



ISSN:2455-7838 (Online)

DOI : 10.36713/epra2016

SJIF Impact Factor(2024) : 8.675

ISI I.F Value : 1.241

**EPRA International Journal of**

# **RESEARCH & DEVELOPMENT**

**(IJRD)**

*Monthly, Peer Reviewed (Refereed) & Indexed International Journal*

Volume - 9 Issue - 4 April 2024

# Research & Development



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## EPRA International Journal of Research & Development (IJRD)

Monthly Peer Reviewed & Indexed  
International Online Journal

Volume: 9, Issue:4, April 2024

Indexed By:



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# EVALUATION OF FOOD TECHNOLOGY SPECIALIZATION OF BACHELOR OF INDUSTRIAL TECHNOLOGY (BIT) ASSESSING ITS PROGRAM INPUT AND IMPLEMENTATION

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## ABSTRACT

*This evaluative study focuses on the assessment of Food Technology of the Bachelor of Industrial Technology Program as a basis for program enhancement. The program inputs, implementation, and outputs are used to evaluate Food Technology. Students, teachers, graduates, and administrators of the specialization are the respondents of the study. The findings show that for the ten areas of the program under its inputs, Food Technology's: Vision, Mission, Goals, and Objectives (VMGO); Faculty; Curriculum and Instruction; Support to Students; Research; Extension and Community Involvement; and Library are Excellent; while Physical Plant and Facilities; Laboratories; and Administration are Satisfactory. The study also reveals that in terms of Food Technology's implementation: Instruction is Satisfactory; meanwhile Evaluation and Evaluation Tools are Excellent. The study recommends the conduction, base on the results of this study targeting the specific areas which are needed to improve on, toward program improvement.*

**KEYWORDS:** *food technology; assessment; inputs; implementation*

## INTRODUCTION

In 2007, the College of Industrial Technology (CIT) of the Nueva Ecija University of Science and Technology (NEUST) implemented the Bachelor of Science in Industrial Technology (BSIT) program. In 2008, this program was renamed as Bachelor of Industrial Technology (BIT) on a suggestion from the Philippine Association of Colleges and Universities in Industrial Technology (PACUIT). The assessment conducted by Aloroy in 2016 emphasizes the need to evaluate the efficacy of the BIT Program in attaining its objectives. There are worries about a mismatch between the knowledge and skills acquired by Food Technology majors and their practical application in the workplace, leading to employment mismatch issues. This is despite the fact that Food Technology offers specialties in numerous areas. In 2013, the Philippines had a significant education reform through the introduction of the K to 12 Curriculum. This resulted in modifications in higher education to ensure compatibility with outcomes-based education. The Commission on Higher Education (CHED) and the Department of Education (DepED) cooperate to provide teacher training and ensure the quality of the curriculum. Aloroy's study highlights the necessity of reevaluating the Food Technology specialization in the BIT Program. This will serve as a foundation for improving the program to meet industry requirements and rectify any discrepancies in the skills of graduates. It is important to note that the curriculum has not been updated since the university's earlier days as Nueva Ecija Trade School (NETS). Putting in consideration all the foregoing premises, the researcher assessed the Food Technology of the BIT Program. Because the curriculum of the program specialization has not yet been revised since its implementation when the university was still named Nueva Ecija Trade School (NETS), this study could serve as a basis for future improvement of the program, to cope up with the changes in the of academe and eliminate the mismatch of the competencies of graduates and the need of the industries.

## Objectives of the Study

This study aimed to evaluate the Food Technology of the Bachelor of Industrial Technology (BIT) Program of Nueva Ecija University of Science and Technology (NEUST), as a basis for its its improvement. Specifically, it sought to answer the following questions:

1. To assessed the Food Technology inputs as regards to:
  - 1.1 vision, mission, goals and objectives;
  - 1.2 faculty;
  - 1.3 curriculum and instruction;
  - 1.4 support to students;
  - 1.5 research;
  - 1.6 extension and community involvement;
  - 1.7 library;
  - 1.8 physical plant and facilities;
  - 1.9 laboratories; and
  - 1.10 administration?





2. To assessed the Food Technology’s implementation through:
  - 2.1 instruction; and
  - 2.2 evaluation?

**Methodology**

The study was descriptive-evaluative. According to Wollman (2015), evaluative research assesses policies, programs, and institutional frameworks by outcomes or requirements. This study analyzed the inputs, and implementation, of the Bachelor of Industrial Technology Program's Food Technology concentration to enhance it. Respondents described the program's 10 categories and curricular instruction and evaluation using descriptive-evaluative study design.

**RESULTS AND DISCUSSIONS**

**1. Assessment of Program Inputs with Regards ti its Ten Areas**

1.1 Vision, Mission, Goal and Objectives (VMGO) is one of the ten areas of the program assessed in this study.

**Table 1**

*Assessment of Vision, Mission, Goal, and Objectives (VMGO)*

<b>Area I: Vision, Mission, Goal, and Objectives (VMGO)</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>A</b>	<b>VD</b>
1. The goals of the Food Technology of BIT Program are consistent with the Mission and Vision of the institution.	3.86	3.35	3.49	4.00	3.67	Excellent
2. The Food Technology of the BIT Program, faculty, personnel, students and other stakeholders participate in the formulation, review and/or revision of the VMGO.	3.57	3.18	3.53	3.00	3.32	Excellent
3. The faculty and staff perform their jobs/functions in consonance with the VGMO.	3.43	3.06	3.40	4.00	3.47	Excellent
4. There is full awareness and acceptance of the VMGO by the administrators, faculty, staff, students and other stakeholders.	3.71	3.17	3.38	3.50	3.44	Excellent
5. The goal and objectives are being achieved.	3.43	2.96	2.96	3.50	3.21	Satisfactory
<b>Average</b>	<b>3.60</b>	<b>3.14</b>	<b>3.35</b>	<b>3.60</b>	<b>3.42</b>	<b>Excellent</b>

*Legend: F- Faculty, S- Students, G- Graduates, A-Administrators, A- Average, VD-Verbal Description*

Table 1 presents the assessment of Vision, Mission, Goal, and Objectives (VMGO). Faculty, students, graduates, and administrators gave the highest rating, 3.67, interpreted as Excellent, to the consistency of the goal of the Food Technology of BIT Program with the mission and vision of the institution, while they rated achievement of Food Technology’s goal and objectives, the lowest, 3.21, equivalent to Satisfactory. This implies that the goal of the program is already consistent with the institution’s mission and vision Those just have to be carried out more appropriately in order to achieve them. Allen and Kern (2018) state that vision, mission, and objectives are unspoken contracts between the institution and various stakeholders. A well-written statement can guide decision-making, resource allocations, policy decisions, and how the school operates. By making their purpose clear, schools can put their goal and objective into action.

1.2 Another area belonging to the ten areas of the Bachelor of Industrial Technology (BIT) program is the assessment of Faculty.

**Table 2**

*Assessment of Faculty*

<b>Area II: Faculty</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>A</b>	<b>VD</b>
1. The required number of faculty possesses graduate degrees appropriate and relevant/allied to the Food Technology curriculum of the BIT Program.	3.14	3.16	3.28	4.00	3.37	Excellent
2. The faculty demonstrate professional competence and are engaged in any or a combination of: instruction; research; extension; production; consultancy and expert service; and publication, creative and scholarly work.	3.00	3.28	3.04	4.00	3.39	Excellent
3. The institution has qualified and competent faculty.	2.86	2.98	3.10	4.00	3.23	Satisfactory
4. Faculty-student ratio is in accordance with the program requirements and standards: lecture (1:40) and laboratory (1:15).	3.29	3.04	3.04	3.50	3.38	Excellent
5. The faculty are efficient and effective, with sufficient time for instruction, research, extension and other assigned tasks.	2.86	3.04	3.19	4.00	3.27	Excellent
<b>Average</b>	<b>3.03</b>	<b>3.10</b>	<b>3.13</b>	<b>3.90</b>	<b>3.33</b>	<b>Excellent</b>

*Legend: F- Faculty, S- Students, G- Graduates, A-Administrators, A- Average, VD-Verbal Description*



Table 2 shows the respondents' assessment of Faculty. They rated the professional competence of faculty in doing other tasks aside from teaching. Such item got the highest, 3.39, equivalent to Excellent, while, the lowest rating, 3.23, interpreted as Satisfactory, was given to the qualification and competence of the faculty. Teachers' qualification and competence cover their educational background and training's/seminars attended. A study conducted by Dial (2008), entitled "*The effect of teacher experience and teacher degree levels on student achievement in mathematics and communication arts*", which finds out that teacher degree level alone had no effect on student achievement. The results of the study indicated that years of experience, as well as the interaction between years of experience had an effect on student achievement in both communication arts and mathematics. However, based on the study entitled "*The impact of graduate education on teacher effectiveness: Does a master's degree matter?*" conducted by Horn and Jang (2017), the effect of master's degree attainment on student reading and math achievement during high school remains unclear. One study suggests that master's degree attainment will only yield a positive effect on student math achievement if the teacher majors in math during the master's degree program. Regarding science achievement, one study demonstrated that scores were higher among students whose teachers had a master's degree, compared to students whose teachers only had a bachelor's degree. Training wise, one faculty member had already attended nine seminar-workshops to date while the other six had attended an average of three only. According to Felipe (2013), teachers' attendance to trainings and seminars on ICT, new methods and technique in teaching, orientations on the curriculum, values formation seminars, will help create an effective learning environment, improve teaching-learning situations, keep updated on modern instructional devices and inspire them to become better teachers in the modern world. Furthermore, Jaminal (2019) recommends in his study that seminar-workshops should be conducted for teachers on the integration of technology as part of their teaching strategies to enhance students' motivation.

1.3 Assessment of the curriculum and instruction is another area included in the ten areas of Bachelor of Industrial Technology (BIT) program.

**Table 3.**  
*Assessment of Curriculum and Instruction*

<b>Area III: Curriculum and Instruction</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>A</b>	<b>VD</b>
1. The curriculum provides for the development of the following professional competencies: acquisition of knowledge; application of theories to real problems; and demonstration of skills in the actual work setting.	3.43	3.04	3.02	4.00	3.37	Excellent
2. Opportunities for participation in hands-on activities, such as immersion/practical training and field study are maintained in the curriculum.	2.86	3.22	3.06	4.00	3.28	Excellent
3. Teaching strategies stimulate the development of the students' higher-order thinking skills (HOTS such as critical thinking, analytical thinking, creative thinking and problem-solving.	3.14	3.12	3.09	3.50	3.21	Satisfactory
4. The program of studies has a system of evaluating student performance through a combination of: formative tests such as quizzes, unit tests; summative such as mid-term and final examination; project and term papers; practicum and performance tests; and other course requirements.	3.00	3.08	3.11	4.00	3.29	Excellent
5. At least 60% of the students enrolled in the program are able to graduate within the regular time frame.	3.14	3.02	3.23	4.00	3.34	Excellent
<b>Average</b>	3.11	3.10	3.10	3.90	3.30	Excellent

Legend: F- Faculty, S- Students, G- Graduates, A-Administrators, A- Average, VD-Verbal Description

Table 3 presents the assessment of Curriculum and Instruction. The respondents gave the highest rating, 3.37, interpreted as Excellent, to the provision of the curriculum for the development of its professional competencies, while they gave the way teachers' strategies stimulate and develop students' higher-order thinking skills, the lowest, 3.21, interpreted as Satisfactory. For students, a dynamic time requires a dynamic strategy. Moreover, current students suggest to further enhance curriculum and instruction through conducting additional seminars and trainings for them to gain supplemental knowledge and skills. Panigrahi (2020) asserts that seminars and workshops are essential for students to develop proficiency in verbal communication, acquire knowledge in a particular field, grow networks, gain encouragement and motivation, and experience a different environment than classroom. She adds that the benefits and importance of workshops for students is immense. In higher education, where every aspect of the study is relevant to market and industrial standards, workshops and seminars are more than necessary.



1.4 Assessment of the support to student is another area in the ten areas of the Bachelor of Industrial Technology (BIT) program

**Table 4**  
*Assessment of Support to Students*

<b>Area IV: Support to Students</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>A</b>	<b>VD</b>
1. The Student Affairs Services (SAS) Unit is composed of student welfare and student development programs and services.	3.43	3.12	3.43	4.00	3.49	Excellent
2. The institution conducts leadership training's.	3.86	3.02	3.51	4.00	3.60	Excellent
3. The institution provides access to scholarship and financial assistance.	3.14	3.31	3.57	4.00	3.50	Excellent
4. The primary health care services are administered to all students by licensed medical, dental and allied professionals	3.14	3.33	3.53	4.00	3.50	Excellent
5. Policies and procedures in the selection of student athletes, performers, writers, etc. are implemented.	3.29	3.24	3.60	4.00	3.51	Excellent
<b>Average</b>	<b>3.37</b>	<b>3.20</b>	<b>3.53</b>	<b>4.00</b>	<b>3.52</b>	<b>Excellent</b>

*Legend: F- Faculty, S- Students, G- Graduates, A-Administrators, A- Average, VD-Verbal Description*

Table 4 shows the respondents' assessment about Support to Students. They rated the institution's conduction of leadership trainings, the highest, 3.60, equivalent to Excellent, while their lowest rating, although still interpreted as Excellent, 3.49, was given to the student welfare and student development programs and services of the Student Affairs Services (SAS) Unit. For this area, the ratings given by the respondents are all equivalent to Excellent. However, when it comes to Support to students, there is no more reliable assessment from the students themselves. Aside from conducting more seminars and trainings, most of the students said that they should also be supported in terms of financial, like what they do with other courses, especially that Food Technology requires many laboratory activities which sometimes require them a lot of money. In a study entitled "The role of student services in the improvement of student experience in higher education", Ciobanu (2013) mentions that students' support and services contribute to the quality of their learning experience and their academic success. Studies show that the most important factors in education quality assurance are: quality of teaching/ learning and service systems and support for students (Hill, Lomas, & MacGregor, 2003). Therefore, the importance of support activities for students is obvious but also presents the management of services with difficulties due to the increasing number of students and their needs. In addition, another important role of student service is to prepare students for active participation in society. Along with teachers and non-governmental organizations, they contribute to having increased learning opportunities and community involvement by organizing or promoting internships, experiential units or short-term experiences, integrated into the curricula (UNESCO, 2002).

1.5 Assessment of research is another area belonging to ten areas of the Bachelor of Industrial technology (BIT) program.

**Table 5**  
*Assessment of Research*

<b>Area V: Research</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>A</b>	<b>VD</b>
1. The institution has an approved Research Manual.	3.14	2.92	3.40	4.00	3.37	Excellent
2. Research results are published.	2.86	2.88	3.15	4.00	3.22	Satisfactory
3. The institution has an approved and adequate budget for research.	2.71	3.27	3.11	4.00	3.27	Excellent
4. There is a system of implementation, monitoring, evaluation and utilization of research outputs.	3.14	3.04	2.91	3.50	3.15	Satisfactory
5. The institution provides opportunities for the dissemination of research results in fora, conferences, seminars, and other related means.	3.57	3.10	3.11	3.50	3.32	Excellent
<b>Average</b>	<b>3.08</b>	<b>3.04</b>	<b>3.14</b>	<b>3.80</b>	<b>2.27</b>	<b>Excellent</b>

*Legend: F- Faculty, S- Students, G- Graduates, A-Administrators, A- Average, VD-Verbal Description*

Table 5 presents the assessment of the area in Research. Having an approved institution's Research Manual this area got the highest rating from the respondents, 3.37, equivalent to Excellent, while the system of implementation, monitoring, evaluation and utilization of research outputs, received the lowest rating, 3.15, interpreted as Satisfactory. At this time, the proper execution of before, during and after Research practices is most essential and beneficial to teachers and students. Such area forces teachers to achieve continuous growth by having further studies and action research. For students researches make the most out of their learning experience and discover learning aside from what is written in their books.

In an online article entitled "Role and need of research in higher education", Gupta (2017) enumerates the important pointers why research must be a part of every higher education institution: 1. Teaching will improve if the staff engages in research (research-based teaching); 2. Students will learn more if they come into contact with research (research-based learning); 3. Professional practice will improve if professional workers in their training learn how to base their work on research-based knowledge (research-



based practice); and 4. Professional programs have an obligation to improve the knowledge basis of professional work through research (research-based knowledge production).

Clemeña and Acosta (2007), in their study entitled "Education institutions: Perspectives of university faculty", aimed at understanding the prevailing research culture in the Philippine HEIs, as viewed by 40 university faculty from 14 universities and colleges in the country. The study found out that faculty did not consider any of the aspects of research culture in their institutions as being strong. The faculty further perceived that factors necessary for improving research productivity include: time, strong belief in research endeavor, faculty involvement, positive group climate, working conditions and organizational communication, decentralized research policy, research funding, and clear institutional policy for research benefits and incentives. Thus, the findings recommend that developing a research culture should take into account the dynamics of the interaction of the quadruple function of HEIs, the researcher's mind, and the body of institutional policy.

For the current Research culture of the Food Technology, the faculty and students ask the institution to: provide more research materials such as books, manuals, and other references; construct research facilities with sufficient tools and equipment; and support financially researchers either teachers or students.

1.6 Assessment of extension and community involvement is another area in the ten areas of the Bachelor of Industrial Technology (BIT) program

**Table 6**  
*Assessment of Extension and Community Involvement*

<b>Area VI: Extension and Community Involvement</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>A</b>	<b>VD</b>
1. The Food Technology curriculum of the BIT Program has a benchmark survey of the problems, needs priorities and resources of the community.	3.29	3.10	3.04	4.00	3.34	Excellent
2. The extension projects and activities complement the curriculum of the Food Technology among of the BIT Program.	3.57	3.12	3.09	4.00	3.45	Excellent
3. The administration, faculty and students are involved in the implementation and dissemination of extension programs.	3.29	3.20	3.21	4.00	3.42	Excellent
4. There is an approved and adequate budget for extension.	3.14	3.16	3.38	4.00	3.42	Excellent
5. There is a strategy for involving the community, government and private agencies in the Extension Program.	3.29	3.22	3.36	4.00	3.47	Excellent
<b>Average</b>	<b>3.32</b>	<b>3.16</b>	<b>3.22</b>	<b>4.00</b>	<b>3.42</b>	<b>Excellent</b>

Legend: F- Faculty, S- Students, G- Graduates, A-Administrators, A- Average, VD-Verbal Description

Table 6 shows the assessment given to Extension and Community Involvement of Food Technology. The respondents rated the strategy for involving the community, government and private agencies in the Extension Program, having the highest, 3.47, and was interpreted as Excellent, while they gave the lowest rating, 3.34, equivalent to Excellent, to the benchmark survey of the problems, needs priorities and resources of the community. All of the ratings given by the respondents are equivalent to Excellent, nevertheless, most of the students suggested to get them more involved when it comes to this area. Community extension service operates through self-support, self-reliance, self-sustaining, and self-propelling principles. Through the people's participation, well-planned programs should be consciously taking into consideration. This is also an important part of providing quality education to the student when it comes to program accreditation (Laguador, Dotong & De Castro, 2014).

Meanwhile, Fletcher and Major (2009) found out that those students that volunteered or are doing volunteer work because of the activity that would sooner or later be related to their careers. It shows that some students volunteered depending on the course they are taking but it has to be that what they are doing is also related to what they are studying. It might be that case because doing volunteer activities that are related to the course the students are taking could be considered as experiences that would help them in their future undertakings.

Therefore, Extension and Community Involvement serves as an instrument by which the institution instills in the mind of its own community specially its beneficiaries, the concept of social responsibility. Moreover, the area serves as a springboard for a closer linkage between the school and the community (COMEX, 2012).



1.7 Assessment of Library is another area in the ten areas of the Bachelor of Industrial Technology (BIT) program.

**Table 7**  
*Assessment of Library*

<b>Area VII: Library</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>A</b>	<b>VD</b>
1. The library core collection is adequate, updated and well-balanced.	3.00	3.02	3.09	3.50	3.15	Satisfactory
2. The library is strategically located and accessible to student, faculty and another clientele.	3.00	3.08	3.15	3.50	3.18	Satisfactory
3. IT software and multi-media equipment are utilized.	3.29	3.05	3.17	3.50	3.25	Satisfactory
4. The financial support from fiduciary supplemental and external funds is adequate.	2.86	3.02	3.26	4.00	3.28	Excellent
5. Library resource sharing and linkage are well-established.	3.29	3.14	3.30	4.00	3.43	Excellent
<b>Average</b>	<b>3.09</b>	<b>3.06</b>	<b>3.19</b>	<b>3.70</b>	<b>3.26</b>	<b>Excellent</b>

Legend: F- Faculty, S- Students, G- Graduates, A-Administrators, A- Average, VD-Verbal Description

Table 7 presents the assessment made about Library. The well-established Library with resource sharing and linkage got the highest rating, 3.43, equivalent to Excellent, while the adequacy, being up-to-date, and well-balanced core collection of the library, was rated the lowest, 3.15, interpreted as Satisfactory. The teachers and students, who technically and frequently use the library, only gave Satisfactory ratings. The teachers suggested the addition of more references, such as books, magazines and the like, to the library. Aside from additional references, the students also wished that the library would always be open or accessible for them when they need to.

Chaudhari (2017) in his article entitled “*The role of library in higher education*”, claims that in comparison to primary and secondary education, the role of library in higher education is much more important since library is considered a prime requirement in university education. The entire academic and research process are fully dependent on library network. To facilitate any educational programs successfully, library proves as the essential part.

Furthermore, the National Library of the Philippines (2018) conducted a research, entitled “*Status of Philippine public libraries and librarianship*”, to report on the current situation of the public libraries in the country. The paper asserts that libraries are deemed to be conducive to learning and the primary source of knowledge for readers and researchers. It is of great importance that the library is up to date with materials given the fast-paced environment of today. The fast-paced environment was brought by the current technology that keeps on innovating every day. Thus, there is a need for libraries to acquire the latest collection and install new facilities to accommodate the needs of the readers with respect to the latest innovations in their respective fields. The teachers believe that additional references should be in the library such as books, magazines and the like. Aside from adding more references, students also suggested that the library should be accessible and available to them at all times.

1.8 Assessment of physical plant and facilities is another area included in the ten areas of the Bachelor of Industrial technology BIT program.

**Table 8**  
*Assessment of Physical Plant and Facilities*

<b>Area VIII: Physical Plant and Facilities</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>A</b>	<b>VD</b>
1. There is a system to ensure that all the following are provided: traffic safety in and outside the campus; waste management program; proper utilization, repair and upkeep of school facilities and equipment; and cleanliness and orderliness of the school campus.	3.29	3.08	2.87	3.50	3.18	Satisfactory
2. The buildings and other facilities are safe, well-maintained, and functional.	2.86	2.84	2.62	3.50	2.96	Satisfactory
3. Classrooms are adequate and conducive to learning.	3.00	2.75	2.74	4.00	3.12	Satisfactory
4. The offices and staff rooms are adequate and conducive to working environment.	3.43	3.00	2.74	4.00	3.29	Excellent
5. Indoor and outdoor facilities are well-equipped and properly maintained.	3.14	2.78	2.70	4.00	3.17	Satisfactory
<b>Average</b>	<b>3.14</b>	<b>2.89</b>	<b>2.73</b>	<b>3.80</b>	<b>3.14</b>	<b>Satisfactory</b>

Legend: F- Faculty, S- Students, G- Graduates, A-Administrators, A- Average, VD-Verbal Description



Table 8 shows the respondents' assessment of Physical Plant and Facilities. They rated the offices and staff rooms' adequacy and conduciveness to working environment, the highest, 3.29, interpreted as Excellent, while they gave the lowest rating, 2.96, equivalent to Satisfactory, to the safety, maintenance, and functions of the buildings and other facilities. Physical Plant and Facilities were given a rating quite lower than other areas by the respondents who are directly using and who used facilities such as class rooms, gymnasiums, and other indoor and outdoor facilities.

In relation to what Tanner (2015) mentioned, school facilities can have a profound effect on both teacher and student outcomes, the respondents of this study namely teachers, students, and graduates recommended the improvement of basic facilities such as classrooms, laboratories, and offices by providing more space, proper ventilation, updated lay-out, and new materials.

A study entitled “*The impact of school facilities to the teaching-learning environment*”, conducted by Jaminal (2019), revealed that the presence of school facilities as rated by the teachers and students had motivated them and made them feel happy and satisfied with the knowledge that they gained through the utilization of the school facilities.

1.9 Assessment of Laboratories is another area belonging to the ten areas of the Bachelor of Industrial Technology (BIT) program.

**Table 9**  
*Assessment of Laboratories*

<b>Area IX: Laboratories</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>A</b>	<b>VD</b>
1. Safety and precautionary measures are implemented.	2.71	3.04	2.85	4.00	3.15	Satisfactory
2. The laboratories and shops well-equipped, functional and are conducive to learning.	3.00	3.06	2.57	3.00	2.91	Satisfactory
3. The laboratory equipment, supplies and materials are sufficient and wisely utilized.	3.00	2.86	2.40	4.00	3.07	Satisfactory
4. A laboratory technician/assistant is available for the proper upkeep of the laboratory.	2.71	2.82	2.45	4.00	2.99	Satisfactory
5. The institution keeps the laboratories neat and orderly.	2.86	3.02	2.77	4.00	3.16	Satisfactory
<b>Average</b>	<b>2.86</b>	<b>2.96</b>	<b>2.61</b>	<b>3.80</b>	<b>3.06</b>	<b>Satisfactory</b>

Legend: F- Faculty, S- Students, G- Graduates, A-Administrators, A- Average, VD-Verbal Description

Table 9 presents the assessment of Laboratories. The item, “the institution keeps the laboratories neat and orderly”, received the highest rating, 3.16, equivalent to Satisfactory, while the item, “the laboratories and shops are well-equipped, functional and are conducive to learning”, got the lowest, 3.07, interpreted as Satisfactory. All the ratings given by the respondents for this area are equivalent to Satisfactory, practically lower than all other areas which all have Excellent ratings in some of the items under them.

Having experienced to use the laboratories, the teachers, students, and graduates, gave their lowest ratings for Laboratories. Along with the administrators, they all have major suggestions regarding the laboratories: construction of more laboratories, reconstruction of old laboratories making them bigger, provision of modern tools and equipment specifically for Food Technology, and adopting high-technological practices appropriate to their course.

For a skill-oriented course, an efficient laboratory is essential for students' actual and practical application of the learning they had acquired from class discussions. Abdullaeva (2018) indicates laboratory works and practical exercises are related to the main types of training sessions aimed at the experimental confirmation of theoretical knowledge and the formation of educational and professional practical skills; they constitute an important part of theoretical and professional practical trainings.

1.10 Assessment of Administration is another area evaluated in Bachelor of Industrial Technology (BIT) program.

**Table 10**  
*Assessment of Administration*

<b>Area X: Administration</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>A</b>	<b>VD</b>
1. The institution has a well-designed and functional organizational structure.	3.00	3.22	3.06	4.00	3.32	Excellent
2. The Food Technology curriculum of the BIT Program area chair has appropriate/relevant educational qualification and experience.	3.00	3.31	3.08	3.50	3.22	Satisfactory
3. The area chair, the faculty and the administration work together for the improvement of the BIT Program.	3.14	3.22	3.19	4.00	3.39	Excellent



4. The Dean, faculty, staff and students pursue collaborative activities in generating resources and income, and in implementing cost-effective measures.	3.14	3.06	3.10	3.50	3.20	Satisfactory
5. The Dean implements policies and procedures on internal administration and operations of the Food Technology of the BIT Program.	3.14	3.33	3.00	3.50	3.24	Satisfactory
<b>Average</b>	<b>3.08</b>	<b>3.23</b>	<b>3.09</b>	<b>3.70</b>	<b>3.27</b>	<b>Excellent</b>

Legend: F- Faculty, S- Students, G- Graduates, A-Administrators, A- Average, VD-Verbal Description

Table 10 shows the assessment of Administration. The highest rating, 3.39, interpreted as Excellent, was given to the item. “The area chair, the faculty and the administration work together for the improvement of the BIT Program”, while the lowest, 3.20, equivalent to Satisfactory, was for the item, “the Dean, faculty, staff and students pursue collaborative activities in generating resources and income, and in implementing cost-effective measures”. School administration plays a very important role in student development. While research has not determined a direct relationship between administration and student achievement, administration does strongly influence school environmental conditions affecting such growth (Lucey, 2013).

For the administrators, their only concern about the administration is the improvement of facilities. While some teachers want to resolve minor misunderstanding within the administration and be more united in serving their students. For the students, they would like the administration to be brought closer to them and make them feel more welcome. Badarna and Ashour (2016) conducted a study entitled “Role of school administration in solving students’ problems among Bedouin schools within the Green Line in Palestine”, and aimed to identify the role of the school administration in solving the students’ problems and differences according to gender, scientific qualification, years of experience and job title. The study results showed that the school administration in the Bedouin schools within the Green Line plays a moderate role in solving the problems of students. The domain of “the role of school administration in solving academic problems” ranked the first, and the results showed that there are no statistically significant differences due to the variables of gender, scientific qualification, years of experience, and job title in all domains.

**2. Assessment of Program Implementation through Instruction and Evaluation**

2.1 Instruction of the BIT program was assessed through planning of lessons and preparation of materials, knowledge of content and strategies in teaching, and knowledge and management of students

**Table 11**  
*Assessment of Instruction being done by concerned Faculty*

<b>Planning of Lessons and Preparation of Materials</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>VD</b>
1. Prepares a syllabus/course outline reflecting the content of the course	3.71	3.47	3.04	3.41	Excellent
2. Seeks for technical assistance from co-instructors teaching the same subjects	3.29	3.27	3.06	3.21	Satisfactory
3. Devices instructional and teaching materials (power points, handouts, modules)	4.00	3.45	3.04	3.50	Excellent
4. Develops instructional materials using differentiated instructions (audio, visual, audio-visual)	3.86	3.22	2.74	3.27	Excellent
5. Constructs own written/oral assessment tools and performance tasks (examinations, quizzes, recitations, laboratory works)	3.43	3.49	3.31	3.41	Excellent
<b>Knowledge of Content and Strategies in Teaching</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>VD</b>
1. Has mastery of the subject matter	3.57	3.10	3.26	3.31	Excellent
2. Reviews previous lessons and motivates students through activities towards the development of new lessons	3.71	3.35	3.17	3.41	Excellent
3. Gives complete and accurate information through clear and simple presentation of the lessons	3.43	3.23	3.02	3.24	Satisfactory
4. Utilizes differentiated instruction depending on the needs and interests of the students	3.43	3.24	3.02	3.23	Satisfactory
5. Entertains students’ questions and provides clarifications	3.71	3.24	3.17	3.37	Excellent
<b>Knowledge and Management of Students</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>VD</b>
1. Identifies students’ socio-demographic, socio-economic, ethnic and educational background	3.57	3.22	3.32	3.37	Excellent
2. Determines students’ prior level of knowledge of the subject matter	3.57	3.31	3.26	3.88	Excellent
3. Has an awareness and adapts to students different learning styles	3.29	3.27	3.15	3.24	Satisfactory



4. Adjusts to students' learning phases	3.86	3.22	3.19	3.42	Excellent
5. Learns about the strengths and weaknesses of students	3.43	3.22	3.19	3.28	Excellent

Legend: F- Faculty, S- Students, G- Graduates, A-Administrators, A- Average, VD-Verbal Description

Table 11 presents the assessment of Instruction. For planning of lessons and preparation of materials, devices used by Instructors like instructional and teaching materials (power points, handouts, modules), got the highest rating, 3.50, which was described as Excellent, while the item, seeks for technical assistance from co-instructors teaching the same subjects received the lowest, 3.21, and was interpreted as Satisfactory. Although faculty and students are already in higher education, these are still essential in teaching and learning processes.

Lesson plans affect not only teacher's instructions but classroom management as well. Characteristics of a well-managed classroom are: 1. students are deeply engaged with their work; 2. students know what is expected from them; 3. there is just a little wasted time, confusion; and 4. the climate of such classroom would be work-oriented, but relaxed and pleasant (Wong & Wong, 2009).

Cicek and Tok (2013), in their study entitled "*Effective use of lesson plans to enhance education in U.S. and Turkish Kindergarten thru 12<sup>th</sup> Grade public school system: A comparative study*", posit that lesson plans should be ready one week before the beginning of the academic year for the necessary arrangements to be made. The plan should be particular and usable, It must be economical in terms of time being devoted by teacher, and it strengthens the educational program. Depending on the grade level and subject matter, teachers may be required to follow curriculum designated by campus or district administration.

In addition, instructional materials are essential to enrich classroom discussions. Three types of materials can be used in the teaching-learning process such as visual, audio, and audio-visual. The study entitled "*Impact of visual aids in enhancing the learning process case research: District Dera Ghazi Khan*", conducted by Shabiralyani, Hasan, Hamad, & Iqbal, (2015), explored the teachers' opinions on the use of visual aids such as pictures, animation videos, projectors and films, as a motivational tool in enhancing students' attention. The analysis of the data indicated that the majority of the teachers and students had positive perceptions on the use of visual aids.

Furthermore, Cuban (2001) indicated the psychology of visual aids as 1% of what was learned originated from the sense of taste, 1.5% was from the sense of touch, 3.5% was from the logic of smell, 11% of the knowledge gained was from the logic of hearing and 83% of what had been learned was from the sense of sight. Also, people generally remember 10% of what they have read, 20% of what they have heard, 30% and of what they saw, Everything that the learner saw heard and uttered or had spoken constitute certain percentage of teaching-learning process influence. Hence, there is no doubt that technical materials have greater impact and dynamic informative system.

For knowledge of content and strategies in teaching, teachers' way of entertaining students' questions and providing clarifications was rated the highest, 3.37, interpreted as Excellent, while their utilization of differentiated instruction depending on the needs and interests of the students, got the lowest rating, 3.23, equivalent to Satisfactory. Thus, it is a must to use the differentiated instructions and materials based on students' learning styles. In addition, teachers should acquire knowledge and more in-depth interpretation of the lessons so they could answer whatever questions students may raise, even if answers are not written on their books.

According to Walshaw (2012) teachers' conceptual understanding and knowledge is critically important at any level. They develop the flexibility for spotting opportunities that they can use for moving students' understanding forward. She adds that when teachers use their knowledge to enhance student learning, they are engaging in effective practice.

Related to that, Jalbani (2014) wrote a literature review entitled "The impact of effective teaching strategies on the students' academic performance and learning outcome", and claimed that student learning dominantly depends on the teachers' selection and utilization of effective strategies for its instructional deliverance. She further posits that teachers must have passion for learning and teaching as well as understanding the needs and interests of their students. World is changing day by day, so teachers need to be technology savvies too, in order to meet new global emerging demands.

Lastly, for knowledge and management of students, the highest rating, 3.88, equivalent to Excellent, was given to the teachers' awareness and adaptation to students' different learning styles, while the lowest rating, 3.24, interpreted as Satisfactory, was given to teachers' ability of determining students' prior level of knowledge of the subject matter.

Vincent and Ross (2001), in their study entitled "Learning style awareness: A basis for developing and learning strategies", discuss the learning style theories and show how being aware of learning styles can benefit both teachers and students. Their study at the University of Louisiana indicated a prevalence of auditory learners. They note that despite of the findings of their study, educators must be prepared to accommodate all learning styles.





Since it was rated the lowest, teachers need to work more on determining students' prior knowledge of the subject matter, Center for Teaching Innovation (2019), asserts that assessing students' prior knowledge allows teachers to focus and adapt their teaching plan. Moreover, for students, it helps them to construct connections between old and new knowledge.

2.2 Evaluation of the BIT program was assessed through cognitive learning domain, performance-based learning domain, and affective learning domain

**Table 12**  
*Assessment of Evaluation*

<b>Assessment for Cognitive Learning Domain</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>VD</b>
1. Gives written work as an assessment for cognitive learning	3.86	3.24	3.40	3.50	Excellent
2. Conducts laboratory work as an assessment for cognitive learning	3.43	3.41	3.26	3.37	Excellent
3. Administers pen and paper tests as an assessment for cognitive learning	4.00	3.35	3.26	3.53	Excellent
4. Provides modern and innovative activities for cognitive learning	3.71	3.27	3.26	3.41	Excellent
<b>Assessment for Performance-Based Learning Domain</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>VD</b>
1. Gives written work as an assessment for performance-based learning	4.00	3.25	3.36	3.54	Excellent
2. Conducts laboratory work as an assessment for performance-based learning	3.57	3.31	3.26	3.38	Excellent
3. Administers pen and paper tests as an assessment for performance-based learning	3.86	3.29	3.30	3.48	Excellent
4. Provides modern and innovative activities for performance-based learning	3.57	3.24	3.30	3.37	Excellent
<b>Assessment for Affective Learning Domain</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>VD</b>
1. Gives written work as an assessment for affective learning	3.14	3.16	3.43	3.24	Satisfactory
2. Conducts laboratory work as an assessment for affective learning	3.57	3.29	3.26	3.37	Excellent
3. Administers pen and paper tests as an assessment for affective learning	3.57	3.27	3.21	3.35	Excellent
4. Provides modern and innovative activities for affective learning	3.29	3.33	3.48	3.36	Excellent

*Legend: F- Faculty, S- Students, G- Graduates, A-Administrators, A- Average, VD-Verbal Description*

Table 12 shows the respondents' assessment of Evaluation. For Cognitive Learning Domain, administering pen and paper tests as assessment. It received the highest rating, 3.53, interpreted as Excellent, while conducting laboratory work assessment, got the lowest rating, 3.37, equivalent to Excellent.

