al-galy or ashes is mentioned in the book, Alkali has become crucial to contemporary Chemistry.

Medieval Europe
In the late sixth century, soapmaker in Naples belonged to a guild that was ruled by eastern Roman Empire
Around 800, the carolingain capitulary de villis describe the soap as a commodity Stewarded by royal ertates by 800 medieval spain was the leading producer of soap (while soapmaking in England began around 1200
Making soap is a big business, that requires variety of abilities, including baking, blacksmithing and carpentry. It's also seen. as a "women work's" and a creation of "good workmen'"

15th-18th Century
The semi-industrialized soap industry of Provence, which included Toulon, Hyeres, and marseille was a major, supplier to the rest of France by the 15th century.

Marseilles was noticeably more productivity than other provencal communities with at least two factories specializing in soap manufacture by 1525

Vegetable oils like olive oil were used to make European soap sorting in the 16th century, and this technique will widely used today one well-known example is castile soap, which is made up the.

19th Century
The soap industry was tiny and soap industry was tiny. And unorganized before to the industrial Revolution Isi order to produce alkalis, James Keir founded tipton chemical works in 1780. Nicolas lebalanc took Over al director. In 1790.
In 1865-his con-in-law Thomas J. Barrott was appointed Pear's first-ever brand manager

Liquid Soap
liquid soap was first created in the 19th century. and was, patented by william Sheppard in 1865.
B.J. Johnson founded the B.J. Johnson soap company in 1898 and marketed "Palmolive" brand soap, which was derived from palm and olive oils.
cleaning cloth, Floors, and bathrooms became, easier when businesses like pinesol and Tide launched their ow liquid. soap in the early 1900s.

8.INGREDIENTS

Base Ingredients:
Oils and Butters, Olive oil, Coconut oil, Palm oil (sustainably sourced), Shea butter

Lye Solution
- Sodium hydroxide (NaOH) for solid soap
- Distilled water

Additives
- Aloe Vera
- Fresh aloe vera gel or aloe vera extract
- Essential Oils
- For fragrance (e.g., lavender, tea tree, or peppermint essential oil)

9. SOAP-MAKING PROCESS

Safety Precautions:
- Wear gloves, goggles, and long sleeves.
- Work in a well-ventilated area.

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Steps

1**. Prepare the Lye Solution**
- Weigh the distilled water and NaOH.
- Slowly add NaOH to the water (never the other way around) and stir until dissolved. Allow it to cool.

2. **Prepare the Oils**
- Weigh and melt the solid oils/butters (coconut oil, palm oil, shea butter) in a heat-resistant container.
- Add the liquid oils (olive oil) to the melted mixture.

3**. Mix Lye and Oils**
- When both the lye solution and oils are at a similar temperature (around 100°F/38°C), slowly add the lye solution to the oils.
- Use a stick blender to mix until reaching "trace" (a thin pudding-like consistency).

4. **Add Aloe Vera and Other Additives**
- Gently fold in aloe vera gel, essential oils, and any other additives.

5. Mold the Soap
- Pour the soap mixture into molds.
- Cover and insulate to allow the soap to undergo saponification for 24-48 hours.

6. Cure the Soap
- Remove the soap from the molds and cut into bars.
- Cure the bars in a well-ventilated area for 4-6 weeks.

10. EVALUATION OF ALOE VERA SOAP

1. Physical Properties
- Appearance: Check for uniform color, absence of cracks, and smooth texture.
- Hardness: Test by pressing lightly; the soap should be firm but not brittle.
- Lather: Evaluate the amount and quality of lather produced.

2. Chemical Properties
- pH Testing: Use pH strips or a digital pH meter to ensure the soap has a skin-friendly pH (around 7-10).
-Moisture Content: Lower moisture content indicates better longevity. Measure using a moisture analyzer.

3. Microbiological Testing
- Preservation: Ensure no microbial growth by testing for bacteria, yeast, and mold.

4. User Evaluation:
- Conduct a patch test for skin irritation.
- Collect feedback on skin feel, moisturization, and fragrance from a group of users.

5.Stability Testing:
-Shelf Life: Assess the soap's stability over time by storing it under different conditions (temperature, humidity) and monitoring changes in colour, fragrance, and efficacy.

Sample Aloe Vera Soap Formula (Cold Process)

- Olive oil: 40%, Coconut oil: 30%, Palm oil: 20%, Shea butter: 10%, Aloe vera gel: 15% (of total oil weight), Sodium hydroxide: Calculated based on oil weights using a lye calculator, Distilled water: 1.5 times the weight of sodium hydroxide, Essential oils: 1-2% of total oil weight.[23]

11. RESULT

ALOE vera soap is popular for its potential benefits for the skin, largely due to the properties of the Aloe vera plant. Here's an overview of what users might expect when using Aloe vera soap:

Benefits of Aloe Vera Soap

Moisturizing: Aloe vera is known for its hydrating properties, making the soap a good choice for dry or sensitive skin. It helps in locking moisture into the skin, leaving it soft and smooth.

Healing and Soothing: Aloe vera has anti-inflammatory and healing properties. The soap can soothe irritated skin, reduce redness, and help heal minor cuts, sunburns, and abrasions.

Anti-Aging: Aloe vera contains antioxidants, including beta-carotene, vitamin C, and vitamin E, which can help improve the skin's natural firmness and keep it hydrated, thereby reducing the appearance of fine lines and wrinkles.

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Anti-Acne: Due to its antibacterial and anti-inflammatory properties, Aloe vera soap can help reduce acne and prevent future breakouts. It also helps in removing excess oil and dirt from the skin.

Hypoallergenic: Aloe vera is generally gentle on the skin and is less likely to cause allergic reactions, making it suitable for sensitive skin types.
Skin Brightening: Regular use of Aloe vera soap can help in achieving a more even skin tone and reducing dark spots and pigmentation.

12. REFRANCE

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23. *This format follows a consistent style, including author names, publication dates, article titles, journal names (where applicable), volume and issue numbers (where applicable), page numbers, DOI (Digital Object Identifier) when available, and relevant publication mediums.*

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CAPACITY BUILDING OF LOCAL ECONOMIC DEVELOPMENT AND INVESTMENT PROMOTION OFFICERS AND POLICY IMPLEMENTATION IN LAGUNA

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ABSTRACT

This study aimed to determine the level of capacity building of Local Economic Development and Investment Promotion Officers and policy implementation in Laguna during the calendar year 2023-2024.

Descriptive quantitative research design was utilized to analyze the demographic profile, the level of learning participation, the level of policy implementation, the profile of the respondents and the levels of capacity building predicting the level of policy implementation, and the significant relationship between the level of learning participation of LEDIPOs, and the level of policy implementation using the following statistical treatment respectively, such as frequency and percentage, weighted mean, regression analysis, Pearson-R, and T-test.

The result showed that the profile of the respondents and the levels of capacity building do not significantly predict the level of policy implementation. And there is a significant relationship between the level of learning participation of LEDIPOs and the level of policy implementation in Laguna.

These findings suggested that investing in capacity-building programs for LEDIPOs can enhance the level of policy implementation outcomes in Laguna. By focusing on areas such as investment promotion, local area promotion, Local Investments and Incentive Code (LIIC), marketing strategies, and partnership with national agencies, LEDIPOs can contribute more effectively to policy implementation efforts.

The study's recommendations offered a strategic roadmap for enhancing the effectiveness of Local Economic Development and Investment Promotion Offices (LEDIPOs). It advocated for collaborative partnerships with external experts to enrich LEDIPOs' expertise and resources. Practical capacity building, coupled with mentorship, ensures that LEDIPOs can apply learned concepts to real-world projects. Understanding investor needs through targeted market research enables LEDIPOs to tailor their strategies effectively, thus promoting local areas to potential investors.

The study also stressed the importance of evaluating LEDIPOs' adherence to guidelines and resource allocation for better policy implementation. By coordinating with national agencies, LEDIPOs can amplify their impact on local economic development. Lastly, institutionalizing LEDIPOs with dedicated budget allocations secures their role in fostering local growth. In essence, these recommendations provide a concise yet powerful framework to empower LEDIPOs in driving sustainable economic development at the local level.

KEYWORDS: *Capacity Building, Policy Implementation, Local Economic Development Officer*

INTRODUCTION

Local economic development and investment promotion are key forces behind economic growth and sustainability at the provincial, city and municipal levels. Local Economic Development and Investment Promotions Officers (LEDIPOs) have a critical role in influencing the economic climate of their particular regions in the achievement of these goals.
In order to promote an environment that attracts investments, generates employment opportunities, and supports the economic prosperity of local communities, these officials' skill and capacities are important.

Addition to this, the Local Economic and Investment Promotion Office has been established as one of the indicators in the Seal of Good Local Governance (SGLG) under Business-Friendliness and Competitiveness Essential Area.

The purpose of Department of Interior and Local Government (DILG) Memorandum Circular No. 2010-113 is to enhance the Designation of Local Economic and Investment Promotion Officer (LEIPO) that only covers the cities and provinces. The updated Memorandum Circular 2020-167, encourages all the municipalities to also designate LEDIPO and to establish/create Local Economic Development and Investment Promotion Office/Unit in expanding their role not only to serve as the local investment promotion officer, but also as the focal economic development. It is deemed necessary to encourage more investments and competitiveness in the locality in sustaining economic development.

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The structure of Local Economic Development and Investment Promotion Office is headed by a LEDIPO, supported by minimum of two (2) or three (3) technical support staff to be designated by the Local Chief Executive (LCE) supported by an executive order/ordinance and has three divisions, the Economic Enterprise Division, Business Development Division and Investment Services Division.

The LEDIPOs and the technical competencies and qualification perform the roles and functions, that is why the capacity building is needed to become effective and efficient on that aspects.

MATERIALS AND METHODS

Using a descriptive quantitative research design by Creswell (2014), characterizes quantitative research as investigating social or human issues by testing theories using measurable variables, analyzed through statistical methods to verify if the theory's predictions are accurate. The study used a questionnaire, integrating a quantitative research method to ensure the level of learning participation in capacity building programs for LEDIPOs in cities and municipalities and ensured the level of policy implementation in Laguna. A maximum sample size of thirty (30) respondents will be targeted.

This study was conducted in the thirty (30) cities and municipalities in Laguna known for its diverse economic activities and strategic location within the Calabarzon region, Laguna has become a key player in the country's economic development. A maximum sample size of thirty (30) respondents included were the thirty (30) LEDIPOs determined through purposive sampling since they belong to the same category. It represents one (1) LEDIPO Head in the cities and municipalities in Laguna.

The study used the researcher-made questionnaire-checklist in connection with Local Economic Development and Investment Promotion Officers (LEDIPOs), considering the demographic profile of the respondent, the level of learning participation, and the level of policy implementation in Laguna.

The instrument was divided into three parts consisted of the following: (Part I) Demographic Profile of the respondents; (Part II) Capacity Building, aims to know the level of participation of LEDIPOs with regards to Investment Promotion, Economic Development Initiatives, Promotion of local area to potential investors and stakeholders; (Part III) Policy Implementation, aims to know the level of LEDIPOs with regard to Local Investments and Incentive Code (LIIC), Marketing and promotion strategies of the LGU, and Partnership with other national agencies.

RESULTS AND DISCUSSION

On the Income classification of Cities and Municipalities in Laguna

There were total of thirty (30) cities and municipalities in Laguna, compose of six (6) cities and twenty-four (24) municipalities.

In the first class income classification, there are five (5) cities and three (3) municipalities are included. While on the second class income classification, three (3) municipalities are included.

In the third class income classification, there is one (1) city and seven (7) municipalities identified. There are seven (7) municipalities in the fourth class income classification, while in the fifth class income classification there are four (4) municipalities.

On the Demographic Profile of the Respondents

There were thirty (30) LEDIPOs in the cities and municipalities in Laguna, majority belong to the age 26-35 years old and 36-45 years old, Gender distribution among respondents is evenly split, with male and female categories. Majority of the respondents hold a Bachelor's degree and based on the civil service eligibility majority are Second level eligibility.

In the employment status mostly are permanent position, when it comes to the designation, majority of respondents hold Concurrent LEDIPO and multiple designation.

Table 1. Income Classification of Cities and Municipalities in the Province of Laguna

Income Classification	City		Municipality		Total (Combined)	%
	f	%	*f*	%		
First Class	5	83.3	3	12.5	8	26.7
Second Class			3	12.5	3	10.0
Third Class	1	16.7	7	29.2	8	26.7
Fourth Class			7	29.2	7	23.3
Fifth Class			4	16.6	4	13.3
Total	**6**	**100**	**24**	**100**	**30**	**100**

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Table 1 presents the income classification of cities and municipalities in Laguna provides a snapshot of the province's economic landscape, categorized into five classes based on average annual income.

First Class localities, with the highest income, include five cities and three municipalities, making up 26.7% of the total. This indicates significant affluence and likely better infrastructure and services in these areas. No cities are classified as Second Class, but three municipalities (10.0% of the total) fall into this category, suggesting a gap between the highest and moderately high-income areas.

Third Class localities, comprising one city and seven municipalities (26.7% of the total), reflect a substantial portion with moderate income levels, essential to Laguna's economic health. Fourth Class includes seven municipalities (23.3% of the total), indicating areas with slower economic development and no cities in this category.

Finally, the Fifth Class, with the lowest income, includes four municipalities (13.3% of the total), highlighting regions needing economic support.
Overall, this data reveals significant economic disparities across Laguna's cities and municipalities, emphasizing the need for targeted policies to promote balanced growth and reduce inequalities.

Table 2 in the next page shows a comprehensive overview of the respondents' profiles across various categories, offering valuable insights into the study population. The age distribution reveals that the most represented groups are 26-35 and 36-45, each constituting 30% of the respondents, while the 18-25 age group follows closely at 26.7%. The smallest representation is seen in the above 55 category, making up just 10%.

Table 2. Frequency and Percentage Distribution of Respondents' Profile

Respondents' Profile	*f*	%
AGE		
▪ 18 – 25	1	3.3
▪ 26 – 35	9	30.0
▪ 36 – 45	9	30.0
▪ 46 – 55	8	26.7
▪ Above 55	3	10.0
SEX		
▪ Male	15	50
▪ Female	15	50
EDUCATIONAL LEVEL		
▪ Bachelor's Degree	15	50.0
▪ Master's Degree	11	36.7
▪ Doctorate Degree	None	-
▪ Others	4	13.3
CIVIL SERVICE ELIGIBILITY		
▪ First Level	6	20.0
▪ Second Level	20	66.7
▪ Others	4	13.3
EMPLOYMENT STATUS		
▪ Job Order	1	3.3
▪ Casual	None	0.0
▪ Permanent	24	80.0
▪ Others	5	16.7
DESIGNATION		
▪ Full-Pledge LEDIPO	None	0.0
▪ Designate LEDIPO	2	6.7
▪ Concurrent LEDIPO	28	93.3
▪ With Other Position	30	100
YEARS OF SERVICE AS LEDIPO		
▪ Less than 1 year	6	20.0
▪ 1 year – 5 years	19	63.3
▪ 6 years – 10 years	3	10.0
▪ 11 years – 15 years	2	6.7
▪ Above 15 years	none	

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Gender representation is balanced, with an equal split of 50% male and 50% female participants, indicating equitable participation across genders. In terms of educational attainment, a significant portion of respondents hold a Bachelor's degree (50%), while 36.7% have attained a Master's degree. The remaining 13.3% are categorized as 'Others', likely including vocational or associate degrees.

The respondents' civil service eligibility levels show that the majority, 66.7%, have Second Level eligibility, suggesting a higher qualification within the public service sector. First Level eligibility accounts for 20%, and 'Others' make up 13.3%. Employment status data indicates that 80% of respondents are permanently employed, highlighting job stability within the group. Smaller proportions are on Job Order (3.3%) or fall under 'Others' (16.7%).

Regarding their organizational roles, a vast majority (93.3%) hold Concurrent LEDIPO positions, with a small fraction (6.7%) being Designate LEDIPO. This distribution points to a dominant role for Concurrent LEDIPO in the respondent pool. The tenure of service as LEDIPO shows that 63.3% have served between 1 to 5 years, indicating a relatively new but significant experience base. Those with less than 1 year of service account for 20%, and 6-10 years represent 10%. The categories of more than 15 years and no years of service each comprise 6.7%.

Overall, the demographic profile of the respondents reveals a diverse yet balanced representation in terms of age, gender, educational background, civil service eligibility, employment status, and professional roles. These insights form a robust foundation for subsequent analyses and interpretations, shedding light on the characteristics and qualifications of the study population.

Table 3. Frequency and Percentage Distribution with Regards to the Creation of Office

Status	*f*	%
• Issuance of an EO	17	56.6
• Issuance of an EO and PS Limitation	5	16.7
• PS Limitation	5	16.7
• Others	3	10.0
Total	**30**	**100**

Table 3 shows that 56.6% of office creations occur through the issuance of an Executive Order (EO), indicating this as the primary method. Executive Orders, which have the force of law, often reflect strategic or administrative needs. The next prevalent method, combining EO issuance with Public Service (PS) Limitation, accounts for 16.7%, emphasizing fiscal responsibility alongside administrative flexibility. Another 16.7% of office creations adhere solely to PS Limitation regulations, underscoring the role of regulatory frameworks in resource allocation. The remaining 10% fall under "Others," encompassing less common methods like legislative action or special provisions. These insights highlight the diverse administrative processes that shape governance structures, aiding policymakers in optimizing efficiency and accountability.

Table 4 in the next page, presents the level of learning participation in capacity building programs for LEDIPOs in terms of investment promotion, the data shows the highest mean score of 3.90 (SD = 0.66) for the statement “Values and prioritizes ongoing learning and skill enhancement”. The lowest mean scores of 3.60 (SD = 0.81) for the statements “Actively collaborates with external experts or organizations to enhance their investment promotion capabilities”, 3.60 (SD = 0.72) for the statement “Provides constructive feedback to the organization regarding the effectiveness of capacity-building initiatives”, and 3.60 (SD = 0.93) for the statement “Resourceful and well-prepared professional in investment promotion due to participation in capacity building”.