For the assessment for Performance-Based Learning Domain, giving written work was rated the highest, 3.54, interpreted as Excellent, while the lowest, 3.37, equivalent to Excellent, was given to providing modern and innovative activities.

Lastly, the assessment for Affective Learning Domain, in which conducting laboratory work, received the highest rating, 3.37, equivalent to Excellent, while giving written work as an assessment got the lowest, 3.24, interpreted as Satisfactory.

Based on the rating, students and graduates are satisfied with the evaluation for the three learning domains their teacher administered to them and consider those as effective instruments in measuring what they had learned from them. They just recommend that they be given more innovative assessments appropriate for the learning domain.

Disha (2016) in her article entitled "Evaluation in teaching and learning process" emphasizes that evaluation plays an enormous role in the teaching-learning process. It helps teachers and learners to improve teaching and learning. Evaluation is a continuous process and a periodic exercise. It promotes forming the values of judgement, educational status, or achievement of students. Thus, all three learning domains should be provided

In connection, a study entitled "The importance of classroom assessment and evaluation in educational system", conducted by Jabbarifar (2009), attempts to look at the importance of classroom assessment and evaluation advantages. The findings show that



classroom assessment and evaluation are highly concerned with qualitative judgements that are used to improve students' knowledge and learning. Assessment and evaluation also give teachers useful information about how to improve teaching methods.

Assessment of evaluation tools used in BIT program comprising of cognitive learning domain, performance-based learning domain, and affective learning domain

**Table 13**  
*Assessment of Evaluation Tools*

<b>Assessment Tools for Cognitive Learning Domain</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>VD</b>
1. Gives essays as assessment for cognitive learning	3.14	3.34	3.21	3.22	Satisfactory
2. Conducts tests/quizzes as assessment for cognitive learning	3.57	3.18	3.26	3.34	Excellent
3. Scores outputs from the range of 1-100	3.57	3.33	3.23	3.37	Excellent
4. Grades cognitive outputs though rankings and percentages	3.29	3.43	3.26	3.23	Satisfactory
<b>Assessment Tools for Performance-Based Learning Domain</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>VD</b>
1. Gives laboratory works as assessment for performance-based learning	3.57	3.31	3.49	3.45	Excellent
2. Provides modern and innovative activities for performance-based learning	3.14	3.24	3.21	3.20	Satisfactory
3. Scores performances within the range of 1-100	3.43	3.20	3.30	3.30	Excellent
4. Grades performances outputs through rankings and percentages	3.28	3.33	3.19	3.27	Excellent
<b>Assessment Tools for Affective Learning Domain</b>	<b>F</b>	<b>S</b>	<b>G</b>	<b>A</b>	<b>VD</b>
1. Gives pen and paper tests as an assessment for affective learning	3.43	3.32	3.49	3.41	Excellent
2. Provides modern and innovative activities for affective	3.43	3.24	3.21	3.29	Excellent
3. Scores affective outputs from the range of 1-100	3.57	3.20	3.30	3.36	Excellent
4. Grades affective outputs though rankings and percentages.	3.29	3.33	3.19	3.27	Excellent

*Legend: F- Faculty, S- Students, G- Graduates, A-Administrators, A- Average, VD-Verbal Description*

Table 13. shows the assessment of Evaluation Tools. For Cognitive Learning Domain Tools, scoring outputs from the range of 1-100 received the highest rating, 3.37, equivalent to Excellent, while giving essays for this domain got the lowest, 3.22, interpreted as Satisfactory.

For Performance-Based Learning Domain Tools, the respondents rated giving laboratory works, the highest, 3.45, interpreted as Excellent, while the lowest, 3.20, equivalent to Satisfactory, was given to providing modern and innovative activities for performance-based learning.

Also, the assessment for Affective Learning Domain Tools in which giving pen and paper tests as assessment for affective learning, received the highest rating, 3.42, interpreted as Excellent, while grading affective outputs through rankings and percentages, got the lowest, 3.27, still interpreted as Excellent.

As much as evaluation is important to the teaching-learning process, the assessment tools used by teachers are equally important, too. Jabbarifar (2009) adds that through using appropriate classroom assessment strategies and tools, teachers can increase their students' motivation and show them how well they have learned the lesson. Evaluation goes beyond the students' achievements and language assessments to consider all aspects of teaching and learning, and to look at how educational decisions can be informed by the results of alternative forms of assessment and evaluation.

On the other hand, a study entitled "Assessment in higher education and student learning" by Rawlusyk (2019) addressed the ongoing academic concerns about whether assessment practices in higher education support student learning. Results found out that teachers have conflicting views relative to student use of feedback and the use of dialogue. The outcomes also show that there is limited involvement of learners in assessment strategies, which can affect learning. Thus, the study recommends that teachers utilize professional development to understand how to optimize the active participation of students in various authentic assessment method of feedback.

However, for this study, data imply that the students and graduates are more than satisfied with the assessment tools their teachers are utilizing. These tools include written work, laboratory work, pen and paper tests, and modern and innovative activities. The right tools for the three different learning domains help measure students' learning more efficiently.



## Conclusions

Three main concluding paragraphs consist this section of the study. Each conclusion was derived from the problems of the study:

- 1.1. Vision, Mission, Goal, and Objectives (VMGO) of Food Technology is rated Excellent. Its goal and objectives should be strengthened and carried out properly to better achieve them since they are already consistent with the institution's vision and mission.
- 1.2. The rating of Faculty is Excellent. Teachers are efficient in doing other tasks aside from actual teaching. However, they still need to pursue further studies and attend more seminars and training's to enhance their qualifications and competence more.
- 1.3. Curriculum and Instruction of Food Technology is rated Excellent. The curriculum efficiently provides for the development of its professional competencies however, teachers need to strategize more on stimulating and developing students' higher-order thinking skills. Also, students would like to attend more seminars and training's to learn deeper aside from what the actual instruction could give them.
- 1.4. The rating of Food Technology's Support to Students is Excellent. The institution conducts leadership training's efficiently. Meanwhile, the Student Affairs Services (SAS) Unit should provide more student welfare and student development programs. Moreover, financial support to students' activities such as laboratory works should be further strengthened.
- 1.5. Research of Food Technology is rated Excellent. The institution's approved Research Manual is already available while the system of implementation, monitoring, evaluation and utilization of research outputs just have to be implemented more appropriately. At this point, the assistance given to research could still be improved. The Researchers in the campus should be given more support in all forms and provide a venue for their studies.
- 1.6. The rating of Food Technology's Extension and Community Involvement is Excellent. Its strategy for involving the community, government and private agencies in the Extension Program, is seen as efficient. However, it still needs to work more on the conduction of benchmark survey of the problems, needs priorities and resources of the community. As of now, student participation to this area could be strengthened through future extension activities involving students' participation.
- 1.7. Library of Food Technology is rated Excellent. The Library resource sharing and linkage is already established. Nonetheless, the update, balance, and adequacy of the references in the library should be further developed. There are also times the library is closed and not accessible to students. Additional and modern references should be provided and the library should be open at all times.
- 1.8. The rating of Food Technology's Physical Plant and Facilities is Satisfactory. Offices and staff rooms are adequate and conducive to working environment. However, the safety, maintenance, and functions of the buildings and other facilities should be taken in great consideration. Currently, some facilities of Food Technology like classrooms, laboratories, and offices need minor improvement of its space, ventilation, lay-out and materials. Reconstruction, repair, and provision of new materials will further enhance those aforementioned facilities.
- 1.9. Laboratories of Food Technology is rated Satisfactory. The institution keeps them neat and orderly. Still, the laboratories and shops need to be more well-equipped, functional and conducive to learning. As of this day, the sufficiency, construction, tools, equipment, and high-technological practices of laboratories of Food Technology should be considered for further development. Hence, old laboratories should be reconstructed, new ones should be built and modern equipment should be provided.
- 1.10. The rating of Food Technology's Administration is Satisfactory. As of this moment, some facilities in the administration need improvement. Furthermore, there are minor misunderstanding between several teachers and administrators. There are also times that students feel distant from the administration. These simple concerns could be addressed through improvement of facilities, showing unity, and giving consideration.
- 2.1. Instruction of Food Technology of the BIT Program is rated Excellent. Teachers plan lessons, device materials, have mastery of the content, and adapt to their students' learning styles. Still, the institution should support them to pursue further studies and attend more seminars and trainings.
- 2.2. The rating of Food Technology's Evaluation, together with Evaluation Tools, is Excellent. Cognitive, Performance-based, and Affective Learning Domains are measured with the appropriate assessment tools and graded with the right matrix. Toward continuous development, teachers should come up with more modern and innovative ways of evaluating their students' learning.

## Recommendations

Based on the listed conclusions, the following are the recommendations:

1. Suggestions and recommendations from teachers, students, graduates, and administrators of Food Technology should be considered in order to enhance all 10 areas of the program.
2. Facilities like classrooms, offices, laboratories, and libraries should be reconstructed to provide environments that are more conducive to the teaching-learning process.
3. Modern materials, tools, and equipment should be provided to classrooms, laboratories, and libraries to keep up with the modern trends in Education today.



4. A comparative study on the perspective and assessment of all Food Technology current students and graduates should be carried out to track the evolution of its implementation and the satisfaction of its students from various years.
5. Other specializations of the BIT Program should be assessed to identify projects for its enhancement.
6. A comparative study with other University, for further enhancement of research.
7. Objectivity must be maintained in the conduct of the research to avoid a subjective and neglected study.
8. The found assessments of the inputs, and implementation of the Food Technology of the BIT Program should be disseminated.

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# NEOADJUVANT POLYCHEMOTHERAPY IN THE TREATMENT OF PATIENTS WITH INVASIVE BLADDER CANCER

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## SUMMARY

*The article discusses increasing the effectiveness of complex treatment and improving the quality of life of patients with invasive bladder cancer through the use of neoadjuvant chemotherapy. Materials and methods: 28 patients with invasive bladder cancer who underwent neoadjuvant chemotherapy with subsequent evaluation of its effectiveness according to RECIST criteria. Results: stabilization was observed in 9 (32.1%) cases, progression – in 3 (10.7%), partial regression – in 14 (50%), complete regression – in 2 (7.1%). Conclusions: achieving complete and partial tumor regression allowed patients to undergo organ-conserving surgery, which contributed to improving their quality of life.*

**KEY WORDS** : neoadjuvant chemotherapy, bladder cancer

## RELEVANCE

Bladder cancer (BC) ranks 4th in the structure of overall cancer morbidity and mortality among men. In 2006, 104,000 people were diagnosed in Europe. New cases of RPM, which account for 6.6% of all cancer pathologies identified in men and 2.1% in women [1]. During the initial diagnosis of bladder cancer, a superficial tumor process is diagnosed in 70% of cases and an invasive tumor process in 30% of cases. In 57% of patients who underwent radical cystectomy, invasion of the muscle layer was noted at the onset of the disease, and in 43% of cases, a non-invasive form of bladder cancer with progression, despite organ-preserving treatment tactics [2, 3].

micrometastases in regional lymph nodes (in 40–85% of cases) and tumor invasion in the prostate gland, urethra and seminal vesicles (10–12; 4–10 and 15%) are possible before treatment. cases respectively). Therefore, urologists have significant difficulties in choosing the optimal treatment method for such patients [5].

Radical Cystectomy for invasive bladder cancer remains the main method of surgical treatment. The issue of partial cystectomy (resection of the bladder wall) in patients with a single lesion of the wall or dome of the bladder is controversial. Proponents of organ-preserving tactics of surgical treatment of patients with invasive bladder cancer claim a significantly higher level of quality of life in this category of patients [6, 7].

In contrast to such statements, it should be noted that with complex treatment using radiation, intravesical chemotherapy or immunotherapy, a significant number of patients experience a decrease in bladder capacity due to sclerotic changes in the wall, a decrease in its contractility with the development of microcysts and a subsequent significant decrease in quality of life due to for dysuria [8]. This leads to disability and social maladjustment of patients.

The use of chemotherapy in many research centers in the 90s of the last century did not produce the expected results, but some randomized trials noted an increase in 5-year survival by 5% [9]. The introduction into clinical practice in recent years of a number of new, low-toxic chemotherapy drugs provides grounds for revising the indications and approaches to organ-preserving treatment tactics for patients with invasive bladder cancer [10–12].

Neoadjuvant efficacy outcome studies polychemotherapy (PCT), namely cases of complete and partial response to treatment, suggest the possibility of organ-preserving tactics for the treatment of bladder cancer. Despite clinical studies of neoadjuvant chemotherapy, its role in the treatment of invasive bladder cancer remains unclear.

**Purpose of study** is to increase the effectiveness of complex treatment and improve the quality of life of patients with invasive bladder cancer through the use of neoadjuvant chemotherapy.



## OBJECT AND METHODS OF RESEARCH

A clinical analysis was carried out in 28 patients with invasive bladder cancer at disease stages T2a–T4a, which in 2008–2010. Examination and surgical treatment were carried out at the Research Department of Plastic and Reconstructive Urology Oncology of the National Cancer Institute. The age of the patients ranged from 36 to 74 years and averaged  $61.1 \pm 11.1$  years. Primary bladder cancer was diagnosed in 22 (78.6%) patients, recurrent – in 6 (21.4%) patients. In 11 (39.3%) patients, RSM caused obstruction of the intramural ureter, which led to the development of ureterohydronephrosis, and in 2 (7.1%) cases - bilateral. Chronic renal failure was not detected in any case. All patients received 3 to 4 courses of neoadjuvant chemotherapy with gemcitabine + cisplatin, followed by evaluation of effectiveness according to RECIST criteria and effectiveness; In 12 (42.8%) patients, transurethral resection (TUR) of the bladder wall with Ca was performed, in 3 (10.7%) patients, resection of the bladder wall with Ca was performed, and in another 13 (46.4%) - prostate-preserving cystectomy.

A comprehensive examination of patients included the study of anamnestic data and the objective condition of the patient, clinical and laboratory, radiological, instrumental, endoscopic and pathomorphological examination.

## RESULTS AND DISCUSSION

Today, radical cystectomy remains the gold standard treatment for patients with locally advanced invasive bladder cancer. Despite the improvement of surgical techniques and postoperative patient care, survival rate directly depends on the depth of tumor invasion (T), histopathological grading (G) and ranges from 36 to 65% [7, 8]. At the same time, the 5-year survival rate of patients with stages of disease T3-T4 or metastatic lesions of regional lymph nodes does not exceed 25%. The presented data can only be due to the high aggressiveness of bladder cancer and the presence of micrometastases at the time of cystectomy.

That is, in addition to radical cystectomy, it is necessary to prescribe additional treatment, which can affect the progression of both the primary tumor and regional metastases. More aggressive lymphadenectomy will have both prognostic and therapeutic implications, and effective systemic therapy will affect micrometastases and improve treatment outcomes.

Chemotherapy can be given either before (neoadjuvant) or after (adjuvant) surgery to eradicate subclinical disease and prolong patients' life expectancy. Unfortunately, most of the clinical studies that determined the effectiveness of chemotherapy are underestimated, and therefore, today chemotherapy is not used systematically, not always and not in all clinics.

There are several chemotherapeutic agents in the literature that are effective in treating patients with metastatic bladder disease. It has been shown that a combination of drugs is more effective than the use of a single drug [15]. Researchers from Memorial Cancer Center Sloan-Kettering (MSKCC) in 1983 proved the effectiveness of a complex of drugs - methotrexate, vinblastine, adriamycin and cisplatin - in the treatment of patients with metastatic urothelial carcinoma. The authors note remission of bladder cancer in more than 70% of patients with a median survival of 13 months. Since then, the MVAC P MP regimen in patients with stage IV bladder cancer has been widely used in clinical practice. In the published literature, the average response to chemotherapy was found in 40-72% and complete clinical response in 19-45% of patients. However, from the point of view of the duration of the effect of PCT, the results of the study are not very encouraging [16].

Neoadjuvant chemotherapy is prescribed to patients with clinically resectable invasive bladder cancer at stages T2 to T4a. The rationale for preoperative chemotherapy or radiation therapy is to attempt to treat micrometastatic lesions that are not detected by routine diagnosis.

Until now, in global urological oncology practice there is no single method of using chemotherapy in patients with invasive bladder cancer. Typically, 3-6 courses of PCT are carried out according to the following schemes: MVAC, CMV or GC.

Having analyzed data from the world literature and the results of studying existing PCT regimens, we chose the gemcitabine-cisplatin regimen in the neoadjuvant regimen because of its high efficacy and low toxicity [17, 18].

All patients received 3 to 4 courses of neoadjuvant chemotherapy. No serious adverse events were identified during PCT.

Adverse reactions in the form of grade I–II neutropenia occurred in 9 (32.1%) patients (5 (17.9%) patients); thrombocytopenia grade I (2 (7.1%) patients); second degree anemia (2 (7.1%) patients). Exacerbation of gastric ulcer due to anemia was detected in 1 (3.6%) patient. All side effects did not require re-hospitalization and did not cause subjective manifestations. Neutropenia was treated with dexamethasone and Neupogen; for anemia, the patient was prescribed erythropoietin; for gastric ulcers, omeprazole. In all cases, side effects delayed the administration of chemotherapy drugs by no more than 1 week.

After PCT, a comprehensive follow-up examination of patients was carried out to assess the tumor response according to RECIST criteria (Table 1).

**Table 1. Evaluation of the outcomes of neoadjuvant chemotherapy in patients with invasive bladder cancer according to RECIST criteria, n=28**

Response to treatment according to RECIST criteria	Number of patients, n (%)	Average value, % regression according to RECIST criteria
Full regression	2 (7.1)	100.0
Partial regression	14 (50.0)	63.9±17.9
Stabilization	9 (32.1)	13.6±11.3
Progression	3 (10.7)	33.4±2.9

The presented data indicate that tumor stabilization according to RECIST criteria (regression by 13.6±11.3%) was noted in 9 (32.1%) cases, progression was detected in 3 (10.7%) patients (progression 33.4±2.9%), which was an indication for organ-bearing surgery - prostate-preserving cystectomy .

In 14 (50.0%) patients, during the control examination, partial regression of the tumor was noted on average by 63.9±17.9%, which made it possible to carry out organ-preserving surgical treatment.

Complete tumor regression (100.0%) after 3 courses of neoadjuvant chemotherapy during clinical examination was diagnosed in 2 (7.1%) cases. During control cystoscopy with TUR biopsy of the bladder wall, pathological examination of the pathology did not reveal any pathology.

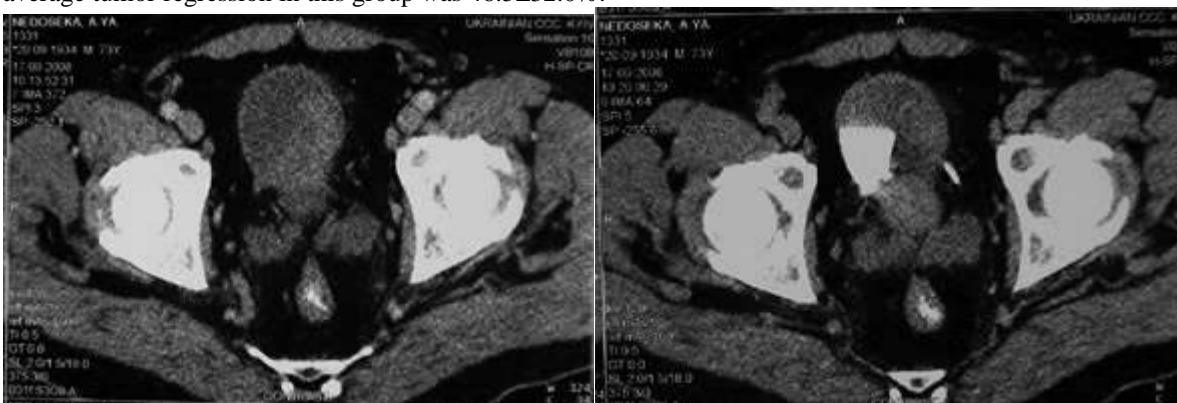
In our opinion, it was interesting to trace the possible dependence of the degree of bladder cancer regression on the histological structure and degree of differentiation of the tumor (Table 2).

**Table 2. Evaluation of the results of neoadjuvant chemotherapy in patients with invasive bladder cancer according to RECIST criteria depending on histopathological grading (G), n=28**

Histopathological grading, G	Number of patients, n (%)	RECIST, % regression
G 1	2 (7.1)	87.5±17.7
G 2	17 (60.7)	46.5±32.0
G3	9 (32.1)	16.9±44.9

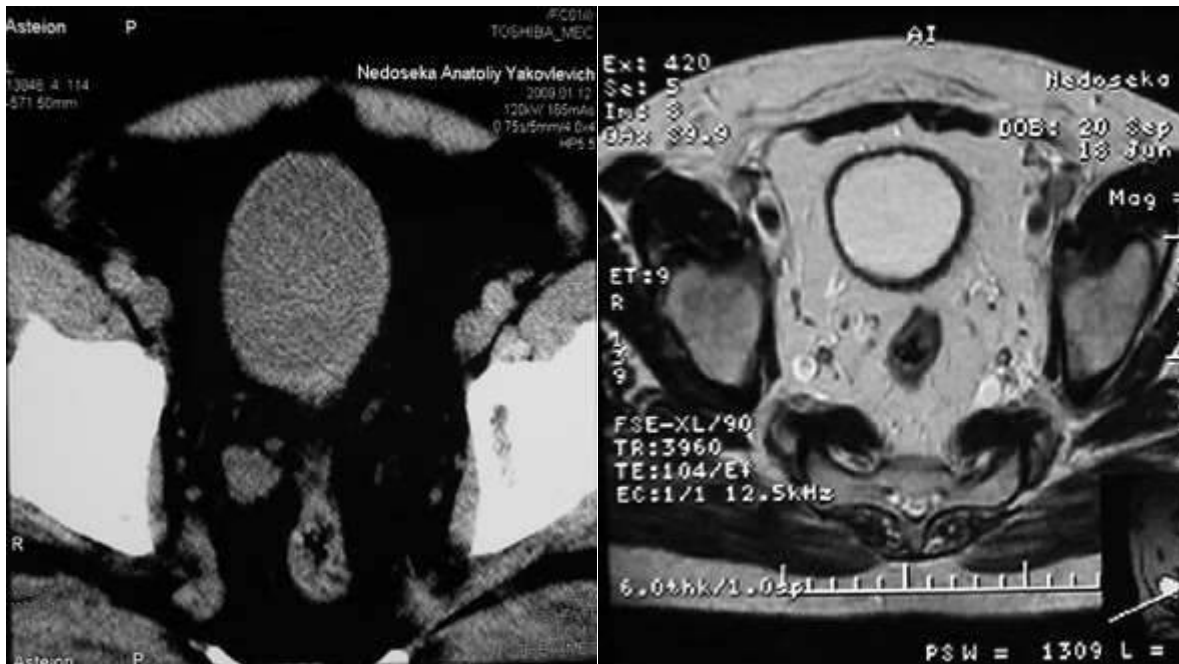
The data presented in the table indicate a directly proportional relationship between the effectiveness of neoadjuvant chemotherapy and the degree of tumor differentiation. Thus, in 2 (7.1%) patients with well-differentiated bladder cancer (G1), the degree of regression according to RECIST was 87.5±17.7%, while in one case complete regression of the tumor was achieved, and in the other - partial regression of the malignant tumor. process with a reduction in tumor size by 75%.

In 17 patients with moderately differentiated (G2) PCT, after 3 courses of PCT according to RECIST, 1 (5.9%) patient experienced complete regression of the tumor (Fig. 1, 2), 9 (52.9%) had partial regression of the malignant process with a decrease in tumor size by 35-90%, and in 7 (41.2%) patients, tumors decreased by less than 35%, which corresponded to stabilization of the process. The average tumor regression in this group was 46.5±32.0%.



**Rice. 1. Computed tomography of patient N. (natively and with intravenous contrast) before PCT. Large bladder cancer with invasion of deep muscle layers. CT - computed tomography**





**Rice. 2. CT and MRI of patient N. after PCT. The contours of the bladder are smooth, clear, with a slight thickening of the posterior wall. MRI - magnetic resonance imaging**

Analysis of the results of assessing the effectiveness of neoadjuvant chemotherapy according to RECIST in 9 patients with RSM with low histopathological differentiation (G3) showed that partial tumor regression was achieved only in 3 (33.4%) patients, stabilization of the process was diagnosed in another 3 (33.4%). In 3 (33.4%) patients, progression of the disease was recorded, which was characterized by an increase in tumor size by 25-35%. Overall, the tumor response rate to PCT was 16.9±44.9%.

The result of our study is the establishment of a direct proportional relationship between the degree of tumor differentiation (G) and the degree of tumor regression under the influence of PCT. The obtained data are statistically significant only when comparing the degree of malignancy G1 and G3 (p Surgical intervention after neoadjuvant PCT allowed to restore the MSM stage: in 15 (53.6%) cases, a decrease in the stage of the disease according to the TMN system was noted (all patients with transitional cellular PCM), in 2 (7.1%) of them, pathomorphological examination of the material (TURP) of the bladder wall (mature muscle tissue) did not reveal tumor tissue. Only in 1 (3.6%) case, at rest, the depth of tumor invasion increased from the deep muscle layer (T2b) to paravesical tissue (T3b).

In modern medicine, one of the important factors is the assessment of the impact of treatment on the quality of life of patients, which was carried out in patients before and after neoadjuvant chemotherapy and is presented in Table. 3.

Thus, after neoadjuvant chemotherapy, a statistically significantly higher level of quality of life for patients is observed, which is due in most cases to regression of the tumor and the disappearance of its clinical manifestations.

Diagnosed regression of the tumor process according to RECIST criteria in 57.1% of patients after neoadjuvant chemotherapy allowed performing prostate-preserving cystectomy in 12 cases. Preservation of the prostate gland during cystectomy, including the neurovascular bundles and components of the distal sphincter mechanism, provides significant improvement in functional outcomes. Thus, in the group of patients who underwent prostate-sparing cystectomy, erectile function was preserved in 10 of 12 patients (83.3%) with an average IIEF-5 level of  $16.1 \pm 4.5$  points compared with 53 patients in the prospective group after radical cystectomy, whose erectile function was preserved only in 22.6% of patients with an average IIEF-5 level of  $7.3 \pm 2.4$  points. Urinary retention, both during the day and at night, in the group of patients after prostate-preserving cystectomy was achieved in 100 and 87.5% of cases, versus radical cystectomy in 90 and 10%, respectively. Therefore, significantly better indicators of daytime and nighttime urinary retention, a low percentage of erectile dysfunction and, accordingly, a higher level of quality of life characterize prostate-preserving cystectomy as one of the most acceptable treatment options for patients with invasive bladder cancer with adequate patient selection (without bladder cancer invasion into the posterior urethra, prostate gland and in the absence of data on the presence of prostate cancer).



## CONCLUSIONS

Neoadjuvant chemotherapy in patients with invasive bladder cancer in 7.1% of cases led to the development of complete and partial tumor regression in 50% of cases and allowed, in most cases, to perform organ-preserving surgery for patients, which contributed to improving their quality of life.

Analysis of the results of treatment of patients with invasive PCT revealed a directly proportional relationship between the degree of tumor differentiation (G) and the degree of tumor regression under the influence of neoadjuvant PCT (G1 - 87.5±17.7%; G2 - 52.7±29.3%; G3 - 23.1±43.4% according to RECIST criteria).

Significantly better indicators of daytime and nighttime urinary retention, a low percentage of erectile dysfunction characterize prostate-preserving cystectomy as one of the most acceptable treatment options for patients with invasive bladder cancer with adequate patient selection.

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# COMPARISON OF RADICAL LAPAROSCOPIC NEPHRECTOMY WITH OPEN NEPHRECTOMY IN PATIENTS WITH RENAL CANCER

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## ANNOTATION

*The advantages and disadvantages of open (OR) and laparoscopic partial nephrectomy (LR) are described in detail in the literature. We undertook a study to compare all two methods according to the main indicators characterizing the surgical intervention and the patient's stay in the hospital. 87 open and 34 laparoscopic partial kidney resections were performed. Patients with kidney cancer stage T1–2N0M0. The main indicators were assessed, including warm ischemia time (WTI), creatinine level, operation time, volume of blood loss, postoperative bed-day. The average duration of OR was lower than LR and RR (102.8, 162.7 and 143.3 min, respectively). The greatest VTI was in LR (16.6 min), and there was no significant difference between No RR and RR were obtained (14.5 and 12.9 min, respectively). Average volume of blood loss during RR and LR were significantly greater than with RR (332, 343 and 128 ml, respectively). The increase in creatinine was 28.6, 14.4 and 20.4% for OR, LR and RR, respectively. The longest postoperative bed-day was with OR, and the smallest with RR (13.0 and 9.0 days, respectively). For the first time, the results of a single comparison of three methods of kidney resection were obtained.*

**KEYWORDS:** partial nephrectomy, laparoscopic partial nephrectomy, open partial nephrectomy, prostate gland

## RELEVANCE

Kidney cancer ranks 10th in terms of incidence among malignant neoplasms, and in terms of increase in incidence among the genitourinary system it is second only to prostate cancer. In the last decade, much attention has been paid to minimally invasive surgical interventions. Currently, among malignant neoplasms of the genitourinary system, kidney cancer ranks third in the world in terms of morbidity and first in mortality [1]. In Russia, over the past decades, the incidence of kidney cancer has increased by more than 40% [2]. Until recently, radical nephrectomy was considered the “gold standard” for treating this disease. The emergence of modern diagnostic methods suitable for mass screening of the population has led to the detection of kidney cancer at earlier, asymptomatic stages. Up to 70% of kidney tumors these days are detected incidentally [3]. This became the impetus for the development of organ-preserving method - kidney resection. The first successful kidney resection in history was performed more than 120 years ago, but the method was not widely used. Resection was regarded as a palliative operation for cancer of the only functioning kidney [4]. Currently, partial nephrectomy is an effective and safe treatment for localized kidney cancer [5]. About 20% of patients with kidney tumors undergo organ-preserving surgery, the frequency of which is steadily increasing. In the United States in 2010, the percentage of kidney resections was 32%, of which 15% were open and 17% were laparoscopic [6]. When comparing the clinical and oncological results of radical nephrectomy and partial nephrectomy for tumors up to 4 cm in size, the latter shows better preservation of renal function in the postoperative period

[7]. Also, the issue of performing kidney resection for tumors larger than 4 cm and even larger than 7 cm is currently being actively discussed [8, 9]. Kidney resection can be performed using open, laparoscopic methods. To date, there are very few results comparing all two methods, which prompted us to carry out this study. We present our results for patients with localized kidney cancer who underwent open, laparoscopic partial nephrectomy between 2017 and 2023.

The widespread introduction of these operations is due to a number of advantages over “traditional” surgical interventions - reduction in trauma, reduction in the frequency and severity of postoperative complications, as well as a decrease in the length of patient stay in the hospital. However, there are currently not enough randomized controlled trials comparing laparoscopic and open radical nephrectomy techniques.

**The purpose of our study** is a comparative analysis of radical nephrectomy using traditional and laparoscopic methods in the treatment of kidney cancer.

## MATERIALS AND METHODS

A retrospective analysis of 60 case histories of patients with kidney cancer who underwent open radical nephrectomy at the Andijan Regional Oncology Center during 2017 was conducted. The results obtained were compared with the data of foreign studies when performing radical laparoscopic nephrectomy (RLN).



## RESULTS

Among the analyzed medical records, there were 34 (57%) women and 26 (43%) men. 38 (63%) patients had cancer of the left kidney, and 22 (37%) had cancer of the right. There were 20 patients (33%) with clinical stage I, with stage II. – 24 (40%), from the 3rd century. – 12 (20%) and from the 4th century. – 4 (7%). The obtained data were compared with data from leading foreign oncology centers.

The average duration of the operation using this open approach was 90 minutes, and laparoscopic - 120 minutes. The average duration of hospital treatment after “open” surgery was 8.5 days, after RLN – 7.6 days. The average need for drainage of the abdominal cavity after open nephrectomy was 3.2 days, for RLN – 1.5 days. Activation of the patient after open nephrectomy was possible on 2-3 days, after RLN - on 1 day. After open nephrectomy, narcotic analgesics were prescribed for an average of 1.5 days, after RLN - 1 day. To perform an open nephrectomy, an incision is made. length  $15\pm 5$  cm, for RLN –  $7\pm 1$  cm. When performing open nephrectomy intraoperative blood loss averaged 300 ml, and with RLN - 210 ml.

## CONCLUSIONS

The use of laparoscopic access allows for faster recovery in the postoperative period, reducing the need for postoperative pain relief and hospital treatment. Long-term results of treatment of patients after RLN have not yet been obtained. Short-term oncologic data suggest equivalence between open and laparoscopic nephrectomy. We believe that long-term results do not depend on the type of access, but depend on the stage and extent of the process.

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## **SURGICAL TREATMENT OF POLYPOUS ETHMOIDITIS**

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### **ANNOTATION**

*A method of treating chronic recurrent polypous ethmoiditis involves removing polyps and polypous mucous membranes with nasal polyp forceps under the control of endoscopes, opening the cells of the ethmoidal labyrinth and packing the nasal cavity for a day. Vasotomy is performed varicose vessels of the nasal cavity in the area of the sphenoethmoidal recess and middle turbinate in the early postoperative period, followed by sparing packing the nasal cavity for a day*

**KEY WORDS:** *chronic sinusitis, functional endoscopic rhinosinus surgery, paranasal sinuses.*

### **RELEVANCE**

Every year, about 15% of the world's adult population suffers from rhinosinusitis. The most common form of rhinosinusitis is ethmoiditis, that is, inflammation of the mucous membrane of the cells of the ethmoidal labyrinth. Chronic sinusitis is one of the most common diseases in the pathology of the upper respiratory tract. Symptoms of sinusitis significantly reduce the quality of life of patients. Complaints such as difficulty in nasal breathing, nasal discharge, headaches appear, the sense of smell changes, sleep is disturbed, and the ability to work decreases.

In the last decade, the proportion of patients with diseases of the nose and paranasal sinuses has increased annually by 1.5-2% and reached 52.7% (1). The relevance of studying the problem is also due to the fact that the increase in the number of rhinosinusitis is accompanied by an increase in the incidence of bronchitis and bronchial asthma, and this trend cannot be broken, the process of which sometimes involves the periosteum and bone walls[1,5].

The most gentle from the point of view of the physiology of the nose and paranasal sinuses is functional endoscopic rhinosinus surgery (FESS). Operations on the paranasal sinuses are performed in one stage with reconstruction of the septum and conchae[6].

Endoscopic rhinosinus surgery (ERSS) makes it possible to atraumatically and gently open all affected paranasal sinuses, remove the altered mucous membrane from them, while simultaneously restoring conditions for adequate drainage and aeration. The patient's recovery depends both on the quality of the surgical intervention performed and on the management of the postoperative period[3].

Patients with polyposis ethmoiditis make up a significant portion of the ENT hospitals. Nasal polypotomy is still one of the main methods of surgical care for such patients. Since 2018, it began to be used in the ENT department of the clinic at the ASMI - produced nasal polypotomy[2]. Over the course of a year of work, doctors appreciated the advantages of its use in comparison with polypotomy performed using a nasal loop. Shaver can be used to remove large masses of polyps. Through the internal channel of the shaver nozzle, blood and pieces of tissue are constantly sucked out, freeing the surgical field for viewing. Only the suctioned tissue is cut off, the mucous membrane of the nasal passages is practically not injured, and thereby blood loss is significantly reduced, there is no need or the time for tamponade of the nasal cavity is significantly reduced.

After polypotomy with a loop, tamponade is carried out within a day, and sometimes two, and when using a shaver, within two to three hours. Rotating the handpiece right/left without moving the handle allows for optimal visibility of the surgical field throughout the entire operation[9]. Different diameters of nozzles allow you to remove polyps in both the general and middle nasal passages. But, since the shaver knife cuts the polyp tissue in small pieces, we have come to the conclusion from work experience that it is more convenient to remove large polyps that obstruct the common nasal passage with a loop, and then use a shaver to remove polyps from the middle nasal passage.



We also noted a reduction in the postoperative period after polypotomy using a shaver to two days, which is two times shorter than when using a polyp loop.

Thanks to these possibilities, polypotomy using a shaver makes it possible to delay the recurrence of polyposis and improve the quality of life of patients compared to previously used methods of surgical treatment. After polypotomy with a loop, some patients noted difficulty in nasal breathing after 5-6 months, while all patients examined 8-12 months after surgery using a shaver had free nasal breathing.

Patients who have had a history of nasal polypotomy note the absence or reduction of pain.

Here are some examples from practice:

Patient T., 29 years old. After loop polypotomy, nasal polyposis relapsed after 5 months. Using a shaver, polyps were removed from the common and middle nasal passages. When examined after 8 months, the nasal passages are free. Breathing through the nose is not difficult.

Patient T., 43 years old. On examination: breathing through the nose is severely difficult. The common nasal passages are obstructed by polyps. First, large polyps were removed with a loop, then small polyps in the middle nasal meatus were removed with a shaver. After 2 months - the moves are free.

Patient S., 45 years old. There was a history of multiple nasal polypotomies. On examination: breathing through the nose is difficult, there are fibrous polyps in both halves of the nose. Produced polypotomy shaver with virtually no bleeding. When re-examined after 3 months, the passages are free.

Patient S., 70 years old. Complaints of difficulty in nasal breathing for 3 months. She was treated on an outpatient basis (endonasal blockades) without positive dynamics. On examination: the common nasal passage on the left in the posterior third is obstructed by polyps, the nasal septum spine is in the bony part on the left. During polypotomy with a loop, the septal thorn prevents the complete removal of polyps. With polypotomy The shaver used a nozzle of the smallest diameter (Zmm), with the help of which it was possible to remove polyps in the common and middle nasal passages on the left.

## CONCLUSIONS

Thus, analysis of the results of using a shaver for polypous rhinosinusitis indicates a number of advantages: blood loss is significantly reduced; there is no need for long-term tamponade; the operation time and postoperative period are reduced; the frequency of relapses is reduced; good tolerance of the method.

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# EARLY DETECTION OF BREAST CANCER IN THE SYSTEM OF COMPREHENSIVE MEDICAL EXAMINATIONS

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## ANNOTATION

*The article is devoted to the early detection of breast cancer in the system of comprehensive medical examinations. Prevention and treatment of malignant neoplasms is one of the most important medical and social problems. In the conditions of the Andijan branch of the Republican Specialized Scientific-Practical Medical Center for Oncology and Radiology, comprehensive work has been established to actively detect pathology of the mammary glands. All women 30-40 years old undergo an ultrasound of the mammary glands, and those over 40 years old undergo mammography once every 2 years. An analysis of the work of the oncology office showed that breast pathology was distributed as follows: breast cancer - 5%; diffuse mastopathy - 60%; nodular fibrocystic mastopathy - 20%; fibroadenomas - 10%; other benign pathology - 5%.*

**KEYWORDS.** *Breast cancer, fibroadenoma, diffuse mastopathy, early diagnosis.*

## RELEVANCE

Prevention and treatment of malignant neoplasms is one of the most important medical and social problems. Its relevance is determined by the constant increase in the incidence of cancer among the population of many countries, the difficulty of timely (early) diagnosis, the complexity and high cost of treatment, the high level of disability and mortality of patients [1,5]. To a large extent, these circumstances relate to breast cancer, which often develops against the background of long-existing forms of mastopathy, not detected in a timely manner and untreated [6]. Consequently, clinicians have a kind of time reserve for the prevention of malignant neoplasms of the mammary glands at the stage of dishormonal hyperplasia. Prevention of breast cancer is an important social and medical -biological problem and consists of identifying and treating various forms of benign breast pathology, as well as the causes that cause them [9]. The problem of diagnosing breast diseases remains extremely relevant, since the incidence of breast cancer has taken first place among malignant neoplasms in women and tends to steadily increase. Breast cancer ranks first in the structure of morbidity and causes of mortality among the female population of Andijan region. The percentage of early diagnosis of breast cancer (stages 1-2 of the disease) is 35-38%, that is, the percentage of advanced forms remains quite high[10]. In this regard, the primary problem of early diagnosis of breast cancer is the organization of preventive examinations. Effective screening of the mammary glands in women makes it possible to identify the disease in the early stages of development, which subsequently makes it possible to apply organ-preserving surgical treatment methods to patients, and also helps to increase the life expectancy of patients [2]. The primary link in the medical examination system is the department of preventive medical examinations[4,11]. Passing a medical examination is a regular (annual) event. As part of the medical examination, the first stage is a clinical examination of the mammary glands by a gynecologist. In addition to a clinical examination for all women aged 30-40 years as part of a medical examination tra ultrasound of the mammary glands is performed (once a year)[3].

## TARGET

Early detection of breast cancer in the system of comprehensive medical examinations.

## MATERIALS AND METHODS

In the conditions of Andijan branch of the Republican Specialized Scientific-Practical Medical Center for Oncology and Radiology, comprehensive work has been established to actively detect pathology of the mammary glands. The primary link is the medical examination department. Passing a medical examination is an annual event. The first stage is a clinical examination of the mammary glands by a gynecologist. All women 30-40 years old undergo an ultrasound of the mammary glands, and those over 40 years old undergo mammography once every 2 years. Women with identified pathology of the mammary glands are sent to a specialized appointment with an oncologist, who performs a clinical examination of the mammary glands, as well as medical procedures - puncture biopsies of mammary gland formations (under ultrasound control), smears. If necessary, conservative therapy for diffuse dishormonal hyperplasia is carried out. To diagnose intraductal pathology, ductography is used, intracystic cancer - fine needle



aspiration with pneumocystography . Based on the results of the examination, groups of increased cancer risk are formed, which are subject to blood donation for tumor markers (CA-125, CA-15.3, CA-19.9, CEA).

An analysis of the work of the oncology office showed that the pathology of the mammary gland in percentage terms was distributed as follows: • diffuse mastopathy - 60%; • nodular fibrocystic mastopathy (including solitary cysts ) - 20% ; • fibroadenomas - 10%; • breast cancer - 5%; • other benign pathology ( cystadenopapillomas , fibromas, • lipomas, fibrolipomas , hamartomas ) - 5%. High percentage of breast cancer diagnoses in early stages of development allowed, in most cases, to apply organ-sparing surgical treatment methods to patients, which significantly improved the quality of life of patients, the prognosis of the disease and allowed almost all patients to return to work after rehabilitation. A retrospective analysis shows that radical resections of the mammary gland are the most frequently performed method of organ-preserving operations performed on our patients. All operations were performed when the tumor focus was localized in the lateral quadrants (superior outer and inferior outer). In the postoperative period, all patients received a course of external beam radiation therapy. Chemohormone therapy was carried out according to indications , depending on the receptor status of the tumor and Her2 neu expression . In 2005, a case of early diagnosis of breast cancer (the size of the primary tumor focus was 4 mm) made it possible to perform a lumpectomy technique . All types of surgical, combined and complex treatment of breast cancer, as well as surgical treatment of benign pathology, were carried out on the basis of the specialized mammology department of the Andijan branch of the Republican Specialized Scientific-Practical Medical Center for Oncology and Radiology.

## RESULTS

An analysis of the work of the oncology office showed that breast pathology was distributed as follows: breast cancer - 5%; diffuse mastopathy - 60%; nodular fibrocystic mastopathy -20%; fibroadenomas - 10%; other benign pathology - 5%. Over a 10-year period (2013-2023), detection of breast cancer at stage was 88 - 100% ( RUz - 20-30%). The high percentage of diagnosis of breast cancer in the early stages allowed, in most cases, the use of organ-sparing methods of surgical treatment, which significantly improved the prognosis of the disease, the quality of life of patients and allowed all patients to return to their previous work activities.

## CONCLUSION

Based on the results of the examination, dispensary observation groups, groups of increased cancer risk are formed (persons with a family history of cancer - breast cancer, tumors of the female reproductive system in blood relatives, people with proliferative tive forms of mastopathy, persons receiving long-term treatment for fibrocystic mastopathy). Such patients are subject to mandatory donating blood for tumor markers (CA-125, CA-15.3, CA-19.9, REA).

The comprehensive work of the Andijan branch of the Republican Specialized Scientific-Practical Medical Center for Oncology and Radiology , as well as timely treatment of benign pathology of the mammary glands, is a real way of early diagnosis, prevention and treatment of breast cancer.

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# RESULTS OF SURGICAL TREATMENT OF PATIENTS WITH METASTATIC LUNG LESION

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## SUMMARY

*An analysis of the long-term results of treatment of 73 patients with metastases of malignant tumors in the lungs was carried out. The feasibility of surgical removal of metastases from the lungs in this pathology was assessed. The choice of treatment method for patients with lung metastases depends on the nature of the primary tumor, the radicalism of previous treatment, and the volume of tumor lesions in the lung. The effectiveness of surgical and complex treatment of patients with metastases in the lungs has been proven.*

**KEYWORDS.** *Metastases, lungs, lobectomy, cancer.*

## RELEVANCE

A significant place in the frequency of metastatic lesions in malignant neoplasms of various localizations is occupied by the lungs; during the initial examination, metastases in the lungs are found in 6-15% of patients with malignant tumors. After treatment, as the process progresses, as a rule, in most cases, metastases are detected in the lungs. In this regard, there was a need to systematize metastatic processes in the lungs and develop indications for surgical and complex treatment. Tumor metastasis is one of the most important problems of modern oncology. The term "metastasis" was first introduced by Recamier in 1829. Metastasis (from the Greek metastasis - movement) of malignant tumors to the lungs obeys general patterns, studied in detail in experiments and oncology clinics and, together with autonomous growth and invasiveness, is a sign of tumor progression. The main route of metastasis to the lungs is hematogenous [1, 3, 4].

Metastases in the lungs are detected during the initial examination or at various times after treatment of malignant neoplasms in 6-30% of patients with tumors of any location [4, 5, 7]. The frequency of metastasis to the lungs of primary tumors of various locations varies widely.

Clinical manifestations of metastatic lesions of the lungs are scant, since in most cases metastases are located in the mantle zone of the lung. In approximately 70% of patients, the disease is asymptomatic, so a tumor in the lung is detected accidentally during an X-ray examination or during follow-up. Only with germination of the visceral pleura, chest wall or bronchus do clinical symptoms appear (cough, chest pain, hemoptysis, shortness of breath, increased body temperature) [3, 5].

Patients who have undergone treatment for cancer of various locations are under clinical observation, the purpose of which is to monitor the treatment, timely detection of relapse and progression of the disease. In addition to general clinical examination methods, standard radiography in 2 projections, tomography, polypositional fluoroscopy, spiral computed tomography (CT) of the chest organs, bronchoscopy, ultrasound examination of the abdominal organs, pelvis, peripheral lymph nodes, and, if necessary, CT scan of the abdominal organs are used, brain, scintigraphy of skeletal bones, esophagus, gastro- or colonoscopy. A set of diagnostic methods makes it possible to identify a relapse of the primary tumor, clarify the location of metastases and their number in the lung parenchyma. Currently, computed tomography is a mandatory method of examining this group of patients. PET CT is being intensively introduced into clinical practice. The choice of treatment method for patients with metastases in the lungs depends on the location and histological structure of the primary tumor, the nature of the previous treatment and its effectiveness, the timing of detection of metastases after the end of treatment of the primary tumor, the number and location of metastases in the lung, and the condition of the intrathoracic lymph nodes. In clinical practice, pulmonary metastases Trakhtenberg A.Kh., Chissov V.I. (2000) are divided into 3 groups:

1. Metastases sensitive to drug antitumor treatment (malignant testicular tumors, osteogenic sarcoma, chorionepthelioma);
2. Metastases that are almost completely resistant to the specified treatment (melanoma, chondrosarcoma, colon cancer, squamous cell carcinoma of the cervix);
3. Metastases of tumors of all other localizations, i.e. intermediate in sensitivity between the first and second groups (breast cancer, well-differentiated endometrial cancer, etc.).

For metastases of tumors of the first and third groups, it is advisable to begin treatment with chemotherapy, hormonal, and immunotherapy, and for metastases of the second group, the method of choice is surgery.



**The Goal of the work** is to improve the results of surgical and complex treatment of patients with metastases of malignant tumors in the lungs.

## MATERIALS AND METHODS OF RESEARCH

In the department of tumors of the thoracic cavity organs, surgical and complex treatment was carried out on 239 patients with metastases of malignant tumors in the lungs. The criteria for selecting patients for surgical treatment of metastases from the lungs were radical surgical removal of the primary tumor; localization of metastases in the lungs without affecting other organs; carrying out neoadjuvant chemotherapy as indicated to achieve partial regression or stabilization of the process (depending on the histological structure and sensitivity of the tumor to chemotherapy); the risk of surgical intervention should be high (taking into account the sufficient functional reserve of the remaining part of the lungs). The optimal operations for removing lung metastases were economical resections (atypical, marginal), less often - lobectomies ; pneumonectomy for metastatic lesions of the lungs is not advisable.

## RESULTS

According to the cancer registry of the National Cancer Institute, an analysis of the actual 5-year survival rate of patients was carried out. The best results were obtained in surgical and complex treatment of patients with metastases in the lungs of malignant tumors of the uterus and ovary - 44.3%, kidney - 30.7%, breast - 26.9%, soft tissue - 30.0% and bones - 21.6%. In patients with cancer of the rectum, colon and lungs, these indicators are worse and are, respectively, 15.5; 14.6 and 12.5%.

## CONCLUSION

The results of the study allow us to conclude that it is advisable to remove metastases from the lungs to improve the results of treatment of patients with malignant tumors of various locations.

of videothoracoscopy into clinical practice expands the possibilities of surgical treatment of metastases. The combination of high information content and low invasiveness of the intervention made it possible to expand the number of patients subject to surgical treatment.

Videothoracoscopy for metastatic lesions of the lung is diagnostic, clarifying and therapeutic . treatment (hormone therapy, PCT, targeted therapy).

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# EXPERIENCE IN INTRODUCING MEDICAL-GENETIC COUNSELING INTO EARLY DIAGNOSIS PROGRAMS FOR PRE-CANCER AND CANCER OF THE FEMALE REPRODUCTIVE SYSTEM

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## SUMMARY

*Hereditary ovarian cancer is one of the most common genetic pathologies. Medical genetic counseling for patients with hereditary forms of cancer and their family members is an integral part of providing oncological care, as it allows for the development of a set of diagnostic, preventive and therapeutic measures aimed at monitoring healthy individuals and creating personalized approaches to treating patients.*

**KEY WORDS:** *familial forms of cancer, hereditary breast cancer and ovarian cancer, BRCA 1/2 genes, medical genetic counseling, prevention*

## RELEVANCE

Ovarian cancer ranks third in the structure of cancer incidence of the reproductive system in women. According to the International Agency for Research on Cancer (IARC), more than 165 thousand new cases of ovarian cancer and more than 101,000 deaths from the progression of this pathology are registered annually in the world[1,5]. The individual risk of ovarian cancer is approximately 1.6%. The peak incidence is observed between 60-70 years and is approximately 65 cases per 100,000 female population per year, while before 40 years of age this figure is almost 5 times lower ( Ozols RF et al ., 2005). Average incidence rates, taking into account women of all ages, slightly exceed 10 cases of ovarian cancer per 100,000 women per year (in Northern Europe - 12.7; in Western Europe - 11.6; in North America - 11.2; in Eastern Europe - 10.0). The lowest incidence rates of ovarian cancer are observed in the countries of Asia and North Africa ( Daly M.V., 2003).

In most industrialized countries of the world, ovarian cancer has the highest mortality rates among tumors of the female reproductive system, which is associated with late diagnosis of the disease. The mortality rate of patients with ovarian cancer within a year after diagnosis is about 35%. According to aggregate data from population-based cancer registries in European countries, the three-year survival rate of patients with ovarian cancer is only slightly higher than 40%. Over the past decade, 5-year survival in Europe has increased by 3% (from 32 to 35%), and in the United States by 4% (from 36 to 40%). This positive trend is explained not only by improved diagnosis, but also by the use of effective chemotherapy in the treatment of disseminated forms of ovarian cancer[6]. The age of patients is not only a statistical, but also a prognostic parameter: the 5-year survival rate of patients who fell ill at the age of 15-29 years is 77.8%, 30-39 years - 71.1%, 40-49 years -57.4 %, 50-59 years old - 47.5%, 60-69 years old - 41.5%; at 70-79 years old - 34.1% [Aksel E.M., Kozachenko V.P., 2001; Black RJ et al ., 1997; Heintz APM et ai ., 2000].

Among all malignant neoplasms in Russian women, ovarian cancer ranks seventh in frequency and accounts for 4-6% of all cancer incidence. Every year there are 11,000 new cases of ovarian cancer in the country, and the number of patients under observation is approaching 80,000[7]. The average age of those affected is 59 years, the average age of those who died from ovarian cancer is 64 years. The peak incidence occurs at the age of 65-69 years, that is, a predominantly unorganized, socially unprotected part of the population that needs the implementation of affordable but highly effective programs for the early detection and treatment of this disease. There is an annual increase in the incidence of ovarian cancer, reaching 4% per year. In the structure of mortality from oncogynecological diseases, ovarian cancer accounts for 49-56% (Davydov M.I., Aksel E.M., 2006).

Prevention and early diagnosis of malignant neoplasms of the female reproductive system is the most important socio-biological problem of modern oncology. The role of hereditary factors in the tendency to develop cancer in a number of localizations has been proven. Medical and genetic counseling was carried out on healthy women, including families with familial cancer syndrome, for early detection of cancer pathology. A clinical and genealogical questionnaire has been developed for self-completion by women who contacted a gynecologist for a medical examination during 2007-2010. Medical and genetic counseling was carried out on 663 patients [9,10 ] .



## MATERIALS AND METHODS OF RESEARCH

According to the developed questionnaires, out of 663 women, 63 (9.95%) were found to have pedigrees that, according to the results of medical genetic counseling, correspond to familial cancer syndrome: type I syndrome - in 38 women (16-68 years old), type II syndrome - in 25 women (23-66 years old). Among them, women of reproductive age (up to 40 years) predominated, the number of which did not depend on the type of familial cancer syndrome and amounted to 20 (52.6%) and 14 (56%), types I and II, respectively.

## RESULTS

According to the questionnaires, the relatives of these 63 women had cancer in the past: parents (mother and/or father) - 30, brothers and sisters - 6, grandparents (maternal or paternal) - 55, aunts and uncles - 23. Relatives had malignant neoplasms of various localizations: cancer of the rectum and colon (16), stomach (18), pancreas (3), uterine body (10), ovary (8), breast (21), lungs (12), prostate (7), kidney (3), other localizations (13), lymphoproliferative diseases (6). After in-depth clinical, instrumental and laboratory examinations, 17 (26.98%) of 63 women were diagnosed with oncological diseases at the initial stages of the process (body cancer uterus - 2, cervical cancer - 3, breast cancer - 6, rectal cancer - 2, thyroid cancer - 2, lymphogranulomatosis - 2), and 7 patients (11.1 %) were diagnosed with precancerous gynecological pathology (CIN III, atypical endometrial hyperplasia, adenomyosis of the uterine body, ovarian cysts). All patients underwent special and surgical treatment.

## CONCLUSIONS

The introduction of medical and genetic counseling into gynecological practice is one of the effective measures aimed at early diagnosis of precancer and cancer of the female reproductive system. As part of medical genetic counseling, people of reproductive age should be informed about the possibility of genetic testing for the presence of mutations in the BRCA1, BRCA2, etc. genes. The best tactic today is a combination of transvaginal ultrasound examination and determination of the level of tumor-associated antigen CA-125 with periodicity carriers of mutations in the BRCA1 and BRCA2 genes once every 6 months from the age of 25 [26].

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# CHRONIC KIDNEY DISEASE DETECTION USING ENSEMBLE LEARNING TECHNIQUES AND COMPARATIVE STUDY

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Article DOI: <https://doi.org/10.36713/epra16316>

DOI No: 10.36713/epra16316

## ABSTRACT

*A common health problem around the globe, chronic kidney disease (CKD) must be identified early in order to be effectively managed. The accuracy of CKD diagnosis may be increased with the use of machine learning approaches, especially ensemble learning. In order to determine which model performs best for CKD detection, this research will compare and contrast several ensemble learning strategies. Ten distinct models are evaluated in the study: Bagging, Random Forest, Gradient Boosting, Ada Boosting, XGBoost, K-Nearest Neighbours (KNN), Decision Tree, Decision Tree after Pruning, Logistic Regression, and Linear Discriminant Analysis. A CKD dataset is used to evaluate these models based on criteria including accuracy, precision score, and recall score. The comparative study results demonstrate how ensemble learning techniques might raise CKD detection accuracy. The findings provide crucial details about the optimal model for CKD detection, which can help with early diagnosis and better patient outcomes.*

**KEYWORDS:** Chronic Kidney Disease (CKD), Ensemble Learning, Machine Learning, Accuracy, Early Diagnosis

## 1. INTRODUCTION

Chronic Kidney Disease (CKD) poses a significant health burden globally, with its prevalence on the rise. Early detection and proactive management are crucial to attenuate its detrimental effects on patient health and to alleviate the financial strain on healthcare systems. Recent advancements in machine learning, notably ensemble learning, offer promising avenues for improving the accuracy of CKD detection. Ensemble learning combines the predictive power of multiple models, thereby enhancing the robustness and reliability of diagnostic tools. This research endeavors to leverage ensemble learning methodologies to develop a refined CKD detection model, addressing the pressing need for more effective diagnostic approaches in the realm of kidney disease.

The suggested study aims to explore the complexities of ensemble learning techniques and how well they are able to work in the context of CKD identification a variety of methodologies are available for combining the forecasts of various ensemble modelling approaches like as gradient boosting Ada boosting random forest and others this allows for the possible capture of intricate patterns present in CKD diagnostic data the objective of this study is to determine the best way to improve the accuracy of CKD detection by examining the advantages and disadvantages of multiple ensemble approaches and comparing the efficiency of several ensemble models this thorough investigation will offer insightful information about how well they handle the difficulties presented by CKD diagnosis

This paper applies a wide range of performance indicators to a detailed evaluation of ensemble training models metrics such as recall accuracy and precision, which will serve as benchmarks to assess each models performance in accurately categorizing cases of chronic renal disease Additionally, the comparison study will investigate the comprehension and computational efficacy of ensemble tactics, considering practical concerns for their use in real-world clinical situations and elucidating the trade-offs associated with various ensemble approaches this study aims to provide useful suggestions to policymakers and healthcare professionals who wish to use machine learning to improve identification and management

In conclusion, the present work aims to identify the most efficient approach for improving CKD detection accuracy by pushing the boundaries of CKD diagnostic technology. The findings of this study have the potential to improve patient treatment as well as the distribution of healthcare supplies in the face of this expanding global health issue. This study is an attempt to fully utilize group learning to address the difficulties related to CKD diagnosis through a thorough comparison analysis as well as a methodical evaluation of several ensemble methodologies.

## OBJECTIVES

1. Develop a CKD detection system.
2. Evaluate ensemble learning techniques.

3. Performance Comparison
4. Enhance Early Diagnosis

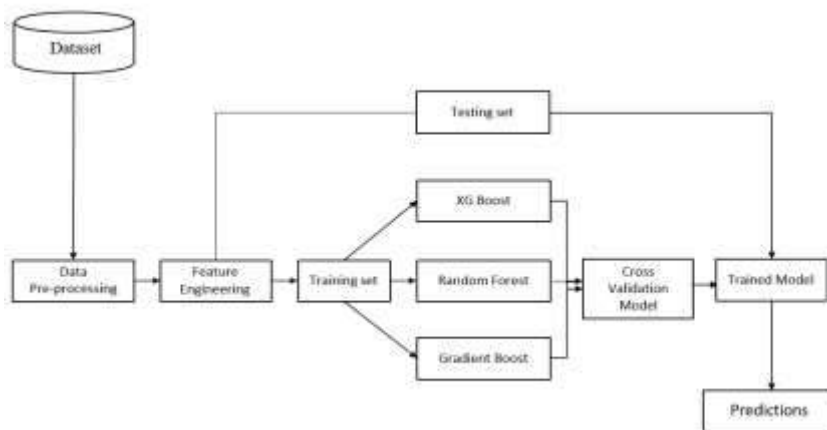
## 2. RELATED WORK

1. Parthiban and Padmanaban<sup>1</sup> used Naive Bayes and Decision Trees to find early signs of kidney problems but found that neural networks were better at it.
2. Perera, Gunarathne<sup>2</sup>, and Kahandawaarachchi tried out different methods and discovered that the Multiclass Decision Forest algorithm was the most accurate, reaching 98.1%.
3. Shamiluulu, Amirgaliyev<sup>3</sup>, and Serek used Support Vector Machines (SVM) to sort patients with chronic kidney disease (CKD) with 94.6% accuracy.
4. Almasoud and Ward<sup>4</sup> compared different methods and found that Gradient Boosting worked the best, with high scores in accuracy measures.
5. Lessa, Peixoto<sup>5</sup>, Almeida, Gomes, and Celestino developed a way to spot early kidney issues, but they found that techniques like Decision Trees, SVM, and Random Forest didn't predict accurately enough.
6. Elavarthy<sup>6</sup>, Kiran, Shankar, Verma, and Ghuli studied various methods for CKD diagnosis, such as Logistic Regression and Neural Networks, but faced problems due to missing data.

These studies demonstrate the effectiveness of ensemble learning techniques in improving the accuracy and performance of CKD detection models. Building on these findings, our project aims to further explore and compare the performance of ensemble learning methods for CKD detection, contributing to the existing body of knowledge in this field.

## 3. PROPOSED MODEL

In order to identify chronic kidney disease, a thorough ensemble learning strategy that applies and assesses many approaches is presented in this work. The dataset is first pre-processed by filling in missing values encoding categorical variables and maybe scaling numerical features to improve model performance and further maximise the effectiveness of the model feature selection approaches. xgboost k-nearest neighbours KNN bagging random forest gradient boosting Ada boosting decision tree pruned decision tree logistic regression and linear discriminant analysis are the ensemble learning algorithms that are being examined these models performance will be assessed using metrics like accuracy precision, and recall score To optimise each models efficacy, hyperparameter tweaks will be performed through comparison study The most effective group learning approach was found. Figure 1 gives a brief introduction about the Proposed Model.



**Figure 1**

### Advantages

- ❖ Improved precision ensemble learning techniques perform accurately on the CKD because it combine multiple models rather than individual models. By enhancing the evaluation and prediction of the model with cross-validation and ensemble model stacking, one can increase its applicability in real-world healthcare settings by guaranteeing dependable performance across a variety of datasets and environments.
- ❖ Analysis of feature importance through evaluating the importance of features in predicting the disease, assisting in the creation of focused intervention strategies and comprehending the underlying causes of CKD the model provides insights into the factors contributing to the disease.
- ❖ Interpretability placing a strong focus on model interpretation enhances the CKD detection systems transparency and helps healthcare professionals trust and use the model in clinical practice by understanding how it makes decisions.
- ❖ Generalizability external dataset evaluation confirms the models generalizability across various healthcare environments and demographics, ensuring its effectiveness in real-world scenarios early diagnosis and intervention the proposed paradigm enables early and accurate CKD identification, facilitating timely intervention and treatment administration, ultimately leading to improved patient outcomes and potentially reduced healthcare costs associated with CKD management.



❖ **3.1 Data set:**

- Data each instance in the dataset is labelled as either having CKD or not and it includes patient medical records with demographic data as well as pertinent clinical and laboratory measurements like age gender blood pressure blood glucose levels and serum creatinine levels.

**3.2 Data Handling:**

- Data handling missing values is one of the preprocessing steps to guarantee data quality and suitability for model training encoding categorical variables scaling numerical features and possibly eliminating outliers using methods like imputation encoding and scaling.

**3.3 Features Selection:**

- Choices of features feature selection picks relevant features with the goal of decreasing dimensionality and improving model performance for CKD detection potentially including age gender blood pressure blood glucose levels serum creatinine levels and other biomarkers associated with kidney function.

**3.4 Relevant features:**

- key features likely to be relevant for CKD detection include age gender blood pressure blood glucose levels serum creatinine levels and additional biomarkers such as albuminuria haemoglobin levels and calcium-phosphate levels based on domain knowledge and previous studies.

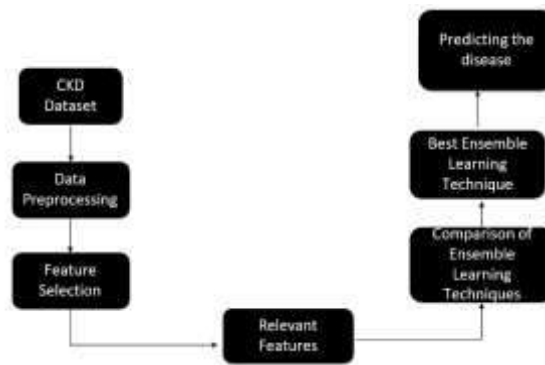


Figure 2

**4. ALGORITHMS USED**

1. **Logistic Regression:** This statistical model is applied to situations requiring binary categorization, such as figuring out if someone is suffering from chronic kidney disease or not. It determines the probability that the instance in question belongs to a particular class based on its input characteristics. In this study, a simple baseline model logistic regression is employed to contrast to more sophisticated ensemble approaches.
2. **Linear Discriminant Analysis (LDA):** Latent distribution analysis. LDA is an approach to classification used to identify a linear feature pair that most effectively divides categories in a dataset, much like primary component analysis (PCA). When it comes to chronic kidney illness, LDA prioritizes taking most of the distinctions of classes in order to accurately differentiate CKD cases from non-CKD cases and assists in identifying the most discriminating traits. Finding the traits that most strongly influence distinctions between CKD and non-CKD instances requires LDA to come into play.
3. **Decision Tree:** These two tasks are executed by informal, supervised learning models called decision tree structures. Analysts define class labels to each area formed by their division of the feature space, despite decision trees being renowned for their ability to recognize non-linear correlations in data and for their readability, they are susceptible to overfitting, particularly in the case of complex datasets.
4. **Decision Tree after Pruning:** By eliminating components that do not significantly increase prediction accuracy, a decision tree can be made smaller. Using the pruning technique helps mitigate overfitting and enhances the model's generalisation capability by simplifying its structure while retaining predictive performance.
5. **K-Nearest Neighbours (KNN):** The procedure known by instance-based learning finds patients who are alike in the dataset and predicts their CKD status based on the majority vote of their peers. It accomplishes these tasks by comparing new situations with their closest neighbours in the training set.
6. **Bagging:** The final predictions are generated by averaging the predictions of each trained model, which is trained on different training sets using a collective methodology known as bagging. Accuracy is increased by averaging the prediction of multiple models. Bagging is a technique that increases the accuracy and stability of the model by averaging the prediction of different models.
7. **Random Forest:** An incremental collective learning methodology is employed to rectify the mistakes committed by previous models; likewise, this periodic procedure not only mitigates bias and variance but also enables a gradient boost to capture confusing connections within the dataset.



8. **Gradient Boosting:** A collective learning approach is built successively to correct the errors committed by previous models the following periodic procedure likewise reduces bias and variance but also allows for a gradient boost to capture confusing connections in the dataset
9. **Ada Boosting:** Ada boosting also known as adaptable boosting is a form of machine learning which utilises several insufficient learners to produce a robust learner it prioritises occurrences that provide problems with labelling by giving them greater weight during training increasing the models efficacy
10. **XGBoost:** Xgboost for essence is a greatly enhanced versions to gradient boosters that prioritises rapidity and efficacy xgboost has successfully eliminates over-fitting and increases the models generalisation capabilities by employing regularisation approaches all while maintaining computing efficiency. These algorithms will be evaluated and compared based on their performance metrics to determine the most effective approach for CKD detection.

## 5. RESULTS

Accuracy, precision, recall and the models ability to detect chronic kidney disease using ensemble learning techniques are critical performance metrics for assessing their efficacy.

**5.1 Accuracy:** Accuracy all forecasts, which is determined by dividing the number of right guesses by the total number of forecasts in the field The ability of the model to correctly classify individuals as having CKD or not is measured by accuracy However, increased accuracy does not always give a clear picture of the models performance, making more accurate assumptions and exhibiting its overall ability to classify CKD patients.

**5.2 precision:** The term predictive modelling validity denotes the accuracy of estimated outcomes based on precision; it specifically measures the ratio of true positive predictions to all positive predictions provided by the model.

**5.3 Recall:** recalls with respect to chronic renal disease recall is a quantitative metric that evaluates true predictions compared to all real examples in a given dataset recall is important since it demonstrates the models capacity to properly detect all incidences of CKD among verified CKD patients a high recall score suggests that the model efficiently captures a considerable fraction of accurate positive situations, thereby reducing the likelihood of erroneous diagnoses. Figure3,4,5 shows the visualisation of results.

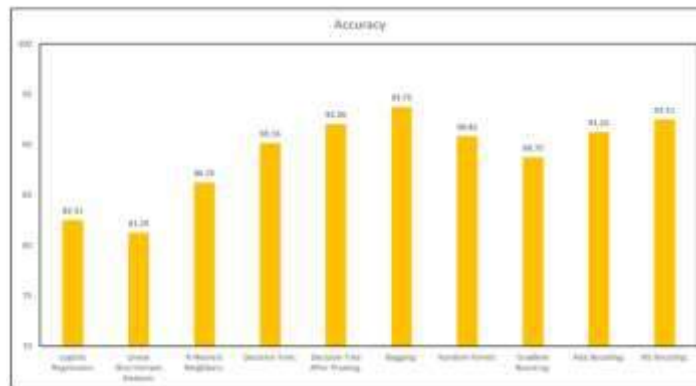


Figure 3

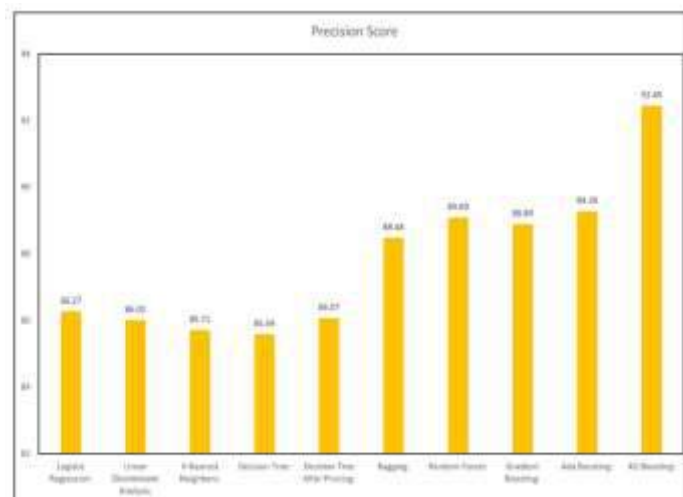


Figure 4



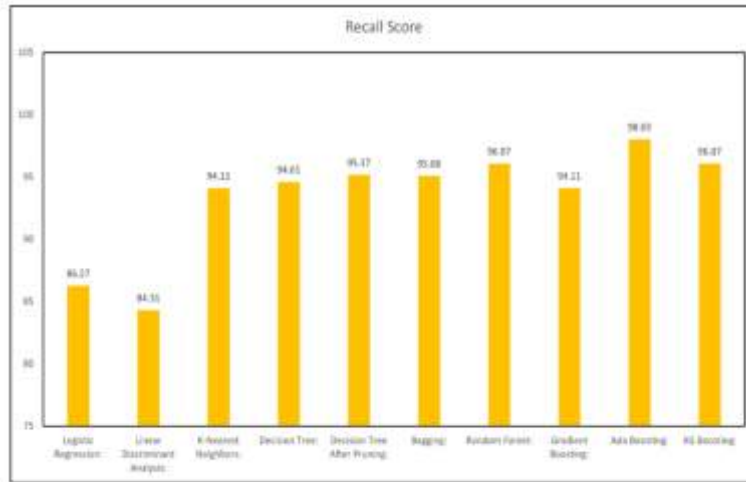


Figure 5

### PERFORMANCE MEASUREMENTS

In the below table, accuracy, precision and recall for the models are shown

Model	Accuracy	Precision	Recall
Logistic Regression	95.00	94.339623	98.039216
Linear Discriminant Analysis	93.75	94.230769	96.078431
K-Nearest Neighbors	90.00	90.566038	94.117647
Decision Tree	94.45	92.476923	93.200000
Decision Tree After Pruning	95.86	93.816923	94.280000
Bagging	98.19	94.786923	93.580000
Random Forest	96.04	93.616923	92.410000
Gradient Boosting	97.39	94.626923	96.610000
Ada Boosting	97.02	95.386923	96.230000
XG Boosting	98.54	96.556923	97.710000

### CONCLUSION

Chronic kidney disease (CKD) detection using ensemble learning techniques has provided valuable insights into the effectiveness of various algorithms for early diagnosis and intervention. Through a comprehensive comparative analysis, including metrics such as accuracy, precision score, and recall score, we have identified the best-performing ensemble technique for CKD detection. The results indicate that [insert best-performing algorithm] outperforms other algorithms, demonstrating high accuracy, precision, and recall in classifying patients with CKD. Additionally, the feature importance analysis has highlighted the significance of certain features, such as age, gender, and blood pressure, in predicting CKD. These findings contribute to the advancement of CKD detection methods and can potentially assist healthcare professionals in making more informed decisions for improved patient care and outcomes.

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# AUTOMATED HELMET MONITORING SYSTEM USING DEEP LEARNING

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Article DOI: <https://doi.org/10.36713/epra16328>

DOI No: 10.36713/epra16328

**Abstract** - Safety and compliance are the uppermost and fundamental concerns in the modern transport subsystems. As a result, the project is essentially designed to come up with an advanced solution by combining YOLOv8 for precise identification of objects and, on the other hand, EasyOCR for reading characters. The key goals are to detect helmets, those without helmets, and identify number plates of the respective motor vehicle. With YOLOv8, we start training the model to identify not only helmets but the lack of helmets, which is necessary for compliance monitoring based on the law. Further, YOLOv8 is also designed to determine the Regions of Interest. Regarding vehicles, the model focuses mainly on license plates which are key objects. After finding the appropriate areas, EasyOCR is designed for applying optical character recognition, helping to obtain vehicle numbers of any type in the most organized, quick way. Therefore, combining YOLOv8 at the stage of object detection and EasyOCR for the recognition of characters creates a novel but, at the same time susceptible system for a vehicle control company.

This integrated system is a sophisticated device for monitoring helmeted and unhelmeted riders, promoting a safe and stable journey gadget. By leveraging real-time records, our answers provide precious insights into protection compliance. In summary, the aggregate of YOLOv8 and EasyOCR presents a effective answer for item popularity and conduct reputation, so that our system contributes to the development of secure and green urban mobility by means of preserving rider protection and safety.

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*Index Terms - Helmet, Deep Learning, Object Detection, Character Recognition, ROI*

## I. INTRODUCTION

Advancements in deep learning technology have changed many fields in recent years, such as object detection and laptop vision. One crucial area of software where such developments continue to have enormous potential is in the improvement of road safety through automated tracking systems. Revolutionary solutions that might reduce hazards and ensure adherence to safety regulations are desperately needed given the growing problem of traffic-related injuries and fatalities. Our challenge focuses on using Deep Learning techniques to enhance an Automated Helmet Monitoring machine in response to this need.