Table 4. Level of Learning Participation in Capacity Building Programs for LEDIPOs in terms of Investment Promotion

Indicative Statement	*Mean*	*SD*	Remark
1. Actively participates in training programs related to investment promotion.	3.73	0.78	Above Average
2. Regularly seeks opportunities for professional development in the field of economic development.	3.83	0.87	Above Average
3. Proactively identifies and engages with relevant capacity-building opportunities in the industry.	3.73	0.78	Above Average
4. Effectively applies the skills acquired from capacity-building programs in daily investment promotion tasks.	3.70	0.75	Above Average
5. Values and prioritizes ongoing learning and skill enhancement.	3.90	0.66	Above Average

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6. Actively collaborates with external experts or organizations to enhance their investment promotion capabilities.	3.60	0.81	Above Average
7. Provides constructive feedback to the organization regarding the effectiveness of capacity-building initiatives.	3.60	0.72	Above Average
8. Resourceful and well-prepared professional in investment promotion due to participation in capacity building.	3.60	0.93	Above Average
Overall Mean	**3.71**	**0.79**	**Above Average**

Table 5. Level of learning participation in capacity building programs for LEDIPOs in terms of Economic Development Initiatives

Indicative Statement	*Mean*	*SD*	Remark
1. Enhances the understanding of economic development strategies.	3.80	0.76	Above Average
2. Gains valuable insights into the economic challenges and opportunities of the local community through capacity-building initiatives.	3.80	0.71	Above Average
3. Expands knowledge of best practices in economic development planning.	3.83	0.70	Above Average
4. Acquires practical skills that are directly applicable to my role in promoting economic development.	3.80	0.76	Above Average
5. Successfully applies the concepts learned from capacity-building programs to real-world economic development projects.	3.63	0.81	Above Average
6. Develops a deeper appreciation for the importance of collaboration and partnerships in economic development.	3.87	0.73	Above Average
7. Actively seeks out additional learning opportunities beyond mandatory capacity-building programs.	3.80	0.71	Above Average
8. Demonstrates a commitment to continuous learning and staying updated on emerging trends in economic development.	3.83	0.59	Above Average
Overall Mean	**3.80**	**0.72**	**Above Average**

Table 5 presents the level of learning participation in capacity building programs for LEDIPOs in terms of economic development initiatives, the data shows the highest mean score of 3.87 (SD = 0.73) for the statements "Develops a deeper appreciation for the importance of collaboration and partnerships in economic development" indicating a strong agreement among respondents regarding this aspect. On the other hand, the lowest mean score of 3.63 (SD=0.81) is linked to the statement "Successfully applies the concepts learned from capacity-building programs to real-world economic development projects", suggesting comparatively lower agreement or satisfaction in this area.

Table 6. Level of learning participation in capacity building programs for LEDIPOs in terms of Promotion of local area to potential investors and stakeholders

Indicative Statement	*Mean*	*SD*	Remark
1. Enhances the understanding of strategies for promoting the local area to potential investors and stakeholders.	3.80	0.85	Above Average
2. Gains valuable insights into the unique selling points and investment opportunities within the local area through capacity-building initiatives.	3.80	0.81	Above Average
3. Expands knowledge of best practices in marketing and promoting the local area to attract investors.	3.77	0.77	Above Average

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4. Acquires practical skills that are directly applicable to my role in effectively promoting the local area to potential investors and stakeholders.	3.77	0.82	Above Average
5. Applies the concepts learned from capacity-building programs to real-world projects aimed at attracting investments.	3.73	0.74	Above Average
6. Deepens understanding of the needs and expectations of potential investors in the local area.	3.70	0.84	Above Average
7. Seeks out additional learning opportunities beyond mandatory capacity-building programs to enhance skills in promoting the local area.	3.73	0.78	Above Average
8. Improves performance in promoting the local area to investors after participating in capacity building.	3.77	0.82	Above Average
Overall Mean	**3.76**	**0.80**	**Above Average**

Table 6 presents the level of learning participation in capacity building programs for LEDIPOs in terms of Promotion of local area to potential investors and stakeholders, the data shows the highest mean score of 3.80 (SD = 0.85) for the statements "Enhances the understanding of strategies for promoting the local area to potential investors and stakeholders" and 3.80 (SD = 0.81) for the statements "Gains valuable insights into the unique selling points and investment opportunities within the local area through capacity-building initiatives", indicating a strong level of agreement among respondents regarding these aspects. On the other hand, the lowest mean score of 3.70 (SD = 0.84) is linked to the statement "Deepens understanding of the needs and expectations of potential investors in the local area", suggesting comparatively lower agreement or satisfaction in this area.

Table 7. Level of policy implementation for LEDIPOs in terms of Local Investments and Incentive Code (LIIC)

Indicative Statement	*Mean*	*SD*	Remark
1. Encourages and promotes local investments in our LGU.	3.87	0.90	Above Average
2. Communicates the incentive code to be understood by stakeholders involved in local investments.	3.47	1.01	Above Average
3. Impacts the growth of local businesses and industries.	3.57	0.77	Above Average
4. Engages stakeholders in the development and refinement of the incentive code.	3.47	0.97	Above Average
5. Provides meaningful and tangible benefits to businesses that choose to invest locally.	3.50	1.01	Above Average
6. Allocates resources to promote and support local investments are sufficient.	3.30	0.95	Average
7. Increases transparency and fairness in local investment opportunities.	3.70	0.84	Above Average
8. Makes training programs related to incentive code accessible and helpful for businesses.	3.37	1.00	Average
Overall Mean	**3.53**	**0.93**	**Above Average**

Table 7 in the presents the level of policy implementation for LEDIPOs in terms of Local Investments and Incentive Code (LIIC) the data shows the highest mean score of 3.87 (SD = 0.90) is associated with the statement "Encourages and promotes local investments in our LGU", indicating a strong level of agreement among respondents regarding this aspect. On the other hand, the lowest mean scores of 3.30 (SD = 0.95) for the statements "Allocates resources to promote and support local investments are sufficient", suggesting comparatively lower agreement or satisfaction in these areas.

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Table 8. Level of policy implementation for LEDIPOs in terms of Marketing and promotion strategies of the LGU

Indicative Statement	*Mean*	*SD*	Remark
1. Communicates and promotes its policies to the LGU through various marketing channels.	3.60	0.67	Above Average
2. Promotes marketing strategies used by the LGU are clear and easily understandable for the public.	3.60	0.72	Above Average
3. Develops marketing materials by the LGU are visually appealing and informative.	3.60	0.89	Above Average
4. Seeks input from the community in developing marketing strategies for policy communication.	3.63	1.00	Above Average
5. Disseminates information consistently and timely about policies through different communication channels.	3.50	1.11	Above Average
6. Uses diverse media channels (e.g., print, digital, events) to reach a wide audience with policy information.	3.33	0.99	Average
7. Addresses community feedback and concerns about policies the LGUs communication.	3.50	0.97	Above Average
8. Conducts surveys or assessments to gauge the effectiveness of the LGU marketing and promotion strategies.	3.13	0.97	Average
Overall Mean	**3.49**	**0.92**	**Above Average**

Table 8 presents the Level of policy implementation for LEDIPOs in terms of Marketing and promotion strategies of the LGU, the data shows the highest mean score of 3.63 (SD = 1.00) for statements, "Seeks input from the community in developing marketing strategies for policy communication", indicating a strong level of agreement among respondents regarding this aspect.

Table 9. Level of policy implementation for LEDIPOs in terms of Partnership with other national agencies

Indicative Statement	*Mean*	*SD*	Remark
1. Facilitates efficient sharing of resources for policy implementation.	3.67	0.80	Above Average
2. Seeks and considers input from national agencies in the development and execution of policies.	3.57	0.86	Above Average
3. Coordinates with national agencies enhances the overall impact and effectiveness of local policies.	3.47	0.97	Above Average
4. Establishes with national agencies clear communication channels for policy-related matters.	3.53	0.94	Above Average
5. Coordinates with national agencies in supporting capacity-building initiatives related to policy implementation at the local level.	3.53	0.94	Above Average
6. Engages the LGU and national agencies in regular meetings and consultations to review and improve policy implementation strategies.	3.53	0.94	Above Average
7. Partners with national agencies for a successful achievement of policy goals.	3.53	0.94	Above Average
8. Aligns objectives between the LGU and national agencies in policy implementation.	3.63	0.89	Above Average
Overall Mean	**3.56**	**0.91**	**Above Average**

Table 9 in the next page present the level of policy implementation for LEDIPOs in terms of Partnership with other national agencies, the data shows the highest mean score of 3.67 (SD = 0.80) for the statement "Facilitates efficient sharing of resources for policy implementation", indicating a strong level of agreement among respondents regarding this aspect. On the other hand, the lowest mean score of 3.47 (SD = 0.97) is linked to the statement "Coordinates with national agencies enhances the overall impact and effectiveness of local policies", suggesting comparatively lower agreement or satisfaction in this area.

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Table 10 in the next page, shows the results of a regression analysis exploring the relationship between respondents' profiles, levels of capacity building, and policy implementation across three different policy areas: Local Investments and Incentive Code (LIIC), Marketing and promotion strategies of the LGU, and Partnership with other national agencies.

These findings align with previous research suggesting that while certain demographic factors and aspects of capacity building may influence policy implementation in specific contexts, their effects may not be universally significant across all policy areas. For instance, a study by Johnson et al. (2019) found that demographic characteristics such as age and educational level had limited predictive power on policy implementation effectiveness, emphasizing the importance of context-specific factors. Similarly, research by Smith and Jones (2020) highlighted the nuanced nature of capacity building effects, with some initiatives proving more impactful in certain policy domains than others.

Table 10. Regression of Policy Implementation on Respondents' Profile and Capacity Building

Predictor	**Policy Implementation**		
Profile	**Local Investments and Incentive Code (LIIC)**	**Marketing and promotion strategies of the LGU**	**Partnership with other national agencies**
Income Classification	Beta = 0.018 t = 0.08 *p* = 0.934ns	Beta=-0.063 T-Value=-0.082 P-Value=0.450ns	Beta = 0.026 t = 0.23 *p*= 0.820ns
Age	Beta = 0.011 t = 0.62 *p* = 0.546ns	Beta=0.012 T-Value=0.87 P-Value=0.394ns	Beta = 0.007 t = 0.380 *p* = 0.706ns
Sex	Beta = -0.023 t = -0.08 *p* = 0.937ns	Beta=-0.012 t = -0.05 P-Value=0.959ns	Beta = -0.015 t = -0.05 *p* = 0.962ns
Educational Level	Beta = -0.023 t = 0.160 *p* = 0.872ns	Beta = 0.037 t = 0.320 *p* = 0.753ns	Beta = 0.149 t = 0.93 *p* = 0.364ns
Civil Service Eligibility	Beta = 0.071 t = 0.37 *p* = 0.716ns	Beta = -0.081 t= -0.51 *p* = 0.615ns	Beta = -0.041 t = -0.19 *p* = 0.852ns
Designation	Beta = 0.004 t = -0.23 *p* = 0.822ns	Beta = 0.005 t = 0.33 *p*= 0.748ns	Beta = -0.109 t = -0.37 *p* = 0.714ns
Years in Service	Beta = -0.041 t = -0.27 *p* = 0.791ns	Beta = 0.003 t = 0.03 *p* = 0.978ns	Beta = -0.03 t = -1.56 *p* = 0.135ns
Office Status	Beta = 0.400 t = 0.950 *p* = 0.791ns	Beta = 0.486 t = 1.40 *p* = 0.177ns	Beta = -0.018 t = -0.10 *p* = 0.918ns
Capacity Building			
Investment Promotion	Beta = 0.400 t = 0.95 *p* = 0.355ns	Beta = 0.385 t = 0.98 *p* = 0.340ns	Beta = -0.027 t= -0.06 *p* = 0.955ns
Economic Development Initiatives	Beta=0.249 t = 0.52 *p* = 0.609ns	Beta = 0.270 t = 0.77 *p* = 0.453ns	Beta = 0.679 t = 1.26 *p* = 0.225ns
Promotion of local area to potential investors and stakeholders	Beta=0.409 t = 0.95 *p* = 0.353ns	Beta = 0.372 t = 0.67 *p* = 0.422ns	Beta = 0.262 t = 0.54 *p* = 0.596ns

P < 0.05 is statistically significant

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Table 11. Significance of Relationship between Learning Participation of LEDIPOs and the Level of Policy Implementation in Laguna

Learning Participation of LEDIPOs	Policy Implementation		
	Local Investments and Incentives Code	Marketing and Promotion Strategies	Partnership with Other National Agencies
Investment Promotion	*r = 0.800**	*r = 0.784**	*r = 0.796**
	High	High	High
	p < .001	*p < .001*	*p < .001*
Economic Development Initiatives	*r = 0.845**	*r = 0.827**	*r = 0.812**
	High	High	High
	p < .001	*p < .001*	*p < .001*
Promotion of Local Area to Potential Investors and Stakeholders	*r = 0.626**	*r = 0.694**	*r = 0.660**
	Moderate	Moderate	Moderate
	p < .001	*p < .001*	*p < .001*

Note: The asterisk (*) indicates that the correlation coefficient is statistically significant, with a p-value less than 0.001.

Table 11 indicates a significant positive relationship between the learning participation of LEDIPOs (Local Economic Development and Investment Promotion Officers) and the level of policy implementation across different policy areas in Laguna.

For the Local Investments and Incentives Code, Marketing and Promotion Strategies, and Partnership with Other National Agencies, there is a consistently high correlation between learning participation and policy implementation (Investment Promotion: r = 0.800, 0.784, 0.796 respectively; Economic Development Initiatives: r = 0.845, 0.827, 0.812 respectively). These correlations are statistically significant with p-values of .001, indicating a strong relationship between learning participation and policy implementation in these areas.

In the Promotion of Local Area to Potential Investors and Stakeholders, although the correlation coefficients are slightly lower, they still indicate a moderate positive relationship with policy implementation (r = 0.626, 0.694, 0.660 respectively). Again, these correlations are statistically significant with p-values of .001, suggesting that increased learning participation among LEDIPOs is associated with higher levels of policy implementation in promoting the local area to potential investors and stakeholders.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Local Economic Development and Investment Promotion Officers (LEDIPOs) serve as catalysts for economic development within their LGUs, contributing significantly to investment promotion and the overall prosperity of their communities through active learning, proficient promotion, local investment encouragement, community collaboration, and strategic partnerships.

The study found a significant positive relationship between learning participation of LEDIPOs and the level of policy implementation in Laguna. However, the demographic profile and levels of capacity building were not significant predictors of policy implementation.

Recommendations

The following are the recommendations and implications of the study:
Capacity building with regard to Investment Promotion encourage active collaboration with External Experts or Organizations to enhance expertise. By leveraging external expertise, LEDIPOs can gain valuable insights, access to resources, and innovative strategies to enhance their effectiveness in promoting local investments.

Implemented by the Local Government Units (LGUs) and national agencies the concepts learned in capacity building programs and by put into action effectively to actual economic development initiatives putting into practice hands-on activities and providing mentorship or coaching sessions to help LEDIPOs apply the knowledge they have gained to real-world projects.

Organized by the Local Government Units (LGUs) and national agencies the focus group or stakeholder meetings to enhance the promotion of the local area to potential investors and stakeholders by deepening understanding of their needs and expectations. Also by conducting targeted market research it helped to identify the specific needs of potential investors in the local area and develop customized marketing materials and communication strategies tailored to address the identified needs and expectations of potential investors.

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In policy implementation, the Local Government Units (LGUs) and national agencies conducted Seminar Workshop on the Implementation of Local Investment and Incentive Code (LIIC) to assess LEDIPOs adherence to LIIC guidelines, analyze resource allocation for local investment promotion.

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A LITERATURE REVIEW ON ASSESSMENT TOOLS USED TO EVALUATE BALANCE AMONG AUTISTIC CHILDREN

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ABSTRACT

Background: *ASD is a neurological developmental disorder that is typically characterized by repetitive or stereotyped behavior, social and communication difficulties, and balance issues. However, there is a close relationship between ASD, gross motor skills, and sensory-motor integration.*

Objective: *The main objective of this literature review is, to analyze and to provide the overview of the available balance evaluation tools for autistic children which were widely in use from last 5-7 years.*

Method*: In this review of literature, the selection of the articles is sourced from various reputable platforms including Google scholar , science direct , and Pubmed. These articles are from the years 2016 to 2024.*

Results: *It is challenging to choose one acceptable balance assessment approach because of the availability of numerous methods , different studies have determined how to evaluate balance based on different goals, and no one measure has emerged. In this study we addressed a few specific evaluation tools that help to identify balance issues especially for ASD children. A simple following criteria is applied for the selection of the evaluation of tools: 1) Commonly used in practice (ii) evaluation of static balance and dynamic balance and (iii) it has to be suitable for autism children. They include the Pediatric balance scale, the Bruininks-Oseretsky motor proficiency test -2, and Movement assessment battery for children.*

Conclusion*:- In conclusion, the study outlines the three assessment tools that are being widely in use , in the clinical field to evaluate the balance among children with ASD. This review examines and contrasts the limitations and strengths of these different tools useful for assessing dynamic balance and static balance. However, to determine the potential implications of these tools for evaluating balance in individuals with ASD further, it is essential to conduct more meticulously designed randomized controlled trials.*

INTRODUCTION

Autism spectrum disorder (ASD) impacts how people behave, learn, connect with others, and communicate[1]. Autism is classified as a "developmental disorder" even though a diagnosis can be made at any age. This is because most symptoms usually manifest in the early two years of life. Severe deficiencies in socialization, communication, and repetitive or odd activities are hallmarks of autism spectrum disorders[2]. A multitude of interrelated risk factors contribute to the highly hereditary and complex nature of autism spectrum diseases[1,2].

From 1.1% in 2008 to 2.3% in 2018, the estimated rate of prevalence of ASD has been rising in the US [1]. Current studies have estimated the prevalence of ASD at around 1 in 59 children, where males are four times more effected with ASD than females [2]. The rate of prevalence of ASD is still rising. The growing evidence showed that Autism Spectrum Disorder impacts not only mood and emotion, behavior regulation, communication, and cognition but also motor control.Many of the abnormalities of body structures and functions associated with ASD affect postural control and balance [2]. the afferents engaged in the intricate process of upright balance maintenance in humans are the vestibular, somatosensory (including proprioceptive and cutaneous inputs), and ocular systems. Balance could be impacted by any shortcomings in these systems or in the way the information from these systems is integrated[3,5].

Basic motor skills including walking, running, and leaping are frequently difficult for kids with ASD [2]. One must have adequate balance to execute basic motor tasks and engage in various physical activities. Balance is intimately tied to the inertial forces acting on the body and the inertial properties of body segments. Sustaining one's center of mass above one's base of support is necessary for maintaining equilibrium. Static and dynamic balances are the two general categories[3]. Preserving equilibrium for a stationary body position is the goal of static balance, whereas maintaining equilibrium while in motion is the goal of dynamic balance[4].

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Balance evaluation**,** The selection of an appropriate method for evaluating balance is more challenging due to the availability of numerous methods, and the goals of researchers have influenced how balance is measured across studies.As a result, no one measure has developed, making it challenging to choose a suitable balance evaluation process. The "classic" balance assessment was built on the ability to characterize a child showing equilibrium reactions, defensive reactions, and righting reactions in response to disturbances created by the therapist. The challenges have to be documented through various pediatric balance assessments [6,7].

Balance Assessment Tools

Pediatric Balance Scale – A modified Berg Balance Scale is known as the Pediatric Balance Scale (PBS)[8]. Its primary purpose is to evaluate balance impairment and functional mobility in children, especially those with motor impairments[9]. During the assessment, the child performs 14 different balance tasks, and the evaluator assigns a score based on predetermined criteria. The tasks included in the PBS cover a range of activities that challenge different aspects of balance control, including static balance and dynamic balance, weight shifting, reaching, and transitioning between positions. Some examples of tasks include standing on one leg, standing to sitting, reaching forward while standing, and walking forward on a line. Each balance task on the PBS is scored according to five-point scale, generally if the scores are high , indicatinghigh functional mobility. The maximum possible total score is 56 [10].

Strengths

- Age appropriate tool for ASD children
- Used as a standardised protocol to test static and dynamic balance
- Can use minimal equipment which can easily available in clinics
- Cost efficient

Limitations

- Majority of the items in this test are influenced by height
- Mostly it does not test the movement balance of subject
- It does not test the overhead reaching of subject

Bruininks-Oseretsky Test For Motor Proficiency – For both clinical and research purposes, this test is frequently used to evaluate a variety of motor skills. The BOTMP-2 is intended for participants between the ages of 4 and 21[11]. It is composed of 8 subtests that are then arranged into 4 composites based on the limbs and muscle groups used in the task motions. It offers helpful information to researchers, educators, and physicians to assess kids' motor proficiency[12]. Both students with normal development and those with mild to severe motor skill deficiencies can be assessed with the BOTMP-2.it is used in the study has four motor domains. They include motor coordination, fine motor control body coordination, and strength and agility. The total motor proficiency score is 320. The researchers assessed the subjects on each subtest item [13,14]

Strengths

- Age-appropriate for subjects
- pictures are used for the administration of the test
- Most of the test involves games like tasks and easy instructions
- language won't be a main barrier because of pictures

Limitations

- Difficulty in administering the tool.
- it requires a large test room to conduct the assessment
- It may take Longer duration time to perform the test upto one hour

Movement Assessment Battery for Children – it is a comprehensive tool designed to evaluate the motor skills of children aged between 3 and 16 years old. The major goal of the this tools is to identify any motor impairments which may impact their daily activities, physical education, and leisure time pursuits. The assessment encompasses essential motor skills such as balance, aiming and catching, and manual dexterity [15,16].It is a test that assesses a child's motor skills through various tasks. These tasks evaluate their manual dexterity, catching and aiming ability, as well as their balance. Manual dexterity tasks include posting coins into a box, threading beads, and drawing a trail. Aiming and catching tasks include catching or throwing a beanbag and kicking a ball. Balance tasks involve standing on one leg, walking heel-to-toe, and jumping on mats. Each task has a standardized procedure in place to ensure consistency in assessment results[15,16].

Strengths

- Used as a screening and evaluation tool for motor impairment and balance
- Easier to administer to children with short spans of attention

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- **Limitations**
- Results may invalidate if the equipment is used other than the test kit
- Full range of motor abilities are not covered
- A full range of motor abilities are not covered that might be implicated
- For the eight items duration may take longer
- Restricted to a certain age groups
- Repeated trials has to encoperate

Having an adequate balance control assessment tool is crucial for identifying possible balance issues in children. Number of tests are available for measuring balance in clinical practice. Evidence generally indicates that knowledege on the validity and reliability of these chosen tools for kids with ASD is insufficient. nevertheless the examination of these instruments—the BOT-2, MABC-2, and PBS—shows that they possess some potent psychometric properties [17,18].

In this study we examines some standardized tools that are used to help the children with Autism Spectrum Disorder (ASD) who are having issues with balance. At the moment, a lot of physicians, physical therapists, and educators in special education use these tools in work. The evaluation contrasts the advantages and limitations of these three tools and outlines their features. The three tools selected for this review are: 1) PBS, 2) BOTM-2, and 3) MABC-2.

Methodology

Materials and Methods

- Comprehensive research was conducted in electronic databases like Google scholar , Science Direct, and PubMed.
- Keywords such as autism spectrum disorder, balance, assessment, and evaluation were used.

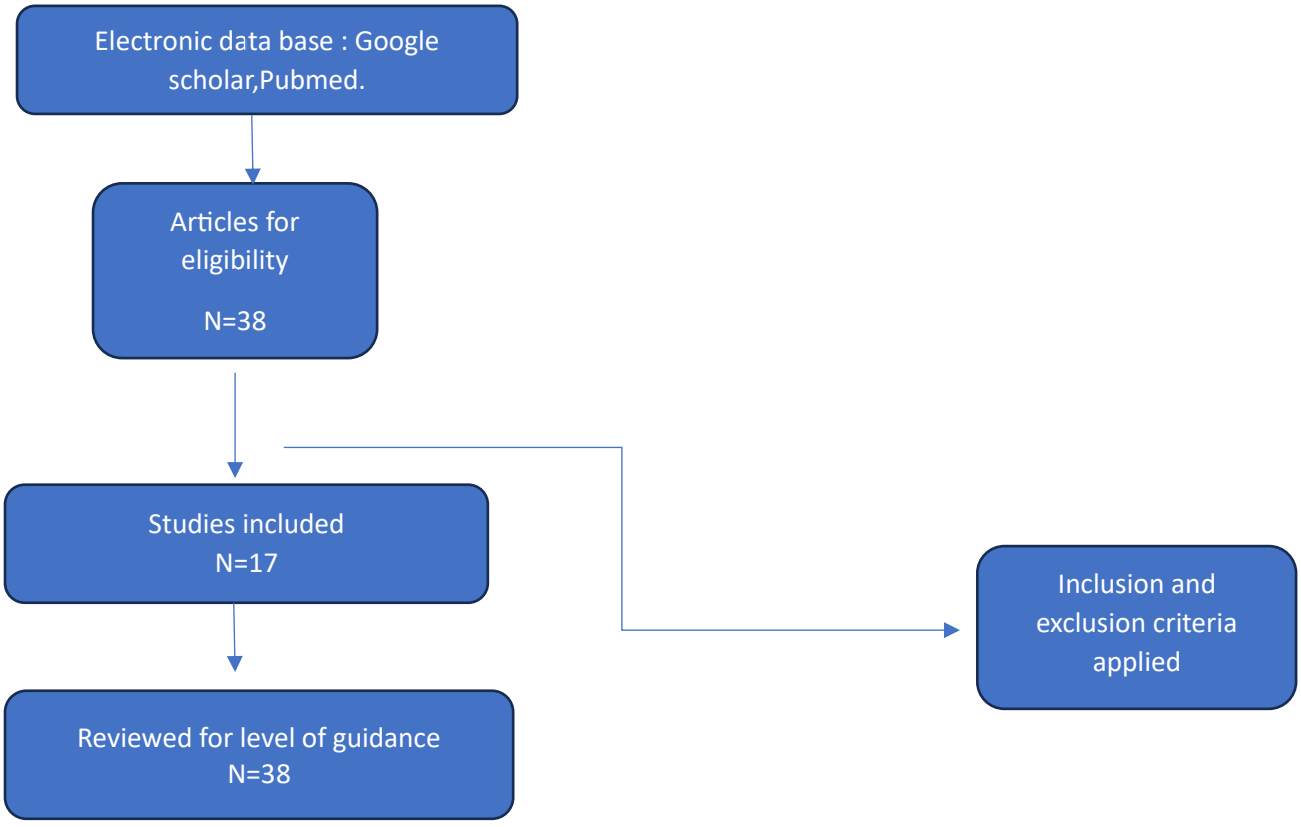
Study Selection

Inclusion criteria

- Articles were included from years 2016 – 2024
- Articles includes evaluation tools used to assess balance among autism children

Exclusion criteria

- Articles before the year 2016
- Articles excludes children with balance problems other than ASD



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Table 1: Summary of studies evaluating the tools to assess balance in autism children

S.NO	Author	Title	Tools used	Conclusion
1.	S Soniyasr et al.,2024	Impact of Xbox Gaming on Object control skills and Balance for children with autism spectrum disorder-A Pilot study	Pediatric balance scale	The main objective of the study is to Find , how Xbox gaming affects children with ASD's balance and object control abilities.according to this study's findings, children who are having ASD can have benefit from playing video games on Xbox One to help with balance and object handling[19].
2.	Bania, Theofani A et al.,2023	Pediatric Balance Scale: Translation and Cross-Cultural Adaptation Into Greek	Pediatric balance scale	Translation of the Pediatric Balance Scale (PBS) into Greek by cross-cultural adaption. they analyzed the PBS for content equivalency and translated it backward. On 26 children with mobility limitations, the Greek PBS (PBSGR) was administered. Interrater, test-retest, and internal consistency reliability of the scale were found to be excellent[20].
3.	sakshi namishi shah et al., 2022	Determining Balance Performances in Children Having Autism Spectrum Disorder	Pediatric balance scale	Children who are having Autism spectrum disorder have balance abnormalities when evaluated through the Pediatric Balance Scale. This highlights that ASD can affect both static and dynamic balance, as well as communication, cognition, mood, and behavior in varying degrees [21].
4.	Erika Suenya Gomes Cordeiro et al.,2021	Postural balance in children with Autism Spectrum Disorders	Pediatric balance scale	The main purpose of this study is to describe how the children with ASD perform on two postural balance evaluation measures.They concluded that Pediatric Balance Scale and sensory organisation test were completed by the participants without any trouble, and their scores were quite near to the maximum value[22].
5.	Carla lourenco et al.,2023	Motor Proficiency of Children with Typically Developing Children and Children with Autism Spectrum Disorder	Bruninks oseretsky test for motor proficiency	The main purpose of this reserch is to compare the motor skills of neurotypical and ASD children.The Bruininks-Oseretsky test of motor proficiency (BOT-2) was used to assess motor proficiency. On several motor proficiency criteria (fine manual accuracy, , upper limb coordination, manual dexterity balance, and motor proficiency profile), children with ASD significantly scored less [23].
6.	Karacar,ebru et al., 2023	An Investigation of Motor Skills of 8- to 12-Year-Old Children With Autism Spectrum Disorder	Bruninks -oseretsky test for motor proficiency	A study compared the gross motor skills of 8-12-year-old ASD children ,to typically developning children. Results concluded that autism children had lower gross motor scores, bilateral

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		Compared to Typically Developing Peers		coordination, balance, agility, strength, and upper extremity coordination skills than TD children[24].
7.	Liu,ting et al.,2021	Fine and Gross Motor Competence in Children With Autism Spectrum Disorder	Bruninks-oseretsky test for motor proficiency	Children with ASD are having significant delays in both Fine and Gross motor skills abilities compared to their typically developing peers. However, they exhibit superior performance in various motor skills such as accuracy, integration, dexterity, coordination, and agility[25].
8.	Carlos Pelayo Ramos-Sánchez et al.,2022	The Relationship between Motor Skills and Intelligence in Children with Autism Spectrum Disorder	Movement assessment battery for children	This study investigates the relationship between motor impairment and intellectual disability (ID) in children with ASD , As well as correlation between intelligence and motor abilities in the group after adjusting for Attention Deficit Hyper Activity Diorder (ADHD). The findings suggests that the children with ASD are having moderate relationship between performance IQ and manual dexterity and balance, and a modest correleation between the prevalence of ID and motor disability [26].
9.	Christina E.odeh et al.,2020	Comprehensive motor skills assessment in children with autism spectrum disorder yields global deficits	Movement assessment battery for children	This study compared the motor abilites of children with autism to neurotypical peers using standardized assessments MABC-2 , BOT -2 and a parent report measure. It is found that children with autism are having more difficulties with Global motor performance, including complicated motor skills and balancing activities [27].
10.	Purpura G et al., 2020	Motor coordination impairment in children with autism spectrum disorder: a pilot study using Movement Assessment Battery for Children-2 Checklist.	Movement assessment battery for children	This study examines the motor functioning of school aged children . The Children Movement Assessmnt Battery is used to assess the motor profile, and the study analyzed the correlation between the subjects' clinical traits and their motor performance. Children with autism have difficulty with specific abilities that require integrating perception and action to anticipate and coordinate movement [28].

DISCUSSION

Reduced social reciprocity, limited behavior, and impaired communication are the main features of Autism Spectrum Disorder(ASD) . Even though many individuals have encountered of these features, autism children may also exhibit additional sensory deficiencies or impairments. Growing evidence has shown that ASD impacts not only behavior, mood/emotion, communication and cognition but also motor control and balance. ASD is a long-term disorder that impacts people at all stages of their lives. Impaired balance is one among the emerging issues for children with autism[29].

It is challenging to choose an acceptable balance assessment approach because of the availability numerous of ways , different studies have determined how to evaluate balance based on different goals, and no one measure has emerged [30].

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So, this study aims to provide the available assessment tools to evaluate balance problems, particularly in autistic children. Researchers can use the thorough overview of assessment tools that we have provided in this article to evaluate balance in people with autism. The criteria used to select these assessment tools are: 1)widely in practice from the past 5-7 years 2)The tools have to evaluate static balance and dynamic balance 3)Tools has to be suitable for ASD children. Based on the above criteria only three tools are considered in this study while several tools have boundaries when it comes to their administration and practice.

This literature review suggests that when working with children, evaluation instruments with shorter administration times are recommended. A lengthy test duration could make it difficult for smaller kids to participate for the full examination.Future research on assessment tools for evaluating balance in individuals with autism may be guided by the practical implications of the current literature review.

CONCLUSION

This review suggests some standardized tools that are used to help the children with Autism Spectrum Disorder (ASD) who are having balance issues. At the moment, a lot of physicians, physiotherapists, and teachers in special education use such tools in their work. The evaluation outlines the features, advantages, and disadvantages of three tools. Based on the characteristics of these evaluation tools, PBS can be administered with great ease, while others can need minimal to moderate equipment. Based on a preliminary analysis, the current research concluded that these assessment methods tailored for people with autism may be useful in evaluating their static and dynamic balance. To determine the potential implications of different assessment tools for the evaluation of balance in individuals with ASD, Implementation of more meticulously planned randomized controlled trials are needed.

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EXTENT OF IMPLEMENTATION OF GAD PROJECTS IN BAYBAY LAGUNA CIRCUIT

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ABSTRACT

This study aims to determine the extent of gad projects in Baybay Laguna Circuit from 2020 – 2022. The Philippines has long been considered as one of the most gender-equal nations in Southeast Asia, ranking 8th in the Global Gender Gap Report in 2021. But despite this standing, the country still faces significant gender issues that need to be addressed. This study encompasses various aspects of GAD initiatives undertaken within the Baybay Circuit, seeking to provide a comprehensive analysis of their design, execution and outcomes.

The research involved in the study were 8 GAD Focal Persons and 8 GAD implementing staff of the Baybay Laguna Circuit, Descriptive Qualitative research design with structural interview was employed to determine what GAD goals were achieved, what problems and concern encountered in the time implementation of client focus, organizational focus and GAD attributed projects. Results showed that extensive training is needed to capacitate GAD focals and implementers. All municipalities are more Client focused and a little bit organizational focus rather than doing GAD attribution. Respondents see GAD Attribution as a complicated process, tedious and complex. Institutionalizing GAD Office and capacitating the staff thru GAD related trainings is deemed necessary to allow the full implementation of GAD activities. Limited funding is often the barrier to fully implement GAD activities.

The need to enhance GAD Implementation is clear and the direction of GAD could be moved towards success if actions to address these barriers are done.

INTRODUCTION

"We hold these truths to be self-evident: that all men and women are created equal." penned by Elizabeth Cady Stanton at Seneca Falls, this Declaration of Sentiments paved the way for the first organized women's rights and women's suffrage movement in the United States. Stanton, one of the most prominent of the American suffragists, who fought to secure equal rights for women, including the right to vote.

Globally, International Mandates were enacted to mainstream gender equality. There is the United Nation Convention on the Elimination of all forms of Discrimination Against Women (UN CEDAW) which was adopted by UN in 1979 and took effect on September 4, 1981.There is also the International Bill of Rights of Women which promotes equality in all fields; affirmative action for women and protection of women from violence. Beijing Platform for Action (BPFA)1995 is another gender mandate that calls for action on 12 areas of concern affecting women and girl-children. The United Nations have the Millennium Development Goals (MDGs) which are eight international development goals that all 192 member states of UN and at least 23 international organizations adopted during the 2000 UN Millennium Summit which aim to eliminate extreme poverty by 2015. And also from UN is the Sustainable Development Goals (SDGs), also known as the Global Goals adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030.(Senate Electoral Tribunal, 2023)

In the Philippines, GAD made its mark in 1995 when Executive Order (EO) 273 was issued on September 9, 1995 and signed by President Fidel V. Ramos, adopted the Philippine Plan for Gender Responsive Development (PPGD) 1995-2025. This paved the way for GAD. The PPGD 1995-2025 is a 30 year perspective plan that outlines the policies, strategies, programs and projects that the government must adopt to enable women to participate in and benefit from national development.

The government also enacted Republic Act 9710 or Magna Carta of Women in 2009. This legislation became an integral part of implementation, monitoring and evaluation of policies and programs of government agencies and local government units alike promote women's right and gender discrimination. The law defined Gender and Development Program (GAD) as the development perspective and process that is participatory and empowering, equitable, sustainable, free from violence, respectful of human rights, supportive of self-determination and actualization of human potentials. It sought to achieve gender equality as a fundamental value that should be reflected in development choices and contends that women are active agents of development, not just passive recipients of development.