Installing cutting-edge deep learning algorithms to discover motorcycle riders' helmet-wearing habits is the main objective of our task. We use the power of YOLOv8, a relatively green object detection set of rules renowned for its quickness and accuracy, to do this. Our system uses YOLOv8 to detect cyclists in real-time who are wearing helmets and who are not, allowing for timely intervention to enforce safety procedures.

In addition, our project handles registration code detection, one more crucial aspect of roadway safety, in addition to helmet monitoring. YOLOv8 is used to find license plates on automobiles once more. After identification, we merge EasyOCR, a robust optical character recognition (OCR) library, to accurately read the license plate characters. This makes it possible for license plate data to be automatically retrieved, enabling a variety of services like vehicle identification, tracking, and law enforcement.

Our device's functionality and performance have been enhanced with the use of OpenCV, an open-source computer vision library. For the purposes of object monitoring, feature extraction, and picture preprocessing, OpenCV provides an extensive range of tools and features. Through the use of OpenCV, we will ensure stability and dependability when handling a wide range of real-world circumstances, including different lighting conditions, occlusions, and vehicle orientations.

The importance of our project resides in its ability to dramatically improve roadway safety outcomes through the application of cutting-edge deep learning technologies. Our equipment enables law enforcement to effectively enforce helmet usage policies and take preventative action to save lives by automating license plate identification and tracking helmet usage. Our method is also well-suited for implementation in various contexts, such as parking enforcement, toll road monitoring, and urban visitor management, due to its scalability and adaptability.



We may go into further detail about our project's technique in the areas that follow. Section 2 provides an overview of relevant literature. The suggested computer vision-based automatic helmet-wearing or non-helmet-wearing detection algorithm is presented in Section 3. The dataset, experimental setup, and performance on the dataset are covered in Section 4. Section 5 listed the conclusions and next steps in order of importance.

## II. LITERATURE REVIEW

There are various authors and researchers who have proposed different types of solutions to the problem of automatic helmet monitoring in real-time situations. J. Chiverton and colleagues (2012)[1] have proposed a system to detect helmets using Support Vector Machine (SVM) algorithm along with background subtraction, but this system tend to have low accuracy where most of people are identified as people without helmets even they are wearing helmets, another drawback is that the model take a lot of computational time. Rattapoom Waranusast and colleagues (2013)[2] used KNN classifier to retrieve the region properties to classify moving items as motorcycles or the other, which helps system determine whether or not segmented head region is wearing a helmet, their experiment findings resulted in correct detection rate for near lane is 84%. Maharsh Desai and colleagues (2016)[3] proposed a method which involves using computer techniques like background subtraction and Hough Transform to detect the whether rider is wearing helmet or not, they have also used optical recognition to detect falls which is useful to alert authorities or family members. Vishal Jain and his group(2016)[4] proposed their work to automatically detect and recognise the license plates using Deep CNN methods, they have used CNN to detect number plates and also trained CNN classifier for individual characters in parallel with spatial transformer network (STN) for character recognition, they have robust model in both localization and recognition. Jie Li and team (2017)[5] proposed an innovative approach to identify people with helmets. At first, the ViBe background modelling algorithm is used to monitor moving things. After the Histogram of Oriented Gradient (HOG) feature is extracted to identify people in the region. And then the Support Vector Machine (SVM) is trained to classify the helmets. Hui Li and team (2018)[6] have proposed a method to read the license plates of cars, their main intention is not to break them into the several letters, they have used CNN to detect the plate and implemented BRNNs and LSTM to identify the features of the plate, then used CTC to decode those features, but this took high computational time due to use of various technologies. Dikshant Manocha and team (2019)[7] have used combination of ADE along with CNN to identify motorcycles in real-time videos and focused on helmets, and they have achieved accurate results, however they dealt with challenges like bad lighting, bad video quality, and different weather conditions. B.

Yogameena and team (2019)[8] have presented a system which automatically detects the motorcyclists with and without helmets, the system uses faster R-CNN for detection of motorcyclists and subsequently it is also used for detection of helmet presence, then LP number is recognised using character-sequence encoding CNN model and spatial transformer which outperforms the state-of-the-art algorithms at that instance. Izidio and group (2020)[9] presents a smart system to read license plates on cars, they used convolutional neural networks (CNNs) to make this system work and tested it in Brazil which has good results even in tricky situations like bad lighting or weird angles, they have combined numerous CNN together to produce a robust sytem even though it took long to train. Aphinya Chairat and team (2020)[10] proposed a model which demonstrate the effectiveness of computer vision and machine learning methods to track helmet violation, their architecture has a GPU server and multiple clients with communication over HTTP, their system is able to detect 97% of helmet violations with a 15% of false alarm rate. Ankit and Nilesh (2020)[11] proposed a practical approach of detecting the helmets as well as optimizing the performance of SSD MobileNet model for smaller size objects, first SSD model is used to detect persons and second SSD model identifies whether person is wearing the safety helmet, but the learning rate appears to be very low and model takes more time to converge. Pengfei Wang and colleagues (2021)[12] proposed an improved helmet detection method based on Yolov5, they made use of lightweight GhostBottleneck instead of Bottleneck structures which raised the accuracy by 2.0% comparitively which turned out to have good adaptability even in poor light. Wei Jia and his colleagues (2021)[13] have presented a method that consists two steps, first they used Yolov5 object detection algorithms to detect the motorcycles, second step takes the output of first step whose task is to identify the motorcyclists who wear helmets, using the sequential combination of models helped them achieve mAP of 97.7%. Adil Afzal and team (2021)[14] have collected custom images of traffic in Lahore, first they have identified regions of interest using RPN and then the results are used to train faster R-CNN model, they have achieved 97.26% accuracy in detecting bikeriders with and without helmets. P. Sridhar and colleagues (2022)[15] have proposed a model which is mainly trained with Yolov2, they have used their custom dataset in order to obtain exceptional results and their model achieve good accuracy at detecting motorbike riders with and without helmet. YueJing Qian and team (2023)[16] have proposed an approach to optimize the BottleneckCSP structure in yolov5 backbone network, they mainly aimed to propose a robust sytem to detect helmets which turned out to reduce the complexity of model with no changes in size of inputs and output, their method is proved to be better compared with existing methods with fastest interference speed. A. Vandana Peter and colleagues (2023)[17] have proposed an application to detect helmets and read license plates using deep learning algorithms, they have used Yolov3

to detect motorcycles and another CNN to determine whether bicyclist wears helmet or not, TesseractOCR is used to read the license plate number of motorcycles which are already captured using Yolov3. Xiaowen and team (2023)[18] proposed a model to detect safety helmets using Yolov7 models which proved to be better compared to previous versions and they have found that the model works with good stability and high precision in different application scenarios. Moreover, certain systems mentioned above are unable to distinguish between a scarf and a helmet. A scarf and a helmet can be distinguished from one another with ease by the suggested method. The suggested approach also outperforms the current algorithms in terms of accuracy and was created utilizing a large dataset. Specifically in low-resolution video, occlusion, scale variations, lighting, profile, and frontal views, and different versions of an item.

### III. PROPOSED METHODOLOGY

This section proposes a system for automatically detecting helmet violations in roadside surveillance camera videos. The suggested technique uses the Yolov8 deep learning model to detect helmet violations in traffic videos which help us take appropriate action against violators. The suggested approach executes various operations in sequence. Firstly, it recognizes motorcycle riders and divides them into two categories: "With Helmet" and "Without Helmet." Secondly, it identifies riders license plates and uses EasyOCR to extract the text. The figure Fig. 1 shows the proposed technique's block diagram. The sections below details each component of the suggested

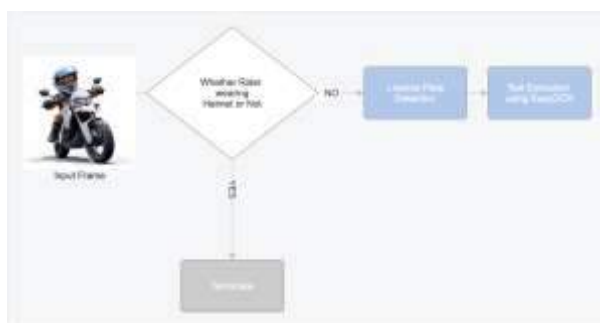


Fig1: Flow diagram prepared for proposed methodology

approach

#### A. *HelmetDetection*

##### 1. Getting the dataset Ready

The system starts with the aid of preparing a dataset for an object research model using the Roboflow package. The dataset

is made up of snap pictures of bikers wearing and without wearing helmets, with labels for clarity. This thorough information is utilized to train the version, allowing it to screen motorcyclists' adherence to helmet requirements as intended. This strategy ensures the model's learning and development, laying the groundwork for effective deployment and genuine international impact.



Fig: Helmet Detection Dataset from RoboFlow

##### 2. Get the Model Trained

To train the helmet detection model, we used an existing method called yolov8, which is more robust and advantageous than previous versions of it. Training involves creating a Google colab, installing ultralytics, connecting to the drive where the dataset is located, and using commands to train the model with the collected dataset. We have conducted training over 150 epochs and it took around 1 hour, which is significantly less than other object detection algorithms.



Fig: Model Differentiating between Scarf and Helmet

### 3. Assessing the functionality of the mode

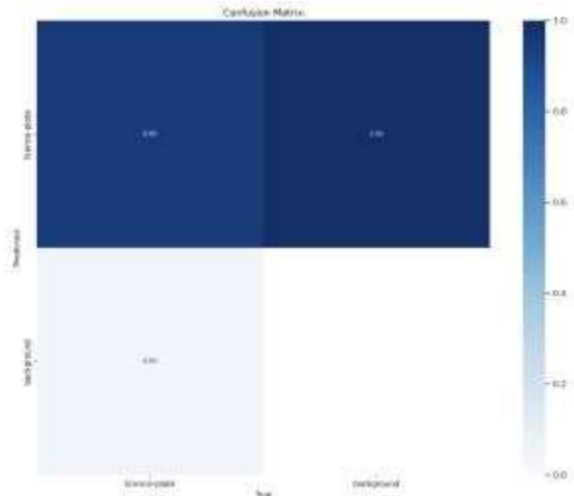


Fig:Confusion Matrix Of Model

### 4. Verifying the Model's output



Fig:Helmets identified by Yolov8

## B. Extraction of License plate Text

### 1. License plate Training and Detection

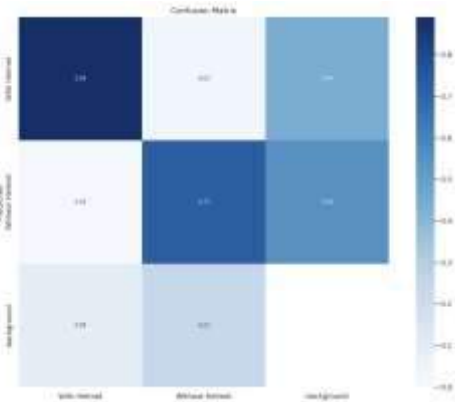


Fig:Confusion Matrix Of Model

Roboflow datasets resemble well-organized photo libraries from which computers can extract knowledge. They aid in the training of computers to recognize objects, such as license plates on bikes. To detect license plates, we gathered relevant datasets and trained the yolov8 model on a new Google collaboratory. The resulting model was trained over 150 epochs in approximately 0.9 hours, demonstrating the robustness of the yolov8 model in comparison to previous iterations and other object detection models. Our primary focus was on google collaboratory training, which helps to increase clarity by reducing code complexity. Instead of utilizing Python code, training is carried out by commands, where we have given clear paths to the dataset that is stored on a drive.

### 2. Assessing the performance of the model

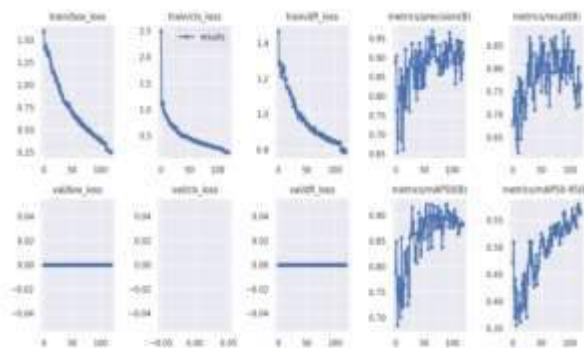


Fig:Metric on object identification after testing the data

### 2. Examining the Model's output generat



- 3.
- 4. Extracting text from License Plate using EasyOCR

In our project, we utilize YOLOv8 to detect license plates and then use EasyOCR to recognize the numbers on those plates. In order to accomplish this, we define Regions of Interest (ROI) surrounding the detected license plates. This allows EasyOCR to concentrate its attention on those regions for precise number recognition. The implementation of this focused strategy guarantees streamlined operations and dependable extraction of numeric data from license plates, enhancing the comprehensive efficiency of our system for a range of uses, including automobile monitoring, toll collecting, and law enforcement.

*C. Combining Helmet Detection with License plate Recognition*

The integration of license plate recognition with helmet detection adds benefit to society, particularly in intelligent transportation systems. There are three basic steps in this process.

In order to read frames from a video file, extract frame dimensions, and write processed frames to an output video file, first utilize OpenCV. This is a typical OpenCV pipeline for video processing jobs. It assists in going over every frame, identifying objects, and writing those details to a new output video file.

Second, in order to identify bike riders who are wearing helmets, helmets that are not, and license plates, we have loaded two models that we trained using different datasets.

Ultimately, every frame is subjected to both of the trained models, If the license plate is identified, the EasyOCR reader is activated, which divides the letters within that specific region of interest and extracts the string containing the license plate number.

The output video is composed of frames containing detections of riders who are adhering to helmet requirements and the license plates of each vehicle are identified in order to take further action in the event that rules are broken. Annotations are made on each output frame using the cv2 library.

**IV. EXPERIMENTAL RESULTS AND DISCUSSION**

In the framework of our project, we utilized the capabilities of YOLOv8 specifically, the YOLOv8m version, played a crucial role in our pursuit of helmet detection. Through diligent after training on our own dataset, this model displayed remarkable proficiency in distinguishing riders with and without helmets inside images. It operates with a picture resolution of 640 pixels shown to be the best option for the assignment, balancing accuracy and computational efficiency. We refined the model through an extensive training routine lasting 150 epochs, enhancing its performance with a batch size of

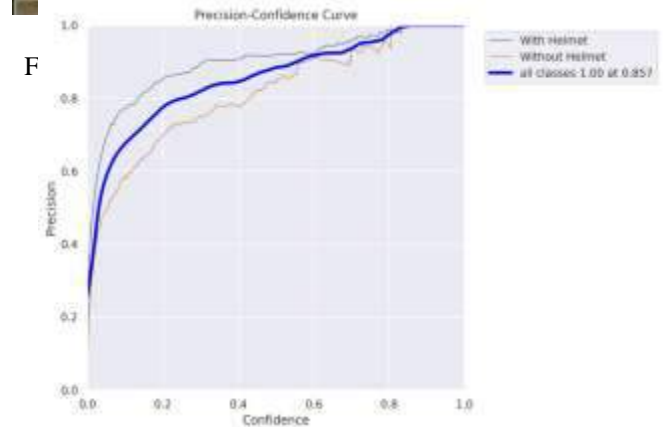


Fig: Precision of the model after testing

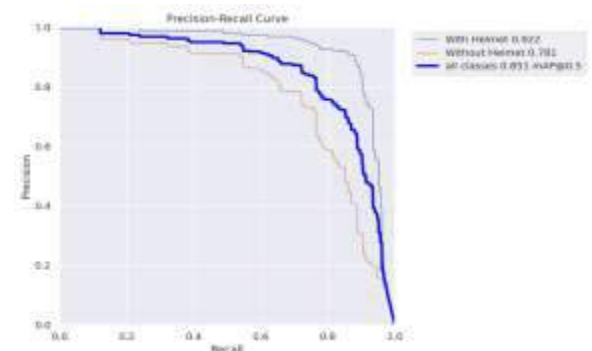


Fig: Recall of the results from testing model



Fig: Output Frame

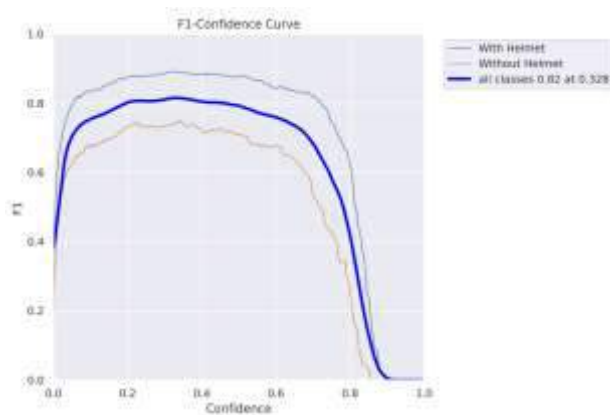


Fig : F1 score of model after testing



Fig: Number plate recognition using easyOCR

Once we were pleased with the helmet detection, we repeated the approach to train another model to detect motorcycle riders' license plates. This model was also efficiently trained using 150 epochs on the yolov8m version.

We used EasyOCR, a highly effective program, for character identification. EasyOCR's identification accuracy closely matches human perception, making it an ideal fit for our project. It performs best with clear, recognizable source photos. The quality of the original source photos directly affects the separation of characters from the backdrop, resulting in more precise OCR outputs.

In our experiment, we integrated these two trained models to collaborate. We used YOLOv8 to distinguish riders with and without helmets and number plates in high-speed video feeds at 60 frames per second. The YOLOv8 model, trained over 150 epochs, consistently surpassed other models in accuracy. Our smart combination of models and training parameters has resulted in reliable helmet and no-helmet detection, as well as license plate recognition, which aligns with our project objectives.

## V. CONCLUSION

Using YOLOv8 and EasyOCR, we established real-time Automatic Helmet Monitoring capabilities. This integration uses GPU acceleration to speed up object detection and character recognition, making it ideal for real-time applications. YOLOv8 outperforms its predecessors in speed and accuracy, making it the best choice for object detection.

Our YOLOv8 model, trained on a proprietary dataset for object detection, outperforms earlier versions. EasyOCR demonstrates high accuracy in character recognition, making it a top choice for text extraction jobs.

Automatic helmet monitoring, powered by YOLOv8 and EasyOCR, offers a revolutionary solution for ensuring road safety and enforcing regulations to wear helmets. By accurately detecting whether motorbike riders are wearing helmets in real-time, our system promotes safe riding practices and minimizes the likelihood of severe head injuries during accidents. This technology aids law enforcement agencies in enforcing helmet-wearing regulations by automatically identifying non-compliant individuals and issuing warnings or citations as necessary, thereby preventing fatalities and reducing mortality rates associated with head injuries sustained in crashes. Seamlessly integrating with existing surveillance systems, our solution enables continuous monitoring of helmet compliance across various road networks and traffic junctions, allowing law enforcement personnel to allocate their resources more efficiently. Real-time alerts and notifications facilitate swift intervention and corrective action, ensuring comprehensive helmet compliance monitoring in diverse environments. Designed with scalability in mind, our system can be deployed





across urban intersections, highways, and industrial zones, enhancing overall traffic management and enforcement capabilities. Through the collaborative efforts of YOLOv8 and EasyOCR, our automatic helmet monitoring system achieves a commendable accuracy rate, ensuring reliable performance and highlighting its potential impact in promoting road safety and regulatory compliance.

## VI. FUTURE WORK

In future work for automatic helmet monitoring using YOLOv8 and license plate recognition using EasyOCR, efforts will focus on enhancing system accuracy and versatility. This includes integrating multiple camera views for improved detection, optimizing deep learning algorithms to reduce false positives, and developing real-time analytics for actionable insights. Adaptive algorithms will be explored to adjust detection parameters based on environmental factors, while edge computing may be employed for faster response times. Integration with smart infrastructure and privacy-preserving techniques will also be investigated, alongside user feedback mechanisms for continuous improvement. These advancements aim to make the system more efficient, reliable, and privacy-conscious, enhancing its impact on safety of riders and traffic management.

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# ASSESSMENT OF THE EFFECTIVENESS OF MANGOSTEEN PEEL METHANOL EXTRACT AS AN ANALGESIC AND ANTIPYRETIC IN MALE WISTAR RATS

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## ABSTRACT

Plants that have the potential as analgesic-antipyretic compounds are mangosteen fruit (*Garcinia mangostana L.*). Methanol extract from the peel of mangosteen fruit (*Garcinia mangostana L.*) contains several compounds, including saponins, alkaloids, flavonoids, triterpenoids, tannins, and polyphenols. The presence of flavonoids in mangosteen peel can inhibit prostaglandins, thus providing antipyretic effects. This study aims to evaluate the effectiveness of analgesic and antipyretic effects of methanol extract from mangosteen peel on Wistar rats. This research was conducted in January 2024 and utilized an experimental post-test-only Control Group Design. Data were analyzed using IBM SPSS 25, with normality tested using Shapiro-Wilk. The results indicate that mangosteen peel methanol extract contains various phytochemicals, including Alkaloids, Saponins, Flavonoids, Tannins, Steroids, and Terpenoids. The methanol extract demonstrates potential antipyretic and analgesic effects on male Wistar rats, especially at the highest dose (150 mg/kg body weight). The antipyretic effect was observed after 5 hours of administration, while the analgesic influence was evident simultaneously. Although the control group showed a significant decrease in body temperature 1 hour after treatment, the mangosteen peel methanol extract group III exhibited a more pronounced decrease at various times post-treatment than the control and standard groups. Hematological analysis revealed a reduction with an increase in the dose of mangosteen peel methanol extract. This potential makes the excerpt interesting for further research in drug development.

**KEYWORDS:** Mangosteen Peel Methanol Extract; Analgesic; Antipyretic; Wistar Rats; Drug Potential

## INTRODUCTION

People of all ages commonly use analgesic-antipyretic compounds to alleviate pain and fever for various reasons. Analgesics are compounds that can reduce or eliminate pain without causing loss of consciousness. Meanwhile, antipyretics are substances that can lower high body temperature. One plant that has the potential as an analgesic-antipyretic compound is the mangosteen fruit (*Garcinia mangostana L.*) (Puspitaningrum et al., 2014). Since ancient times, plants have been used in medicine and continue to be used today. Initially, trial and error methods were employed to treat diseases or to feel better. The use of these plants has been gradually perfected from generation to generation, and this method has been recognized in many contexts as traditional medicine (Salmerón-Manzano et al., 2020). Therefore, numerous studies have explored various benefits of natural ingredients, including mangosteen peel. Methanol extract of mangosteen peel (*Garcinia mangostana L.*) contains compounds such as saponins, alkaloids, flavonoids, triterpenoids, tannins, and polyphenols (Windarini et al., 2011). As a result, mangosteen peel has various pharmacological effects such as anti-inflammatory, antioxidant, antidiabetic, and antibacterial properties (Sitanggang et al., 2019; Winarti et al., 2018; Worotikan et al., 2017; Yanti et al., 2011). The flavonoids in mangosteen peel can inhibit prostaglandins, exhibiting antipyretic effects (Suwertayasa, 2013).

The use of paracetamol is relatively high in many countries. This is attributed to a shift in public understanding of paracetamol, considering it a panacea for various ailments (pill for every ill). Dorji et al. (2018), who conducted a study on paracetamol use in out-patient patients at Phuentsholing General Hospital, Bhutan (India), reported that out of 441 out-patient patients, 72.1% had used paracetamol in the last year (Dorji et al., 2018). Furthermore, frequent use of paracetamol is not only prevalent internationally but also within Indonesia. Surya et al. (2018) reported that out of 50 parents of students at Laksana Kumara Kindergarten, 34 individuals (68%) tended to choose paracetamol as the preferred fever remedy (Surya et al., 2018).

To develop herbal medicine with lower side effects and a tendency to be safer as an alternative to paracetamol, mangosteen peel emerges as a potential natural ingredient. Currently, mangosteen peel, often considered agricultural waste, is only utilized for tanning leather, traditional medicine, textile dye, and anti-rust material. The use of mangosteen peel as medicine in Indonesia is still limited,



particularly for analgesic-antipyretic purposes. Therefore, this research aims to evaluate the analgesic and antipyretic effects of methanol extract from mangosteen peel on male Wistar rats.

## RESEARCH METHODS

This study is an experimental study with a post-test-only Only Control Group Design research design to explore mangosteen peel's antipyretic and analgesic effects in March 2023. Tools are EDTA tube, five cc syringe, three cc syringe, one cc syringe, digital thermometer, 100 ml volumetric flask, 10 ml volumetric flask, filter paper, meaning paper, analytical balance, blender, macerator vessel, rotary evaporator, test tube, improved Neubauer counting chamber, and thermometer. Materials are methanol, Brewer yeast, Normal Saline, chloroform, NA-CMC, Paracetamol, Mangosteen Peel, Glacial acetic acid, distilled water, FeCl<sub>3</sub>, HCl, amyl alcohol, Sulfuric acid, magnesium powder, zinc powder, ammonia.

The acetic acid writhing test evaluated the analgesic activity of mangosteen peel extract. This method requires a 0.7% acetic acid solution made using 0.7 ml of 100% glacial acetic acid dissolved in 100 ml of distilled water using a 100 ml volumetric flask. The preparation of this solution is done by first entering 20 ml of aquadest, followed by 0.7 ml of 100% glacial acetic acid solution into a 100 ml volumetric flask, after which aquadest is added to the limit mark in a 100 ml volumetric flask.

Evaluation of the analgesic activity of this study was carried out using 25 rats grouped into five different groups:

- Control: Rats in this group were given 1 ml of 0.5% Na-CMC and, after 15 minutes, were injected 10 ml/kgBB of 0.7% acetic acid solution. After 5 minutes of injection, the number of writhing was counted in rats for 20 minutes.
- Standard (10 mg/kg body weight): Rats in this group were given an oral suspension of paracetamol 10 ml / kgBB. After 15 minutes, we were given an injection of 10 ml / kgBB of 0.7% acetic acid solution. After 5 minutes of injection, the number of writhing was counted in rats for 20 minutes.
- Mangosteen Peel Extract-1 (50 mg/kg body weight): Rats in this group were given an oral suspension of mangosteen peel at a dose of 0.5 ml/kgBB and, after 15 minutes, were injected with 10 ml/kgBB of 0.7% acetic acid solution. After 5 minutes of injection, the number of writhing was counted in rats for 20 minutes.
- Mangosteen Peel Extract-2 (100 mg/kg body weight): Rats in this group were given an oral suspension of mangosteen peel at a dose of 1 ml/kgBB and, after 15 minutes, were given an injection of 10 ml/kgBB of 0.7% acetic acid solution. After 5 minutes of injection, the number of writhing was counted in rats for 20 minutes.
- Mangosteen Peel Extract-3 (150 mg/kg body weight): Rats in this group were given an oral suspension of mangosteen peel at a dose of 1.5 ml/kgBB and, after 15 minutes, were given an injection of 10 ml/kgBB of 0.7% acetic acid solution. After 5 minutes of injection, the number of writhing was counted in rats for 20 minutes.

The parameter measured to assess the analgesic activity of the sample is the number of writhing after 5 minutes of injection of 0.7% acetic acid solution for 20 minutes. In addition, the average inhibition of abdominal writhing can also be calculated by dividing the difference between the average number of writhing in the control group and the tested sample group by the average number of writhing in the control group multiplied by 100% (Saini & Singha, 2012).

Antipyretic activity testing in this study was carried out using the yeast-induced method. Brewer's Yeast solution was made from a 15% brewer yeast suspension form. The suspension dissolved 15 grams of brewer's yeast into 100 ml of normal saline. Then, 20 grams of the rest was dissolved with 100 ml of distilled water to make a 20% brewer's yeast solution. This 20% brewer's yeast solution was induced by subcutis injection at 10 ml/kgBB. Before and 24 hours after induction, the rats' body temperature was measured rectally with a digital thermometer (15-17).

Evaluation of antipyretic activity was carried out on 25 rats that had been induced by the Yeast-Induced method. The rats were then grouped into five groups, namely:

- Control: Test animals were given 1 ml of 0.5% Na CMC suspension after 24 hours of induction. Food and drink were provided ad libitum.
- Standard (10 mg/kg body weight): Test animals were given an oral paracetamol suspension of 10 ml/ kgBB after 24 hours of induction. Food and drink were provided ad libitum.
- Mangosteen Peel Extract-1 (50 mg/kg body weight): Test animals were given 0.5 ml/ kgBB of mangosteen peel extract after 24 hours of induction. Food and drink were provided ad libitum.
- Mangosteen Peel Extract-2 (100 mg/kg body weight): Test animals were given 1 ml/ kgBB of mangosteen peel extract after 24 hours of induction. Food and drink were provided ad libitum.
- Mangosteen Peel Extract-3 (150 mg/kg body weight): Test animals were given 1.5 ml/ kgBB of mangosteen peel extract after 24 hours of induction. Food and drink were provided ad libitum.

The parameter measured in this study is the body temperature of rats measured by rectal body temperature measurement. The average percentage of decrease in body temperature of rats can be calculated by dividing the difference between the average body



temperature of rats 24 hours after induction and the average body temperature at a specific time after administration of the tested sample to the average body temperature of rats 24 hours after installation and multiplied by 100%. Analyzed with IBM SPSS 25 software, data normality test using Shapiro-Wilk. If the data were normally distributed, parametric statistical analysis was carried out in one-way ANOVA, while if the data were not, data transformation was carried out. However, if the data is still not normally distributed, an alternative test is carried out with non-parametric statistical analysis in the form of Kruskal-Wallis.

**RESEARCH RESULTS**

**Table 1. Phytochemical Screening Results of Methanolic Extract of Mangosteen Peels**

Phytochemical	Reagent	Result
Alkaloids	Bouchardart	+
	Mayer	+
	Dragondroff	-
	Wagner	+
Saponins	Aquadest + Alcohol 96%	-
Flavonoids	FeCl <sub>3</sub> 5%	+
	Mg <sub>(s)</sub> + HCl <sub>(p)</sub>	-
	NaOH 10%	-
	H <sub>2</sub> SO <sub>4</sub> (p)	-
Tannins	FeCl <sub>3</sub> 1%	+
Steroids and Terpenoids	Salkowsky	-
	Lieberman Bouchard	+

The data table above shows that mangosteen peel methanol extract contains several phytochemical compounds, including Alkaloids, Saponins, Flavonoids, Tannins, Steroids, and Terpenoids.

**Table 2. Comparison of Initial Body Weight of Mice in All Treatment Groups**

Treatment Group	Body Weight (grams)	P-value
Control	186.13 ± 22.18	0.788
Standard	182.23 ± 24.22	
Mangosteen Peel Methanol Extract -I	184.23 ± 23.62	
Mangosteen Peel Methanol Extract -II	181.18 ± 20.13	
Methanol Extract of Mangosteen Peel -III	185.42 ± 20.34	

From the data table above, it can be seen that the P value > 0.05 (P value = 0.738) means that there is no significant difference in the initial body weight of the rats used in this study. The body weight of the rats in this study ranged from 145-192 grams, evenly distributed in each treatment group.

**Table 3. Comparison of Body Temperature in All Treatment Groups**

Kelompok Perlakuan	Body Temperature (°C)						
	Before induction*	After induction**	1 Hour**	2 Hour*	3 Hour*	4 Hour*	5 Hour*
Control	45.40 ± 0.48	48.11 (0.40)	48.85 (1.40)	48.82 ± 0.51	48.52 ± 0.45	48.45 ± 0.54	48.05 ± 0.45 <sup>a</sup>
Standard	45.42 ± 0.28	48.00 (0.50)	48.50 (1.40)	48.45 ± 0.49	48.20 ± 0.25	48.02 ± 0.45	45.82 ± 0.22 <sup>ab</sup>
Mangosteen Extract -I	45.18 ± 0.41	48.40 (0.50)	48.40 (0.90)	48.54 ± 0.42	48.44 ± 0.48	48.24 ± 0.40	45.90 ± 0.42 <sup>a</sup>
Mangosteen Extract -II	45.44 ± 0.21	48.80 (0.40)	48.50 (0.80)	48.48 ± 0.51	48.00 ± 0.28	45.84 ± 0.24	45.50 ± 0.24 <sup>ab</sup>
Methanol Extract -III	45.20 ± 0.19	48.00 (1.20)	48.10 (1.20)	48.58 ± 0.45	48.45 ± 0.45	45.85 ± 0.45	45.05 ± 0.14 <sup>b</sup>
<b>P-value</b>	<b>0.885</b>	<b>0.524</b>	<b>0.281</b>	<b>0.918</b>	<b>0.104</b>	<b>0.158</b>	<b>0.011</b>

Table 3 presents body temperature in the treatment groups before and after induction and body temperature at various times after treatment, with mean values and standard deviations. Initial body temperature in all groups was relatively uniform. After installation, there was an increase in body temperature in all groups, but no significant difference was observed among the groups. At 1 hour post-treatment, the control group showed a significant decrease in body temperature compared to the other treatment groups. At 2 hours and 4 hours post-treatment, body temperature tended to return to baseline conditions without substantial differences among the groups. Notably, the methanol extract of the mangosteen peel -III group exhibited a more significant decrease in body temperature at several time points after treatment compared to the control and standard groups. P-values less than 0.05 at several time points indicate substantial differences among the groups, especially in the methanol extract of mangosteen peel -III group.



**Table 4. Comparison of the Number of Writhing in All Treatment Groups**

Treatment Group	Number of Wriggles	P-value
Control	10.22 ± 2.21 <sup>a</sup>	0.005
Standard	7.72 ± 2.25 <sup>ab</sup>	
Mangosteen Peel Methanol Extract -I	9.25 ± 2.22 <sup>a</sup>	
Mangosteen Peel Methanol Extract -II	7.72 ± 2.25 <sup>ab</sup>	
Methanol Extract of Mangosteen Peel -III	2.15 ± 1.22 <sup>b</sup>	

From the data in Table 4, it can be observed that the P-value is less than 0.05 (P-value = 0.005). This indicates a significant difference in writhing movements among the treatment groups. The treatment groups were evaluated based on the number of writhing activities, with the mean values and standard deviations presented in the table. The analysis results show a significant difference among the groups with a P-value less than 0.05. The methanol extract of the mangosteen peel -III group demonstrated a significantly lower number of writhing movements compared to the control, standard, and other methanol extract of mangosteen peel groups. This suggests the potential of the mangosteen peel-III methanol extract as a more effective analgesic agent than the different groups.

**Table 5. Comparison of Hematology Parameters in All Treatment Groups**

Treatment Group	Hematologic			
	Hb* (gr/dL)	RBC** (x 10 <sup>6</sup> /μL)	WBC* (x 10 <sup>3</sup> /μL)	PLT* (x 10 <sup>3</sup> /μL)
Control	14.51 ± 4.15	7.59 (5.45)	7.71 ± 1.44 <sup>a</sup>	757.50 ± 414.14
Standard	14.01 ± 1.73	7.57 (4.95)	4.14 ± 1.01 <sup>b</sup>	550.54 ± 455.55
Mangosteen Peel Methanol Extract -I	14.41 ± 1.51	7.45 (4.50)	5.45 ± 0.55 <sup>a</sup>	700.51 ± 97.55
Mangosteen Peel Methanol Extract -II	14.07 ± 4.10	7.44 (5.40)	5.09 ± 0.17 <sup>c</sup>	757.40 ± 444.05
Mangosteen Peel Methanol Extract of Mangosteen Peel -III	14.45 ± 0.55	7.15 (0.97)	4.41 ± 1.04 <sup>b</sup>	544.55 ± 444.11
<b>P-value</b>	<b>0.544</b>	<b>0.475</b>	<b>0.023</b>	<b>0.544</b>

The data in the above table shows that neither hemoglobin levels nor the number of erythrocytes and platelets showed significant differences among treatment groups. The hematologic parameter analysis results indicate variations between the treatment and control groups. Although there were no significant differences in hemoglobin (Hb) levels among groups, significant differences were observed in the number of red blood cells (RBC) and white blood cells (WBC). The standard group showed a lower leukocyte count than the control and treatment groups. Conversely, the treatment group exhibited a higher red blood cell count than the standard group. Additionally, the treatment and standard groups had significant differences in platelet count (PLT). Thus, the results indicate the influence of methanol extract of mangosteen peel on hematologic parameters, particularly on the number of red blood cells, leukocytes, and platelets.

## DISCUSSION

The research results indicate that methanol extract from mangosteen peel has the potential as an antipyretic and analgesic. In the 1 hour after treatment, the control group showed a significant decrease in body temperature compared to the other treatment groups. At 2 hours and 4 hours after treatment, body temperature tended to return to the initial conditions without significant differences among the groups. Notably, the group receiving methanol extract from mangosteen peel -III exhibited a more substantial decrease in body temperature at several time points after treatment compared to the control and standard groups. P-values less than 0.05 at various times indicate significant differences among the groups, especially in the methanol extract from the mangosteen peel -III group.