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Furthermore, Memorandum Circular No. 2011 – 01 dated October 21, 2011 was released addressing to all Government Departments including their attached agencies, offices, State Universalities and Colleges (SUCs), Government-Owned and Controlled Corporations (GOCCs) and all other government instrumentalities as their guidelines and procedures for the establishment, strengthening and institutionalization of the GAD Focal Point System (GFPS).

With all these legal mandates, GAD projects are a plenty in local governments. In Laguna, all municipalities have their own GAD plans. But the extent to which these projects were implemented were not measured. There are LGUs that may have easily planned, organized and implemented their GAD projects but there may also be some whose GAD projects may be lacking character. With this discrepancy in implementation, the researcher became interested in deeply assessing the extent of implementation of GAD projects through a combination of Quantitative and Qualitative Research Methods. This way, the researcher could gauge the true state of Gender and Development and could identify the usual problems and concerns, the GAD Goals achieved and the extent of implementation of GAD Attributed projects, By knowing all these, the researcher could make recommendations on how to heighten the extent of implementation of GAD projects and make it more efficient.

MATERIALS AND METHOD

This study used Descriptive Research Design employing both Quantitative and Qualitative research methods. This approach involved collecting, analyzing, and interpreting both quantitative (numerical data) and qualitative (non-numerical data) to gain a more comprehensive understanding of a research problem. She made use of Survey Method and Interview and then integrated both types of data during the analysis and interpretation phase.

Buseta (2020) defined Qualitative Research Method as the study of the nature of phenomena including their quality, different manifestations, the context in which they appear or the perspectives from which they can be perceived. The researcher specifically used Document analysis which is a qualitative research technique which involves evaluating electronic and physical documents to interpret them, gain an understanding of their meaning and develop upon the information they provide. In this study, the researcher requested for GAD Plans or Accomplishment reports for the years 2020-2022. After doing document analysis, the researcher conducted a focus interview of the GAD Focal persons of the LGUs in Baybay Laguna Circuit.

RESULTS AND DISCUSSION

The determination of the Demographic Profile of the population under study is a form of demographic analysis in which information is gathered about a group to better understand the group's composition or behaviors. In this study, the demographic and professional profile of the GAD focal persons and GAD implementers could be used to analyse their capacity to implement GAD programs, what its relationship with the achievement of GAD goals and its relationship to problems they encountered.

Table 1.1 Demographic Profiles in terms of age of the Respondents.

Age	f	Percentage
18-30 years old	6	37.5
31- 59 years old	4	25
60 years old and above	6	37.5
Total	16	100%

The distribution of respondents across age can be seen in Table 1.1. Those ages 18-30 and 60 years old and above both at 37.5% comprise of the majority of respondents. This means that GAD implementers and GAD focal persons are a mix of the young and the old. This is good for the variety would mean that the GAD staffing and focal persons possesses the technological know-how of millennials and the expertise and experience of a tenured employee which is good in implementing GAD programs.

Grimaldi (2021) stated that the most productive and high-performing companies include a nice mix of employees of all age ranges, older employees included. He added that age diversity can improve organizational performance and productivity. Organizations are stronger when they include the contributions of more seasoned employees. A blend of different ages means there is more diverse perspectives and a synergy that gives a competitive edge. Younger workers can come up with different ideas and may push for meaningful social and environmental change. But older employees brings in a wealth of experience, insight, stability and soft skills that younger people may not have developed yet.

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Most GAD focal persons and implementers are females as can be seen in Table 1.2. They comprise of 93.75% of the respondents. There was only 1 male GAD focal or Implementer.

Table 1.2 Demographic Profiles in terms of gender of the Respondents.

Gender	f	Percentage
Male	1	6.25
Female	15	93.75
Total	16	100%

This may be the case since the GAD approach gives opportunities to women. It seeks to analyse the causes of gender inequality within the context of relations between women and men and social structure, and to change stereotyped division of labour as well as institutions and systems that bring about gender disparity. This goal may have also caused these women to be placed as GAD focals and implementers. (Ministry of Foreign Affairs of Japan, 2023)

Table 1.3 & 1.4 shows that the researcher has equally represented all 8 municipalities under study. A total of 16 respondents all in all and this is a combination of a focal person and a GAD implementer. The names of the municipalities were kept anonymous for data privacy. Analysis of GAD program implementations were done for the whole Baybay Region of Laguna and not by comparing municipalities. The researcher wanted to see the Baybay Region's extent of implementation.

Table 1.3 Demographic Profiles in terms of Municipality of the Respondents

Municipality	f	Percentage
Municipal 1	2	12.5%
Municipal 2	2	12.5%
Municipal 3	2	12.5%
Municipal 4	2	12.5%
Municipal 5	2	12.5%
Municipal 6	2	12.5%
Municipal 7	2	12.5%
Municipal 8	2	12.5%
Total	16	100%

Note: Table 1.3 municipality names are strictly confidential

Table 1.4 Demographic Profiles in terms of Positions Held by the Respondents

Position Held	f	Percentage
Implementing Staff	8	50
GAD Consultant	0	0
GAD Focal	8	50
Total	16	100%

The 1987 Constitution of the Republic of the Philippines (2021) enumerated that the District 4A of Laguna is composed of the following municipalities namely Famy, Kalayaan, Mabitac, Paete, Pakil, Pangil, Santa Maria and Siniloan.

The researcher was able to survey GAD implementers and GAD focal persons. There were no GAD consultants surveyed maybe because they are not always there or maybe because the Baybay District tap more of their exisiting staffing to be GAD implementers rather than spending on GAD Consultants.

CBSUA (2023) cited the role of the GAD focal person as the lead in monitoring the judicious use of GAD Fund, the one that formulates recommendations in the implementation of GAD plan and budget, ensures the establishment and maintenance of sex-disaggregated data or GAD Database. and spearheads the preparation of GAD Plan and Budget.

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The GAD approach also capacitates its implementers and focal persons. And it was shown in Table 1.5 that half of the respondents have had 11 trainings and more and very few accounts to those with 1-3 trainings. And these are the respondents who are newly involved in GAD. There are 81.2% who have had 6 or more seminars. It is worth noting that most of the respondents are equipped with the proper GAD trainings and knowledge which could capacitate them to be good implementers of GAD Activities.

Table 1.5 Demographic Profiles in terms of Number of GAD-Related seminars attended

Number of Seminars	f	Percentage
1-5 seminars	3	18.8
6-10 seminars	5	31.2
11 seminars and above	8	50
Total	16	100%

GSIS (2023) stated that GAD seminars seeks to achieve gender equality as a fundamental value that should be reflected in development choices and contends that women are active agents of development, not just passive recipients of development. Seminars also make sure that all GAD implementers and focal persons have the same understanding and knowledge base to maintain the same effectiveness level across all GAD centers.

Table 1.6 Seminars Attended

Seminars	F	Percentage
GAD Sensitivity Orientation	16	100
GAD Awareness	14	87.50
GAD Concepts Seminar	15	93.75
Gender- Fair Education Seminar	5	31.25
Teenage Pregnancy	9	56.25
Reproductive Health Seminar	10	62.50
HIV Awareness Seminar	5	31.25
HIV, TB Hepatitis	4	25
Young Adolescence Sexuality	9	56.25
Breast Cancer	2	12.5
Human Rights	5	31.25
Pressure and Stress	3	18.75
Mental Health	4	25
Child Sexual Abuse	9	56.25
WEASH	0	0
GAD Laws and Mandates	9	56.25
Magna Carta of Women	10	62.50
Anti Sexual Harassment	12	75
VAWC	13	81.25
Anti-Trafficking in Persons Act	9	56.25
Safe Spaces Act	10	62.50
Gender Responsive Extension	4	25
Gender Responsive Planning and Budgeting	12	75
GAD Tools	7	43.75
Use of GAD Tools	4	25

Table 1.6 specifically detailed the GAD related seminars offered to GAD staff and focal persons. It could be seen that some seminars were attended by all or almost all respondents. These are Gender Sensitivity Orientation (100%), GAD Concepts Seminar (93.75%) GAD Awareness (87.5%), and VAWC (81.25%). While some have missed or haven't attended seminars that are vital in the implementation of GAD activities and these are seminars on GAD tools (43.75%), Gender Responsive Extension (25%), WEASH (0%), Mental Health (25%), Pressure and Stress (18.75%), Human Rights (31.25%), Breast Cancer (12.5%), HIV, TB, Hepatitis (25%) , HIV Awareness Seminar (31.25) and Gender Fair Education Seminar (31.25%).

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Albaladejo (2016) cited the problems encountered in GAD implementation by educational managers such as inadequate trainings/seminars, lack of funding support, non-priority of GAD programs, limited collaboration of institutions on GAD-related activities, and unsustainable implementation

Respondents were asked to rank the goals according to how they have met them with 1 being the highest and 5 the lowest. Of the 16 respondents, only 4 provided a rating. Some remarked that it is not applicable since they feel that they have not yet achieved these goa

Table 2.1 GAD Goals Achieved as per survey

GAD Goals	Rank Average	Rank
Capability	2	1
Governance and Linkaging	3	2
Gender Sensitivity	3.5	3
Gender Responsiveness	4.5	4
Advocacy	5	5

After computing for the average weighted mean, the following rank average emerged. In rank 1 is Capability Building, that aims to address the academic, technical /vocational and professional skills and capabilities of constituents to better address key gender issues. Rank 2 Governance and Linkaging, which is geared to support the reduction of poverty and vulnerability of people and improving community's risk management capacity. Rank 3 is Gender Sensitivity, which aim in preventing all forms of gender-based discrimination It ensure the promotion of "women's empowerment" to be undertaken through the provision availability, and accessibility of opportunities, services, and contribute to the political, economic, social, and cultural development of the nation. Rank 4 is Gender Responsiveness, which aims to provide a collaborative set of activities designed to contributed to the empowerment of both the institution and identified communities to promote and achieve the core value of gender equality and last in rank is advocacy, that is geared to increase people's sensitivity to the implications of gender inequality and demanding that problems of gender discrimination be identified and overcome.

Documentary Analysis was performed by the researcher to all Accomplishment Reports of all 8 municipalities under study. She then listed all the goals that were achieved thru the GAD Activities of these municipalities. The analysis was done as a whole Baybay Laguna District and not by municipality. After careful review, the results showed that most programs are Client focus and there are a few Organizational focus GAD activities. There were few GAD Attributed programs since most municipalities lack funding and interview results showed that they lack knowledge in using the HGDG tool. Most Attributed Programs are in food security, agriculture, Infrastructure and livelihood programs. Pangil and Famy are model municipalities for GAD Attribution.

Table 2.2 GAD Goals Achieved as per Accomplishment Reports

GAD Goals Achieved	Client Focus GAD Activities	Organizational Focus GAD Activities	GAD Attributed Projects
Provide Safe Settlement	Emergency Shelter Assistance Program		
Enhance knowledge in Parenting and adolescents	Training on Responsible Effective and Active Parenting Seminar Family Planning Health Counselling on Family Planning		
Protection and support of infant and young child	Organization of Breastfeeding Support Group		
Decrease incidence of food and water borne disease	IEC Campaigns Water Quality Surveillance Food Sanitation Provision of Sanitary Toilets		

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Decrease number of underweight, wasted and stunted pre-school children	Monitoring of Height and Weight of Pre-school children Supplementary Feeding Mother's Class Pabasa Nutrisyon		
Support School needs of the indigent	Implementation of Special Program for Employment of Student (SPES) Scholarship Program for Indigent		
Provide Medical Support for Mental Illness	Treatment and Management of Mental Illness Cases		
Provide support to Pregnant disadvantaged, solo parents, indigent mothers	Procurement of prenatal vitamins and medicines		
Provide Adequate Livelihood Development Programs	Livelihood Trainings Job Fairs Local Recruitment Activities		
Increase knowledge in VAWC	Training Seminar on VAWC		
Preservation of Culture	Conduct of Socio Cultural Activities		
To provide HIV/AIDS Cancer Control	Conduct of Free PAP Smear AND Visual inspection of cervix Financial Assistance HIV Awareness Month Smoking Cessation Month		
Day Care Welfare	Purchase of ECCD Educational Materials		
Equitable quality education and lifelong learning	Conduct of Sportsfest		
To empower women	Women's month celebration Livelihood training Symposiums		
Provide financial and medical and burial assistance	Provision of medical, financial and burial assistance		
Food Stability thru increased crop production	Provision of fertilizers and seedlings		
Capacitate all office personnel and staff in dealing with GAD issues		GAD Awareness Training	
Ensure proper implementation of GAD operations		Hiring of GAD Personnel	
Support school needs of indigent students			Special Program for Employment of Students (SPES)
Increase Crop Production			Procurement of seedlings and fertilizers

After reviewing the Annual Reports of the municipalities of the Baybay Laguna Districts, the researcher found out that most objectives met are from Client-focused GAD Activities, but it was worth noting that there were notable Organizational focused GAD activities and there were two municipalities with GAD attributed projects, however, they were still in the project development phase. Efforts to come

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up with GAD Attributed activities can be seen but the need to institutionalize the GAD Office, provision of office and skilled staffing should be prioritized.

DPWH (2023) enumerated the GAD objectives as stated in the Magna Carta for Women (RA No. 9710). These are as follows: it seeks to achieve gender equality as a fundamental value that should be reflected in development choices; seeks to transform society's social, economic and political structures and questions the validity of the gender roles ascribed to women and men; contends that women are active agents of development and not just passive recipients of development assistance;and stresses the need of women to organize themselves and participate in political processes to strengthen their legal rights.

In Table 3.1, the respondents ranked the problems and concerns they encountered according to their seriousness and effects. With one (1) as the highly serious problem and five (5) as the least serious problem.

Results showed that lack of funding is the major, most affecting problem GAD implementers and Focal persons encountered with 13 out 16 respondents experiencing it. This was followed by insufficient data and research. And tied at third rank are Inadequate training and inadequate human and technical. The problem on lack of funding is very limiting and hinders the full implementation of programs,

The Philippine Commission on Women (2023) defined Gender and Development Budget as the policy that directs all government departments and agencies to allocate a minimum of five percent (5%) of their total annual budgets for gender programs, projects and activities. GAD budget is by attribution. Meaning, agencies don't set aside (i.e., appropriate) a separate budget for GAD activities; instead, agencies integrate GAD activities into their regular programs.

Table 3.1 Problems and Concerns Encountered

Problem and concern encountered	Frequency	Percentage	Rank
Inadequate training	6	37.5	3.5
Lack of Funding	13	81.25	1
Non-priority of GAD programs	4	25	6
Unsustainable implementation	4	25	6
Inadequate Human and Technical	6	37.5	3.5
Weak Coordination	4	25	6
InsuffIcient data and research	7	43.75	2
Limited attention to neglected groups and issues	1	6.25	8

** Multiple answers allowed.

Gabotaf (2024) clarified that While it is true that the GAA set a 5% threshhold for GAD activities, the same does not pertain to a separate budget that should be set aside by the agency; instead, at least 5% of the total cost of the agency's regular activities must pertain to GAD. The reason why it is called "by attribution" is because the law presupposes that the regular activities of the agency contain or at least address GAD issues/concerns. Therefore, most projects are Client-focus and a little of Organizational focus.

The summary of the survey and interview questionnaires has yielded results on how Client-focus and Organizational focus GAD Activities have outnumbered GAD Attributed programs. Only one LGU was able to have GAD Attributed projects, however it was still in the project design phase. The researcher identified the problems and concerns encountered.

Albaladejo (2016) identified the top three problems met by the educational managers and faculty members in the implementation of GAD programs were: the inadequacy of training, seminars, workshops and conferences related to GAD; followed by the lack of funding/budget support for GAD programs implementation; and GAD programs are not the priority of the institution. It can therefore be said that GAD related programs were given less attention by the institutions. Further, the results imply that since there is a lesser awareness and implementation, institutions should allocate minimum, if not maximum, funding to mobilize the GAD programs and gain better appreciation among stakeholders of the institution. In the following discussion, the researcher presents the most common issues and problems encountered by the GAD Focal Persons in implementing GAD activities.
For municipalities that have Client-focused GAD Activities, the usual problems are lack of funding often caused by the non-priority of GAD Program, unsustainable implementation which could have been triggered by Inadequate Human and Technical, insufficient Data and Research, Inadequate Training, Weak Coordination and Limited Attention to neglected groups and issues.

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The Department of Budget and Management (2009) in their BP 600 defined Client-focused GAD activities as activities that seek to address the gender issues of the agency's clients. For oversight agencies whose clients are government organizations, client-focused GAD activities may include the review and integration of GAD in policies, database systems, monitoring and evaluation, or integration of GAD in training modules of government employees. Organizational-focused.

As for municipalities with Organizational-focused GAD activities the usual problems are lack of funding, unsustainable implementation, Insufficient Data and Research, Inadequate Training, Inadequate Human and Technical, Weak Coordination and Non-priority of GAD Programs. It should be noted that though the Client-focused far exceeds Organizational-focused GAD activities in the number of activities and programs, they both share almost the same problems encountered in their implementation.

The Department of Budget and Management (2009) in their BP 600 defined Organization-focused activities as activities that seek to create the, organizational environment for implementing gender-responsive policies, programs and projects; and b) address the gender issues of employees particularly those that affect women's performance as government workers like sexual harassment, low participation of women in human resource development undertakings and decision making structures and processes, and lack of support to ease women's multiple burden such as daycare in the workplace.

For the few Municipalities with GAD-Attributed programs (at project development stage or project proposal stage), though not yet implemented, the main problems encountered were Insufficient Data and Research, Unsustainable implementation and Limited Attention to neglected groups and issues.

The Commission on Audit (2024) defined GAD Attributed Activities as the attribution of the whole budget appropriations for major programs/projects or a portion thereof to gender-responsive programs using the appropriate Harmonized Gender and Development Guidelines (HGDG) design checklists during the GAD planning and budgeting phase.

There were no specific solutions applied by the GAD Focal Persons mentioned in their interviews. The problems were clearly presented and the Focal Persons were aware that they are prevalent but the solutions are not yet applied to the problem. Mostly because of lack of funding and lack of prioritizing GAD activities. But the respondent GAD focal persons were able to suggest ways to address these pressing problems to their GAD implementations.

For one, it was clear that the National and Local Government both made efforts to capacitate the GAD Focal Persons and Implementers through series of seminars offered. Though the lack of trainings still fall part of the most pressing problems, it is not because of the absence of training but more of the unavailability of the GAD Focal persons and implementers to attend these seminars since most of them are also functioning as DSWD Heads and Staff and it is often impossible to leave their posts to attend seminars. The implementing body could schedule trainings and seminars so as not to coincide with their regular work.

The GAD approach also capacitates its implementers and focal persons. And it was shown in Table 1.5 that half of the respondents have had 11 trainings and more and very few accounts to those with 1-3 trainings. And these are the respondents who are newly involved in GAD. There are 81.2% who have had 6 or more seminars. It is worth noting that most of the respondents are equipped with the proper GAD trainings and knowledge which could capacitate them to be good implementers of GAD Activities.

The GAD related seminars offered to GAD staff and focal persons. It could be seen that some seminars were attended by all or almost all respondents. These are Gender Sensitivity Orientation (100%), GAD Concepts Seminar (93.75%) GAD Awareness (87.5%), and VAWC (81.25%).

Seminars with low attendance but are vital in the implementation of GAD activities should be reoffered such as seminars om the use of GAD tools (43.75%), Gender Responsive Extension (25%), WEASH (0%), Mental Health (25%), Pressure and Stress (18.75%), Human Rights (31.25%), Breast Cancer (12.5%), HIV, TB, Hepatitis (25%) , HIV Awareness Seminar (31.25) and Gender Fair Education Seminar (31.25%).
Institutionalization of the GAD Office, designating a GAD Focal and hiring of Skilled and Professional GAD Staff are some of the recommendations of the GAD Focal Persons. All in all, putting high priority and importance to GAD Programs is the tantamount trigger to resolve the problems and issues in the implementation of GAD Programs.

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ACTION PLAN PROPOSAL
Name of the Proposal: Enhancing the Implementation of GAD Programs
Proponent: VIRINICI V. MARTINEZ
Date of Proposal: April 2024
Proposal Overview:

The study "EXTENT OF IMPLEMENTATION OF GAD PROJECTS IN BAYBAY LAGUNA CIRCUIT" has yielded results showing how much Client-focus and Organizational focus GAD Activities have outnumbered GAD Attributed programs. Only one LGU was able to have GAD Attributed projects, however it was still in the project design phase. The researcher identified the problems and concerns encountered, so that she can address these issues and improve the implementation of GAD Programs.

Key Results	Problem Encountered	Solution	Duration
Most respondents were not able to attend some of the GAD related seminars which are crucial in the implementation of GAD Projects. Specifically , the seminar on the use of GAD tools, Gender Responsive Extension, WEASH, Mental Health, Pressure and Stress, Human Rights, Breast Cancer, HIV, TB, Hepatitis, HIV Awareness Seminar and Gender Fair Education Seminar	.Lack of Knowledge on these Gender Issues	Conduct of Seminars about these GAD topics	June-December 2024
The government could offer additional manpower or consider institutionalizing the GAD office for a smoother operations of GAD activities.	Lack of funding and of human and technical manpower	Institutionalizing GAD offices and Upskilling GAD staff	June-December 2024
Monitoring and Evaluation trainings could be conducted to ensure continuous implementation of projects.	Inconsistent Implementation	Project planning and Monitoring and Evaluation of Projects	June-December 2024
LGUs should also do Research and Development studies to provide GAD implementers with needed data.	Lack of data and information	Tapping CBMS and Census for GAD data	June-December 2024
GAD offices could focus on Advocacy projects to heighten the involvement in GAD Activities.	Lacking Advocacy initiatives	Promotion of GAD advocacy in schools and Civic Society Organizations	June-December 2024

CONCLUSIONS

After careful review of the results and information gathered, the researcher was able to come up with the following:

Majority of the interviewed GAD focal persons are female but their age varies. And most of them took 11 seminars and more, making them skilled GAD implementers. But most of them were still demanding for more capacity enhancement training. Though these GAD capacitating trainings were offered, some were unable to attend due to other DSWD related tasks. The GAD approached also capacitates its implementers and focal persons in addressing GAD issues.

The GAD office employees were also designated as the implementers with one GAD Focal Person. There were no GAD consultants surveyed maybe because the Baybay District tap more of their existing staffing to be GAD implementers rather than spending on GAD Consultants.

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It could be seen that some seminars were attended by all or almost all respondents. These are Gender Sensitivity Orientation, GAD Concepts Seminar GAD Awareness, and VAWC. While some have missed or haven't attended seminars that are vital in the implementation of GAD activities and these are seminars on GAD tools, Gender Responsive Extension, WEASH, Mental Health, Pressure and Stress, Human Rights, Breast Cancer, HIV, TB, Hepatitis, HIV Awareness Seminar and Gender Fair Education Seminar.

Among the GAD Goals achieved by Focal Persons and Implementers Capability Building is the one most gainfully achieved, followed by Governance and Linkaging, and Gender Sensitivity.

The results revealed that most programs were Client focus and there were a few Organizational focus GAD activities. There were few GAD Attributed programs since most municipalities lack funding and interview results showed that they lack knowledge in using the HGDG tool. Most Attributed Programs are in food security, agriculture, Infrastructure and livelihood programs. Pangil and Famy are model municipalities for GAD Attribution.

The obtained outcome showed that lack of funding was the major, most affecting problem GAD implementers and Focal persons encountered with 13 out 16 respondents experiencing it. This was followed by insufficient data and research. And tied at third rank are Inadequate training and inadequate human and technical. The problem on lack of funding is very limiting and hinders the full implementation of programs.

There were only 2 responses out of the 8 Focal Persons Surveyed. The 6 others refused to rank the objectives met since they felt they have not yet met these objectives.

Addressing the age groups, lack of funding is the most serious problem faced by the GAD Focal persons. The young GAD Focal Persons have problems with lack of training. The Tenured 60 years old and above Focal Persons have issues with training, and inadequate technical and Human Resources.

The data revealed that regardless Sex, lack of funding is still the most pressing problem among Focal Persons. Followed by Inadequate training. There were more problems faced by the female Focal Persons than male focal persons since they have outnumbered male respondents with the ration 7 females to 1 male.

RECOMMENDATIONS

1. Conduct of seminars by municipalities that were least attended such as GAD tools, Gender Responsive Extension, WEASH, Mental Health, Pressure and Stress, Human Rights, Breast Cancer, HIV, TB, Hepatitis, HIV Awareness Seminar and Gender Fair Education Seminar.
2. The municipalities may offer additional manpower or consider institutionalizing the GAD office for a smoother operations of GAD activities.
3. Monitoring and Evaluation trainings by municipalities may be conducted to ensure continuous implementation of projects every year.
4. LGUs may also do Research and Development studies to provide GAD implementers with needed data.
5. GAD offices can focus on Advocacy projects to heighten the involvement in GAD Activities

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INDIA'S LABOUR MIGRATIONS: HISTORICAL TRAJECTORIES AND PERSPECTIVES SINCE THE EARLY NINETEENTH CENTURY

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Labor Migration Pattern in Mizoram

ABSTRACT

This paper examines the study on pattern of migration in Mizoram. It tries to give the deeper understanding of socio economic characteristics and assess the push and pull factors of the migration. The traditional view and experiences reveal that the migration is from rural to urban areas- where living conditions of migrants would improve. But still betterment of migrants depends upon where they finally settle and what opportunities being offered to them. Basically migrants move in search for better employment opportunities, improved food and nutrition, higher standard of living and have better access to health and educational facilities.

INTRODUCTION

This paper simply attempts to analyze the patterns of migration and its impact on living conditions of migrants in Mizoram. UN Multi-Lingual Demographic Dictionary states that Migration is nothing else but a change in geographical areas. Masses moving from a geographical area into another and try to adapt that place. It can also be described as the change in residence from the original area to the place of destination. Migration happens because of various reasons but higher the migration would result in higher interregional inequalities.

Generally, the main motive of migration is that migrants can seek better lifestyle so they move towards resource rich area in search of livelihood. Migration is the worldwide phenomenon and acted as a powerful engine of growth. India witnessed several migration trends over the century. Migration occurred in steps –firstly, from rural to nearby towns and secondly, to large cities. Migration is of two types intra-national and international. It can also be explained as External migration (from one country to another) and internal migration (within the country). Migration takes place if the benefit of migration is more than the cost of migration. The cost of migration can be money cost (opportunity cost) and non- money cost (psychic cost). The opportunity cost is the present real income in the origin country that the migrant forgoes if he migrates to some other country. In simple language migration is redistribution of population.
The main concern of this paper is to study Mizoram. To understand the migration pattern of Mizos we have to look at their migration history. Secondly, this paper also tried to compare the different socio- economic factors like population size, literacy rate above 7+ years, and sexratio from 2001 to 2011 in Aizwal city of Mizoram. Then, this paper will try to find out the answers to many questions like what causes urbanization? , what was the impact of migration in Mizoram? , what causes the migration or what factors lead to migration? And why people migrate from one place to other?

HISTORY AND WAVES OF MIGRATION

There are few studies on migration in North East India especially in Mizoram. Mizos was the combination of many tribes which were originated in mystery. The land is mixture of tribes from Chin Hills, Lai, Mara and Chakmas which agglomerated into super tribe called Mizo because of religious, political and cultural revolutions in mid of 20th century. Movement of Mizos group depends on the migration of other tribes in time and space. Under the Government of Assam it became the district called Lushai Hills in 1947 after the independence from British. A name given to a district was Mizoram in 1972 and was declared as Union Territory. Later in 1986, Mizoram became a full-fledged federal state of India. On 20thFebruary Mizoram became the 23rd state of India.And that is how Mizoram originated. Now, Mizoram is a state out of the seven states of Northeast, with Aizawl as its capital city.The name Mizoram was a combination of two words MIZO and RAM. The meaning of these two words, Mizo means the name of the inhabitant and Ram described as Land, which means 'The Land of Mizos'.

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Since most of the migration history was based on oral history and archaeological inferences. Nothing can be said accurately. Shinlung or Chhinlungsan which was on the banks of river Yalung in China, possibly from there all mizos entered in. Then they moved to Kabaw valley to Khampat (which was now in Myanmar) after settling down in the Shan state and then inmiddle of 16th century to Chin Hills.

Kukis were one of the tribe in the Mizos who migrated earliest to India. Rangkhol, Bete, Langrong, Aimol, Chiru, koiren, Hmar, Cha and kom etc were identified in these groups. The New Kukis pushed away the old Kukis (who were first migrants in Mizoram) to Tripura. They were thesecond immigrants. New Kukis were identified as Changsen, Thado, Hawkips and Shingson e.t.c. migrated and followed the path to Tripura. Then they were shoved back again for creating troubles in British Frontiers by Col. Lister. Old Kukis and New Kukis both were then relocated in North –Cachar Hills of Assam and few other migrated to Manipur. The last Mizo tribe migrated to India was the Lushais. In the beginning of 18th century Lushai group came by driving out the New Kukis.

Population Dynamics

These districts like Kolasaib, Mamit and Serchhip have relatively low concentration of Chins. In Champhai district, there was the highest concentration of Chins. In Mizoram, 63,000 or more were Chins. By at least 13,000, population has showed a sudden increase from when the 2003 evictions called by Young Mizo Association. There were no accurate data given by any individual or any organization. The estimation of district wise population as follows: Aizawl -10,000, Lunglei-8000, Lawngtlai-10,000, Saiha-10,000, Champhai-20,000,and Serchhip-5,000. All These districts were visited by the large number of cins along with the local population. The total population of Mizoram was 891,058 with an average of 12,600 per district.

Most of the Chins between 1988 and mid 1990's came to Mizoram. Movement of Chins was majorly in Mizoram as compared to other North-Eastern states. Migrants or Chins were preferred to live in those places where they find somewhat close ethnic affinities. For example - Saiha district was preferred by the Maras of Myanmar where majority were Maras of Mizoram. Also Lawngtlai district was preferred by Lais tribe.

It was also noticed that the Chins were the cheapest labor in Mizoram like in domestic work, agricultural work,road construction, roadside vegetable vendors. Petty pan shop, scavengers in forests for leaves, timbers and herbs. Some of them were forced into sex work too. Local Mizoram population had a perception that the Burmese are well off but there were only few Chins who owned small or medium businesses and it was completely wrong perception. Most the Chins were struggling to meet their ends. They were labeled as backward people, uncivilized and anti-social even after their contribution in the labour market and in other services too.

Chins average incomes on per day basis in Mizoram lie in the range of INR 100 to INR 120. Chins were cheated in most the cases, on their wages and were also exploited by contractors as well as sub contractors. Despite of being cheated and exploited on their wages, life in Mizoram is better than in Myanmar. In Myanmar for the same work, the daily wage of the worker was INR 25 per day.

Majority of Chins were wanted to travel Delhi for better opportunitiesand for higher living standards. But many people could not afford the journey and travelling such a long distance after borrowing huge sum of money was a huge risk for chins. After the 2003 evictions in Mizoram, many people were forced to live in huge debts in Delhi.

Aizawl City

Earlier it was known as Aijal. In 1890, British had a stronger side in Aijal.Aizawl is the largest city in Mizoram and there were large villages which later transformed into towns. Later, it became the capital of Mizoram. Aizawl situated in the northern part with the population of 228,280 according to 2001 census. In total population males were 50.80% and females were 49.20% (Shown in fig.1)

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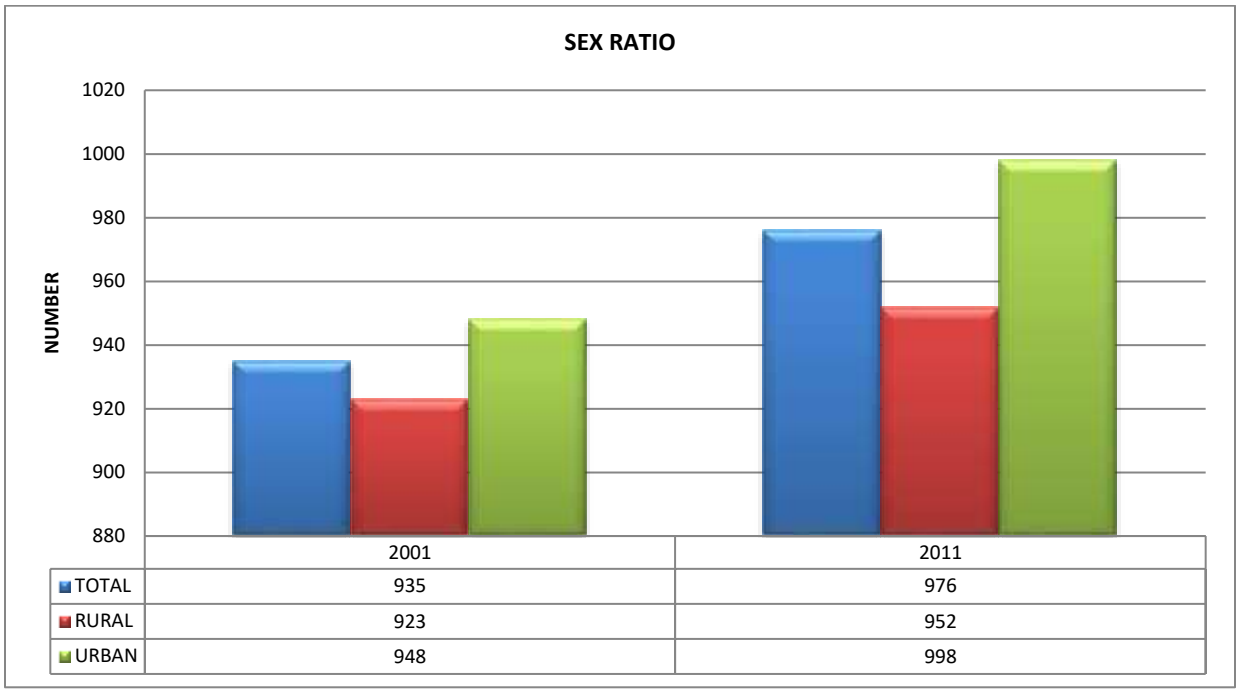


FIG.1 Sources: Census of India 2011

This means there were 976 females per 1000 males which was even greater than the national average data of 940 females per 1000 males. Gradually urbanization has increased in Mizoram especially in Aizawl city having 77.42% to its total population. Aizawl is the largest and most populated town among the 23 towns in the state. And hence, it is the rapidly growing urban centre. Urban Mizo is finding living every second in the capital city.

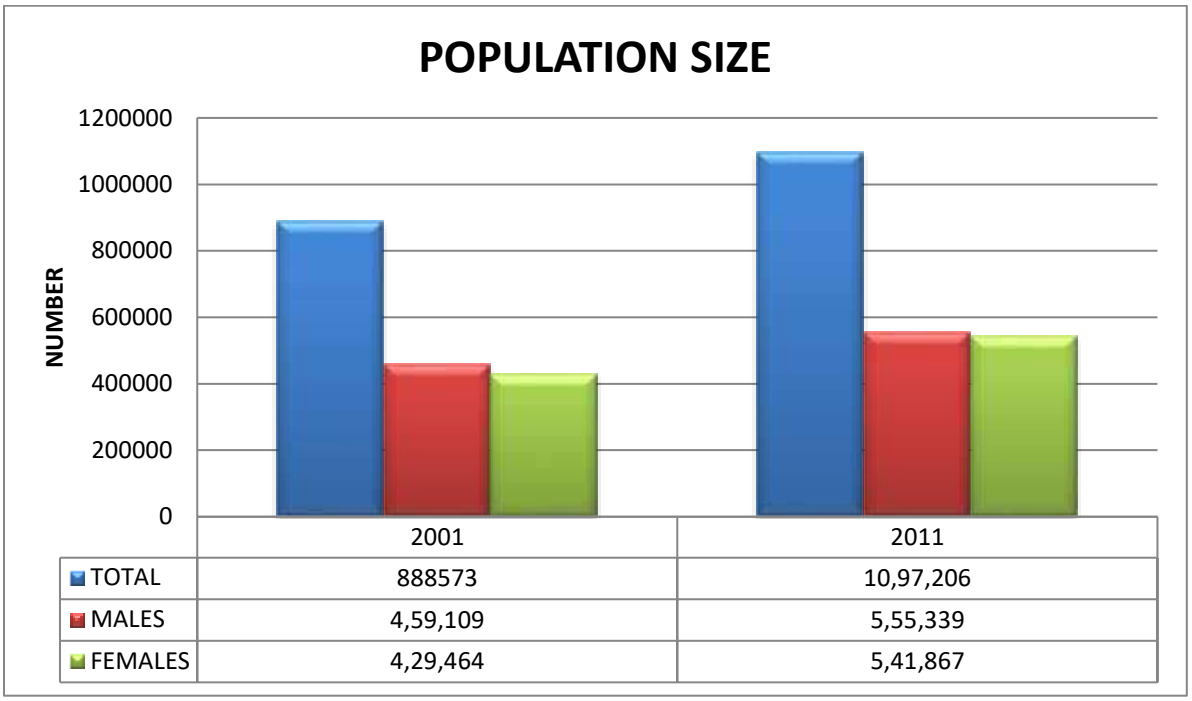
Urbanization in Mizoram

As we have discussed it, Aizawl is the most growing city state in Mizoram. Urbanization as a whole increased at a faster rate than the growth in infrastructure and service sector. Urban population has significantly started increasing since 1951. In 1951 the urban population was only 3.54% which drastically changed to 49.63% in 2001.