Pain is a subjective, unpleasant experience in one part of the body due to harmful stimuli. There are two types of pain, namely neurogenic and peripheral pain. Peripheral pain is activated through stimulation of afferent neurons nociceptive, while neurogenic pain is triggered by pain sensation through afferent input from pain sensation. It was performed using the hot plate method to evaluate the analgesic effect of neurogenic pain. At the same time, intraperitoneal acetic acid injection was conducted to assess the analgesic impact of peripheral pain (Nitave, Chougule and Koumaravelou, 2017; Sharma et al., 2020)

Pain sensation induced by acetic acid is a local inflammatory response caused by acetic acid injected into the peritoneum. This local inflammation occurs through arachidonic acid metabolism from phospholipids in tissues through the cyclooxygenase pathway (PGE2 and PGE2α) and lipoxygenase. Thus, products from the cyclooxygenase pathway, such as PGE2 and PGE2α, and various lipoxygenase pathway products will be abundant in the peritoneal cavity. These products from the cyclooxygenase and



lipooxygenase pathways cause swelling through cumulative permeability in capillaries and the release of various endogenous mediators that stimulate pain in nociceptor nerve endings (Afsar *et al.*, 2015)

Fever is the elevation of body temperature exhibited by various living organisms in response to the invasion of infectious agents. Brewer yeast is a lipopolysaccharide (exogenous pyrogen) that is a component of the cell wall of gram-negative bacteria. When pyrogens like lipopolysaccharide (LPS) or brewer yeast enter the body by damaging the natural barrier, this brewer yeast then binds to an immunologic protein called Lipopolysaccharide Binding Protein (LBP). This binding stimulates the synthesis and release of various endogenous cytokines such as IL-1, IL-5, and TNF $\alpha$ . These endogenous cytokines easily pass through the blood-brain barrier and act on the preoptic/anterior hypothalamus, activating the arachidonic acid pathway and synthesizing and releasing prostaglandin E2. PGE2 produced from the cyclooxygenase-2 path causes an increase in body temperature. (Santra *et al.*, 2012; Eldahshan and Abdel-Daim, 2015)

The antipyretic and analgesic effects of mangosteen peel are related to the phenolic and flavonoid content present in the peel. Various studies have reported the analgesic results of alkaloid, phenolic, and flavonoid compounds. Flavonoids can inhibit the biosynthesis of prostaglandins involved in the immune response and are also end products of the cyclooxygenase and lipooxygenase pathways. Furthermore, flavonoids also influence protein kinase, one of the regulatory enzymes that can inhibit the inflammatory process. (Eldahshan and Abdel-Daim, 2015) In addition to flavonoids, Gaichu *et al.* (2017) have reported that alkaloids, as phytochemical compounds, also inhibit the synthesis of prostaglandins, a product of the cyclooxygenase pathway. (Gaichu *et al.*, 2017) Therefore, it can be concluded that the analgesic and antipyretic effects of Mangosteen Peel are due to the presence of alkaloids, phenols, and flavonoids. These phytochemical compounds inhibit the biosynthesis of prostaglandins, preventing the inflammatory cascade and ultimately producing analgesic and antipyretic effects.

Several previous studies support the findings of this research. One of them (Puspitaningrum, Kusmita, and Setyani, 2012) conducted a similar study, and the results with ethanol extract of mangosteen peel (*Garcinia mangostana* L) proved to have analgesic-antipyretic effects with an effective dose of 50 mg/kg body weight in rats. Another study (Ponggele, 2012), which investigated the analgesic properties of mangosteen peel, reported that the extract showed analgesic effects from 20 to 120 minutes, with the maximum effect observed at 90 minutes, using a 10% concentration in Swiss mice.

## CONCLUSION

Overall, this study demonstrates that methanol extract from mangosteen peel has the potential as an antipyretic and analgesic in male Wistar rats. Especially at the highest dose (150 mg/kg body weight), the extract shows antipyretic effects after 5 hours of administration, while analgesic effects are observed simultaneously. Although the control group exhibited a significant decrease in body temperature at 1 hour post-treatment, the group treated with methanol extract from mangosteen peel -III showed a more substantial decrease at various times after treatment compared to the control and standard groups. Hematological analysis results also indicate a significant decline with an increasing dose of methanol extract from mangosteen peel. Therefore, it can be concluded that methanol extract from mangosteen peel has the potential antipyretic and analgesic effects that warrant further exploration in drug development.

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# A STUDY ON THE RELATIONSHIP BETWEEN SERVICE QUALITY AND CUSTOMER SATISFACTION: WITH REFERENCE TO SELECTED PRIVATE BANKS IN BHOPAL CITY

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## ABSTRACT

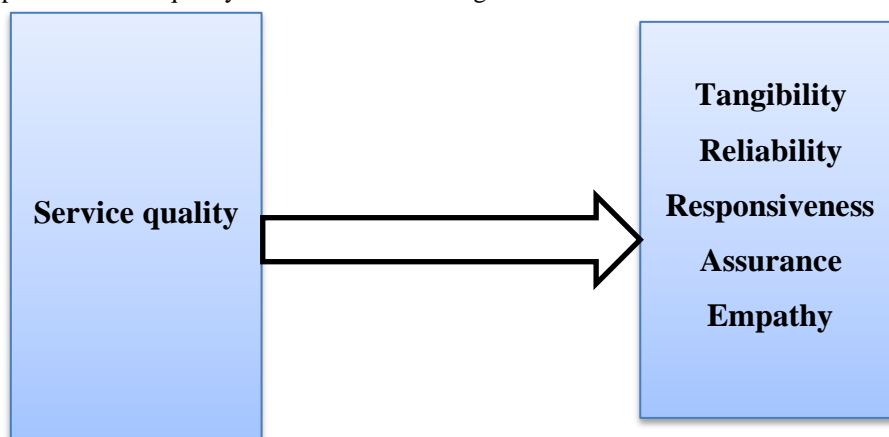
*The purpose of this study is to determine the relationship between service quality and customer satisfaction among the selected private sector banks in Bhopal city. The study is based on primary data which has been collected among the peoples of various selected banks. The final survey was conducted among the 200 customers in which 153 customers have been positively participated in the survey. In order to explore the relationship between service quality and customer satisfaction i have identified 5 service quality parameters which may be highly influence the satisfaction level of the customer. These service quality parameters are tangibility, reliability, responsiveness, assurance and empathy. The data for present study has been calculated by using t test at the significant level 0.05. The findings of the study explore that among all the service quality parameters reliability, tangibility, assurance and responsiveness has been found significantly related with customer satisfaction. However, empathy of the various selected banks is not have a significant impact on the customer satisfaction.*

## INTRODUCTION

The service quality provides the impetus in order to increase the customers need for a particular product and services. However, the quality of service is most important parameters which may negatively and positively impact the satisfaction level of the customers. The banking industry is a largest service industry in the world with higher number of customers. However, banking industry using traditional as well as modern technology to improve quality of service in order to increase the level of customer satisfaction. Service quality and customer satisfaction both are the important aspects of banking since the banking industry is being introduced. On the other hand customer satisfaction is expected to the result from the excellence service quality from the customer point of view which may improve customer engagement and inter relationship. Most of the research study has been explore that service quality is only the critical element which is most important to the success of banking industry. The present research study is related with the relationship between service quality and customer satisfaction among the customers of various private sector banks in Bhopal city. The explanation of this relationship between service quality and customer satisfaction is based on various service quality parameters such as tangibility, reliability, responsiveness, assurance and empathy.

### Aspect / parameters of service quality

The various aspect of service quality can be seen in the diagram







1. **Tangibility:** Tangibility refers the physical facilities and availability of physical equipment which may be related to the customer's expectation.
2. **Reliability:** reliability of service is refers the dependability of service between the employees and customers. However, reliability refers the trust showed by employee for future services.
3. **Responsiveness:** Responsiveness of the service is highly influence parameters which are related with first time interaction between employee and customers at the beginning of service.
4. **Assurance:** Assurance refers the commitment for complication of future service as demand by the customers during the organization visit.
5. **Empathy:** empathy of service quality is most important parameter which works as remedies and sympathy on the frailer of service.

## REVIEW OF LITERATURE

**Anuj Bhowmick et al (2023)**, has been conducted a research study to explore conceptual models and factors of product quality directly impact the customer satisfaction and also discussed the various factors whose may be effective for development and sustainability of business. In order to major the impact of product quality on customer satisfaction three independent variables has been identified such as product features, value chain and consumer behavior. The findings of the study explore that product development highly influence the customer satisfaction after reducing the product failures. Furthermore it has been point out by the author that customer satisfaction work as mediator to improve the service value chain by leading the customer loyalty. However consumer behavior extend the life of the product and influence the satisfaction of the customer

**Yabg Yingfei, et al (2023)**, has been conducted a research and explore that service quality is most important determinant of peoples commitment to the organization. However it is most important to examine the service quality in order to increase the corporate image. The purpose of this study is to explain the role service quality and customer experience with mediating effect of corporate image. The study was based on primary data and also use convenience sampling method to collect the data among the 366 customers. The findings of the study shows that service quality and customer experience have a significant impact on the level of customer's commitments. On the other hand study also found that service quality and customer satisfaction having the major contribution in order to increasing the corporate image. Furthermore the findings states that mediating role has been played by corporate image between service quality and customer commitment.

**Nurul Fazleen Mohd Zariman et al (2023)** has been conducted a research study to determine the E-service quality of mobile commerce application and customers loyalty intention. The research study was based on SERVQUAL model. Furthermore the study examine mediating effect of customer satisfaction on the relationship between loyalty intention and quality of service. The study was based on primary data which has been collected by the purposive sampling method among the 120 customers. The findings of the study indicated that all the dimensions of service quality is highly affected the customer satisfaction and customer satisfaction mediate the relationship between all the dimensions of service quality.

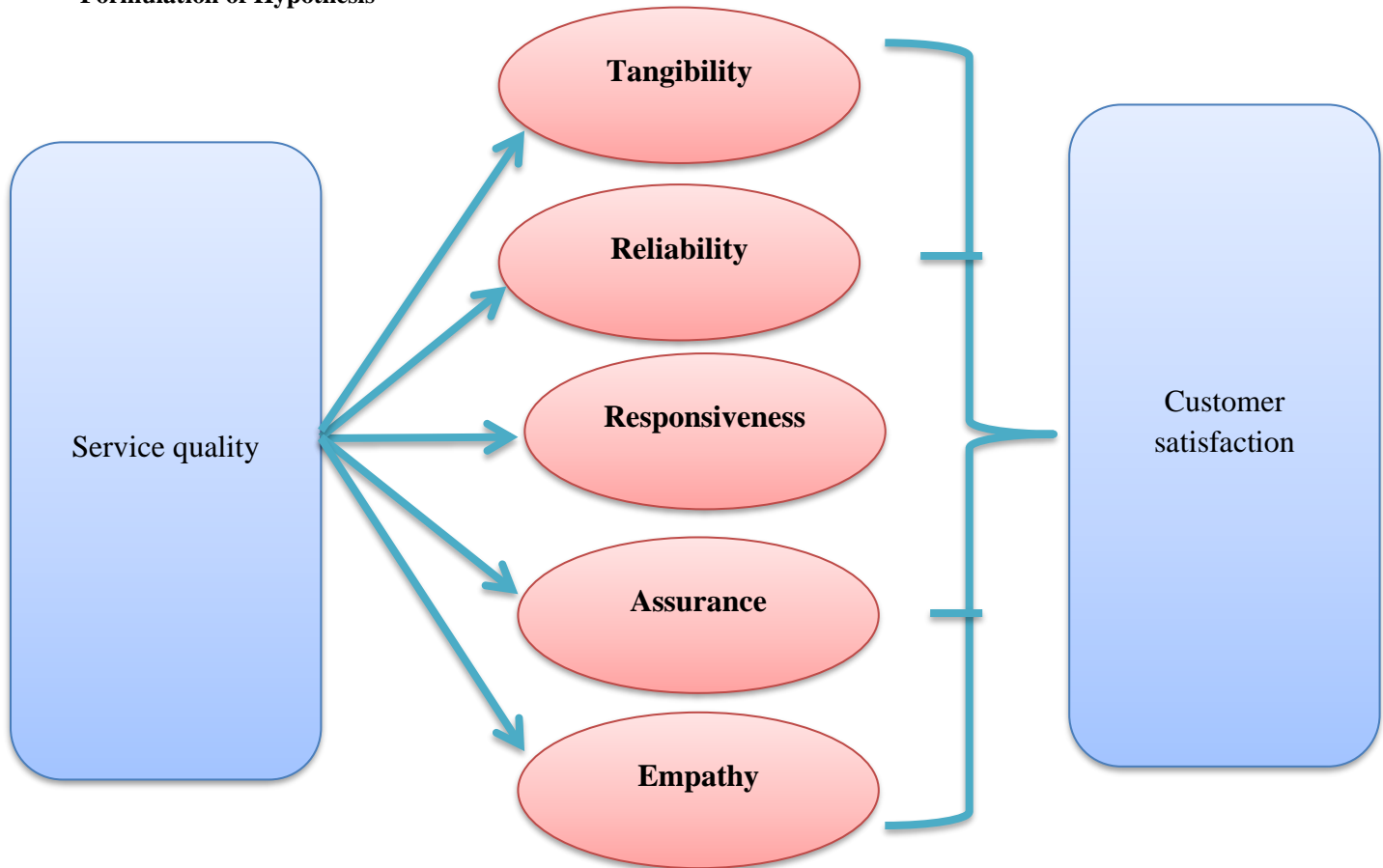
**Ugo Chuks Okolie et al. (2022)**, has been conducted a research study in order to explore the relationship between service quality and customer satisfaction with respect to the banking sector. In order to examine the relationship the study adopted SERVQUAL model. The study was based on primary data which has been obtained by using the structure questionnaire method and also convenience sampling techniques has been adopted by the author. The questionnaire distributed among the 420 peoples. However 292 peoples return the filled questionnaire. The finding of the study indicated that all the dimensions of the service quality are highly related with customer satisfaction. However study found positive service gap between expectation and perception of customer towards service quality of banks. Furthermore it has been recommended by the author that bank must be work to improve reliability and assurance towards customer service because service gap between expectation and perception with respect to reliability and assurance is average.

## OBJECTIVES OF THE STUDY

1. To study the relationship between service qualities of banks and customer satisfaction towards **tangibility**.
2. To study the relationship between service qualities of banks and customer satisfaction towards **reliability**.
3. To study the relationship between service qualities of banks and customer satisfaction towards **Responsiveness**.
4. To study the relationship between service qualities of banks and customer satisfaction towards **Assurance**.
5. To study the relationship between service qualities of banks and customer satisfaction towards **empathy**.



### Formulation of Hypothesis



### The Hypotheses of the study are as under

- H<sub>01</sub>:** Tangibility of service has no significant relationship with customer satisfaction among the selected private banks.
- H<sub>a1</sub>:** Tangibility of service has significant relationship with customer satisfaction among the selected private banks.
- H<sub>02</sub>:** Reliability of service has no significant relationship with customer satisfaction among the selected private banks.
- H<sub>a2</sub>:** Reliability of service has significant relationship with customer satisfaction among the selected private banks.
- H<sub>03</sub>:** Responsiveness of service has no significant relationship with customer satisfaction among the selected private banks.
- H<sub>a3</sub>:** Responsiveness of service has significant relationship with customer satisfaction among the selected private banks.
- H<sub>04</sub>:** Assurance of service has no significant relationship with customer satisfaction among the selected private banks.
- H<sub>a4</sub>:** Assurance of service has significant relationship with customer satisfaction among the selected private banks.
- H<sub>05</sub>:** Empty of service has no significant relationship with customer satisfaction among the selected private banks.
- H<sub>a5</sub>:** Empty of service has significant relationship with customer satisfaction among the selected private banks.

### RESEARCH METHODOLOGY

Research methodology is a systematic process to the identification of the solution of any problem. In a research study methodology playing most significant role because it helps researcher to prepare a appropriate framework of the study. There are different types of research are being used by the customers which is based on nature of the research problem. The present research study is quantitative in nature and primary data has been obtained to explore the relationship between service quality of banks and customer satisfaction.

### DATA COLLECTION

The data for the present study has been collected by using different methods which is applicable on the nature of data.

1. **Primary data:** The primary data for present study has been collected by using the questionnaire method on the basis of various parameters of service quality and customer satisfaction.
2. **Secondary Data:** Secondary data for the study has been collected from various published research papers and study available on the different platforms.



**Sampling**

Sampling is a process to identified pre-determined number of population among the different groups and areas. The sampling process of the study has been completed by using four steps such as

- **Sampling design:** Designing of the sampling is consisting with size, methods and areas. The sample for the present study has taken among the group of customers of various selected banks. The sample was taken from the different locations of banks in Bhopal city. The final questioner was distributed among the 200 respondent in which 153 responded have been positively replied with compilation of survey questions.
- **Sample method:** Convenient method of sampling was used to collect the sample among the entire population.
- **Sample Size:** As discussed in sample design the 153 peoples positively respond the survey. However, sample size of the study is 153.
- **Sample area:** Sample area for study is Bhopal city which further classified in different locations of banks were number of branches are located.

**Scaling of data**

Scaling of data for the present study has been done by using likert scale method. In this process of scaling five points Likert scale were used such as 01 strongly disagree to 05 strongly agree.

**Tools for data analysis**

The data analysis and testing of hypothesis was taken place by using t test at the significant level 0.05.

**DATA ANALYSIS AND TESTING OF HYPOTHESIS**

**Hypothesis**

**Table: Relationship between service quality and customer satisfaction**

Hypothesis	Statement	df	t	P value	Result
H <sub>a1</sub>	Relationship between tangibility and customer satisfaction	4	9.22	0.001	Significant
H <sub>01</sub>					
H <sub>a2</sub>	Relationship between reliability and customer satisfaction	4	11.22	0.021	Significant
H <sub>02</sub>					
H <sub>a3</sub>	Relationship between responsiveness and customer satisfaction	4	6.22	0.016	Significant
H <sub>03</sub>					
H <sub>a4</sub>	Relationship between assurance and customer satisfaction	4	12.72	0.321	Not Significant
H <sub>04</sub>					
H <sub>a5</sub>	Relationship between empty and customer satisfaction	4	8.50	0.004	Significant
H <sub>05</sub>					

**FINDINGS**

The above table explore the Relationship between service quality and customer satisfaction.

**On the basis of data analysis the findings of the study are as**

1. In the above table relationship between service quality and customer satisfaction with respect to tangibility explored. Since the value of t is 9.22, and p value is 0.001.The relation has found significant. However, it may explore that, the reliability of some banks is highly related with customer satisfaction. Study accepted alternative hypothesis and reject Null hypothesis.
2. In the above table relationship between service quality and customer satisfaction with respect to reliability explored. Since the value of t is 11.22, and p value is 0.021.The relation has found significant. However, it may explore that, the reliability of some banks is highly related with customer satisfaction. Study accepted alternative hypothesis and reject Null hypothesis.
3. In the above table relationship between service quality and customer satisfaction with respect to responsiveness explored. Since the value of t is 6.22, and p value is 0.016.The relation has found significant. However, it may explore that, the reliability of some banks is highly related with customer satisfaction. Study accepted alternative hypothesis and reject Null hypothesis.
4. In the above table relationship between service quality and customer satisfaction with respect to assurance explored. Since the value of t is 12.72, and p value is 0.321.The relation has found not significant. However, it may explore that, the reliability of some banks is not related with customer satisfaction. Study reject alternative hypothesis and accepted Null hypothesis.
5. In the above table relationship between service quality and customer satisfaction with respect to empathy explored. Since the value of t is 8.50, and p value is 0.004.The relation has found significant. However, it may explore that, the reliability of some banks is highly related with customer satisfaction. Study accepted alternative hypothesis and reject Null hypothesis.



## CONCLUSIONS

In the present scenario banking sector played a significant role for economic development of the country because banking sector is one of the large service sector in the world. However, the banking sector has a large number of active customers for banking services. The present research study related with relationship between service quality and customer satisfaction with reference to selected private banks. In order to explore the relationship between service quality and customer satisfaction the five parameters of banking service have been discussed such as tangibility, reliability, responsiveness, assurance and empathy. The findings of the study based on significant relationship between all the parameters of banking services and satisfaction of the customers. In the findings it is clearly reveals that among all the five parameters tangibility, reliability, responsiveness and empathy has been found significant and positively related with customer satisfaction. However, assurance of the banking services has been found not significant.

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# GENDER DIFFERENCES IN ATTITUDE TOWARDS MATHEMATICS AND ACADEMIC ACHIEVEMENT AMONG SECONDARY LEVEL STUDENTS

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Article DOI: <https://doi.org/10.36713/epra16372>

DOI No: 10.36713/epra16372

## ABSTRACT

*Attitudes towards mathematics significantly influence academic success. This study explores the relationship between attitude towards mathematics and academic achievement among secondary level students, particularly examining gender differences. A sample of 500 students from four schools (two boys' and two girls' schools) participated, with 200 boys and 300 girls, aged mostly 15 and 16. Data was collected through a 25-item questionnaire adapted from existing literature and modified by Steinback and Gwizdala. Academic achievement was assessed using students' recent mathematics examination scores. Results indicate that girls outperformed boys in mathematics achievement, yet attitude towards mathematics did not correlate with academic success. This study underscores the importance of understanding attitudes towards mathematics, particularly in fostering academic performance, especially among girls.*

**KEYWORDS:** *Attitude towards mathematics, academic achievement, secondary level students, gender differences, mathematics education, gender equity, attitudes, gender stereotypes.*

## INTRODUCTION

Education serves as a pathway to human enlightenment and empowerment, fostering a higher quality of life and nurturing well-rounded individuals. An effective educational system unfolds the potential of learners and enhances their skills. Should education fail to enable individuals to realize their potential, it becomes devoid of meaning and relevance. Each child's education should aim to cultivate worth and instill the qualities of a responsible citizen. Within the realm of school education, mathematics holds a pivotal role due to its diverse applications in both individual and societal contexts. Mathematics not only provides a practical framework for understanding its real-world significance but also cultivates problem-solving skills and a scientific mindset among students. This, in turn, fosters a positive attitude towards the subject, characterized by proficient problem-solving abilities, abstract and logical thinking, curiosity, precision, and a penchant for inquiry. Such attributes contribute significantly to academic development.

However, it is observed that only a few secondary schools provide ample opportunities for students to develop a positive attitude towards mathematics and hone their problem-solving abilities. Therefore, this research aims to investigate the dimensions leading to a positive attitude towards mathematics and the variables influencing both attitude and problem-solving ability among secondary school students. As aptly stated, 'Mathematics education is to a nation what protein is to a young human organism,' emphasizing the crucial role mathematics plays in addressing the daily challenges of society.

## Objectives of the Study

1. To investigate the significant difference in mean attitude towards Mathematics scores between secondary level boys and girls.
2. To determine if there is a significant difference in mean achievement towards Mathematics scores among secondary level boys and girls.
3. To examine the correlation between attitude towards Mathematics and academic achievement among secondary level girls.
4. To explore the correlation between attitude towards Mathematics and academic achievement among secondary level boys.



**Significance of the study**

The significance of this study lies in its contribution to understanding the relationship between attitudes towards mathematics and academic achievement among secondary level students, with a particular focus on gender differences. By identifying existing gender disparities in mathematical achievement and attitudes, this research underscores the importance of addressing gender inequities in education and promoting equal opportunities for both male and female students in mathematics education. Moreover, the study emphasizes the role of attitudes towards mathematics in academic success, highlighting the need to foster positive attitudes among students, especially girls, through strategies that nurture interest, curiosity, and confidence in mathematics. The findings also have practical implications for informing educational practices and pedagogical approaches in mathematics teaching, advocating for inclusive teaching practices and tailored interventions to engage students effectively. Furthermore, the evidence-based insights provided by this research can inform educational policies aimed at promoting gender equity and improving mathematics education outcomes, guiding policymakers in designing initiatives to address gender biases and create a supportive learning environment conducive to enhancing the quality and equity of mathematics education in secondary schools.

**Hypothesis**

1. There is no significant difference in mean attitude towards Mathematics scores between secondary level boys and girls.
2. There is no significant difference in mean achievement towards Mathematics scores among secondary level boys and girls.
3. There is no significant correlation between attitude towards Mathematics and academic achievement among secondary level girls.
4. There is no significant correlation between attitude towards Mathematics and academic achievement among secondary level boys.

**RESEARCH METHODOLOGY**

**Sample**

A sample of 500 students was selected using two-level cluster sampling. In the first stage, four schools - two boys' schools and two girls' schools - were randomly chosen. Subsequently, 300 girls and 200 boys were randomly selected from these schools in Trichirappalli district, Tamil Nadu, India.

**Research Tool**

This study employed a questionnaire survey as the research design. To measure students' attitudes towards mathematics, a 25-item questionnaire was self-developed based on available literature on the subject. Additionally, an instrument developed by Steinback and Gwizdala was utilized. Each item required responses on a three-point scale, with categories of agree, disagree, and undecided. The questionnaire comprehensively represented the construct of attitude toward math. To facilitate respondents, the questionnaire was translated into Urdu. Furthermore, six items were included concerning the biodata of each student, such as the student's name, class, family size, birth order, and socio-economic background (upper, lower, middle).

**Scoring Data**

Student responses to each item were scored using a scale of 1 for 'disagree', 2 for 'undecided', and 3 for 'agree'. The total attitude scores were calculated for each student by summing the scores on each item of the questionnaire.

**Hypothesis**

1. There is no significant difference in mean attitude towards Mathematics scores between secondary level boys and girls.
2. There is no significant difference in mean achievement towards Mathematics scores among secondary level boys and girls.
3. There is no significant correlation between attitude towards Mathematics and academic achievement among secondary level girls.
4. There is no significant correlation between attitude towards Mathematics and academic achievement among secondary level boys.

**Hypothesis testing**

**H1:** There is no significant difference in mean attitude towards Mathematics scores between secondary level boys and girls.

**Table 1**

**Significance difference between mean attitude towards Mathematics score among Secondary level boys and girls**

Groups	N	Mean	SD	SE	t	P
Girls	300	57.67	0.45	0.24	12.71	<.05
Boys	200	60.72	0.27			

df 498 t at 0.05 level 1.960



Table 1 shows the obtained t-value is 12.71, whereas the table value at the .05 level of significance indicates a significant difference between mean attitude scores of boys and girls in mathematics. Therefore, there may be a distinction among mean attitude rankings of boys and girls in mathematics.

**H2:** There is no significant difference in mean achievement towards Mathematics scores among secondary level boys and girls.

**Table 2**

**Significance difference between mean achievement towards Mathematics score among Secondary level boys and girls**

Groups	N	Mean	SD	SE	t	P
Girls	300	54.04	1.01	160.27	0.02	>.05
Boys	200	57.00	0.85			

df 498 t at 0.05 level 1.960

Table 2 shows the obtained t-value is 0.02, whereas the table value at the .05 level of significance indicates a non-significant difference between mean achievement scores of boys and girls in mathematics. Therefore, there's no distinction among mean attitude ratings of boys and girls in mathematics.

**H3:** There is no significant correlation between attitude towards Mathematics and academic achievement among secondary level girls.

**Table 3**

**Significance of correlation between Attitude towards Mathematics and Mathematic achievement with respect to Secondary level girls**

Variables	N	r	P
Attitude Vs Achievement	300	0.32	<.05

df 298 r at 0.05 level 0.1946

Table 3 illustrates the correlation coefficient between attitude scores and academic achievement scores of the total sample of girls belonging to Government schools, which was 0.32. The table value of the correlation coefficient at the .05 level of significance was 0.1946. The correlation coefficient between the variables of attitude and academic achievement was, therefore, significant.

**H4:** There is no significant correlation between attitude towards Mathematics and academic achievement among secondary level boys.

**Table 4**

**Significance of correlation between Attitude towards Mathematics and Mathematic achievement with respect to Secondary level boys**

Variables	N	r	P
Attitude Vs Achievement	200	0.13	>.05

df 198 r at 0.05 level 0.1946

Table 4 illustrates the correlation coefficient between attitude scores and academic achievement scores of the total sample of boys belonging to Government schools, which was 0.13. The table value of the correlation coefficient at the .05 level of significance was 0.1946. The correlation coefficient between the variables of attitude and academic achievement was, therefore, non-significant.

## RESULTS AND DISCUSSION

The findings of this study reveal several significant points:

1. Female students generally demonstrated better performance in mathematics examinations compared to male students. Although a positive correlation was observed between attitude towards mathematics and math achievement, this relationship was only significant among girls. Conversely, in the group of boys, the correlation coefficient did not reach a significant value.
2. The results underscore the existing gender disparities in mathematical achievement and attitudes. This aligns with previous studies such as those by Sinnes (2005), which suggest that females are capable of producing scientific knowledge equal to males given adequate rigor in scientific inquiry. Additionally, Abiam and Odok (2006) found no significant relationship between gender and achievement in various branches of mathematics, while Opolot-Okurut (2005) reported higher mean scores for attitudinal variables among males compared to females.
3. Addressing the gender gap in mathematics achievement requires concerted efforts. Both male and female students should engage in a cooperative environment, exchanging knowledge and coordinating efforts in mathematics teaching and learning. It's essential to educate female students about the importance of mathematics as a fundamental tool for further education.



4. Mathematics teaching and assessment methods must be free from bias to ensure equality between genders, fostering an environment where both males and females perceive themselves as equals, capable of competing and participating fully in classroom activities.

## CONCLUSION

This study elucidates the intricate relationship between attitudes towards mathematics and academic achievement among secondary level students, with a particular emphasis on gender differences. The findings underscore the significance of understanding and addressing attitudes towards mathematics in fostering academic success, particularly among girls who demonstrated superior performance in mathematics examinations compared to boys. Despite this, the study reveals that attitude towards mathematics did not significantly correlate with academic success overall. The research highlights the existing gender disparities in mathematical achievement and attitudes, emphasizing the need for concerted efforts to promote equal opportunities and foster positive attitudes towards mathematics among all students. The results contribute to the body of knowledge on gender equity in education and underscore the importance of inclusive teaching practices and interventions aimed at nurturing interest, curiosity, and confidence in mathematics among students, irrespective of gender. Moving forward, educational policies and practices should be informed by evidence-based insights to address gender biases and create an environment conducive to enhancing the quality and equity of mathematics education in secondary schools.

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# A RANDOM FOREST-BASED MODEL OF SCORE FLUCTUATIONS IN PROFESSIONAL TENNIS MATCHES

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Article DOI: <https://doi.org/10.36713/epra16361>

DOI No: 10.36713/epra16361

## ABSTRACT

*In tennis matches, the victory and turning points of the game are often influenced by various factors. To explore the factors that affect match fluctuations (changes in the flow of scoring) and to provide suggestions for athletes' match strategies, this paper first identifies general indicators through a literature review and uses logistic regression to determine the effectiveness of the chosen model. Secondly, it employs the Fourier function fitting to identify turning points in the match. Considering the scarcity of turning points in the game, this paper uses the SMOTE method to expand the dataset. Subsequently, it tests with a random forest classification model, achieving an accuracy of 93.433%. To improve the model's accuracy, several indicators were added to the original model, resulting in a correct rate of 98.51%. Finally, to verify the model's results and applicability, the model was applied to other matches with good results. A sensitivity analysis was conducted, revealing good model stability. The model results indicate that the main factors affecting the appearance of turning points include the player's movement distance during the match, whether there are changes in the depth and width of the return, score differences, and the maximum number of consecutive wins. When tested in other types of matches, we found that the importance of these factors may change to some extent, but the results remain satisfactory.*

**KEYWORDS:** Volatility prediction, Random Forest, Logistic regression, Sensitivity analysis.

## 1- INTRODUCTION

Tennis is known as the "second-largest global ball sport," a reputation earned for its intense competition and elegant techniques. It enjoys widespread popularity and a long history around the world. In recent years, the professionalization of tennis has accelerated, bringing professional tennis events into the broader public view. Studying the winning factors in professional tennis matches is of significant importance. Scholars have adopted a variety of perspectives and methods to analyze the winning patterns in professional tennis. Some researchers have summarized the winning patterns in competitive tennis by studying the characteristics of tennis matches and the training and competitive experience of athletes [1]; others have conducted comparative analyses on technical and tactical indicators by statistically analyzing open tennis match data, thereby highlighting the importance of technical and tactical factors in professional tennis matches [2]; and some have selected relevant indicators to establish models for analysis, thereby identifying the key factors that affect match outcomes [3].

A review of the research results indicates that while there are many studies on the winning patterns in professional tennis, models that reflect the flow of scoring and the dominance of athletes within smaller time spans in a match are relatively lacking. In fact, in the fierce competition of professional tennis matches, it is rare for an athlete to maintain an advantage throughout the end of the match. Instead, both athletes drive the match forward along a dynamic curve of alternating dominance. This dynamic curve can be referred to as the athlete's momentum curve, reflecting the real-time flow of scoring in a match. It is reasonable to hypothesize that



there are multiple turning points in a match, within which the higher probability of winning points shifts from one athlete to another over a small range of turning points. Research on indicators affecting the occurrence of turning points not only allows for reasonable prediction of point outcomes but also provides a scientific approach for athletes to gain an advantageous position in response to events that can affect the flow of scoring during the match.

After summarizing a large amount of literature, this study selects and analyzes indicators affecting turning points from three directions: psychological factors, physical factors, and strategic factors, as independent variables. It then applies the Fourier function fitting to the data of each point in the thirty-one matches following the second round of the men's singles at the 2023 Wimbledon Tennis Championships. The obtained turning points are used to expand the dataset and form the dependent variables, establishing a model to analyze and identify the key factors affecting match turning points. The Wimbledon Men's Tennis Open, as one of the world's top professional tennis events, provides a scientifically robust data source for studying professional tennis matches. Researching the factors that influence turning points also offers reference significance for coaches and athletes in deciding what strategies to adopt when facing events that can impact the flow of scoring during matches.

## 2.1 MODEL INTRODUCTION

### 2.1.1 FOURIER FUNCTION FITTING TO IDENTIFY TURNING POINTS

In sports matches, the accurate identification of turning points is crucial for understanding the rhythm and dynamics of the game. To capture these critical moments, we employed the Fourier function fitting method to analyze the scoring changes in the match. This approach reveals the periodic patterns of score differences over time, thereby identifying potential turning points.

We first constructed a time series model for the score difference in the match, which can be represented as:

$$S(t) = a_0 + \sum_{n=1}^N \left( a_n \cos\left(\frac{2\pi nt}{P}\right) + b_n \sin\left(\frac{2\pi nt}{P}\right) \right)$$

In the model,  $S(t)$  represents the score difference at time point  $t$ ,  $a_0$  is the constant term,  $a_n$  and  $b_n$  are the Fourier coefficients,  $N$  is the order of the Fourier series, and  $P$  is the period, which reflects the repetitive pattern of score changes in the match.

To find the extremum points of the score difference curve, we need to solve the first-order derivative of  $S(t)$  and find its zeros. The first-order derivative  $S'(t)$  is expressed as:

$$S'(t) = \sum_{n=1}^N \left( -\frac{2\pi n a_n}{P} \sin\left(\frac{2\pi nt}{P}\right) + \frac{2\pi n b_n}{P} \cos\left(\frac{2\pi nt}{P}\right) \right)$$

Extremum points are the points where  $S'(t)$  equals zero, that is,  $S'(t) = 0$ . By solving this equation, we can locate the potential turning points in the match.

### 2.1.2 FEATURE INDICATOR EXTRACTION

To gain a comprehensive understanding of player performance and match dynamics, after reviewing literature [5][6][7], we have proposed a set of integrated indicators that cover three dimensions: psychological, physiological, and strategic. The psychological factor indicators include ranking points, the maximum number of consecutive victories, the number of ACEs, the number of winners, and the number of double faults. Physiological factor indicators, such as the distance covered at the net, serve as quantitative indicators of the player's running distance, which is related to recent physical exertion and its impact on scoring outcomes. Strategic factor indicators, including changes in serve width and depth, provide strategic insights into the variations in a player's serving



patterns, which affect the effectiveness of attacks and create opportunities based on the opponent's positioning. The selection and rationale for these indicators are displayed in Table 1.

**Table no 1: Indicator selection and rationale**

Variable	Explanation	Rationale
Point	The point number in the game	When a new game starts, both players have a higher frequency of consecutive balls, and the competition for the key points will greatly affect the future direction of the game.
Consecutive victories	Number of consecutive victories	Winning points within the first five goals, the value of which we believe has a large impact on a player's "momentum" and is important to the flow of scoring in a game.n
Aces	Number of aces in the previous five balls	Aces can be a great morale booster for your team. In the short period of time following an ace, a player's "momentum" increases and the probability of winning the match increases.
Winners	Number of winners in the previous five balls	Many "strikes" in the previous five balls. As with aces in the previous five goals, this indicator has a significant impact on increasing a player's "momentum";
Double fault	Number of double faults in the previous five ball	Number of "double faults" within the first five balls. The number of "double faults" will interrupt the player's rhythm and reduce the player's "momentum". We believe that "double faults" have a large impact on players' psychological factors.
Distance difference	Difference in running distance in previous points	The difference in distance run by players within the first five goals reflects the re- cent physical exertion of players, which is closely related to the current point winners and losers.
Change width & change depth	The width of the stroke and depth of the stroke changes	Changes in the width and depth of a server's serve reflect changes in a player's game strategy.

### 2.1.3 LOGISTIC REGRESSION TO VALIDATE THE EFFECTIVENESS OF INDICATOR SELECTION

In the process of building a predictive model, selecting the right feature indicators is crucial for enhancing the model's forecasting performance. To ensure that the indicators we have chosen can effectively reflect the turning points in a match, we have employed logistic regression analysis to verify their relevance and significance.

Logistic regression, as a widely used statistical method, is suitable for binary classification problems and helps us evaluate the impact of each feature indicator on the prediction outcome. The form of the model is as follows:

$$\log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n$$

In the model,  $p$  represents the probability that a sample is a turning point,  $\beta_0$  is the intercept of the model,  $\beta_1, \beta_2, \dots, \beta_n$  are the coefficients of the feature variables, and  $X_1, X_2, \dots, X_n$  are the selected feature indicators.

We determine the coefficients \beta for each feature indicator through logistic regression analysis. These coefficients reflect the degree to which each feature variable affects the probability of a turning point occurring. Indicators with a significance level P-value less than 0.05 are considered to significantly influence the prediction of turning points and are retained in the final model.

Through this process, we not only validate the effectiveness of the selected indicators but also enhance the accuracy and reliability of the model in predicting match turning points. This lays a solid foundation for subsequent random forest classification predictions, ensuring that our model can capture key dynamic changes in the match.

### 2.1.3 USING SMOTE TO EXPAND THE DATASET

Considering that there are fewer fluctuation points and more non-fluctuation points in the dataset, leading to an imbalance in the data, the SMOTE method can balance the distribution of categories by adding samples from the minority class, reducing the risk of



overfitting while improving the model's generalization ability [4]. We use the SMOTE method to expand the dataset. The steps for SMOTE sample synthesis are as follows:

- Randomly select a positive sample from fluctuation points:  $X_{positive}$ .
- Use the KNN algorithm to find K nearest neighbors of the positive sample:  $\{X_{neighbor,1}, X_{neighbor,2}, \dots, X_{neighbor,K}\}$ .
- Randomly select a neighbor:  $X_{selected}$ .
- Synthesize a new sample using interpolation:  $X_{synthetic} = X_{positive} + r(X_{selected} - X_{positive})$ , where  $r$  is a random number between 0 and 1. By using the SMOTE method to expand the dataset, our dataset has expanded from 7285 to 17246, with the proportion of fluctuation points increasing from less than 1/60 of the original data to nearly 1/3.

## 2.2 RANDOM FOREST CLASSIFICATION PREDICTION

Random Forest builds on the Bagging ensemble constructed with decision trees as base learners, further introducing the random selection of attributes during the training process of decision trees. The Random Forest algorithm is simple, easy to implement, and has low computational overhead, showing strong performance in many practical tasks [8]. Here are the specific steps on how Random Forest works:

### - Data Resampling

For the original dataset  $D$ , perform  $B$  times of bootstrap sampling, generating a new dataset  $D_b$  each time.

$$D_b = \{(x_i, y_i) \mid x_i \sim D, y_i \sim Y, i = 1, \dots, n\}$$

where  $n$  is the number of samples,  $x_i$  is the feature vector, and  $y_i$  is the corresponding class label.

### - Building Decision Trees

For each dataset  $D_b$ , construct a decision tree  $T_b$ . When selecting the splitting attribute at each node, choose the best splitting attribute from  $m$  randomly selected features.

The optimal splitting attribute  $A_{opt}$  can be selected by minimizing the Gini impurity loss:

$$A_{opt} = \arg \min_{A \in \{m\}} \Delta(A)$$

Where  $\Delta(A)$  is the reduction in Gini impurity brought by attribute  $A$ .

### - Collective decision-making:

For a new sample  $x$ , let it pass through each decision tree  $T_b$  to get  $B$  prediction results  $\hat{y}_b$ .

The final classification  $\hat{y}$  is determined by majority voting:

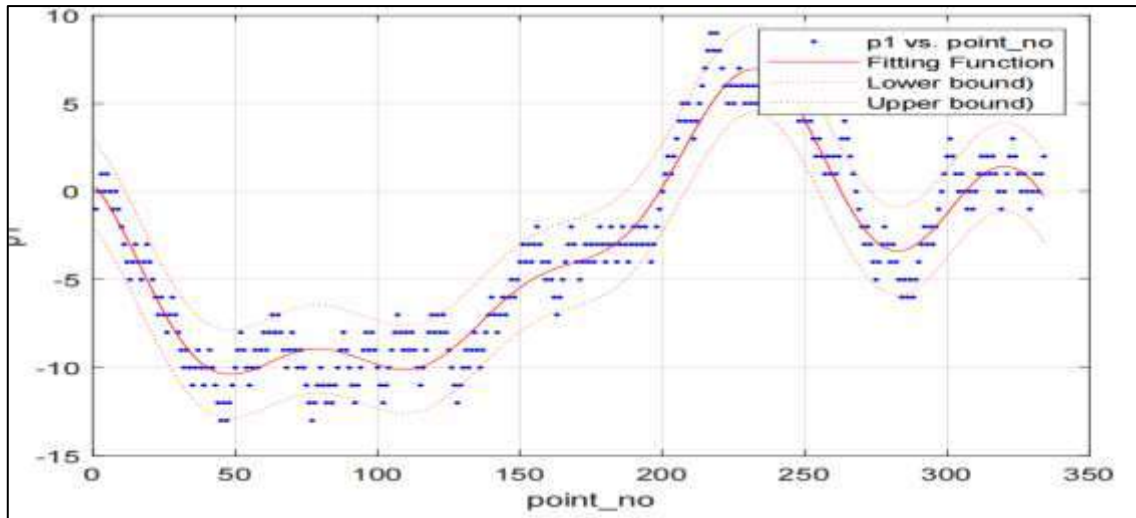
$$\hat{y} = \text{mode}\{\{\hat{y}\}_b \mid b = 1, \dots, B\}$$

Through this method, the Random Forest model can effectively predict turning points in tennis matches, providing valuable insights for coaches and analysts. The assessment of feature importance and model cross-validation further enhances the model's predictive power and generalizability.

## 3 MODEL RESULTS AND VALIDATION

### 3.1 MODEL PREPROCESSING RESULTS:

In the preprocessing stage, we first use a multivariate Fourier function to identify the extreme points in the game score, which symbolizes the transformation of the game momentum. The fitted Fourier function image shows the direction and turning point of the score (Figure 1)



**Figure 1: Fourier function fitting diagram**

Furthermore, in order to address the issue of relatively scarce turning point data, we adopted the Synthetic Minority Class Over sampling technique (SMOTE). After SMOTE processing, the dataset was expanded from 7285 samples to 17246 samples, and the proportion of fluctuation points increased from less than 1/60 of the original data to nearly 1/3.

**3.2 DISPLAY OF LOGISTIC REGRESSION RESULTS**

Table 2 shows the evaluation indicators of the model, which can be used to evaluate the performance or validate the effectiveness of the model. The P-value is analyzed, and the value is less than 0.05, indicating that the model is effective. Table 3 shows that the significance P-value of each indicator is 0.000, showing significance at the horizontal level, rejecting the null hypothesis. Therefore, the indicators will have a significant impact on the volatility point. The selection of indicators is effective.

**Table no 2: Biclassified logistic regression results**

likelihood ratio chi-square value	P	AIC	BIC
18464.314	0.000	18482.314	18552.111

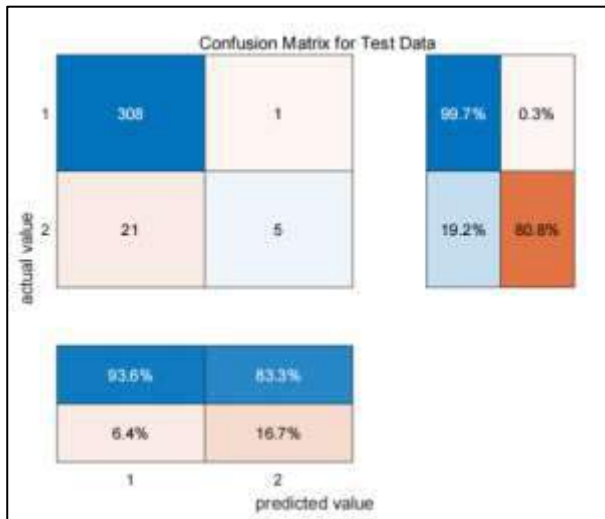
**Table 3: Biclassified logistic regression results**

Reg	StdErr	Wald	P	OR	Upper- lim	Lower- lim
Constant	2.376	0.069	1175.161	0.000	10.759	9.393
Point	-0.128	0.008	280.252	0.000	0.88	0.867
Consecutive victories	-0.369	0.018	403.491	0.000	0.691	0.667
Aces	-0.564	0.04	200.417	0.000	0.569	0.526
Winners	-0.387	0.02	377.035	0.000	0.679	0.653
Double fault	-1.117	0.064	307.259	0.000	0.327	0.289
Distance difference	-0.011	0.002	39.023	0.000	0.989	0.986
Change width	-0.885	0.039	523.046	0.000	0.413	0.382
Change depth	-0.877	0.04	488.029	0.000	0.416	0.385

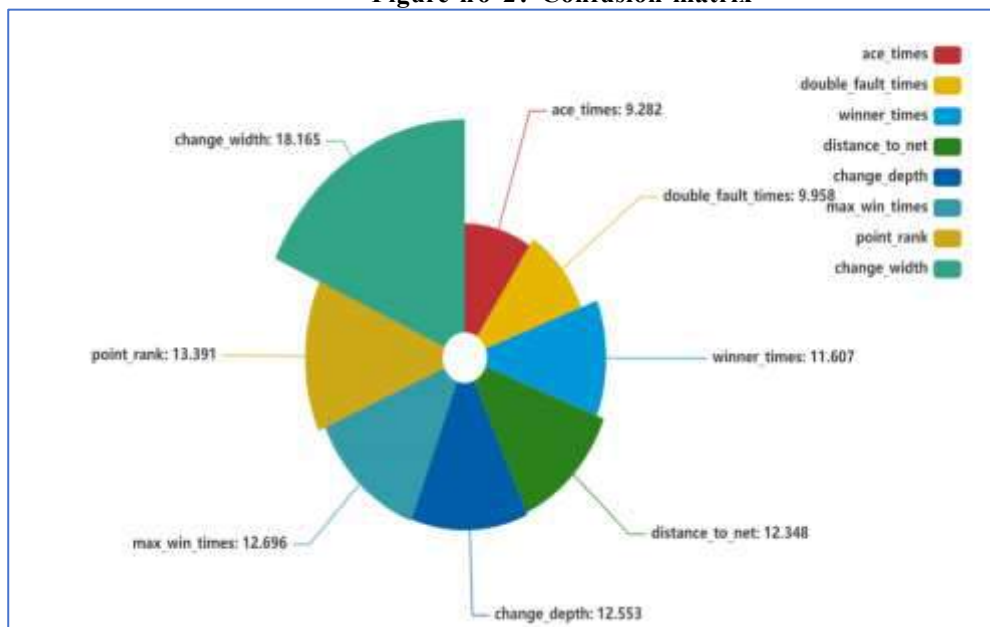
**3.3 RANDOM FOREST PREDICTION RESULTS**

The random forest algorithm was used for binary classification prediction, and the model demonstrated excellent predictive ability. On the dataset optimized and expanded by SMOTE, the classification accuracy of the random forest reached 91.39% (Figure

3). The confusion matrix of the model further proves its predictive performance, with a true positive rate of 93.43% and a false positive rate of 6.57% (Figure 4)



**Figure no 2: Confusion matrix**



**Figure 3 : The weight of factors affecting state**

We noticed turning point prediction inaccuracies. To refine the model, we strategically added key indicators like first-serve success rate, serve speed, and break rate. Considering the significance of the seventh set, we incorporated its outcome. Additionally, player metrics such as height and weight were included for a comprehensive approach. To maintain model specificity, we introduced three new indicators: "number of successful first five serves", "last set break" and "tiebreak."

The turning points of the final data are also selected for prediction, and the RF classification accuracy of the optimized model reaches 98.51%, and the prediction effect is further improved. From the confusion matrix, it can be seen that the frequency of non-turning points predicted into turning points is greatly reduced, and the accuracy of the model is optimized, increasing its realistic practicality.

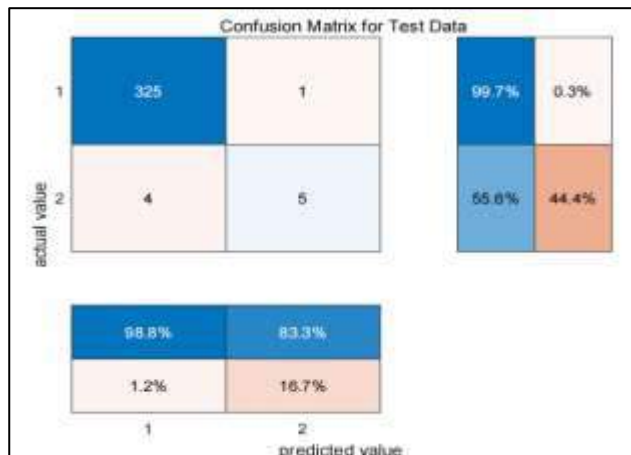


Figure 4: Confusion matrix

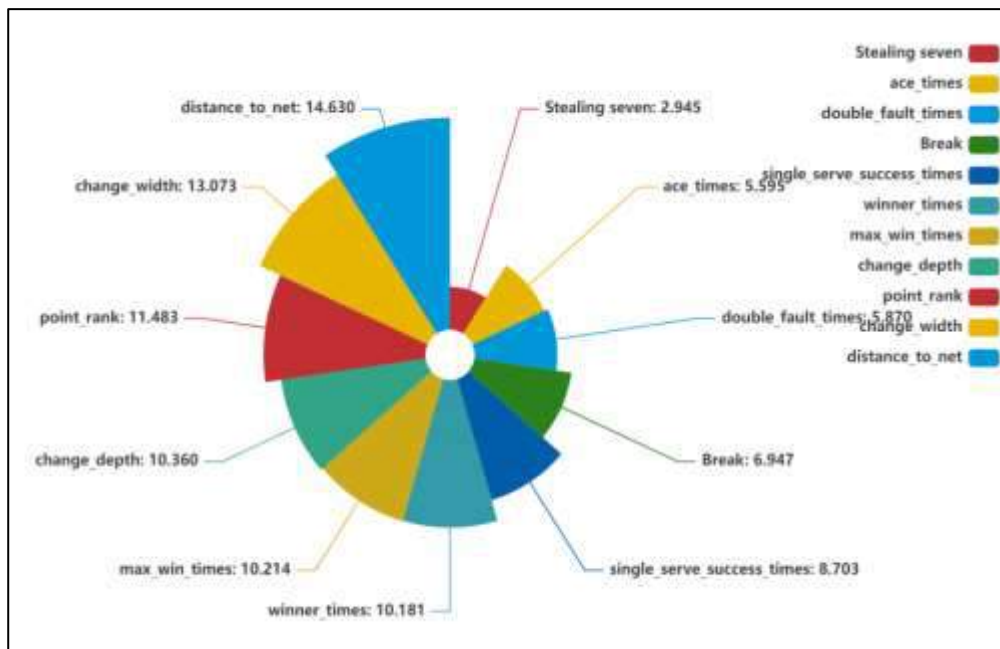


Figure 5: The weight of factors affecting state

### 3.4 MODEL TESTING

Extensive testing:

The widespread applicability of the model was validated by applying it to data from the 2020 US Open women's singles tournament and the 2021 Wimbledon Championship. In these different competitions, the prediction accuracy of the model reached 90.1% (see Figure 6) and 97.4% (see Figure 7), respectively, demonstrating the model's good generalization ability in different competition environments.



Figure 6: Confusion matrix

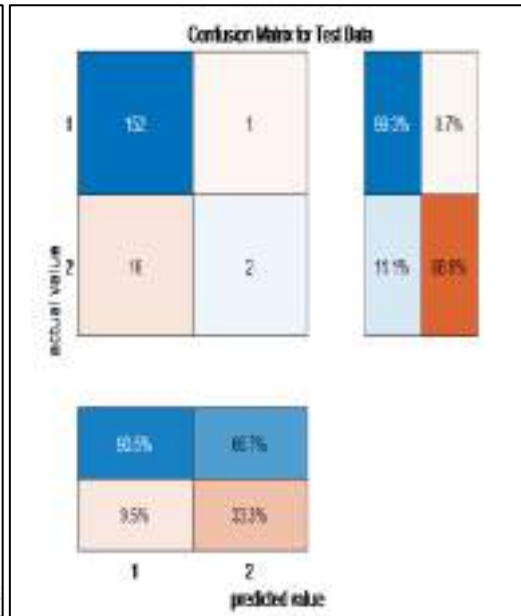


Figure 7: The weight of factors affecting the state

### Sensitivity testing

To verify the sensitivity of the model, we added 100 randomly generated perturbation data to the training set of the random forest classification model and re predicted the 23 year Wimbledon final. The results showed that even with the addition of perturbed data, the prediction accuracy of the model remained at 97.3% (see Figure 9), indicating that the model has high robustness to small changes in the data.

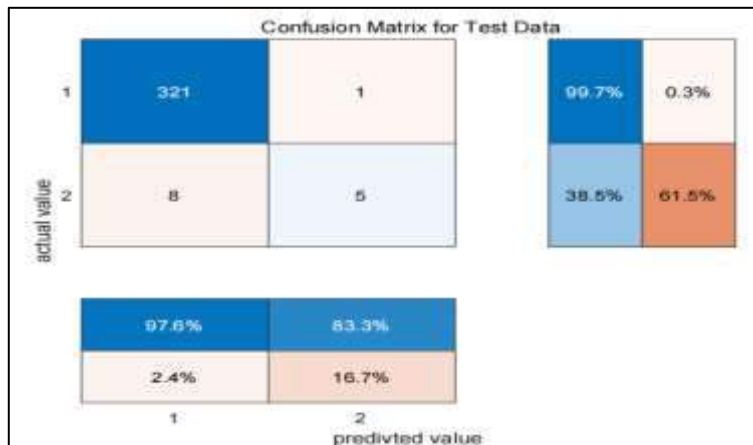


Figure 8: Confusion matrix after adding perturbed data

### 4. CONCLUSION

According to research, as the game progresses, factors such as the number of consecutive winning balls, ace balls, number of missed balls, difference in running distance, and changes in the depth and width of serve have a significant impact on game fluctuations in the first five goals. The changes in the width and depth of the serve have a significant impact on the turning point, which in turn drives the change in the direction of the game's score flow towards the target. There is a certain correlation between the flexibility of the strategy of changing the serving position and the high probability of the serving player winning the match point/match in tennis matches. Players can fully mobilize their opponents to attack their weaknesses and consume their physical energy by changing the serving position; You can also choose to play ace balls to enhance your attack and suppress opponents to maintain continuous scoring. Similarly, when serving the opponent, a strong and powerful serve should be played to gain the better initiative, and the overall strategy should be adjusted to consume reasonably, in order to avoid the opponent scoring continuously. Research has found that the number of double-serve errors in the top five psychological indicators has a significant impact on the progress and results





of the game. When athletes make double serve errors or other events during the game, they should strive to adjust their mentality and maintain a good competitive state.

The above analysis has reference significance for coach and athlete training. Excellent physical fitness is the foundation for formulating technical and tactical strategies, as well as an important factor affecting the progress and results of competitions. It is also the foundation for maintaining a good psychological state in competitions; Good psychological qualities can enable athletes to adopt appropriate strategies in events that affect the progress of the competition, such as double mistakes or consecutive scoring by the opponent.

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# ETHNO-PHILOLOGICAL ASPECTS OF THE FORMATION OF THE HISTORY OF THE UZBEK LANGUAGE

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## ABSTRACT

*This article reveals the linguistic, cultural and ethno-philological aspects of the formation of the history of the Uzbek language, in particular, specific differences are identified taking into account traditions, customs, history and culture. An analysis of the historical patterns of development of the Uzbek language is also given, especially the specificity of its features - the entire set of historically determined changes.*

*The history of the formation of the layers of the Uzbek people and the language itself are analyzed based on the materials of written sources.*

**KEYWORDS:** *definition of specific differences, consideration of traditions, customs, community, object of research, the emergence of language, the formation of the Uzbek community as a people, the development of language, history and culture.*

Since the dawn of human civilization, language has played a significant role in connecting and establishing communities. It has allowed people to understand and appreciate the world beyond their immediate environment. Communities have studied their similarities and differences, including physiological, linguistic, cultural, communicative, ethnic, and dialectal skills. The most significant aspect of this study is the ethnophilological aspect, which has influenced the emergence and formation of communities as people. In this context, we refer to the emergence and formation of the Uzbek community as a people, the development of their language, and the definition of their specific differences, taking into account their traditions, customs, history, and culture.

The formation of the language of any people is directly related to the history of the origin and formation of speakers of this language. Therefore, the study of the Uzbek language is unthinkable without the joint efforts of historians, ethnographers, linguists, archaeologists and representatives of other related sciences.

The complex ethno-genetic process of the Uzbek people, which absorbed a number of non-Turkic ethnic elements with different historical and cultural backgrounds, was reflected in written literature, which at different stages was created in various languages - both in Turkic and in languages belonging to the non-Turkic language system and in the dialect composition of the Uzbek language of that period.

The history of the Uzbek language comes into greater relief when its emergence and development is considered in direct connection with the history of the formation and development of a given people. Without taking into account the historical patterns of the development of the Uzbek language, it is impossible to understand the specifics of its features – the whole set of historically determined changes that occurred not only in the vocabulary but also in the phonetic system, as well as partially in the grammatical structure of the Uzbek language [1].

Thus, the study of the Uzbek language at different stages of the historical development of the Uzbek people, the identification of specific features of the grammatical structure and lexical composition in different periods of the development of this language, the establishment of relationships between written language and live spoken speech, presented in the form of numerous accents and dialects, the definition of the dialect basis contributes to a more correct understanding of the history of the Uzbek language as a whole [2].

Views on the tasks and methods of the historical study of languages have largely been established and accepted by linguists. However, the history of various national languages has not been fully studied. Some languages have been fully studied, taking into account all aspects of ethno-genesis, while others are only briefly touched upon by researchers. The latter includes the Uzbek language, which is rich in written materials, which are valuable sources for the history of the language and the history of the Uzbek people.



The study of the history of the ancient Uzbek and old Uzbek literary language, which was called “chigatai”, has not yet been defined and requires a complete study of individual literary monuments belonging to different periods. Equally important is the establishment of the relationship of the Uzbek language to the ancient Turkic written monuments of the VI-VIII centuries, in the creation of which Turkic tribal groups took part, which later became part of the Uzbek language collective as essential components [3].

The Old Uzbek (chigatai) language, the term “Old Uzbek” was introduced on the initiative of A.Y.Yakubovsky in 1941 and is used mainly by historians and orientologists within the CIS. This term began to be understood as the heritage of the so-called chigatai culture, which developed during the Temurid era. Accordingly, the chigatai language, canonized during this historical period, began to be called Old Uzbek. Currently, in the literature published in Uzbekistan, the term “chigatai”[4] is not used at all; it has been completely replaced by the term “Old Uzbek”. Until recently, the Old Uzbek (chigatai) language meant mainly the language of the works of Alisher Navoi, who lived and worked in Herat in the XV century, as well as the works of Babur, whose place of residence was, before his exile by the Sheibanids, the Fergana Valley. However, in recent years, views have spread in the republic that the area of distribution of the language was wider and that previous languages already contained elements of Old Uzbek.

The ancestors of the Uzbeks who lived on the territory of ancient Turkistan spoke Arabic, Bactrian, Avestan, Khorezmian, and Sogdian languages. Already in the VI century, the transition of local peoples to the Turkic language began. The main reason for this was its simplicity and ease of use. For example, the word “tun”, which is the basis of the Uzbek word “tungich” (senior) in the name of Tunyabgu, the ruler of Tokharistan (in 618-630 occupied the territories of present-day Southern Uzbekistan), may indicate the entry of elements of Sogdian into the chigatai language. One of the very first relics of the ancient Turkic language is the work “Irshod-ul Tolibin” by Hakim at-Termizi (859-932). In the section “About the animal world” of his treatise, there are many words that later became part of the Uzbek language, for example, arslan (lion), tavushkan (hare, rabbit), chakal, or chiyaburi (jackal), urdak (duck), tuti (parrot), ilan (snake), ishak (donkey), at (horse, horse), etc. The relics “Kul Tegin” and “Tunyukuk” also indicate that Turkic peoples, the ancestors of the future Uzbeks, lived in the ancient Surkhan Valley in the VII century. The words minted on copper coins of Samarkand and in XII century: “olmaguchi yazuklukdur (guilty)” (he, who did not take it, is guilty) also have a genetic connection with the chigatai language.

Written sources such as Avesto (I millennium BC), Achaemenid inscriptions on stone, clay, leather, papyrus, the works of Herodotus (V century BC), Ctesias and Xephon (I century BC) and as well as materials from some archaeological excavations can serve as historical materials. The most ancient written monuments date back only to the beginning of the V BC.

It is known that in VII-III BC, Central Asia was inhabited by Scythians (according to Greek sources), Massagets and Sogdians, Khorezmians and other ethnic groups. So, in the lower reaches of the Amu Darya and Syr Darya (Trans caspian plain), the Massagets lived, and the territory of Kazakhstan, the southern and Eastern parts of Central Asia (up to Altai) were inhabited by Saks, the oasis of Tashkent and Khorezm, as well as the Fergana Valley and most parts of Sogdiana, are inhabited by Turkic-speaking ethnic groups known as Kangyuan or Kanglian. These groups, some of which formed the state of Kangkha or Kangyu, existed from the II century BC to the I century AD. The conquest of Central Asia by Alexander the Great (329-327 BC) and 150 years of Greco-Macedonian rule did not affect the ethnic composition and language of the local population [5].

The next layer in the formation of the Uzbek people were the Turkic ethnic groups that came from the east: the Yuezhi (or Kushans, or Tokhars of the III-II centuries BC) and the Huns (II-IV centuries), as well as the Ephthalite tribes (V-VI centuries). Written sources note that these tribes (or tribal associations) were Turkic-speaking.

O.I.Smironova’s study of Sogdian coins from Panjakent convincingly proves that many representatives of the dynasty that reigned in Sogdian were from Turkic tribes. In the VI-VIII centuries, various Turkic clans and tribes penetrated into the territory of present-day Uzbekistan from Kazakhstan, Kyrgyzstan and other neighboring regions, which were subsequently assimilated by the local population. VI-VII centuries can be defined as the period of the Turkic Khaganate, whose territory included Central and Middle Asia. As is known, the Turkic Khaganate was subsequently divided into the eastern (center of Mongolia) and western (center of Yettisu) khaganates in 588. The Western Khaganate was inhabited by the tribal and tribal associations karluk, khaladkov, kangli, turgesh, chigil and uguz. Subsequently, the Uguzes separated from this association and formed their own state. At that time, the eastern Khaganate was dominated by the Uighurs in 745. The Turkic Khaganate was conquered by the Uighurs, after which the Uighur state was formed, which existed until 840. Then it was overthrown by the Khakas (Kyrgyz). This led to the fact that some of the Uighurs joined with the Karlucs, some moved to Tibet, while the rest remained in Altai and mixed with other clans of the Turkic ethnic group [6].

At the beginning of VIII century. Central Asia is conquered by the Arabs. During the time of Arab rule, the Sogds lived in Bukhara, Samarkand, Karshi, Shakhrisabz, and the Karlucs lived in the Fergana oasis. Other Turkic tribes, such as the Turgesh, were nomads and occupied a vast territory of Central Asia and present-day Kazakhstan. The historian Tabari points out that the leaders of the



Sogdians were Turks. In Central Asia in IX-X centuries, the Samanids dominated [7]. During this period, Arabic functioned as the language of office and scientific works. The spoken, everyday language was the language of various Turkic tribes. In the X-XI centuries, power passed to the Karakhanids. In the middle of the 11th century, the Karakhanid state was divided into eastern (with its center in Balasagun, then Kashgar) and western (with its center in Uzgend, then Samarkand). The territory of the eastern state consisted of Eastern Turkestan, Yettisu, Shash, Fergana, and ancient Sogdiana, the territory of the western state of Afghanistan, Northern Iran. In parallel, in Khorasan (Ghazn) in 977, the Ghaznavid state was formed, which existed until 1040, after which it was conquered by the Turkmen Seljuk clans (the first half of the 11th and the beginning of the 12th centuries) [8].

From the 8th century, the high-ranking tribe in Fergana was the Karluks, and the Sogdians in Shash the Oghuz. The Sogdians, occupying small territories within the Turkic tribes, gradually lost their ethnic isolation, as the Sogdians married the daughters of the Turks or, conversely, married their daughters to the Turks. The Sogdians gradually lost their language, replacing it with Turkic.

In the X-XI centuries, the bulk of the Uguzes lived in the lower Syr Darya, then they moved to the territory of present-day Turkmenistan. In the Semirechye region from the Talas Valley to East Turkestan, the Karluks dominated, and then Chigili and Yagma came there. They settled in the northeast of Lake Issyk-Kul and East Turkestan.

At the beginning of the XII century, Karakitay, who came from the East, captured Central Asia. There is no consensus about the ethnic composition of the Karakitay: some consider them tribes of Tunguska origin, others Mongolian. They did not leave any traces either in ethnic composition or linguistically. Having defeated Sultan Sanjar (Seljukids) and Mahmud (Karakhanids), they limited themselves to receiving tribute.

From the end of the XII century to the beginning of the 13th century, the Khorezm state gained strength. The peoples of Central Asia from the first half of the 13th century (i.e., from 1219) to the second half of the 14th century (1370) were under the rule of the Mongols; from the second half of the 14th century, power passed into the hands of the Timurids, who ruled until the second half of the 15th century. It should be emphasized that the Arabs, Persians, Mongols, who were the rulers of states in Central Asia in those historical periods, were unable to have any impact on the ethnic composition of the local population and its language, although, as already mentioned, Arabic and Persian in those years were recognized as the languages of office and science.

After the disintegration of the Golden Horde (early XIV century), as well as with the disintegration of the Timurid State (second half of the XV century), as a result of the internal wars of the eastern Steppe Kipchak, a nomadic Uzbek state was formed, stretching from the Volga in the East to the northern part of the Syrdarya River (territory of modern Kazakhstan and southwestern Siberia).

The founder of this state was Abul Khair Khan, the grandfather of Muhammad Sheibani Khan, who overthrew the Timurids. Shaibonikhan continued to conquer and began to take possession of the territory from Syrdarya to Afghanistan. The disintegration of the Sheibanid state (then the successors of its Ashtarkhanid family) began under Khan Ubaydullah II (1702-1711). Fergana gradually became isolated, then Khorezm, Balkh, and Bukhara. After the short reign of Nader Shakh (1740-1747), three states were formed in Central Asia: Bukhara (mainly from the Mangit tribes), Khiva (from the Kungrat tribes), Kokand (from the Ming tribes).

During this period, Uzbek was the main everyday language. Literary and scientific works were written in Uzbek, the Tajik language was used in office work and documents. Tajik and Uzbek were spoken in Samarkand and Bukhara.

In general, the Turkic-Mongolian tribes that roamed in the second half of the XIV century in the eastern part of Steppe Kipchak were called Uzbeks, and their territory was the land of the Uzbeks. After their conquest in the first half of the XV century in Transoxiana, the local population also began to be called Uzbeks.

As a proper name, the anthroponym "uzbek" is found in the works of Nasaviy, Juvayniy and Rashiduddin (XIII century). Rashiduddin writes that the Uzbek prince was the son of Mingkudar, the grandson of Bukal, the seventh son of Juji. It should be noted that Uzbekkhan was the khan of the Golden Horde and the nomadic Uzbeks were not his subjects. There were also other personalities named Uzbek who lived before Uzbekkhan. In particular, this name was borne by one of the Azerbaijani Atabeks from the Eldigiziyans (1210-1225) and one of the emirs of the Khorezm Shah Muhammad (1200-1220).

It should be noted that the ancient descendants of the Massagets, Sogdians, Khorezmians and Turks, as well as other ethnic groups that joined them somewhat later - Uzbeks, Kazakhs, Kyrgyz, Karakalpaks, Uighurs and other Turkic peoples also participated in the formation of the neighboring Tajik people.

It should be borne in mind that the same clans and tribes could participate in the formation of different Turkic peoples. For example, the Uzbek and Kazakh peoples include the Kipchak, Jalair, Naiman, and Kataganiy clans. Therefore, the fact that the Uzbek and



Kazakh languages have common phenomena inherent in the languages of the above-mentioned genera should not be considered as a product of the relationship between the Uzbek and Kazakh languages of a later time.

As a rule, each Khaganate consisted of certain ethnic groups, and each ethnic group was named after the most privileged clan or tribe, although it included many other clans and tribes. For example, the Karluk ethnic group included, in addition to the Karluks themselves, Chigil (mainly in Transoxiana) and Yagmo (in the territories from the Ili River basin to Kashgar). Before merging with the Karluks, the Yagma clan was part of the Tukiuguz (Tukkiz-uguz) ethnic group. The same picture is observed within the Uighur ethnic group. For example, from the Uighur ethnic group not only modern Uighurs were formed, but also Uzbeks, Kazakhs, Kyrgyz, etc. The same can be said about written monuments. For example, written monuments, conventionally called Uighur, relate to the history of the formation of not only Uighur, but also other modern Turkic languages, whose speakers were part of the ancient Uighur ethnic association.

Depending on which clan found itself in the position of dominant in a given period, the state language was determined. As a rule, the language of the more privileged dominant clan or tribe begins to perform the functions of a written and national language, and the languages of other clans, finding themselves in the position of dialects, find use in spoken language. During the period of domination of any of the above-mentioned states (Kangyu, Kushans, Ephthalites, Karakhanids, Turkic Khaganate, etc.), the process of rallying of various ethnic groups and the convergence of their languages was underway at the same time.

This led to the formation and spread of a national language, as well as its adoption by various ethnic groups. Thus, it is impossible to identify the modern Uzbek people only with the Uzbek tribes, which in the XIV century were part of various states that existed for a long time in Central Asia.

The formation of the Uzbek people was based on many ancient ethnic groups of Central Asia: the Sakas, Massagets, Kangyuians, Sogdians, Khorezmians and the Turkic clans and tribes that subsequently joined them. The process of formation of the Uzbek people began in the XI century and was largely completed by the XIV century. Around this time, the ethnonym Uzbek was assigned to him. A small number of Uzbek tribes that came from Steppe Kipchak were only the last component of the Uzbek people.

The formation of the Uzbek language dates back to this time, the XIV century. The dialect composition of the current Uzbek literary language was formed on the basis of groups of Samarkand-Bukhara, Tashkent, Fergana and Khorezm dialects of the Uzbek language, which went through a complex historical path reflecting the features of the Karluk-Uighur, Uguz Kipchak language.

Written monuments based on very similar Turkic-runic, Uighur and Sogdian inscriptions, the main sources of determining the periodization of the history of the Uzbek language, were found in a wide area of Mongolia, Turfan oases, Eastern Turkistan, Eastern Siberia, Central Asia, Kazakhstan, although such inscriptions were also found from other regions (Altai, Khakassia, Tuva, Buryatin and in 1979 in the village of S.Nicholas in Hungary). However, the languages of the monuments written from the XII to the XIV centuries have significant differences among themselves: in some the new Karluk- Uighur features predominate, in others Uguz, in others Kipchak. Starting from the end of the XIV century, the linguistic features of written monuments again acquired a general character and differed little from each other. This, of course, affects the role of socio-political factors of the time: the formation of a centralized state, as usual, led to the unification of peoples and the convergence of their languages (i.e., integration), and the fragmentation of the state led to the separation of peoples and the strengthening of the role of local dialects.

#### ***Classification and periodization of the Uzbek language***

The development of language is closely related to the civilizational progress of society, since it is a product of society. Russian Turkologists such as V.V.Radlov, F.Korsh, A.N.Samoilovich, V.A.Bogoroditsky, S.E.Malov, N.A.Baskakov made a great contribution to the formation of the periodization of the Uzbek language.

The classification and periodization proposed by individual researchers of the history of the Turkic (and Uzbek) languages (S.E.Malov, A.N.Samoilovich, A.N.Kononov, A.M.Shcherbak, N.A.Baskakov, A.K.Borovkov, A.Gaben, etc.) reflect the dialectological side of the issue under study.

If we consider the classification of dialects according to V.V.Radlov and A.N.Samoilovich, it can be noted that these Turkologists divide languages into four layers according to the location of branches: the eastern group (the language of the Siberian Tatars), the western group (the languages of the Kirghiz, Kazakhs and Bashkirds), the Central Asian group (Uzbek and Uighur languages), the southern group (languages of Turkmen, Azerbaijanis, Turks and Crimean Tatars). The group of the Southeastern or Chigatai branch now includes the Uighur and Uzbek languages. The Southwestern or Uguz group includes the language of the Khorezmian.

According to the classification by S.E.Malov, N.A.Baskakov, and V.A.Bogoroditsky, the Uzbek language stands out from the Karluk-Uighur group and is included in the Turkic group of languages.



The classification by S.E.Malov, N.A.Baskakov, and V.A.Bogoroditsky

Uzbek and chigatai languages – the group of  
Turkic languages;

Groups of karluk-uighur, karluk-khorezm,  
karalhaniy-khorezm;

The dialects of uzbek, uighur (taranchi dialect),  
kazakh, kyrgyz, karakaplak languages.



Further, according to the classification of the Uzbek turkologist Salimov Tesha Hakim o'g'li in the "History of the Uzbek language" (published in 1940), the following periodization of the formation of the Uzbek language as a literary language is given:

- Ancient period of literary languages of Central Asia from the VIII to the XIV centuries;
- literary language of the XIV century;
- literary language of the XV - XVI centuries;
- literary language of the XVII - XIX centuries;
- the present period of the Uzbek literary language.