All the towns in Mizoram had shown remarkable growth in different years like Aizawl in 1951, two towns in 1971, six in 1981 and twenty three in 2001. Mizoram has achieved the tag of most urbanized state in the country as 16 rural constituents according to 1981 census acquired the status of towns according to1991census. Despite of having number of rural tribes in Mizoram, now the economy has fastest trend towards urbanization.

Census 2011 reveals that the total population of the state is 10,91,014. 5,61,977 of total population are living in urban areas which is approximate 51.51% (shown in fig.2).The decadal growth rate of urban population is 27.43% from 2001-2011. Census also indicate that the urban population to the total population of India is 31.16 which increased by 3.35% from 2001. What are the factors that lead to increase in urban population? One of the major reasons of migration from rural to urban areas was in search of livelihood, availability of resources and access to better health and education. Expansion of urban population was also because of higher birth rate as compared to death rate in urban areas which lead to expansion of new towns. Then, gradually infrastructure improved like building roads because of high infrastructure investment in Aizawl district. Some factors which responsible for the growth of urban population in Mizoram.
FIG. 2

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SOURCE: Census of India 2011

Literacy rate above the age of 7 years played an important role in development of Mizoram state. Literacy rate in Mizoram has significantly increased as compared to national literacy rate.

According to census 2011 literacy rate in Mizoram is 91.33% while total national literacy rate is 76.04%.

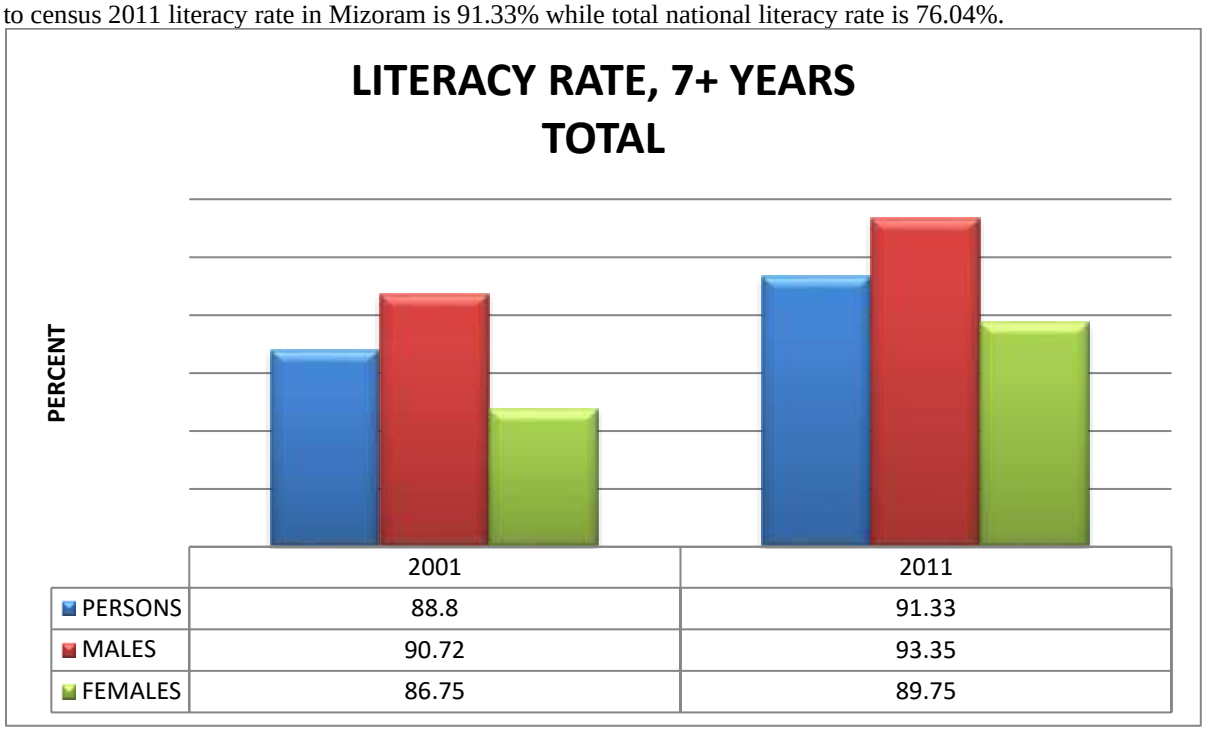


FIG.3 Source: Census of India 2011

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Above graph clearly shows the expansion of education. It is really good to see that female literacy rate has increased. The total percentage of literacy rate has changed from 88.80% in 2001 to 91.33% in 2011.

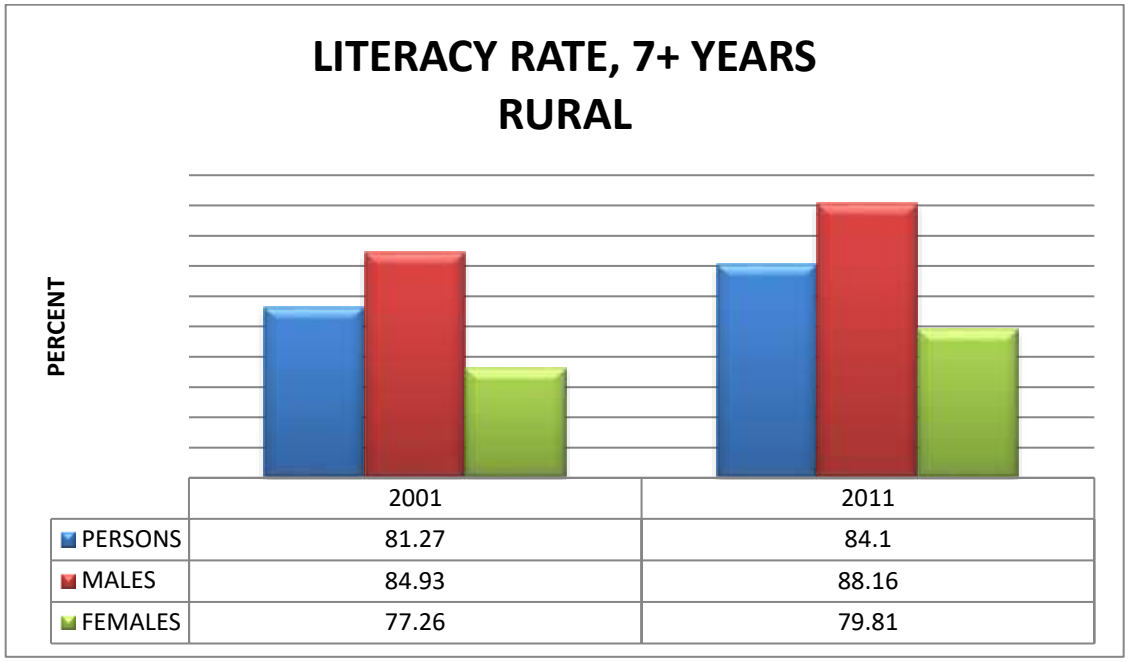


FIG.4 Source: Census of India 2011

Literacy rate in 2011 has also increased but the change in rural female literacy rate was less than the change in rural male literacy rate. Rural female literacy rate has changed approximately by 2.58% from 2001 to 2011 whereas rural male literacy rate has changed approximately by 3.23% from 2001 to 2011.

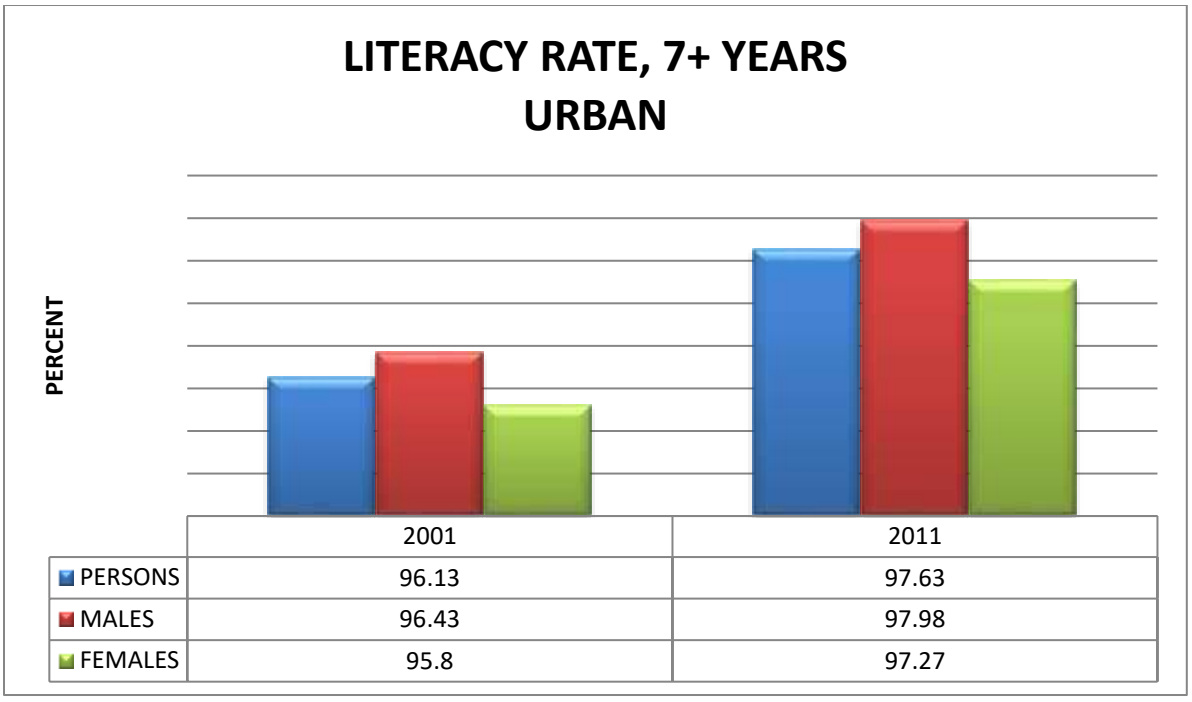


FIG.5 Source: Census of India 2011

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Urban literacy rates has improved drastically, there is a negligible change in urban male and urban female in 2011. From 2001 to 2011 female literacy rate change significantly and a little more than the change in male literacy rate.Education has always been the cause of migration after Nutritional Health.

Impact of Migration

Livelihood and living conditions were the two main causes of migration. And on the basis of that impact of migration can be analyzed. Primary and secondary occupations were taken as indicators of livelihood and annual income of the households taken as indicators of living condition.

In case of occupational structure, before migration about one-third of the population were engages in primary sector (agriculture) and government sector which changed tremendously after migration. People were engaged in more government sector and the highest proportion was mainly from labors and artisans. More two-third of population was not engaged in secondary population but most of them were practicing agriculture before migration. After Migration these figures changed significantly in secondary occupation. And a considerable part of population has started holding small businesses.

The indicator of living condition which is annual income of household,is classified into 4 categories such as (a) below Rs. 25,000,(b) Rs. 25,000-Rs. 50,000,(c) Rs.50,000-Rs. 75,000 and (d) Rs. 75,000 and above to understand the economic condition of the migrants before and after migration. Before migration, about half of the migrants were in the category of below Rs. 25,000 and after migration majority of migrants were categorized in income group Rs. 25,000-Rs. 50,000 and Rs. 75,000& above. This study reveals that the migration has improved the living conditions of migrants to a certain extent. But still this improvement was not enough and it was also not the case in entire Mizoram. There was a disparity in improvement between central and fringe areas. The incomes were considerably higher in central areas like capital city Aizawl as compared to local areas or fringe areas. Therefore, central areas improved significantly while the improvement in the household income of the migrants was not significant in fringe areas. Living condition can also be study from the housing conditions of migrants. Most of migrants were living in rented house which doesn't mean that people who had their own house were in better condition as compared to people in rented houses. And most importantly people in central area were living in rented houses while in fringe areas people had their own house. Migrants in Central areas are in a stable and a better economic condition. Condition of migrants had improved to a certain extent. Migrants living conditions as well as livelihood improved. They have better employment opportunities, earned more money, improved their food and nutrition, assets, sanitation, standard of living and have better access to health and education.

What were the main problems in fringe areas which created so much disparity between the fringe and central area? According to migrants isolation from the community and adjusting with different community was the biggest issue in fringe area. In fringe area land was bountiful while in centre area the case was different. Problems that were similar in both the areas were lack of regular employment and access to local resources in Mizoram.

Historically, Mizoram was famous for **Jhum Cultivation** (slash and burn). Mizo people practiced slash and burn for 100 of years. Majority of mizoram population was depended on this and earn their livelihood. In 20th century British Government has restricted the use of forest areas and gave the control to chiefs of Mizo over forest resources. Later on, Mizo people lost control over the communal land because of land use policy and governmental development policy. In post colonial India, Jhum Cultivation was abolished and replaced with the more liberal economic models which were more profitable according to Britishers. In addition, Jhum Cultivation was always considered as extravagant and unscientific in colonial period. The entire Northeast region considered as Indo-Burma diversity hotspot and ranked 6th among the 25 hotspots in the world. Majority of the population believed that the Northeast was considered as the large emitter of carbon dioxide. Jhum Cultivation was abolished by the Government in order to protect the global environment. This decision affected the large part of the population, they didn't have work to do and did not have stable livelihood.

Causes of Migration

Migration was caused due to following reasons:

1. Geographical and Economic Factors

   In history geographical and economic factors were responsible for the movement of people. People usually migrate to productive areas from unproductive ones. This means that the size of population depends on the productivity of the land. Similarly, the Mizo populations were also in search of Jhum land and favorable climate where they can cultivate easily. The Mizos were living the nomadic life and they were continuously migrating like nomads for fertile land that can be cultivated. The climatic conditions were also the responsible factor for staying long in that region. The availability of food and clean water

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were also the important reason for settling in that economy. Soon, the population has increased and migrated I search for the cultivating land, climatic conditions, and availability of food. Mizos started living according to the different tribes, sub tribes on the basis of clans. Hence, this period was characterized by the clannish assertion.

In 1283 A.D: In two groups Mizos were abandoned. One group reached Seithel Mual and the other group on the hill range of Letha or Tang Tlang.
In 1706-1730: Due to wars with Sokets,Pawls and Tang Tlang(Lakhers) were carrying guns and cannons Mizos(Lushais) migrated to the west. Then Lushai were forced to move to Tripura and Cachar district.
In 1765 A.D: Lallula and Sailo crossed the river Tyao in fear of Pawis of Falam. New village called Zopui established by Lallula.
In 1780 A.D: Large number of Mizos migrated across the rivers Tyao and Tuipui from areas of west

2. Socio-Cultural Factors:
In this period Mizos lived clan wise and according to the division of tribes, sub-tribes and clans. Hence, this period was also characterized by the clannish assertion. The social system that was prevalent in which the clans and sub clans showed their loyalty towards their respective chiefs. The chief was the head of the village and enjoys all power. Nobody could challenge hid decision. They control the clans and the other clans.
All the villages were a separate political entity and governed by their respective chiefs. The social isolation occurred in various groups. This isolation marked the development of social values as well as cultural ethics. Most of the clans had developed the district identity and mostly these names were given on the names of their respected chiefs. The languages and the dialects also developed in isolation. The new culture and ethics had emerged for the different clans and they want preserve and cherish for all time to come.

3. Political Factors
The different groups or different clans were politically independent under the political system which was present at that time. Chief was the head of the village or head of the people. Similarly, no one can challenge his decision. Each village acts as a different political entity which was ruled by their respective chiefs. They enjoyed all political independence based on the different clans and tribes. Chief can control their clans and the land which belong to their community. They created the political platform and create the separate identity for them. The distinct cultures of tribes and had to preserve at all cost.

CONCLUSION

Migrants in Mizoram represented as the poor sections of the society and lead their lives in harsh conditions. Life for migrants was not easy, they have to adjust within the different communities and face many problems. Migration occurred only because of the difference in the development of rural-urban region. Therefore, to seek better education facilities and access to better health facilities, job opportunities and basic civic amenities. Basically, in order to achieve higher living standards migration happens. Many policies or agreements in Mizoram attracted the migrants like New Land Use Policy (NLUP) which was introduced by the government of Mizoram in 1984-85. The objective of this policy was to end the practice of Jhum Cultivation and provide the farmers an alternative a stable land based activities. Then in 1986, the Mizoram accord was an official agreement between the Mizo National Front and Government to end violence and insurgency in Mizoram. It was the most successful and omly Peace agreement in Indian after Independence. An organization Mizo National Front was led by Laldenga to fight for Independence. This movement was started because of the conditions faced by Mizoram during the famine called Mautam in late 1950s.

All these policies and agreements led increase in the total population 1,091,014 according to census 2011. Mizoram has seen different waves of migration. Mizoram was the third least densely populated state in the country, after Arunachal Pradesh and Andaman and Nicobar Island, because of continuous in and out migration. Population is increasing by 0.26 million every year. Urbanization was also the factor of migration and the population living in urban areas was about 52% which was higher than the average. It is the fifth smallest state of India which covers an area of approximately 21,081 square kilometers and an area covered with forests is about 91% of the total area. The state has shown significant improvement in literacy rate, sex ratio, population and in health conditions. Mizoram is growing in trade with Myanmar and Bangladesh.