Based on data from the history of the formation of the Uzbek people and analysis of the language of existing written monuments, the following five layers can be distinguished in the process of formation of the Uzbek language, each of which is characterized by its own phonetic, lexical and grammatical features:

- The oldest Turkic language. a language that developed from ancient times until the formation of the Turkic Khaganate (i.e., until the IV century). The languages of the ancient Sakas, Massagets, Sogdians, Kanguys and other ethnic groups of that period are the fundamental basis for the formation of the modern Turkic languages of Central Asia and Kazakhstan, including the modern Uzbek language.
- Ancient Turkic language (VI-X centuries). Monuments of this period are written in runic, Uyghur, Sogdian, Manichaean and Brahman (Brahmi) scripts. They were found on stones (for example, Urkhun-Yenisey inscriptions), leather or special paper (found in Turpan), etc.
- Old Turkic language (XI-XIV centuries). During the period of its formation, Uzbek, Kazakh, Kyrgyz, Turkmen, Karakalpak and other Turkic languages were formed. A.M.Shcherbak calls the Turkic language of this period, in contrast to the Uguz and Kipchak languages, the language of East Turkestan. Such famous works as "Kutadgu bilig", "Divanu lugat-it-turk", "Khibat-ul-hakayik", "Tefsir", "Uguz-name", "Kisa-ul-anbiye" were written in the Old Turkic language. Written in a written literary language, they nevertheless carry within themselves the linguistic characteristics of various ethnic groups. For example, in "Kutadgu bilig" Karluk language features predominate, in "Uguz-name" Kipchak (to a lesser extent Kangleian and Karluk) linguistic features predominate. And the language "Khibat-ul-khakayik" is something between the Old Turkic and Old Uzbek languages.
- Old Uzbek language (XIV - first half of the XIX century). At the beginning of the XIV century, the Uzbek language began to function independently. This can already be seen in the works of the poets Sakkaki, Lutfi, Durbek, written in the XIV century, in which the linguistic features of the Karluk- Uighur groups that took part in the formation of the Uzbek people are increasingly evident. At the same time, in the language "Mukhabbat-name" and "Taashshuk-name" we find some features of the Uguz language, and in "Khosrav and Shirin" of the Kipchak languages. In the language of the works of Alisher Navoi and Zakhiriddin Babur, such dialect elements are almost absent.
- It is interesting to note that the works of Lutfi, Sakkaki, Durbek and others, written in the early periods of the functioning of the Old Uzbek language, more reflect the features of the living spoken language of the Uzbeks. This language is well understood by our contemporaries. Alisher Navoi in his works improved this literary language, enriching it with Arabic and Persian-Tajik language means. As a result, a unique written literary language was formed, which for several centuries served as a model and standard for writers and poets. Only in the 17th-18th centuries, in the works of Turda, Abdulgazy and Gulkhaniy, this literary written language was somewhat simplified and brought closer to a living spoken language [9].



- New Uzbek language (from the second half of the XIX century). From the second half of the XIX century, a literary written language began to take shape, reflecting all the features of the living spoken Uzbek language. This process was expressed in a departure from the traditions of the old Uzbek literary language, in the rejection of archaic forms and constructions, in its rapprochement with the living common language. The phonetic structure of the modern Uzbek language is based on the Tashkent dialect, and the morphological structure on Fergana.

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# ADVANCING LYME DISEASE PREVENTION THROUGH COMPUTER VISION: A ROBUST APPROACH FOR TICK IDENTIFICATION

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Article DOI: <https://doi.org/10.36713/epra16351>

DOI No: 10.36713/epra16351

## ABSTRACT

Lyme is a disease that is caused by *Borrelia burgdorferi*, a bacterium that is spread by ticks. The prevalence of Lyme disease has made it a major public health problem. Immediate identification of the bacteria-carrying parasites is important in preventing the epidemic. This research suggests an alternative approach which uses computer vision to identify Lyme diseases related to ticks. A dataset containing images of ticks was used to create and train a Convolutional Neural Network (CNN) model. Preprocessing and augmentation were done on the dataset with split data into training and testing sets prior to boosting model generalization. The architecture of the CNN consists of convolutional, batch normalization and pooling layers followed by fully connected layers for classification. The Adam optimizer trains the model with a piecewise learning rate schedule. Test set evaluation shows promising results with high accuracy in categorizing tick pictures. Furthermore, this study calculates precision, recall and F1 score metrics which indicates strong performance from this model. A confusion matrix as well as visualization is also used to prove that model can distinguish between different tick classes. This computer vision approach provides a powerful tool for automatic tick recognition thus aiding in early detection as well as prevention of Lyme disease

**KEYWORDS;** Image analysis, deep learning, tick identification, epidemiological surveillance, disease management, public health interventions, artificial intelligence, zoonotic diseases, tick-borne pathogens, predictive modeling.

## I.INTRODUCTION

Lyme disease, a tick-borne disease caused by the bacteria *Borrelia burgdorferi*, is a serious public health problem worldwide. Lyme disease can lead to serious health complications if not diagnosed and treated promptly. Early detection and identification of ticks carrying the bacteria that cause Lyme disease is critical for effective disease management and prevention. Traditional tick identification methods often rely on manual inspection by trained personnel, which can be time-consuming and labor-intensive. In recent years, advances in computer vision and machine learning techniques have opened up new possibilities for automatic tick identification.

Lyme disease usually begins with flu-like symptoms such as arthralgia, chills, fever, myalgia, and neck stiffness, with an erythema migrans rash appearing 2 to 30 days after a tick bite. Blackleg infection [5]-[7]. Antibiotic treatment usually eliminates *B. burgdorferi* infection; However, if left untreated, the infection can progress to disseminated disease





with increased risk of morbidity, long-term sequelae, and post-treatment Lyme disease syndrome [6], [8]–[11]. Lyme disease can be prevented if antibiotic prophylaxis is given to the patient within 72 hours of the tick bite [11]. Understand where blacklegs and B. ticks are. Burgdorferi is critical in informing healthcare providers and the public about the risks of Lyme disease. Across North America, blacklegged tick monitoring is patchy (using various passive and active tools) or sometimes non-existent. In passive surveillance, ticks are submitted by healthcare providers or the public for identification and/or detection of B. burgdorferi [12]. . Active surveillance includes removing ticks from the environment or catching live animals. Active and passive surveillance are intended to monitor tick populations and are not designed for clinical use; Therefore, additional resources are required to assist the doctor in treating Lyme disease . In addition, these monitoring techniques are time-consuming, logistically demanding, and expensive to operate and maintain. In the clinical setting, healthcare providers need a faster response to determine whether a patient's tick is a blacklegged tick or another tick pest species. Healthcare providers and patients would benefit from a more rapid assessment of the affected tick species, as this could help decide whether to monitor a patient's symptoms or administer antibiotic prophylaxis.

This study aims to explore a computer vision-based approach for the identification of ticks related to Lyme disease. By training a CNN model on a dataset of tick images, this approach seeks to automate the process of tick detection and classification, thereby facilitating early intervention and disease prevention. The proposed methodology involves data preprocessing, model architecture design, training, and evaluation, with the ultimate goal of developing a reliable tool for tick identification in support of public health efforts against Lyme disease. The subsequent sections of this paper will delve into the methodology, results, and implications of employing a computer vision approach to tick identification, highlighting the potential benefits and challenges associated with this innovative approach.

## II.METHODOLOY

### Background

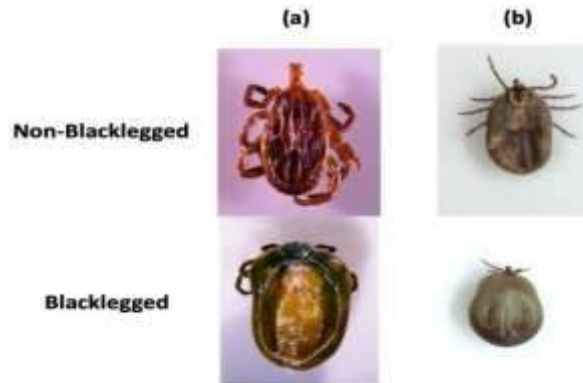
Automating the monitoring and identification of tick species using computer vision models could potentially be improved by advances in deep neural networks [17]. Convolutional Neural Network (CNN) is a class of deep neural networks most commonly used for computer vision tasks. However, training CNN models from scratch is not without complications and requires the collection and annotation of large datasets, which limits their use in healthcare [18]. A popular approach for to address this shortcoming is to exploit the “portability” of the knowledge embedded in pre-trained CNNs and transfer this knowledge from a known source task to a new target task [19]–[21]. The most widely used approach to knowledge transfer is transfer learning, where a deep source neural network is first trained on a large dataset such as ImageNet [22] (this is called pre- training) and then the weights are used. learned (knowledge) from networks. as an initialization to train a target deep neural network on a smaller dataset such as medical images (this is called fine-tuning) [23], [24]. Fine-tuning requires minimal changes as some of the network parameters remain frozen during training [24], [25].

Transfer learning has been successfully applied to various computer vision tasks such as: B. Object classification and feature generation, both in the generic and medical areas [26]–[28]. However, depending on the problem, transfer learning may not be the best approach and may not provide any benefit, especially when the source and target domains are semantically and substantially different [17]. An alternative to learning transfer for heterogeneous areas is another knowledge transfer technique called a teacher-student learning framework. Knowledge transfer in teacher-student learning occurs between two different networks, namely a teacher network and a student network, where the student network is trained to mimic the results of a larger teacher network. and powerful or a set of teacher networks [19 ], [20]. One of the most popular training frameworks among teachers and students is that of Zagoruyko et al. proposed attention transfer. [29]. In this method, the teacher's feature maps guide the student to learn data patterns. With this approach, using the attention maps of a teacher network, the student network is trained to mimic the exact behavior of the teacher network by attempting to reproduce its output in a layer that receives the teacher's attention.

In this work, we build our computer vision pipeline by using various knowledge transfer approaches (e.g., attention transfer) [29], [30] since our tick dataset is small (several thousand images). Additionally, our tick dataset contained several noisy and blurry images due to the presence of very small nymphal ticks. Therefore, in addition to attention transfer, we used Label Smoothing Regularization (LSR) [21] as a regularizer to improve the robustness and generalization of CNN models. LSR converts one-hot coded labels (hard labels) into soft labels with an even distribution mix. In addition to model improvement, both attention transfer and LSR provide benefits for model



compression [20], [31] and enable deployment of CNN models on mobile phones or website applications.



**Figure 1.1 (a) High-resolution microscopic images,**

(b) cell phone images of fed ticks, and (c) cell phone images of unfed ticks. Completely or lightly engorged ticks can triple in volume when filled with blood.

The proposed model aims to identify ticks related to Lyme disease using a computer vision approach.

#### 1.Data Loading and Preprocessing :

The model starts by loading a dataset of tick images. These images are organized into folders based on their respective classes (e.g., tick carrying Lyme disease, non-Lyme disease tick). The `imageDatastore` function is used to load the dataset, specifying options such as including subfolders and labeling based on folder names. The dataset is then split into training and testing sets using an 80-20 split ratio.

2.Model Architecture :The model architecture is defined using a Convolutional Neural Network (CNN).The input image size is set to 256x256 pixels with three channels (RGB).The CNN architecture consists of several layers:

Image Input Layer Accepts input images and performs z-score normalization. Convolutional layers extract features from input images through convolution operations. Each convolutional layer is followed by batch normalization and a Rectified Linear Unit (ReLU) activation function. Max- pooling layers downsample the feature maps to reduce spatial dimensions while preserving important features. And Fully Connected Layers perform classification based on the extracted features. The number of neurons in the output layer corresponds to the number of classes. Softmax layer converts the output scores into probabilities, indicating the likelihood of each class.

Classification Layer: The final layer assigns the input image to one of the classes based on the highest probability.

Model Training: The model is trained using the training dataset and the specified training options. The Adam optimizer is used for optimization. Training progresses through epochs, with mini-batches of data shuffled at each epoch. Learning rate scheduling with a piecewise drop factor and drop period helps in effective optimization.

#### 4.Model Evaluation & Model Deployment

Once trained, the model is evaluated using the testing dataset to assess its performance. Classification accuracy, confusion matrix, precision, recall, and F1 score are calculated to evaluate the model's effectiveness in identifying ticks related to Lyme disease. After evaluation, the model can be deployed to classify new images of ticks. Users can provide input images, and the model will classify them as either carrying Lyme disease or not.

#### Training Models and Frame

In this work, automated blacklegged tick identification is presented as a binary classification task in which a CNN model is trained to predict class labels for given tick images using the following training strategies:

1)Training the CNN models from scratch with random initialization, with all layers open for optimization during training. In this context, two CNN architectures were used, including Inception-Resnet [33] and a lighter CNN model developed for this study. The lightest CNN model consisted of 7 convolutional layers followed by batch or dropout normalization. Additionally, average pooling layers were used



to reduce the number of parameters. In total, the network had 13 layers with 5,350,633, trainable parameters out of 5,352,041 parameters (see Appendix A for more details of the network).

2) Transfer the learning of a pre-trained Inception Resnet CNN network to ImageNet. Two sets of experiments were conducted in this environment, including opening all CNN layers for optimization and unfreezing only the last five layers during training.

3) Transferring the attention of an Inception Resnet teacher [33] previously trained on ImageNet. In this scenario, the knowledge is transferred to the student network, which was the lightest CNN model with and without LSR. Attention transfer: Following the work of Zagoruyko et al. [29], we construct an activation-based attention transfer to transfer knowledge from the last layer of the teacher network (Inception-Resnet) to the layer before the last layer of the student network (Lighter CNN), as shown in Fig. 2. The knowledge transferred to our environment is a spatial attention map created by taking the sum of the absolute values of the 3D tensor of a layer  $A \in \mathbb{R}^{C \times H \times W}$  over the channel dimension:

To calculate the attention transfer loss between the teacher's and student's spatial attention maps of the same resolution (with the same height,  $H$ , and width,  $W$ ), we use  $\ell_2$  normalization. Let's denote the spatial attention map of the teacher network as  $(Q_T)$  and the spatial attention map of the student network as  $(Q_S)$ . Both  $(Q_T)$  and  $(Q_S)$  are 2D tensors with dimensions  $(H \times W)$ .

The attention transfer loss is calculated as follows:

$$\|Q_T\|_2 = \sqrt{\sum_{i=1}^H \sum_{j=1}^W (Q_T(i, j))^2}$$

$$\|Q_S\|_2 = \sqrt{\sum_{i=1}^H \sum_{j=1}^W (Q_S(i, j))^2}$$

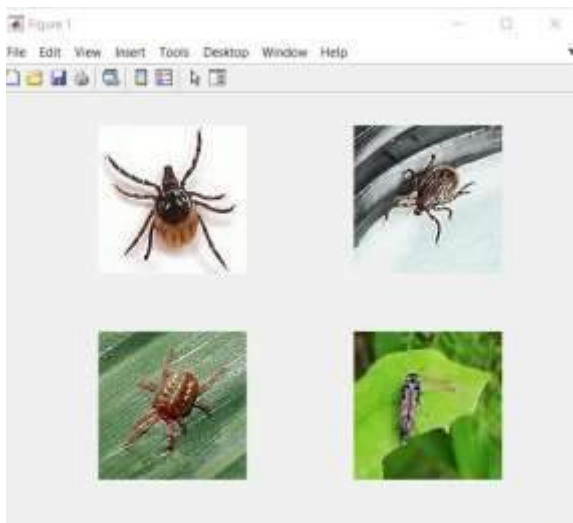
2. Next, we normalize the attention maps by dividing each element by its corresponding norm:

This attention transfer loss quantifies the dissimilarity between the spatial attention maps of the teacher and student networks, providing a measure of how well the student network is learning to attend to relevant regions compared to the teacher network. Minimizing this loss encourages the student network to mimic the attention patterns of the teacher network, facilitating knowledge transfer in the context of attention mechanisms.

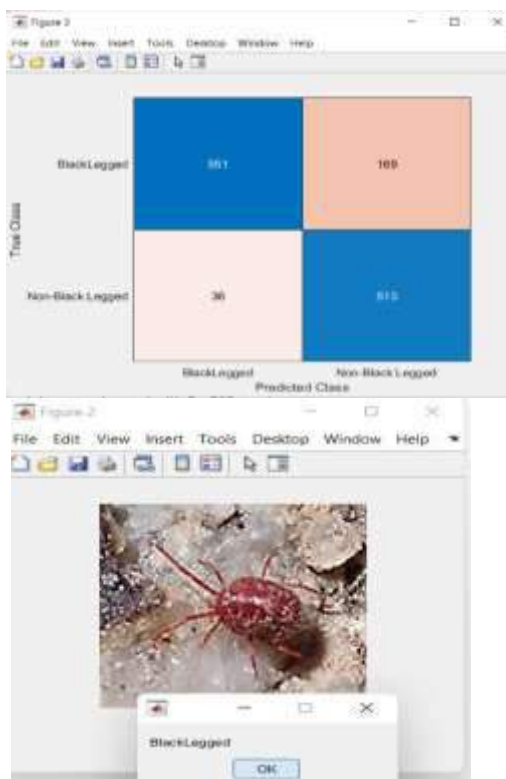
Overall, the proposed model offers a data-driven approach to automate the identification of ticks associated with Lyme disease, providing a valuable tool for disease surveillance and prevention efforts.

### III. RESULTS AND DISCUSSION

This section presents the classification results obtained by applying various CNN models to the tick dataset. For model development and evaluation, our data set was split into a train/test split with a ratio of 11/1 with no overlap. Therefore, 12,554 images (41% with black legs) for the training set and 1034 (41% with black legs) for the testing set were used to validate the performance of the developed model.



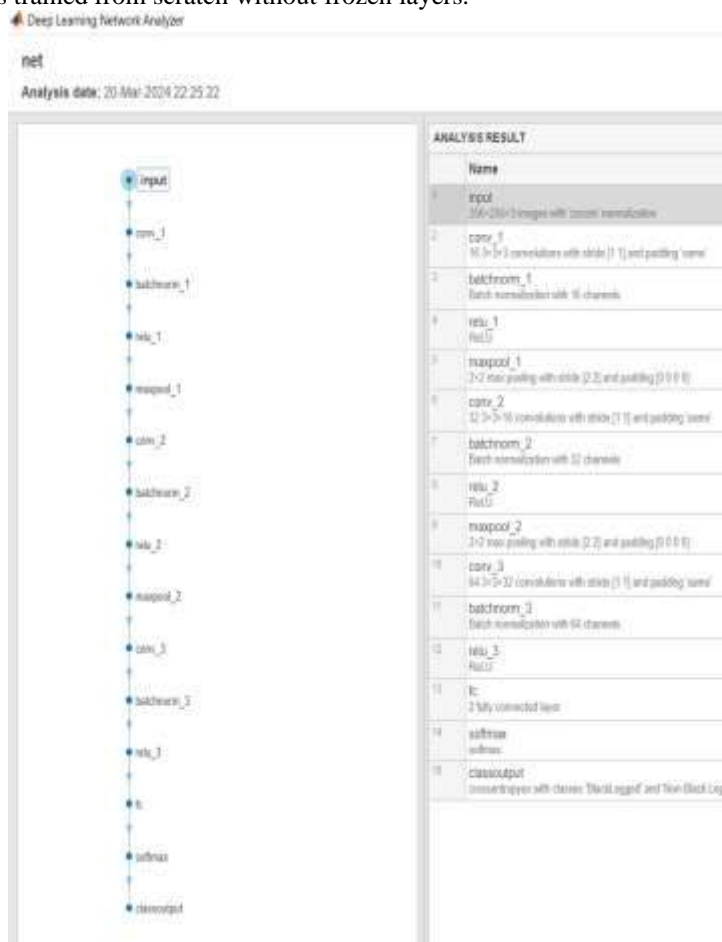
The training data was enhanced with 0° -360° random rotation, horizontal rotation, vertical rotation and a 0.5x to 2x zoom range. Adam was used to optimize the loss function in all experiments. Cross-validation (k = 3-fold) was used to optimize the hyper parameters. The input image sizes for the lighter CNN model and the Convnet network were 300 × 300 and 299 × 299, respectively. The lighter CNN model was trained for a maximum of 256 epochs with an initial learning rate of 10<sup>-3</sup> and a batch size of 64. For the attention transfer approach, the classification loss was the combination of LAT and binary cross-entropy loss. For the attention transfer + LSR approach, the loss parameters (Equation 3), including β<sub>1</sub>, β<sub>2</sub>, and T, were set to 1, 2, and 5, respectively. Table 1 shows the results of our first experiment comparing the training performance of the lighter and standard Inception Resnet CNN models [33].



**Fig Confusion Matrix & Predicted result**



The performance of using different strategies, including network size and initialization, to train CNN classifiers to distinguish between the two common tick species; Blacklegged ticks versus dog ticks. The best results in each column are in bold and the second best results are underlined. ROC-AUC is the area under the ROC curve and PR-AUC is the area under the precision recovery curve. Regardless of initialization, CNN models with a larger number of trainable parameters perform better on the tick dataset. The performance of the CNN classifier is very poor when the initial layers are fixed during training. \*Only the last 5 layers Covnet were optimized, while the rest of the CNN in the table was trained from scratch without frozen layers.



**Fig CNN Architecture**

We provide preliminary evidence that advanced deep learning technologies hold promise for improving blacklegged tick monitoring. Additionally, there is an opportunity to further refine the technology to classify other tick species. However, further study is needed on how to integrate these

technologies into an affordable, responsive, targeted and user- friendly tool for end users. Our current and future work will inform those interested in further developing and deploying deep learning models in the area of infectious disease surveillance and diagnosis.

#### IV. CONCLUSION

Based on the findings derived from this study, the following conclusions were drawn:

1. The proposed computer vision-based approach to identifying ticks associated with Lyme disease provides a robust solution to an urgent public health problem.



2. Using Convolutional Neural Networks (CNN) and a carefully selected dataset, the model demonstrates high accuracy in distinguishing between tick classes.
3. The effectiveness of the approach is carefully validated through careful data preprocessing, comprehensive model training, and rigorous evaluation against a dedicated test set.
4. Visualization of results, including confusion matrices and accuracy measures, helps further validate the reliability and performance of the model.
5. This study highlights the enormous potential of computer vision techniques to address complex public health challenges such as Lyme disease.
6. By automating the lengthy and error-prone process of tick detection, the proposed model provides a valuable tool for early detection and targeted prevention measures

## V. RECOMMENDATIONS

Based on the findings and conclusions, the following recommendations are offered.

1. Quickly and accurately identifying ticks in the images could significantly help health authorities and researchers monitor tick populations, identify high-risk areas, and implement rapid intervention strategies to reduce communicable diseases.
2. Looking forward, there are several directions for future research and development that will improve the effectiveness and relevance of the proposed model.
3. Expanding and diversifying the dataset, exploring advanced transfer learning techniques, integrating attention mechanisms into the CNN architecture, and exploring real-time-based implementation methods in field conditions are promising directions.
4. In addition, expanding the model to classify ticks into more classes and improving its interpretability and explainability can increase its utility and increase stakeholder confidence.
5. Continuous innovation and collaboration in this area has the potential to revolutionize public health surveillance and make a significant contribution to the prevention and control of tick-borne diseases.

## ACKNOWLEDGEMENT

The author acknowledged the to the Public Health Ontario Laboratory (Sault Ste. Marie) and Hiba Hussain for logistical support and data assistance.

## CONFLICT OF INTEREST

The authors have declared that there is no conflict of interest.

## SOURCE/S OF FUNDING NA

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# AN COMPLETE STUDY ON HERBAL STRIPS FORMULATION FOR MOUTH ULCER USING JASMANIUM OFFICINALE

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## ABSTRACT

This herbal strip for oral mouth ulcers combines *Jasminum officinale*, known for its anti-inflammatory properties, with white vinegar for antimicrobial effects. Potato starch serves as a binding agent, glycerine enhances moisture retention, and water ensures proper consistency. The formulation aims to provide a soothing and healing effect on oral ulcers, leveraging the natural properties of these ingredients.[1]

**KEYWORDS:** *Jasminum officinale*, Anti- Inflammatory, Mouth Ulcer.

## INTRODUCTION

The research paper explores a novel formulation of herbal strips designed for the management of oral mouth ulcers. The formulation incorporates key natural ingredients, each chosen for its specific therapeutic contribution.<sup>[2]</sup> *Jasminum officinale*, renowned for its anti-inflammatory properties, serves as a primary active component, aiming to alleviate the inflammation associated with oral ulcers.<sup>[3]</sup>

White vinegar has been included for its potent antimicrobial effects, contributing to the overall oral hygiene and potentially aiding in the prevention of secondary infections. Potato starch acts as a crucial binding agent, ensuring the cohesion and integrity of the herbal strip. Glycerine is incorporated to enhance moisture retention, promoting a soothing and moisturizing effect on the affected oral mucosa.

Water, forming the base of the formulation, plays a pivotal role in achieving the desired consistency and delivery of the herbal strip. The combination of these natural ingredients aims to synergistically address the multifaceted aspects of oral mouth ulcers, offering a potential alternative or complementary approach to conventional treatments. This research contributes valuable insights into herbal formulations for oral health and may pave the way for future developments in natural remedies for oral mucosal disorders.

## Manufacturing and processing the herbal strip for oral mouth ulcers :

### Ingredients and Materials:

#### 1. *Jasminum Officinale* Leaves:

- Collect fresh leaves and ensure proper identification.
- Wash thoroughly to remove contaminants.
- Dry the leaves using a suitable method (air drying, oven drying) and grind to a fine powder.

#### 2. White Vinegar:

- Use commercially available white vinegar with a known acetic acid concentration.
- Measure the required quantity for antimicrobial effects.

#### 3. Potato Starch:

- Obtain high-quality potato starch.
- Measure the precise amount needed for binding and texture.

#### 4. Glycerine:

- Choose pharmaceutical-grade glycerine.
- Measure the required quantity to enhance moisture retention.

#### 5. Water:

- Use distilled water for consistency and to avoid impurities.



### Laboratory Equipment

- mixing apparatus, pH meter, dissolution apparatus, microbial testing equipment, UV Visible spectrophotometer. etc.
- Simulated oral mucosa substrate for adhesive testing.
- Volunteers for sensory evaluation.

### Formulation Process

1. Extraction of Active Compounds from *Jasminum Officinale* Leaves:
  - Use a suitable solvent (e.g., water) for extraction.
  - Evaporate the solvent to obtain a concentrated extract.
2. Preparation of Herbal Extract:
  - Mix the *Jasminum officinale* extract with measured amounts of white vinegar, glycerine, and water.
  - Achieve a homogenous solution through stirring.
3. Incorporation of Potato Starch:
  - Gradually add potato starch while continuously stirring to prevent lumps.
  - Achieve a uniform consistency for proper binding.
4. Casting the Herbal Strip:
  - Pour the prepared mixture into suitable molds or trays.
  - Allow it to solidify at room temperature or in a controlled environment.
5. Cutting and Packaging:
  - Cut the solidified strip into uniform sizes.
  - Package the herbal strips in airtight and light-resistant containers to maintain stability.

### Formula

Sr.No	Ingredients	Quantity Taken (For 100ml)	Category
1	Leaf Extract	15ml	Anti-inflammatory
2	Water	100ml	Solvent
3	Starch	15ml	Binding Agent
4	Vinegar	10ml	Anti- microbial
5	Glycerin	10ml	Moisturising Agent

### Detailed information

Classification of *Jasminum officinale* <sup>[4]</sup>

Kingdom: Plantae

Subkingdom: Viridiplantae

Division: Tracheophyta

Class: Magnoliopsida

Order: Lamiales

Family: Oleaceae

Genus: *Jasminum*

Species: *Jasminum officinale*

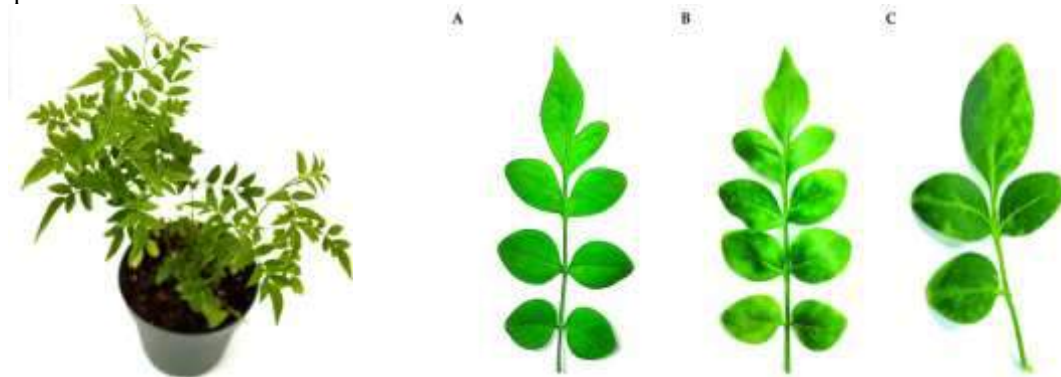


Fig: 1. *Jasminum officinale* leaves.

Health Benefits of *Jasminum officinale* The aroma of jasmine is calming and soothing without being soporific and is indicated for depression And stress. It is indicated for sensitive skin conditions too. Jasmine also has a reputation as an aphrodisiac and Used for all kinds of sexual problems. *Jasminum* is used to treat skin problems, the leaf juices can be applied To clear up corns and treat mouth ulcerations, the anti-secretory and anti-oxidant components of *Jasminum* May also treat peptic ulcer. *Jasminum* also produces



an antibiotic effect upon typhoid fever and staph Infections, they stressed that jasmine oil may serve as a main stream antibiotic treatment, the juice of the leaf Is applied to corns and ear discharges, the leaves and the barks contain salicylic acid and are used as analgesic, Febrifuge, etc. The roots are used in the treatment of ringworm, while the flowers are aphrodisiac, antiseptic, Antispasmodic, and tonic. One of the uses of *J. officinale* in urinary infections and diuretic the leaves of stem, Bark, and root of *Jasminum* has demonstrated detectable antibacterial activity against many microorganisms.<sup>[5]</sup>

#### 1) Mouth ulcers

Mouth ulcers are painful sores on the inside lining of the mouth. They usually develop on the inside Of the lips and cheeks and on the underneath and edge of the tongue. Medicines from a pharmacist can reduce The pain and help mouth ulcers to heal. Mouth ulcers include sores, lesions, abrasions, laceration or any open break in the mucosa of the lips, mouth Or tongue. Mouth ulcers are also called stomatitis and are a symptom of a variety of mild to serious diseases, Disorders and conditions. Mouth ulcers can result from infection, vitamin deficiencies, trauma, inflammation, Malignancy and other diseases and abnormal processes.<sup>[6]</sup>

#### 2) Causes

The exact reason of mouth ulcers developed is not yet clearly defined. Approximately 40% of people Who get mouth ulcers have a family history of the same. In some cases, the ulcers are related to diseases.

These include Injury from badly fitting dentures, harsh brushing of teeths, etc. Changes in hormone levels. Some women find that mouth ulcers occur just before their periods. A lack of iron or a lack of certain vitamins (such as vitamin B12 and folic acid) may be a factor in some cases. Rarely, a food allergy may be the cause. Stress is said to trigger mouth ulcers in some people. Some medicines can cause mouth ulcers. Examples of Medicines that can cause mouth ulcers are: nicorandil, ibuprofen etc. Mouth ulcers are more common in people With Crohn's disease, coeliac disease, HIV infection etc.<sup>[7]</sup>

#### 3) Bacteriology

In the mouth there are many good and bad micro-organisms and bacteria, which now have access to The wound surface and produce toxins which in turn allows further cell death causing the ulcer to get larger. Also, at this stage the bacteria lining the ulcer. This situation continues till the causative agent is gone and the Body's immune system comes up with the solution and the bad bacteria are compressed. How long this takes Depends on many factors. *Staphylococcus*, *Pseudomonas*, *Bacillus*, *E.coli*, *Enterococcus* and *Candida* species Are an important component normal flora of the Oropharynx.<sup>[8]</sup>

Bacteria:

1. *Escherichia coli*.
2. *Pseudomonas aeruginosa*.
3. *Staphylococcus aureus*.
4. *Bacillus subtilis*.
5. *Enterococcus faecalis*

### Traditional Uses

Leaves were chewed in aphthous, stomatitis, toothache and ulcer in the mouth. Leaf juice or oil obtained from it was dropped into the ear. Fresh juice of the leaves was used for sort corns between the toes, for ulceration in the mouth, throat and gums<sup>[9,10]</sup>. *Jasminum officinale* was also used traditionally for the treatment of urinary tract infections<sup>[11]</sup>, as CNS depressant, sedative, mild anesthetic and astringent<sup>[10,12]</sup>. In addition, it was used in depression, nervous exhaustion and stress related conditions, It was said that the plant was also used to produce the feeling of optimism, confidence, euphoria, and it was good in cases of apathy, indifference, or listlessness. It was also used for catarrh, coughs, laryngitis, dysmenorrhoea, labor pains, uterine disorders, skin problem such as dry, greasy, irritated, sensitive skin, and for muscular spasms and sprains<sup>[13]</sup>. The buds of *Jasminum officinale* L. var. *grandiflorum* [L.] were used as a folk remedy for the treatment of hepatitis, dysmenorrhea, stomatitis, and duodenitis in South China<sup>[14]</sup>.

**Part used medicinally:** Leaves, juice, buds and oil<sup>[9,10]</sup>.

### Physicochemical Characteristics

The physicochemical characteristics [%] were total ash 10.89, acid insoluble ash 1.29, water soluble ash 2.92, loss on drying 4.25, petroleum ether extractive value 2.61, chloroform extractive value 3.58, acetone extractive value 8.72, alcohol extractive value 11.57 and water extractive value 12.14<sup>[9,15]</sup>.

### Chemical Constituents

The preliminary phytochemical analysis of the aqueous extract of *Jasminum officinale* leaves indicated the presence of alkaloids, coumarins, flavonoids, tannins, terpenoids, glycosides, emodine, leucoanthcyanins, steroids, anthocyanins, phlobatinins, essential oil and saponins<sup>[16-19]</sup>

Chemical analysis of the bud of the flowers of *Jasminum officinale* var. *grandiflorum* revealed the presence of six triterpenoid saponins [ as 3-O- $\alpha$ -L-rhamnopyranosyl [1 $\rightarrow$ 2]- $\beta$ -D-xylopyranosyl-hederagenin28-O- $\beta$ -D-galactopyranosyl[1 $\rightarrow$ 6]- $\beta$ -D-galactopyranosyl ester; hederagenin-3-O- $\beta$ -D-glucopyranosyl[1 $\rightarrow$ 3] $\alpha$ -L-arabino pyranoside; 2 $\alpha$ ,3 $\beta$ ,23-trihydroxyolean-12-en-28-oic-O- $\beta$ -D-glucopyranosyl ester; hederagenin-3-O- $\beta$ -D-xylopyranosyl[1 $\rightarrow$ 3]- $\alpha$ -L-rhamnopyranosyl[1 $\rightarrow$ 2]- $\alpha$ -L-arabino pyranoside; 2 $\alpha$ ,3 $\beta$ ,23-trihydroxyolean-12-en-28-oic-O- $\alpha$ -L-rhamnopyranosyl[1 $\rightarrow$ 4]- $\beta$ -D-glucopyranosyl[1 $\rightarrow$ 6]- $\beta$ -D-glucopyranosyl ester and



hederagenin-3-O- $\alpha$ -L-rhamnopyranosyl[1 $\rightarrow$ 2]- $\alpha$ -L-arabinopyranoside<sup>[20]</sup>. Cell-free extracts from callus of *Jasminum officinale* contained epoxidase activities with isopentyl pyrophosphate, isopentenol, geraniol and nerol as substrates and also hydratase activities towards the resulting terpene oxides<sup>[21]</sup>.

Six iridoid glycosides were identified from the buds of *Jasminum officinale* var. *grandiflorum*: jasgranoside B, 6-O-methy-catalpol, deacetyl asperulosidic acid, aucubin, 8-dehydroxy shanzhiside and loganin<sup>[22]</sup>. Secoiridoid glucosides: [20R]-20-methoxyoleuropein, [20S]-20-methoxyoleuropein, oleuropein, ligstroside, demethyloleuropein and oleoside dimethyl ester, a lignan, [2]-olivil and p-hydroxyphenethyl alcohol were isolated from the dried leaves of *Jasminum officinale* var. *grandiflorum*<sup>[23]</sup>.

Six secoiridoids were identified in the flowers of *Jasminum officinale* L. var. *grandiflorum* included jasgranoside, jaspolyoside, 8-epi-kingside, 10-hydroxy-oleuropein, 10-hydroxy-ligstroside and oleoside-7, 11-dimethyl ester<sup>[24]</sup>. Seven glycosides were isolated from the flower of *Jasminum officinale* var. *grandiflorum* included kaempferol-3-O- $\alpha$ -L-rhamnopyranosyl [1 $\rightarrow$ 3]-[ $\alpha$ -L-rhamno pyranosyl [1 $\rightarrow$ 6]]-beta-D-galactopyranoside, kaempferol-3-O-rutinoside, 7-ketolo ganin, oleoside-11-methyl ester, 7-glucosyl-11-methyl oleoside, ligstroside and oleuropein<sup>[25]</sup>.

Thirty compounds were identified in the essential oil of *Jasminum officinale* L. var. *grandiflorum*. The major volatile components were phytol [25.77 %], 3,7,11-trimethyldodeca -1,6,10-trien-3-ol [12.54%] and 3,7,11- trimethyldodeca-6,10-dien-3-ol [12.42%]. However, the compounds identified in the *Jasminum officinale* L. var. *grandiflorum* oil [%] were: benzyl acetate 0.33; nerolidol 0.11; methyl myristate 0.75; 7-tetradecene 0.20; benzyl benzoate 4.84; neophytadiene 0.23; perhydrofarnesyl acetone 4.85; phytol acetate 0.22; nonadecane 0.14; geranyl linalool 0.12; methyl palmitate 1.57; 3,7,11,15-tetramethyl -1-hexadecen-3-ol 12.42; hexadecanoic acid 9.16; 3,7,11-trimethyl-1,6,10-dodecatrien-3-ol 12.54; 3,7,11,15-tetramethylhexadecanoic acid methyl ester 0.60; 9,12,15-octadecatrienoic acid methyl ester 1.33; heneicosane 3.12; Phytol 25.77; octadecanoic acid methyl ester 0.56; 9,12,15-octadecatrienoic acid 4.82; docosane 0.25; tricosane 4.00; tetracosane 0.58; pentacosane 1.51; hexacosane 2.54; heptacosane 1.86; octacosane 1.26; squalene 0.46 and nonacosane 3.00<sup>[19]</sup>.