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ETHNOCULTURAL IDENTITY IN THE CONTEXT OF GLOBALIZATION

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ANNOTATION

In conditions of ethnic and cultural diversity, in conditions of intensification of intercultural interactions, individuals have the right to cultural freedom, the right to choose a cultural identity.

KEY WORDS: *national culture, cultural identity, globalization, public life, ethnic cultures, national values, cultural diversity.*

Globalization is a complex process that covers all spheres of public life. Globalization has both positive and negative aspects. Globalization processes allow peoples to interact closely with each other, intercultural contacts contribute to the rapprochement of peoples. The spread of the same cultural patterns, the openness of borders for intercultural interaction lead to the erasure of cultural differences, to the loss of cultural identity. The leveling effect of globalization on ethnic cultures causes opposition from ethnic groups. The formation of a global culture is simultaneously accompanied by the growing interest of peoples in their own roots, the desire to counteract globalization processes, and the preservation of their identity and uniqueness. Globalization is also associated with the process of growing interest in one's own culture, traditions and customs of one's people. In this regard, the problem of ethnocultural identity is being actualized. The problem of ethnocultural identity is relevant in the modern world, which is characterized by the intensification of intercultural relations and interethnic contacts. In the context of globalization, the efforts of ethnic communities and states to preserve their cultures are being actualized, and ethno-protective mechanisms are being launched.

Ethnocultural identity is one of the most important factors that can protect and preserve ethnic culture.
An individual has the right to choose the culture, values, norms of which are more preferable for him. The choice of cultural identity is influenced by the status of culture. An individual may prefer to choose a culture that occupies a dominant position in society. Cultural diversity enables an individual to exercise his right to cultural freedom. Different cultures have different status. Belonging to the dominant culture gives the individual wide access to its cultural values, the opportunity for self-realization and social growth. The choice of a dominant culture may also be caused by the fact that an individual may feel a sense of shame for his culture or a sense of inferiority of his culture. The right to cultural freedom exists alongside the right to distinction. The right to distinction means that an individual can learn his own language, join and assimilate the values of his ethnic culture. The right to distinction makes it possible for an ethnic culture to exist and develop, to preserve its identity and uniqueness. Ethnocultural identity means a person's awareness of his belonging to a certain ethnic culture, allows him to determine his place in the cultural space, gives a person freedom to navigate the world. However, to belong to an ethnic culture, it is not enough only to identify a person, it is necessary that representatives of this culture and representatives of other cultures accept his identity.

Ethnocultural identity, which is a protective mechanism of ethnic culture, is formed in the process of ethnic socialization. In the process of socialization, individuals assimilate the values of ethnic culture. By assimilating their native language, values, meanings, and behavioral stereotypes, an individual becomes a carrier of their culture. The process of socialization involves the assimilation of the native language, which is an important element of ethnic identity, the immersion of an individual in an ethnocultural environment forms common features of their mentality, common worldview, and a similar picture of the world. The stable values of ethnic culture are a factor of support in an unstable world. They provide support and a sense of protection in an environment where globalization leads to the loss of stability of many social institutions.

In conditions of instability, a person turns to the values of ethnic culture, which over the centuries has shown its viability, the stability of its norms, traditions, and customs. Ethnocultural identity gives a person a sense of psychological comfort, a sense of protection and support in the context of globalization.

Ethnocultural values include two main aspects - material and spiritual. The material includes language, customs and traditions, history, literature, folk crafts, dance and musical culture, historical monuments, oral folk art, etc. The spiritual is based on such concepts as historical memory, historical heritage, moral ideals, role models, respect for ancestors, work, love of nature, Homeland

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and others. Ethno-cultural values have the potential to overcome cultural problems generated by the process of globalization, ethno-culture is based on values that encompass religious worldview, etiquette, cult, ethics, customs and traditions, folk art, architecture, everyday life, forms of interpersonal communication. Ethnoculture is fixed in ethnic constants, which represent "paradigmatic forms of ethnic consciousness", including religion, worldview, language, practice, historical patterns, common ancestry and Homeland. One of the components of ethno-cultural values is language as an integral part of the culture of the people, so ethnic self-identification is expressed more highly when a person speaks their native language well. Language is an internal link of a person with his ethnic culture, contributes to strengthening his desire for integration with his native ethnic group.

It should be emphasized that ethnocultural education is aimed at "strategically important processes of ethnic identification and intercultural integration", therefore, in our research we pay special attention to them. Due to the heterogeneity of the concept, it is worth emphasizing that by ethnocultural values we mean a set of values of world national and folk culture based on three interrelated value levels and objectified in cultural monuments, historical heritage, language, worldview focused on ethnic identification and national integration. Ethnocultural values are considered at interrelated levels based on eternal higher humanistic values. The next level contains family and natural values that combine the values of each individual nation, the last level combines historical and ethnic values, including the values of a particular ethnic group with a common historical picture.

An actual approach to education and socialization is an ethnocultural approach based on the principles of ethno-culture, naturalness, cultural creativity, dialogue of cultures and tolerance, contributing to creative development, instilling love for nature and preserving ethnic values. Guided by the principles of a systematic approach, we will consider the key concept of "ethnocultural values", highlighting the following components in it: cognitive-active, emotional-moral and value-semantic.

The cognitive-activity component represents the amount of knowledge necessary for a high level of formation of ethnocultural values: a set of theoretical knowledge about the peoples inhabiting the country, a small homeland, general knowledge of folklore, the basics of folk crafts. In this case, it is necessary to dwell in detail on what includes the minimum amount of knowledge necessary for the implementation of pedagogical activities for the formation of ethno-cultural values:

- To know the specifics of the historical evolution of ethnic communities;
- To know general information about the diversity of theories of the origin of ethnic groups;
- It is easy to differentiate concepts "ethnos", "nation", "nationality";
- Have an idea of the ethnopsychology and behavioral patterns of certain ethnic groups;
- To know the history and culture of the small homeland and be able to present it in the context of national state policy.

Presenting the necessary minimum of knowledge that a teacher who carries out ethnopedagogical activities should have, it is necessary to competently master the material, be able to present it correctly, and broadcast positive attitudes. For the successful realization of this goal, it is necessary to have empathy, to be creative in the pedagogical process:

- To use means of harmonization of interethnic relations;
- To use knowledge, skills and abilities to resolve interethnic conflicts.

Thus, the teacher translates his knowledge, the child learns from experience, the formation of such personality qualities as interest in knowledge, learning in practical activities - in the process of play or creativity. The formation of the cognitive activity component is carried out by stimulating ethnocultural awareness and indicates the relevance in the modern world of addressing the issue of the formation of an ethnocultural personality, the development of intercultural communication skills. The term "ethnocultural awareness" means "integrative personal education", characterized by a certain set of ethnocultural knowledge, acting as a factor of "effective intercultural interaction", which is realized in the formation of a positive, respectful attitude towards ethnic groups and cultures.

The next component is emotional and moral. This component implies moral education through emotional and aesthetic influence.

Thus, with an aesthetic effect on the emotional sphere of a teenager, moral education is carried out. The moral and aesthetic component includes the ability to receive aesthetic pleasure from creativity (the results of creativity and the process itself), which reflects the peculiarities of ethnic culture, creativity, reflection on creative activity, indirect formation of such personality qualities as politeness, tact, tolerance, loyalty, respect for nature.

The value-semantic component is an integral part of the ethno-cultural values of a person, including value orientations (man, love, goodness, nature as a source of life, the personification of mother, Homeland and common home, family, fatherland, patriotism, traditions of the native people), as well as ideological attitudes that are formed under their influence.

When the term "ethnocultural values" is used in our study, it means a set of spiritual values objectified in certain material objects, norms of social behavior and in the self-identification of a subject with a certain ethnoculture.

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According to social needs, this concept refers to cultural values, since it covers national customs and traditions, patterns of behavior, folklore, folk crafts, worldview and language. According to the subjects of satisfaction, it refers to social values. In terms of content, ethnocultural values are inextricably linked with humanistic, universal, natural, and family values, historical and ethnic values.

The criteria of their formation that we have identified correlate with the component composition of ethnocultural values. So, the cognitive-activity component is revealed in the following criteria:

- Knowledge of ethno-cultural norms of behavior in communication (ascertaining - 34%, forming - 62%);
- Knowledge of customs, traditions, norms and rules of conduct (ascertaining - 52%, forming - 66%);
- The desire for active activity and the need for self-realization (stating - 29%, forming - 47%);
- Readiness for positive interaction with representatives of other ethnic groups (stating - 22%, forming -38%).

Criteria of the emotional and moral component:

- The ability to empathize, receptivity to the feelings of other people (ascertaining - 34%, forming - 52%);
- Tendency to open expression of emotions (stating - 26%, forming - 43%);
- Striving for moral behavior based on awareness (stating - 23%, forming - 56%).

The value-semantic component is implemented through:

- Awareness of one's own nationality (stating - 64%, forming - 72%);
- Mastering the concepts of "folk culture" and "national dignity" (stating - 42%, forming -69%);
- The ability to analyze situations and problems in relationships, including with representatives of other ethnic groups (stating - 46%, forming - 62%).

Thus, addressing the problem of the formation of ethnocultural values is determined by the priorities of modern national policy: the importance of ethnic identification and intercultural integration, which are difficult to achieve in the practical pedagogical process if attention is focused exclusively on patriotic or ethnic education.

In our research, we proceed from the essence of a key concept consisting of three interrelated levels that follow from each other: higher and humanistic values, natural and family values, historical and ethnic values, which are objectified in cognitive-activity, emotional-moral and value-semantic components. The components, in turn, are based on mastering the theory of material, certain rules of conduct and the desire to take the initiative. Having considered the preliminary practical results according to the criteria of formation of each component, we can conclude that the development of components of ethnocultural values is carried out in certain pedagogical conditions.

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FORMULATION AND EVALUATION OF HERBAL HAIR OIL TREAT THE HAIR FALL

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ABSTRACT
Herbal preparations always have less or no side effects compared to synthetic preparationsPharmaceutical factories are used to manufacture and produce countless medicines. In addition, herbs areused to beautify the body in the preparation of cosmetics, flavors and dyes. The purpose of this review isto study the parameters regarding Formulation of herbal hair oil, using scientific research to make herbal hair oils using herbal ingredients like amla, hibiscus, flower curry. leaves, coconut oil onion neem almand tushi alovera Fenugreek sesame oil . Shatavari shikakai drumstick Based on the above observation, a crude herbal mixture was prepared in the form of herbal hair oil using the boiling method The preparation has anti-hair loss and other useful properties such as anti-dandruff effect, improves blood circulation of the scalp and roots, reduces hair pigmentation, anti-fungal effect, reduces hair graying. The formulated vegetable oil was evaluated and parameters such as acid content, viscosity, saponification value pH, skin irritation etc. were determined and described in this

KEYWORDS : -*hair oil herbs formulation preparation evaluation results and discussion*

INTRODUCTION

Hair plays an important role in human lifeIn India the traditional process is the preparation of hair oils put together with various hair growth promoting drugs. Indian women areknown for their long, shiny and healthy hair, so it is not surprising that hair care features prominently in their self-care rituals. The Charaka Samhitha (the definitive book on Ayurvedic medicine) describes the importance of oiling the hair and scalp to maintain good hair health and prevent hair loss. he daily hair oiling was recommended with appropriate herbs filled to suit others constituents and this practice also continuous until today2.The hair oil preparations are included to treat various dandruff, hair fall process, split endsetc. The hair oil preparations are mainly used to cool the scalp for luxurious growth of hair in both men and women.Various types of oils like calmond oil, castor oil, onion oil are applied to scalin admixture with suitable herbal drugs. Amongthese oils coconut oil is the foremost worthy oibase because it get absorbed into the hair strands better than other oils and also economical compared to other oils. Hence coconut oil addedwith herbal drugs is mentioned method for best hair growthHair on our head is the first line defense against the sun's UV rays. Hair care product are nothing but it is those formulations which are used for modifying the texture of hair. Herbal cosmetic are highly used due to their less adverse effects and the ingredients used are easily available.Now a days hair care cosmetic are added with herbs and they are well recognized compared with synthetic ones Hair oils are formulated with both synthetic and natural ingredients Synthetic hair oils are those hair care products which are made by chemical or artificial substances. They are used to provide shine and excellent conditioning and they also helps to reduce frizz.Natural hair oils are the hair care products which are rich in Vitamins, Mineralsand Fattyacids whicha rethevitalel

STATEMENT OF THE PROBLEM

1. Hair loss such as genetic factor or predisposition vitamin and meineral deficiency
2. Hair growth disorder poor diet hormonal problem certain internal disease druuse
3. Strees and depression cosmetic factor and nutrients deficiencies Avoiding heat

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Hair Follicle



The hair follicle is where hair begins to grow and where it is held in place. It is a stocking-like structure that starts in the epidermis. It extends to the dermis. The follicle is lined by an inner and outer sheath that protects and molds the growing hair and ends just before the opening of sebaceous gland.

Hair shaft

The hair shaft is the part of the hair that is made up of three layers of keratin.

Those layers are;-

i. The inner layer:- Also called as medulla. Depending on type of hair, the medulla is not always present.

ii. The middle layer:- This is called the cortex which makes the majority of the hair shaft.

iii. The outer layer:- Also called as cuticle, which is formed by tightly packed scales in an overlapping **stru**cture that resemble roof shingles

Hair Oil

Hair oil are hair care products. Hair care products are defined as the formulations which are used for the purpose of cleansing, modifying the hair texture, providing nourishment to the hair and maintaining the healthy appearance of hair. Hair oil are hair care formulation applied to the hair for the treatment of hair disorder such as baldness, greying of hair, hair fall, dry hair and also helps in providing nourishment to hair. Herbal cosmetics are high in demand due to increasing interest of mankind towards them also herbal cosmetics are more effective with negligible side effects and ingredients are easily available. Herbal hair oil is an essential part of herbal cosmetics. Herbal hair oil is more preferred and used in many aliments of hair. They not only promote hair growth but also provide necessary moisture to the scalp rendering in beautiful hair. Herbal oil which contain herbal drugs are known as hair tonic. Herbal hair oil provides a number of essential nutrient which are important to maintain the normal function of sebaceous gland and promote natural growth of hair. These are one of the most well recognized product for the treatment of hair.The use ofhair oil is increasing everyday in line with the improvement in standard of living of people To give natural flavours and colours to hair oil the herbal essences and

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Their benefits are as follow:

 It provides natural goodness to hair. Herbal oil contains vitamins and micro nutrients which acts as a food for hair.
 Hair oil helps in preventing hair loss and fames frizzy hair. Hair ends needs special care and herbal oil pampers them throughout their nourishment.
 Regular use of hair oil of hair oils cure problem of premature grey hair.
 Keeps the scalp hydrated.
 Improves hair growth.
 Prevents dandruff.
 Offers shine glow.
 Stress relief.

Formulation :

Sr no	Ingredients	Quantity
1	Coconut oil	50 ml
2	Amala	2 gm
3	Alovera	2 gm
4	Bringraj	1 gm
5	Onion	One onion
6	Shikakai	1 gm
7	Drumstick	10 leaves
8	Shatavari	1 gm
9	Fenugreek	2 gm
10	Sesam oil	2 ml
11	Neem	10 leaves
12	Tulshi	10 leaves
13	Hibiscus	5 flower

Coconut oil



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Coconut oil

Coconut oil is obtained from the milk of the fruit of the coconut pain. Coconut oil is used as an edible oil and used indusrial application to produce cosmetics and detergents

Family - Aceraceae

Scientific name - cocos nucifera L

Parts used - kernal oil

Geographical location - southern india

Activ constituents - fatty acid ,caprin acid lauricacid

Role

- Mask hair
- Moisturizer hair
- Seal hair
- Makes hair look shinier

Amala



B**otanical name -** phyllanthus embica

Kingdom - plantae

Order - malpighiales

Family - phyllanthaceae

Genus - phyllanthus

Phyllanthus emblica is an important medicinal plant in Indian traditional system of medicine.[13] The tree is of 1-8 meter in height. The leaves are simple and intently set alongside branchlets. The flowers are of greenish yellow colour. The fruit is nearly round in shape and having hard appearance.

Role

 Condition your scalp.
 Minimize greys
 Reduce dandruff
 Promote healthy hair growth.
 Strengthens the hair roots

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Alovera



Alo vera
Botanical name - Aloe vera
Kingdom - plantae
Order - Aspiragales
Genus - Aloe
Species - A.vera

Aloe vera is a stemleess or very short stemmed plant growing to 60-100 centimeters tall. Leaves are thick and fleshy, grey to green. Aloevera is a species Aloe that is particularly known for its medicinal properties. Aloe species are distributed widely in the eastern European continents and are spread almost throughout the world.

Role
- Strengthen and repair hair strands
- Deep cleans oily hair
- Calms an itchy sclap

Bringraj



Bringraj

Botanical name - Ecllipta prostrata
Kingdom - platae
Order - Asterales

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Species -E.prostrata
Family - Asteraceae
Genus - Eclipta
Eclipta alba is an annual multibranched herbaceous plant. The height of plants isup to 30-50cm. It is found in tropical and subtropical region of the world such as
South America, Asia and Africa at an altitude upto 2000 m. In the region of Indi it is mainly found in state of Bihar, Assam, Uttar Pradesh and Manipur.

Role
- Prevents hair fall
- Promotes hair growth
- Makes hair lustrous
- Repairs hair damage
- Treats balndness.

Onion



Botanical name - Allium
Kingdom - plantae
Order -Asparagales
Family - Amaryllidaceae
Genus - Allium
Species - A.cepa

The onion is also known as the bulb onion or common onion, is a vegetable that lis most widely cultivated species of genus Allium. The onion plant has been grown and selectively bred in cultivation for at the least 7000 years. Modern varieties grow to a height of 15-45 cm. The leaves are yellowish to bluish green. They are hollow, cylindrical with one flattened side. Onion has been valued as a food and a medicine plant since ancient times.

Role
- Treats dandruff
- Inhibits hair thinning
- Fights scalp infection
- Slows down premature greying
- Nourishes dry or brittle hair.

Shkakai
Botanical name - senegalia rugata
Kingdom - plantae

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Order - febales
Family - fabaceae
Genus - senegalia
Species - S rugata



Shikakai

Shikakai is a woody climber, shrub upto 5 metres tall. Leaves are bipinnate.
Shikakai has a naturally mild pH that gently cleans the hair without stripping it of natural oil. The regions having dry hot weather like South India isbest suited for these trees. The extract from the bark, leaves, of shikakai is used as hair cleansing agent[15]. Shikakai is traditionally used in shampoo preparations for the purpose of hair growth.

Role

- Makes hair soft and shiny
- Heals scalp and prevents the agony of the dry scalp
- Boosts hair growth
- Delaying greying of hair
- Works as natural hair cleaner



Drumstick

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cleanses, prevents damage, dandruff, dryness, and boosts blood circulation, promoting hair growth. Its role includes boosting hair growth and leading to thicker, healthier hair.Drumstick is beneficial for hair and scalp due to its rich vitamin and mineral content. It The role of the given text is to highlight how a certain product boosts hair growth, promotes hair growth, and ultimately leads to thicker and healthier hair.

Shatavari

Botanical name - Asparagus
Kingdom - plantae
Order - Asparagales
Family - Asparagales
Genus - Asparagus
Species - A recement



Shatavari

Shatavari is a plant with small, shiny green photosynthetic branches that are uniform in appearance. It is known as a general tonic and specifically as a tonic for female reproductive health. The plant contains various secondary metabolites such as steroids, alkaloids, flavonoids, furan derivatives, and essential oils

Role

a certain product, which includes smoothing the scalp, promoting hair growth, strengthening hair roots, and maintaining hair color and luster.

Fenugreek



Fenugreek

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scalp and hair as it moisturizes, stimulates hair growth, strengthens, and softens the overall texture. It also possesses anti-fungal, anti-inflammatory, antibacterial, and anti-pesticide properties that contribute to overall hair health.

- **Role : -** a certain product in increasing hair thickness and
- promoting growth,
- controlling scalp inflammation, fighting dandruff,
- adding shine and soft texture to the hair.

Till oi/ l sesam oil



family Pedaliaceae and is derived from the seeds of the plant with the scientific name S. indicum.
The oil is extracted from the seeds and is commonly found in the Middle East states of India.

Neem
botanical name - Azadirachta indica.
Kingdom Plantae, -order Sapindales,
family -Meliaceae
genus -Azadirachta,
species - A. indica.



Neem

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Neem trees are prevalent in India, Africa, and America, known for their medicinal properties utilized in ayurvedic medicine for millennia. The tree grows rapidly, reaching heights of 15-20 meters, with its Sanskrit name being Arista. The US National Academy of Science acknowledged the significance of the neem tree, releasing a report in 1992 titled "Neem - a tree for solving global problems." The leaves, bark, and gum are essential non-woody products of the neem tree.
The neem tree has various uses, including antifungal, antibacterial, insecticidal, and other biological activities.

Role

- Curve scalp problem
- Make lustrous and healthy hair
- Promotes thicker stronger hair growth
- Cooling and soothing effect

Tulshi



Tulshi

Botanical name - ocimum tenuifloram
Kingdom - plantae
Order - lamialea
Family - lamiaceae
Genus - ocimum
Species - o.tenuiflorum
Tulsi, a herb from the Lamiaceae family, is well-known in the Indian subcontinent and has been utilized in Ayurvedic medicine for over 3000 years. It is an erect subshrub with many branches, typically 30-60 cm tall, and has a hairy stem. The leaves of Tulsi can be green or purple in color. This plant possesses various medicinal properties, with the leaves serving as a nerve tonic and aiding in memory enhancement.

Role

- Coagent remedy for hair loss
- Hair loss treatment
- Strengthening the hair roots
- Prevent bacteria and fungal infection

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Hibiscus Flower

Botanical name - Rose - sinensis
Kingdom. -plantae
Order. - malvales
Family. - malavaceae
Genus. - hibiscus



Hibiscus flowers

The leaves are alternate, oval or lanceolate, often toothed or serrated. The flowers are large, showy, trumpet-shaped, with five or more petals. This plant is widely cultivated as an ornamental plant in tropica and subtropical regions . This plant is commonly found throughout the tropics and as a houseplant worldwide .

Role

- Stops hair loss
- Prevent premature grying
- Thicken hair and add valume
- Treat dandruff

Method and Apparatus

Preparation of herbal hair oil used are the boiling method all herbal crud drungs
Are collected and proper magerment all used ingredients and heat the oil and step by step add the harbs and boil are the properly 30 min after and cool the oil and filter the oil .



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Apparatus : -Measuring cylinder, beaker , china dish , tripod , spatula , filter paper , burettestand

Benifits of Herbal Hair Oil

➢ **I**t gives natural beauty to the hair. Vegetable oil contains vitamins and minerals nutrients that act ashair nourishment
➢ Hair oil helps prevent hair loss and reduces frizz. The ends of the hair need special care, andvegetable oil pampers them throughout the diet
➢ egular use of hair oils and hair oils cures the problem of premature grey hair
➢ Keeps scalp moist
➢ Improves hair growth
➢ Prevents dandruff
➢ Gives shine.
➢ To relieve stress
➢ For longer and stronger hair
➢ preservation of hair color
➢ maintaining hair health .

Ideal Characteristics of Hairs

➢ Nourishing
➢ Moisturising
Antioxidants properties
➢ Protect from damage
➢ Texture
➢ Density
➢ Porosity
➢ Elasticity
➢ Tenacity
➢ Formation

Various herbal oils are available in the market

1. Amala Hair Oil
2. Coconut Hair oil
3. Bhringraj hair oil
4. Jasmine hair oil
5. Brahmi Hair Oil 6.Cantharidin hair oil7.Onion hair oil

EVALUATION PARAMETERS

The prepared herbal oil was subjected to physical and biological evaluation.

Saponification value: 1 ml of oil was accurately weighed into a 250 ml Erlenmeyer flask and 10 ml of ethanol ether mixture (21) was added. 25 ml of 0.5 N alcoholic KOff solution was placed in this bottle. The flask was kept for 30 minutes and the flask in 0.5 N HCl. using a phenolphthalein indicator. Zero titration was also done without taking the oil (sample). The amount of KOH in mg that was calculate

PH : -Phof herhal oil was determined by PH meter. The most accurate cone method for measuring PH is a laboratory device called a probe and material, a PH meter. A glass electrode sensor through which a small voltage is passed. The Muter voltmeter measures the electronic impedance of the glass electrode and displays Pusits instead of volume. Typically, a pH meter must be calibrated with each use two standard solutions of known pH are prepared by dipping Meement into the probe liquid until the meter registers a reading.

Viscosity : - The viscosity of the herbs was determined with a viscometer Ostwaldand Take the specific gravity bottle, wash it with distilled water, dry in an oven for 15 minutes, cool, cap and weigh (a) Now fill the same specific gravity bottle with the sample and cap

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and weigh again (b) Determine the weight of the sample per milli liter by subtracting the mass (ba).Susceptibility test: 1 cm of prepared plant cells was applied to the skin of the hands and exposed to sunlight for 4-5min.

Acid Value 10 ml of oil added 25 ml of ethanol and 25 ml of ether phenolphthelin was added as indicator and titrated with 0.1 m potassium hydroxide solution
N = number of ml of 0.1m KOH
W= wt of oil

Organoleptic Property
Colour :- detected by naked eyes
Colour - dark greenish brown
Sensitivity : - applied to the skin and exposed to the sunlight for 5 min to check to any irritation over skin
Arittiness - rubbed to the skin and observed
Resul and Discussion: -
Formulated herbal hair oil evaluated by various standard parameters and found acceptable in all limits the colour was found dark greenish liquid consistency easily spredability with good extradability the PH viscosity and odar of formulated herbal hair oil

CONCLUSION

The utilization of herbal hair oil in the cosmetic enhanced many folds in personal hygiene and health care system. Herbal oil is one of the most well- recognized hair treatments. The use of different herbal materials which is having different benefits with good combination will give the great effect for hair. The herbal extracts and constituents chosen for the formulation of hair oil were reported to have hair growth,relaxation, anti-dandruff. hair thickening, and hair fall control properties, which when used together gives a synergistic effect in promoting healthy and shiny hair growth. The formulation was proven to be safe for human use. Hair oil formulation with good values of evaluation parameters show similar beneficial in maintaining good hair growth of the hair sturning grey hairs to black providing protection from dandruff and results lustrous looking hairs. Also hair oil will help in maintaining good growth of hair, not only that it also provides turning grey hair to black, protects from dandruff metres street It provides various coential nutrients required to muntan normal function of sebaceous glands and prom natural hair growth. Formulation was done and evaluated by means of various parameters like pH greenish brown organoleptic properties (colour, odour, sensitivity, sedimentation) acid value, viscosity, specific gravity, and stability test. At last, it can be concluded that the herbal hair oil formulations .

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FORMULATION AND EVALUATION OF POLYHERBAL SHAMPOO

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ABSTRACT
Polyherbal shampoo is a hair care product crafted from a blend of several herbal extracts and natural ingredients. Unlike conventional shampoos laden with synthetic compounds, polyherbal shampoos harness the power of multiple plant-based components to provide a comprehensive approach to hair health. Each herb contributes unique benefits, such as strengthening, nourishing the scalp, and enhancing shine. The need for polyherbal shampoos arises from a growing inclination towards holistic and natural hair care solutions. These shampoos cater to individuals seeking effective alternatives that prioritize both hair vitality and overall well-being. The varied herbs encompass vitamins, minerals, and antioxidants, fostering hair growth, reducing dandruff, and preventing damage. They offer a harmonious blend of nature's goodness, catering to the rising demand for environmentally-conscious and sustainable options. By embracing the power of plants, polyherbal shampoos embody the fusion of tradition and modernity, meeting the diverse needs of individuals in pursuit of healthier, more vibrant hair. This Polyherbal shampoo contains Shikekai, Ritha, Aloe vera, Neem, Hibiscus Leaf, etc.

INDEX TERMS - *Polyherbal, Hair, Shikekai, Aloe-vera, Neem, Hibiscus Leaf.*

I. INTRODUCTION

Hair is one of the vital parts of the body considered to be a protective appendage on the body. Shampoos likely rank as the most commonly utilized cosmetic items to cleanse both hair and scalp in our everyday routines.[1] Essentially, a shampoo can be described as a detergent solution with added ingredients to provide various advantages like improving hair conditioning, lubrication, and even potential medical benefits. In today's times, there is a wide array of shampoos available, including synthetic, herbal, medicated, and non-medicated options. However, the preference for herbal shampoos is increasing among consumers due to their perception that these products, originating from natural sources, are secure and devoid of adverse effects.[2] Herbal formulations are seen as substitutes for synthetic shampoos; yet creating cosmetics solely from entirely natural ingredients presents a challenging endeavor.[3] There are large numbers of medicinal plants which are reported to have beneficial effects on hair and are commonly used in formulation of shampoo.[4] The herbal shampoo although better in performance and safer than the synthetic ones will be popular with consumers.

II. MATERIAL AND METHOD

Table No. 1 Formulation of Herbal Shampoo

Sr. No.	Ingredient Name	Quantity (100 ml)
1	Hibiscus powder	5 gm
2	Neem powder	5 gm
3	Henna powder	5 gm
4	Amla powder	10 gm
5	Shikakai powder	20 gm
6	Ritha powder	20 gm
7	Aloevera Gel	10 ml
8	Banyan Powder	5 ml
9	Tragacanth	1 gm
10	Almond	5 gm
11	Curry Leaves	5 gm

Importance of Active Ingredients

1. Shikekai

Acacia concinna (Shikakai), a plant utilized in India, has various applications such as the treatment of lengthy hair, dandruff and skin issues. Moreover, Shikakai possesses several medicinal attributes which encompass anti-dandruff, wound-healing, and anti-hair fall properties. Additionally, it exhibits anti-inflammatory and antifungal capabilities as well as antioxidant activity.

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Furthermore, it aids in hair growth and maintains scalp cleanliness without disrupting its natural pH balance, consequently fostering accelerated hair development and radiance. It is also effective in strengthening and conditioning hair.[5]



Picture 1: Shikakai

2. Ritha

Reetha is a well-recognized component in numerous Ayurvedic shampoos and cleansing products. The kernels within Reetha seeds are abundant in proteins and display a well-proportioned composition of amino acids, as stated by the World Health Organization.[5] Its fruit is rich in vitamin A, D, E, K, saponin, sugars¸ fatty acids and mucilage. Reetha extract is useful for the promotion of hair growth and reduced dandruff [6] Soapnuts, also known as washing nuts, have been significant in natural hair care for a long time. These nuts contain saponins that contribute to maintaining the health, shine, and luster of hair when applied regularly.[7]



Picture 2: Ritha

3. Aloe-vera

It is used in cosmetics like shampoos, face washes. Aloe Vera is used as a moisturizer for skin.[8] The anticipated advantages include hair conditioning, hair surface smoothing, and overall hair health, along with the elimination of dandruff, dirt, grease, and lice. Its purpose involves cleansing the hair, averting scalp debris, and removing residues from hair grooming products. It helps for thickening hair. It also helps to nourish hair.[9,10]



Picture 3: Aloe vera

4. Neem

Neem (Azadirachta indica) provides positive effects on cleansing the scalp by efficiently clearing blocked pores and encouraging hair growth. Its rejuvenating qualities are especially advantageous for tackling dandruff problems. Neem possesses preservative and therapeutic attributes, rendering itsuitable for addressing diverse hair-related issues. Neem leaves can be employed as a rinse for effectively combatting dandruff. Following Ayurvedic practices, Neem is commonly included in our hair care routines, along with Amla, Lisa, and Acacia. It holds a vital position as an herb for nurturing vibrant curls, promoting hair growth, minimizing hair loss, and augmenting hair volume.[11]

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Picture 4: Neem Leaf

5. Hibiscus Leaf

Chinese hibiscus (Hibiscus rosa-sinensis) is a popular remedy for hair growth, promoted by herbal healers. Proponents claim that hibiscus can also help: stop hair loss. make your hair look healthy and lustrous Proponents claim that hibiscus can also help.



Picture 4: Hibiscus Leaf

Method of Preparation

All the ingredients were carefully measured in accordance with the formula. A decoction containing Neem and Aloe vera gel was prepared using one portion of water. The mixture was then filtered through muslin cloth, and the resulting filtrate was collected. In a separate portion of water, a decoction of Shikakai and Ritha was created, followed by filtration through muslin cloth to gather the filtrate. Subsequently, the above-mentioned filtrates were combined and thoroughly stirred together. To maintain the desired semi-solid consistency of the herbal shampoo, gaur gum was incorporated as a thickening agent. Then add Glycerin that helps to look the moisture in hair Additionally, CAPB (Cocamidopropyl betaine) was introduced for its surfactant and foam-enhancing properties. Finally, preservatives and lemon oil as a fragrance were added to the mixture. Lemon also helps to balance the pH of formulation.[14]



Picture 1: Polyharbal Shampoo

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III. EVALUATION OF FORMULATION

To evaluate the quality of commercial and prepared formulations, several quality control tests including visual assessment, physico-chemical controls conditioning performance tests were performed.

1. **Physical appearance/visual inspection:**
   The formulation prepared was evaluated for the color, odor and foam producing abilityetc.[15]
2. **Determination of pH:**
   The pH of 10% v/v shampoo solution in distilled water was measured by using pH meter at room temperature.[16]
3. **Determination of % of solid contents:**
   4 grams of shampoo were placed in a previously clean, dry and weighed evaporating dish. The dish and shampoo was weighed again to confirm the exact weight of the shampoo. The liquid portion of the shampoo was evaporated by placing the evaporating dish on the hot plate. The weight and thus % of the solid contents of shampoo left after complete drying was calculated.[17]
4. **Dirt dispersion test:**
   Two drops of shampoo were added to 10 mL of distilled water taken in a large test tube. To this solution, one drop of India ink was added and the test tube was stoppered and shaken ten times. The amount of ink in the foam was indicated by the rubric such as None, Light, Moderate or Heavy.[18]
5. **Surface tension measurement:**
   The surface tension of 10% w/v shampoo in distilled water was measured using stalagmometer at room temperature.[19]
6. **Foaming ability and foam stability:**
   Foaming ability was determined by using cylinder shake method. Briefly, 50 ml of the 1% commercial or formulated shampoo solution was placed into a 250 mL graduated cylinder; it was covered with one hand and shaken 10 times. The total volume of the foam content after 1 min of shaking was recorded. Foam stability was evaluated by recording the foam volume after 1 min and 4 min of shake test.[20]
7. **Wetting time test:**
   A canvas paper was cut into 1-inch diameter discs having an average weight of 0.44 g. The smooth surface of disc was placed on the surface of 1% v/v shampoo solution and the stopwatch started. The time required for the disc to begin to sink was noted down as the wetting time.[21]
8. **Skin sensitization test**
   This test is performed on skin of human volunteers and checks whether it irritation on skin or not.[14]

Table 2: Evaluation of Herbal Shampoo

Sr. No.	Evaluation Parameters	Observation
1.	Color	Dark brown
2.	Odour	Pleasant
3.	pH (10% solution)	5.5 to 5.9
4.	% Solid contents	3.5%
5.	Surface tension (dynes/cm)	35.77 ± 1.25
6.	Foam volume (mL)	70 ml
7.	Foam type	Small, dence
8.	Wetting time (sec)	177 ± 5
9.	Skin Sensitization Test	No irritation on skin

IV. RESULT AND CONCLUSION

The current research aims to effectively create an herbal hair shampoo using traditional herbal extracts known for their hair cleansing properties in India. All the components utilized in crafting this herbal Shampoo are deemed safer in comparison to commercially available products. The characterization of the herbal shampoo demonstrated favorable outcomes. Further investigations are needed to enhance the stringent quality assessment of the product, particularly through animal testing, and to evaluate its performance under various conditioning conditions. As seen from the results, it is possible to formulate a natural herbal shampoo by using herbal extracts develop a stable shampoo by excluding all types of synthetic additives, which are normally incorporated in such formulations. Numerous tests were conducted to assess the effectiveness of the prepared shampoo. The outcomes of the evaluation of the newly formulated shampoo indicated similar results in terms of quality control assessment. However, additional scientific confirmation is required to verify its overall quality.

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