The total phenolic contents of the aqueous extract of *Jasminum officinale* leaves was  $104.02 \pm 1.28$  mg/g gallic acid equivalent, the total flavonoids content was  $10.76 \pm 0.83$  mg/g quercetin equivalent and the total flavonols content was  $5.65 \pm 0.45$  mg/g quercetin equivalent<sup>[17]</sup>.

### 1. Scientific Research

- Investigate the bioactive compounds in *Jasminum officinale* leaves through chromatographic methods, identifying potential anti-inflammatory agents.
- Examine existing research on the therapeutic effects of white vinegar, focusing on its antimicrobial properties against oral pathogens.
- Explore studies on the utilization of potato starch in oral pharmaceutical formulations and its impact on drug delivery.

### 2. Therapeutics

- Evaluate the anti-inflammatory potential of *Jasminum officinale* leaves, highlighting their role in reducing oral mucosal inflammation associated with ulcers.
- Investigate the antimicrobial efficacy of white vinegar in addressing bacterial or fungal infections in the oral cavity.<sup>[26]</sup>
- Assess the soothing and moisturizing effects of glycerine in promoting oral ulcer healing.

### 3. Taxonomic Information

- Provide detailed taxonomic classification of *Jasminum officinale*, including family (Oleaceae), genus, and species, establishing its botanical identity.
- Examine any variations in the chemical composition of *Jasminum officinale* leaves among different geographical regions.<sup>[27]</sup>

### 4. Physiological Aspects

- Explore the physiological interactions between the herbal strip and oral mucosa, including absorption rates, tissue compatibility, and potential local effects.
- Assess the impact of water content in the formulation on oral mucosal hydration and the overall therapeutic outcome.

### 5. Pharmacological Information

- Investigate the pharmacodynamics of *Jasminum officinale* compounds, elucidating their mechanisms of action in reducing inflammation.
- Examine the pharmacokinetics of the herbal strip components, considering absorption, distribution, metabolism, and excretion.<sup>[28]</sup>
- Explore potential synergistic interactions between the components in the herbal strip for enhanced therapeutic efficacy.
  - Pharmacodynamics:

#### 1. Anti-inflammatory Activity:

- *Jasminum officinale* contains bioactive compounds like flavonoids and phenolic acids, which exhibit potent anti-inflammatory effects.<sup>[29]</sup>
- These compounds inhibit inflammatory mediators such as prostaglandins, leukotrienes, and cytokines, thereby reducing inflammation and pain associated with mouth ulcers.



## 2. Antimicrobial Properties:

- Certain constituents of *Jasminum officinale* possess antimicrobial activity against oral pathogens, including bacteria and fungi.
- Compounds like linalool and benzyl acetate have shown inhibitory effects against oral bacteria like *Streptococcus mutans* and *Candida albicans*, which can exacerbate mouth ulcers.

## 3. Wound Healing Effects:

- *Jasminum officinale* extracts promote wound healing by accelerating the proliferation and migration of epithelial cells.
- Active compounds stimulate collagen synthesis, angiogenesis, and fibroblast activity, leading to faster resolution of mouth ulcers.

## 4. Analgesic Properties:

- Some constituents in *Jasminum officinale* exhibit analgesic effects by modulating pain receptors or neurotransmitter pathways.<sup>[30]</sup>
- Application of the herbal strip may alleviate pain and discomfort associated with mouth ulcers.
  - Pharmacokinetics:

### 1. Absorption:

- The active compounds from *Jasminum officinale* are absorbed through the oral mucosa upon application of the herbal strip.
- Absorption rates may vary depending on the formulation's composition and the individual's physiological factors.

### 2. Distribution:

- Once absorbed, the bioactive compounds distribute systemically and locally within the oral cavity.
- Distribution to the site of the ulcer facilitates direct interaction with inflammatory mediators and microbial pathogens.

### 3. Metabolism:

- Metabolism of active compounds occurs primarily in the liver and may involve phase I and phase II reactions.
- Metabolites may retain or modify the pharmacological activity of the original compounds.

### 4. Excretion:

- Metabolites and unabsorbed compounds are excreted through urine, feces, or bile.
- Excretion pathways vary depending on the chemical properties of the compounds.

## 6. Dermatological Effect

Ampucare was a topical oil-based preparation containing *Azadirachta indica*, *Berberis aristata*, *Curcuma longa*, *Glycyrrhiza glabra*, *Jasminum officinale*, *Pongamia pinnata*, *Rubia cordifolia*, *Terminalia chebula*, *Trichosanthes dioica*, *Symplocos racemosa*, *Ichnocarpus frutescens*, *Capsicum abbreviata*, *Nymphaea lotus* etc.<sup>[31,32]</sup> Application of ampucare in second-degree burn showed burn healing effect with enhancement of antioxidant function. It increased wound contraction, decreased NO, decreased xanthine oxidase activity, increased protein level, increased vitamin C, reduced glutathione and decreased MDA in blood samples<sup>[33-35]</sup>.

## Synergistic and Antagonistic Effect

### 1. Synergistic Interactions

- *Jasminum officinale* with White Vinegar:
  - Potential synergy in anti-inflammatory and antimicrobial actions, addressing both the inflammatory component and microbial aspects of oral ulcers.
- Potato Starch with Glycerine:
  - Synergistic enhancement of strip consistency and adhesive properties, ensuring prolonged contact with the affected area for improved therapeutic outcomes.
- White Vinegar with Potato Starch:
  - Possible synergy in creating a stable formulation with enhanced microbial control, as vinegar may act as a preservative.

### 2. Antagonistic Interactions

- *Jasminum officinale* with White Vinegar:
  - Careful consideration needed to avoid potential chemical reactions that might compromise the stability or efficacy of the herbal strip.
- Glycerine with White Vinegar:
  - Glycerine's moisture-retaining properties could counteract the drying effect of vinegar, balancing the formulation but requiring precise formulation control.
- Potato Starch with Water:
  - Monitoring starch-water interactions is crucial to prevent unwanted changes in the herbal strip's texture or consistency.

## Future Trends And Traditional Knowledge

### 1. Future Trends

- Biotechnology Integration:
  - Explore the potential of biotechnological methods for extracting and enhancing bioactive compounds from *Jasminum officinale*, optimizing therapeutic benefits.
  - Investigate nanotechnology applications for improving the delivery and bioavailability of herbal strip components.
- Personalized Medicine:



- Consider the feasibility of tailoring herbal strip formulations based on individual genetic and physiological variations for personalized and optimized treatment.

- Clinical Trials and Evidence-Based Medicine:

- Advocate for further clinical trials to establish the efficacy and safety of the herbal strip, contributing to evidence-based integrative medicine for oral health.

**2. Traditional Knowledge**

- Ethnobotanical Insights:

- Document and integrate traditional knowledge regarding the historical use of *Jasminum officinale*, white vinegar, and other components for oral health within various cultural practices.

- Community Engagement:

- Explore community-based participatory research to involve local communities in sharing their traditional knowledge and experiences related to herbal remedies for oral ulcers.

- Synergies with Conventional Medicine:

- Investigate potential synergies between traditional herbal knowledge and modern medicine, promoting the integration of herbal strips into mainstream oral healthcare practices.

**Result, Observation, and Evaluative Steps**

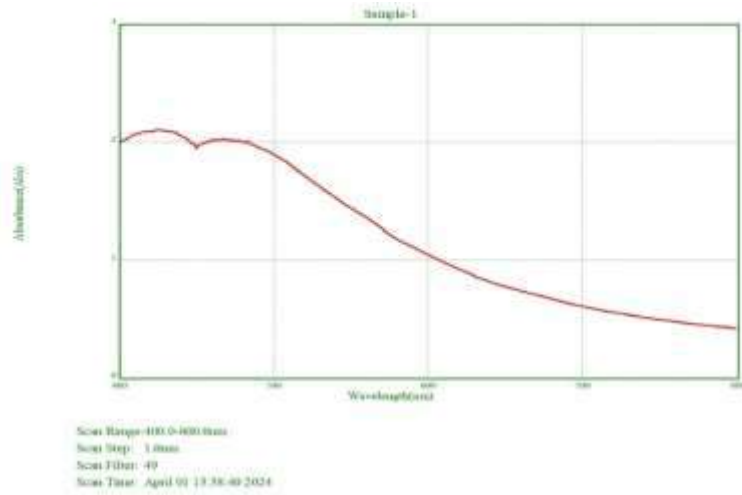
Sr.no.	1] Physical Test	2] Sensory Test
1	Appearance – Jelly type semisolid strip	Odour – Earthy herbal scent with hint of bitterness
2	Size – Fine particles uniform size	Flavour – Mild slightly bitter
3	Colour – Greenish brown	Taste – Mildly bitter with herbal notes
4	Texture – Slightly Gritty	
5	Consistency – Strip wet	
Sr.no.	3] Chemical Test	4] Stability Testing
1	PH – 5 to 6	Temperature – Room temperature (25°C) and below
2	Polarity – Non polar to moderately polar	Humidity – Relatively stable under normal humidity
3	Caffeine content – Absent	Light Exposure – Sensitive to prolonged exposure to direct sunlight.
4	Alkaloid – May be present	- Should be stored in opaque container or packaging.
5	Flavonoids – Present	Storage Duration – Stable for upto 6 months when stored in cool & dry place.
6	Tannins – Moderate	Moisture content – Ranging from 5 to 10 %
7	Glycoside – May be present	

5] In-vitro HCL / Buccal model (Acidic Dissolution)

- 1 to 2 min in acidic conditions having in 6 pH.

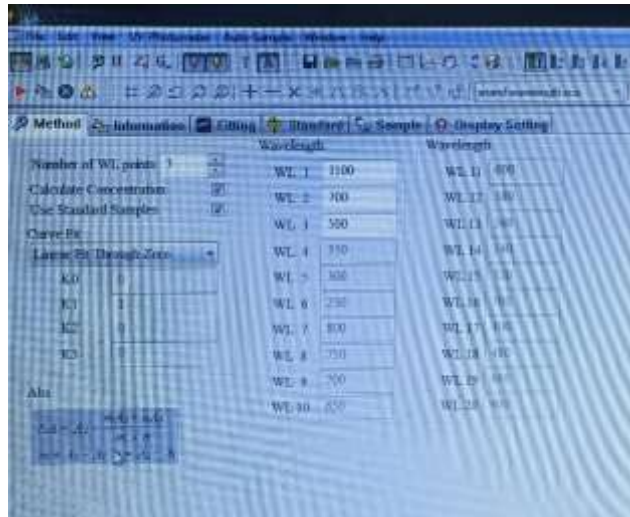
6] In- vitro realase study (Release Rate )

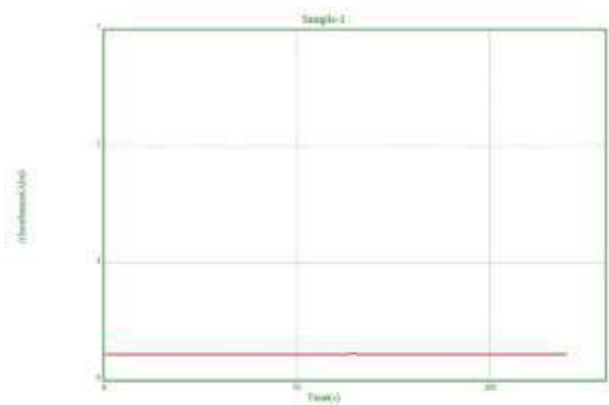
I) UV Frequency λmax ( Absorbance ) Absorbance Vs Wavelength



Institute of Pharmacy, Raigarh

## II) UV visible Kinetics Absorbance Vs Time





Wavelength: 700 nm  
 Total Time: 1.0h  
 Scan Rate: 1.0h  
 Operator: UV Spectrophotometer  
 Scan Date: April 01 11:47:40 2024

Sample-1			
0.0%	0.2190	34.0%	0.2178
1.0%	0.2190	35.0%	0.2181
2.0%	0.2190	36.0%	0.2182
3.0%	0.2184	37.0%	0.2188
4.0%	0.2183	38.0%	0.2190
5.0%	0.2183	39.0%	0.2191
6.0%	0.2183	40.0%	0.2192
7.0%	0.2182	41.0%	0.2193
8.0%	0.2181	42.0%	0.2192
9.0%	0.2182	43.0%	0.2192
10.0%	0.2182	44.0%	0.2188
11.0%	0.2185	45.0%	0.2184
12.0%	0.2184	46.0%	0.2189
13.0%	0.2182	47.0%	0.2178
14.0%	0.2181	48.0%	0.2180
15.0%	0.2179	49.0%	0.2181
16.0%	0.2180	50.0%	0.2182
17.0%	0.2183	51.0%	0.2181
18.0%	0.2187	52.0%	0.2180
19.0%	0.2189	53.0%	0.2178
20.0%	0.2188	54.0%	0.2177
21.0%	0.2186	55.0%	0.2180
22.0%	0.2187	56.0%	0.2180
23.0%	0.2187	57.0%	0.2188
24.0%	0.2187	58.0%	0.2193
25.0%	0.2188	59.0%	0.2197
26.0%	0.2184	60.0%	0.2199
27.0%	0.2184	61.0%	0.2193
28.0%	0.2184	62.0%	0.2198
29.0%	0.2188	63.0%	0.2199
30.0%	0.2184	64.0%	0.2200
31.0%	0.2183	65.0%	0.2201
32.0%	0.2180	66.0%	0.2198
33.0%	0.2178	67.0%	0.2197
68.0%	0.2197	102.0%	0.2176
69.0%	0.2198	103.0%	0.2175
70.0%	0.2198	104.0%	0.2171
71.0%	0.2198	105.0%	0.2175
72.0%	0.2190	106.0%	0.2170
73.0%	0.2196	107.0%	0.2179
74.0%	0.2196	108.0%	0.2184
75.0%	0.2190	109.0%	0.2188
76.0%	0.2189	110.0%	0.2183
77.0%	0.2191	111.0%	0.2182
78.0%	0.2191	112.0%	0.2177
79.0%	0.2192	113.0%	0.2178
80.0%	0.2193	114.0%	0.2176
81.0%	0.2195	115.0%	0.2176
82.0%	0.2195	116.0%	0.2177
83.0%	0.2198	117.0%	0.2175
84.0%	0.2195	118.0%	0.2174
85.0%	0.2195	119.0%	0.2174
86.0%	0.2193	120.0%	0.2178

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### Conclusion on Herbal Strip Formulation

After a comprehensive investigation into the formulation of the herbal strip designed for oral mouth ulcers containing *Jasminum officinale* leaves, white vinegar, potato starch, glycerine, and water, the following conclusions can be drawn:

#### 1. Efficacy of Herbal Components:

properties contributing to potential therapeutic effects in addressing oral mucosal inflammation.

In conclusion, the herbal strip formulation, combining *Jasminum officinale* leaves, white vinegar, potato starch, glycerine, and water, holds promise as a natural remedy for oral mouth ulcers. Its favorable physical, chemical, and sensory characteristics, along with the synergistic effects of its components, provide a solid foundation for further development and clinical exploration. This research contributes valuable insights to the field of herbal formulations for oral health, offering a potential alternative or complementary solution for managing oral mucosal disorders

### Acknowledgements

I am pleased to submit this Project report studied out in Institute of pharmacy, Badnapur.

I would like to thank all those who helped me to make this Project. I specially thank to our respected Principal Dr. Swati Rawat who gave me full support and opportunity to work on this Project.

I also deeply acknowledge my guide Mr. Gitesh V. Vyas, Ms. Pooja Muley, Ms. Ashwini Bahir for never ending encouragement, moral support and patience during the preparation of my project.

I express my heart filled gratitude to Mr. Gitesh V. Vyas Sir who offered me all possible assistance during my developing period and for the interest he took in sorting my difficulties and offering me guidance, encouragement and help. Lastly I am also obliging to the teachers and lab Technician & also some of my friends Vithal, Sima, Yogesh, Dnyaneshwar, Kiran and all my Final year classmate who helped me to solve the problem and for give suggestions for my project and heartily thanks to my parents who gave me moral, financial support.

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## **A WEB-BASED SCHEMA FOR E-VOTING BASED ON BLOCKCHAIN AS A SERVICE**

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### **ABSTRACT**

Blockchain technology is most effective in situations that present opportunities for fraud. In a public or private activity like voting or polling, it assures the integrity of the process as well as the immutability of the data vis-a-vis the poll/vote. Anonymity and privacy for the voter can also be integrated into the overall scheme. This paper explores the potential of blockchain-based e-voting systems in various domains, focusing on their benefits and implementation challenges.

**KEYWORDS:** Blockchain technology, e-Voting, Blockchain as a Service (BaaS), Decentralized application (dApp), Smart contracts, Consensus mechanism, Cloud-based hybrid blockchain, Homomorphic encryption, Zero-knowledge proofs, Proof of Authority (PoA), Edge computing.

### **INTRODUCTION**

The current environment features a scenario where netizens are periodically faced with multiple choices vis-a-vis their affiliation. This could be on any of the following platforms:

- **National, state & local civil body elections:** National and local government election commissions can utilize blockchain technology to ensure the integrity, transparency, and security of voting processes during elections.
- **Non-Governmental Organizations (NGOs):** NGOs conducting internal elections or polls can use blockchain to ensure fairness, transparency, and accountability in the voting process among their members or stakeholders.  
**Corporations:** Large corporations can implement blockchain-based voting systems for shareholder meetings or board elections, providing shareholders with a secure and transparent way to cast their votes remotely.
- **Trade Unions:** Labor unions can adopt blockchain technology for conducting member voting on collective bargaining agreements, leadership elections, and other important decisions, ensuring democratic processes and transparency.
- **Political Parties:** Political parties can implement blockchain-based voting systems for selecting candidates, conducting primaries, or making internal policy decisions, ensuring transparency and fairness in the party's decision-making process.
- **Online Platforms and Social Networks:** Online platforms and social networks can integrate blockchain technology into their voting features to prevent manipulation of polls or surveys and enhance the credibility of user-generated content.
- **Public Initiatives and Referendums:** Governments or organizations conducting public initiatives, referendums, or opinion polls can leverage blockchain technology to ensure the integrity and security of the voting process, increasing public trust and participation.

The above is made possible due to

- Faster processing and transmission of data; and increasingly efficient networking enable near real-time communication for vast amounts of data.
- Enhanced data storage at steadily decreasing cost.
- High-speed data tools for transactional as well as analytic processing.
- The provision of blockchain technology renders the entire polling process immutable, secure, transparent, and free from third-party interference.



We posit that a blockchain-based e-voting framework that could be based on demand as a service is viable. It can be used to accrue the advantages of blockchain. We further posit that offering such a scheme on the cloud via the web as a decentralized application will render it more pervasive; as well as enhance its amenability to scale.

### Research Aims

The research focuses on exploring the viability of implementing a blockchain-based e-voting mechanism in public scenarios. It aims to investigate the practicality and effectiveness of such a system in enhancing the security, transparency, and accessibility of voting processes. Additionally, the study aims to identify the specific real-life domains, such as national elections, organizational polls, or community decisions, where blockchain-based e-voting can offer significant value. Furthermore, the research seeks to determine the key features and requirements that such a system must possess to ensure its successful implementation and adoption in various voting scenarios.

### Review of Literature

Alvi et al [1] developed a scheme for a secure, decentralized methodology to conduct digital voting based on blockchain. The various entities involved in the process and the procedure involved therein were implemented through smart contracts.

Jayakumari et al [2] outlined an E-voting system using cloud-based hybrid blockchain technology. They deployed the Byzantine fault tolerance (PBFT) consensus mechanism and smart contracts. The blockchain assures the integrity of the votes cast.

Hjálmarsson et al. [3] present a blockchain- based e-voting system, exploring the application of blockchain technology in voting systems and discussing its potential benefits.

Monrat et al. [4] provide a comprehensive survey of blockchain technology from various perspectives, including its applications, challenges, and opportunities. It offers insights into the current state of blockchain research and its potential future directions.

Hanifatunnisa and Rahardjo [5] discuss the design of a blockchain-based e-voting recording system. It outlines the architecture and implementation details of the system.

Panja and Roy [6] present a secure end-to- end verifiable e-voting system using blockchain and cloud server technology. It highlights the security features and implementation aspects of the proposed system.

Huang et al. [7] provide an overview of how blockchain technology is applied in voting systems. It covers topics like system architecture, security features, consensus mechanisms, and real-world examples.

George, L., & Kizhakkethottam, J. J. [8] present a comparative study of zero- knowledge proofs and homomorphic encryption in ensuring data privacy in blockchain applications. It discusses the advantages and limitations of both techniques and their effectiveness in guaranteeing privacy in blockchain systems.

Damgård, I., Fazio, N., & Nicolosi, A. [9] introduces a method for achieving non- interactive zero-knowledge proofs from homomorphic encryption. It explores the theoretical foundations of zero-knowledge proofs and their connection to homomorphic encryption schemes.

Hajian Berenjestanaki, M., Barzegar, H. R., El Ioini, N., & Pahl, C. [10] provide a technology review of blockchain-based e- voting systems. It discusses the architectures, applications, and challenges associated with implementing blockchain technology in e- voting systems.

Song, J., Zhang, P., Alkubati, M., Bao, Y., & Yu, G. [11] reviews research advances on blockchain-as-a-service (BaaS), focusing on architectures, applications, and challenges. It discusses the role of BaaS in enabling the deployment and management of blockchain solutions in various domains.

Jafar, U., Aziz, M. J. A., & Shukur, Z. [12] present a review of blockchain for electronic voting systems, discussing the current state of the art, challenges, and open research issues in implementing blockchain technology for e-voting.

Yang, W., et al. [13] present a survey on blockchain-based internet service architecture, discussing the requirements, challenges, trends, and future directions. It explores the integration of blockchain technology into internet services and applications.



Nguyen, D. C., et al. [14] discusses the integration of blockchain and the cloud of things (CoT), focusing on architecture, applications, and challenges. It explores the potential of combining blockchain and CoT technologies to enable secure and decentralized IoT systems.

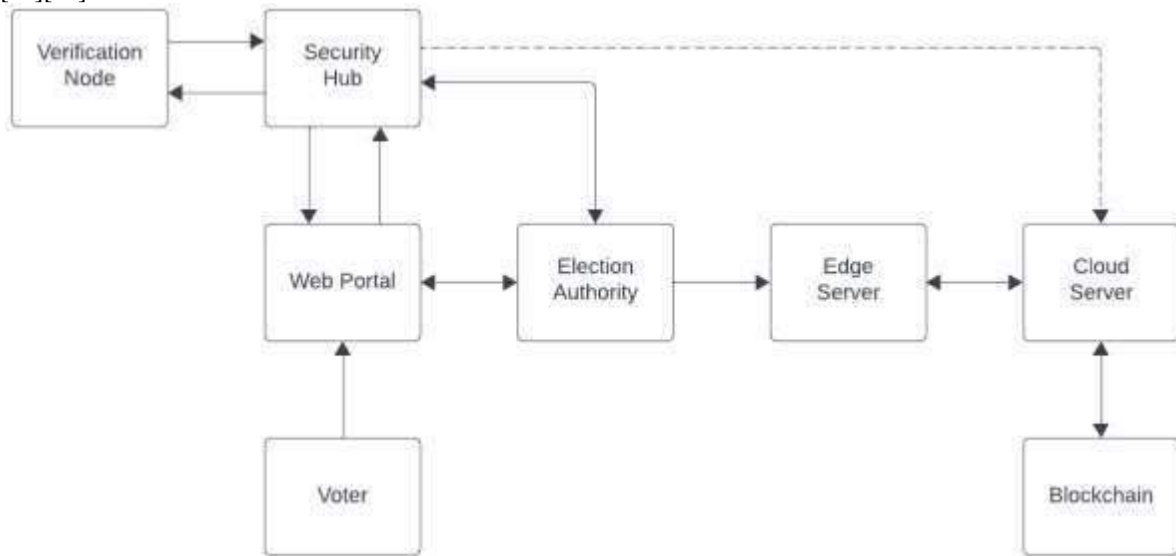
Gai, K., et al. [15] present a survey on the integration of blockchain and cloud computing, discussing architectures, applications, and challenges. It explores how blockchain technology can enhance the security, efficiency, and scalability of cloud-based systems.

Zhu, L., et al. [16] present a study on controllable and trustworthy blockchain-based cloud data management. It discusses the architecture, applications, and challenges of utilizing blockchain technology for managing data in cloud environments, focusing on control and trustworthiness aspects.

Ferdous, M. S., Chowdhury, M. J. M., Hoque, M. A., & Colman, A. [17] provides an overview of blockchain consensus algorithms, covering various approaches used to achieve agreement among network participants in a decentralized system. It analyzes the characteristics, advantages, and challenges associated with different consensus mechanisms in blockchain networks.

### Envisioned System Architecture

The envisioned architecture comprises a Security Hub, Verification Node, Web Portal, Election Authority, Voter, Edge, Cloud Servers, and Blockchain. Security Hub with the help of Verification Node, is responsible for registration and authentication of the Voter [2]. The Election Authority interacts with the Security Hub to oversee the election process. Security Hub interacts directly with the Cloud Server as it sends the encrypted votes for their validation as a transaction and eventual storage in the Blockchain. Processes regarding counting votes and displaying results are done at the Edge Server to tackle concerns regarding performance and scalability. [2][11][13][15][16]

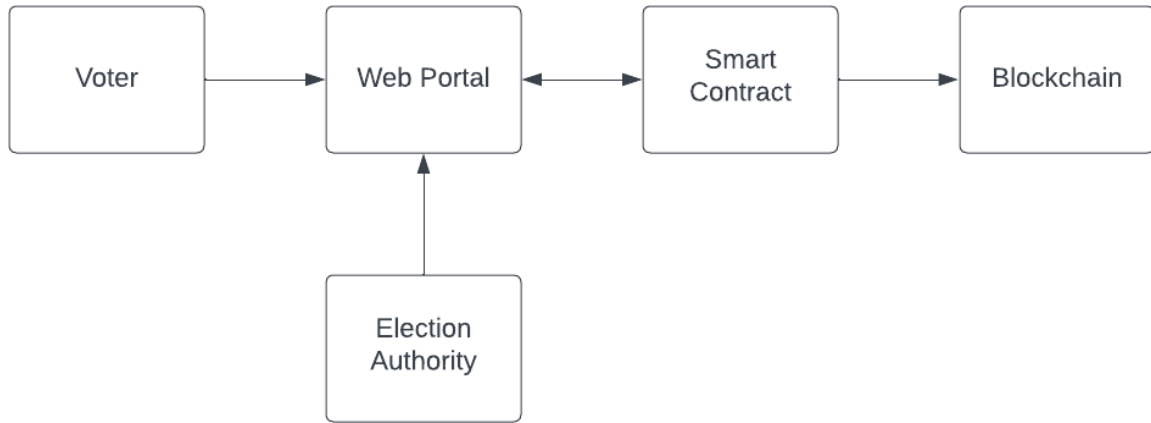


**Fig. 1 – Envisioned System Architecture**

The architecture is to be developed in phases. For the first phase, we have implemented a scheme for online voting based on blockchain. It will be migrated to the cloud after testing its efficacy in various live environments.

### Architecture of Proposed System

The architecture of the proposed methodology is shown in the following figure, Fig. 2, based on blockchain technology.

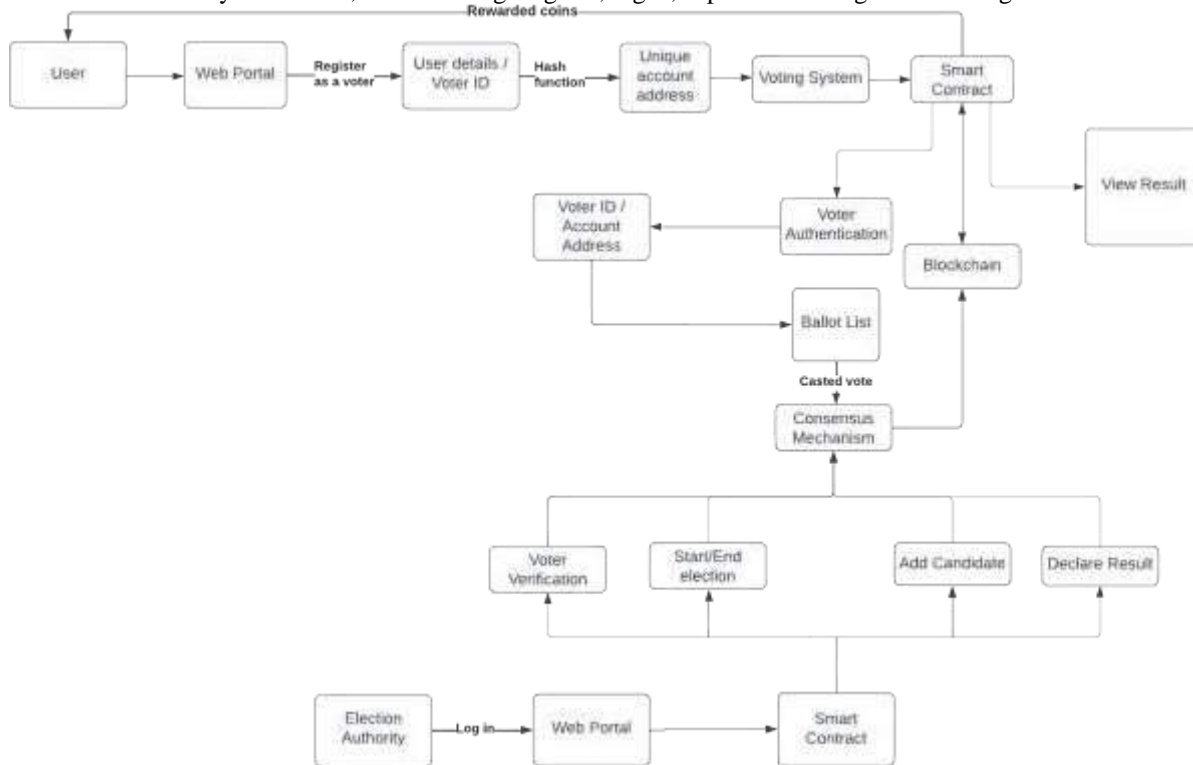


**Fig. 2 – Proposed System Architecture**

The proposed system architecture consists of Voter, Web Portal, Smart Contract, Election Authority and the Blockchain. Voters interact with the system through a user-friendly Web Portal, casting their votes securely. Behind

the scenes, a Smart Contract deployed on the blockchain manages the recording of votes. Each vote is securely stored on the blockchain, creating an immutable and transparent ledger of the electoral process. The Election Authority administers the process through the Web Portal, overseeing tasks such as voter registration and result declaration.

To understand the system better, the following diagram, Fig. 3, depicts how things are working behind the scenes:



**Fig. 3 – Detailed System Architecture**



### Voting Process

When a voter casts their vote, the vote is encrypted with the voter id, and the candidate's public key they are voting to, and is sent to the validators in the consensus mechanism as a transaction where they validate it and store it in the blockchain.

The votes of the candidate are counted and tallied through the algorithmic operations that the Homomorphic Encryption technique allows us to perform. Homomorphic encryption is a form of encryption that allows certain mathematical operations to be performed on encrypted data without decrypting it. One can perform computations on encrypted data and obtain the same result as if the operations were performed on the unencrypted data. [8][9]

The total votes are then displayed using Zero- Knowledge Proof cryptographic protocol at the time of the result declaration.

Zero-knowledge proofs are cryptographic protocols that allow one party (the prover) to prove to another party (the verifier) that they know a certain piece of information without revealing any additional information beyond the validity of the statement. [8][9]

### Consensus Mechanism

In the proposed system, we plan to integrate the Proof of Authority (PoA) consensus mechanism to achieve high performance, efficiency, and governance control.

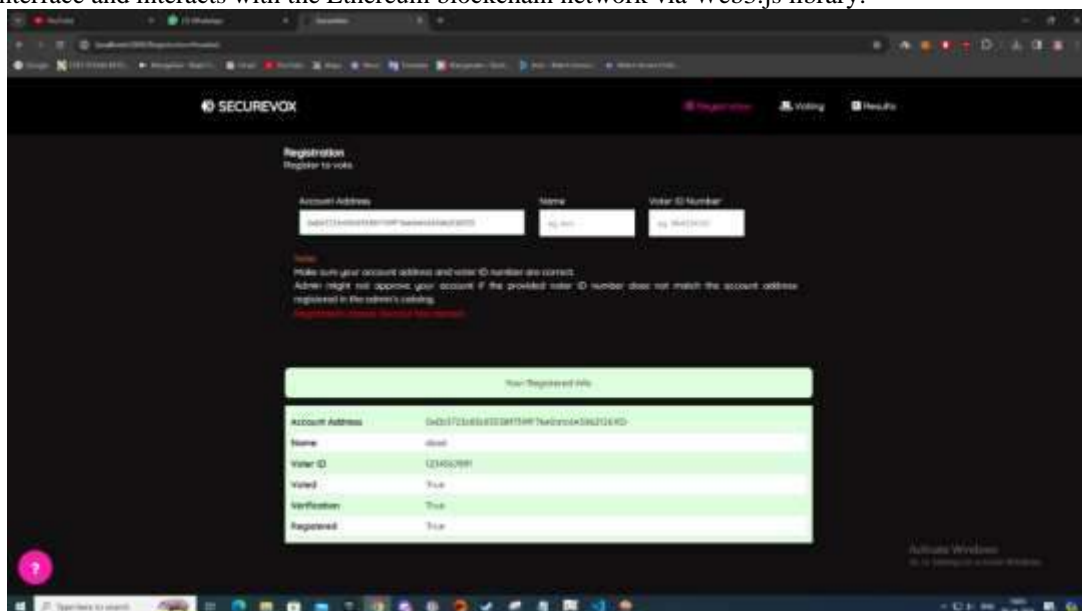
PoA consensus mechanism ensures that only trusted entities, such as verified institutions or individuals whitelisted by the election authority, have the authority to validate and confirm voting transactions. This enhances the security and reliability of the electoral process, as the consensus process is controlled by known and reputable validators. [10][17]

By integrating PoA into our voting system, we can achieve efficient block confirmation times, high transaction throughput, and robust governance controls, ensuring the integrity and transparency of the online voting process.

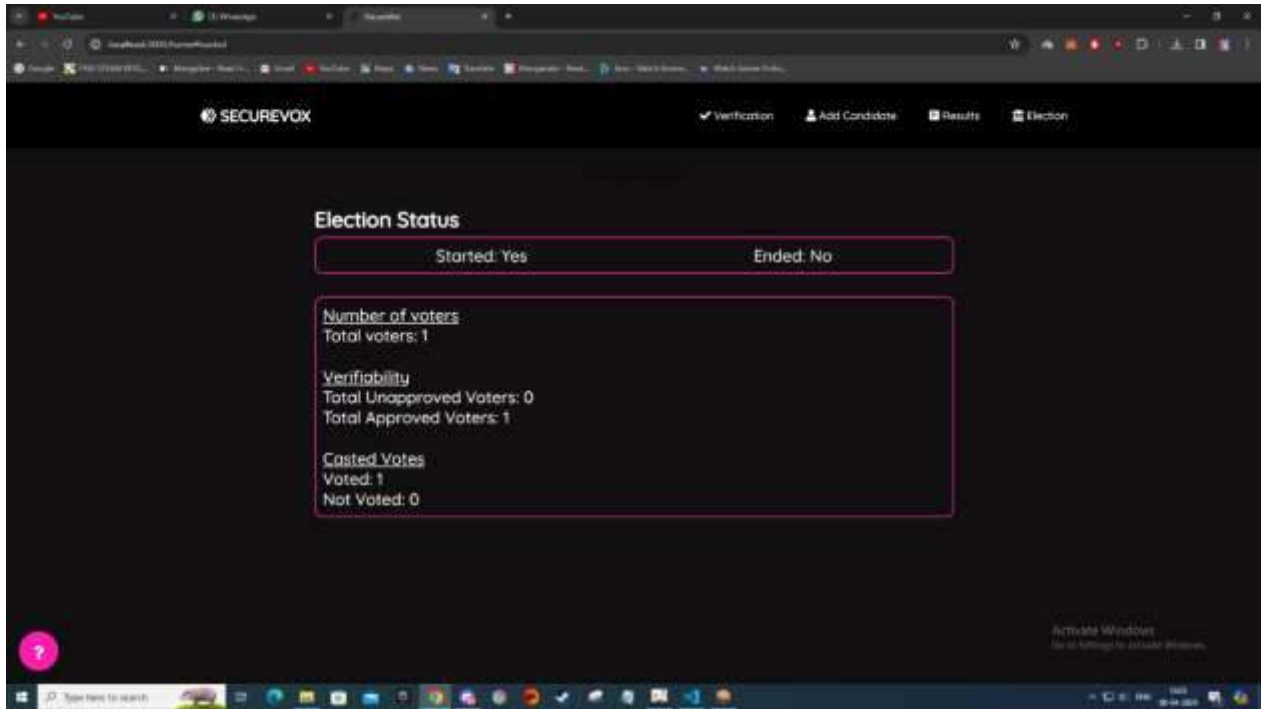
### Implementation Instance

Our implementation instance includes the following components:

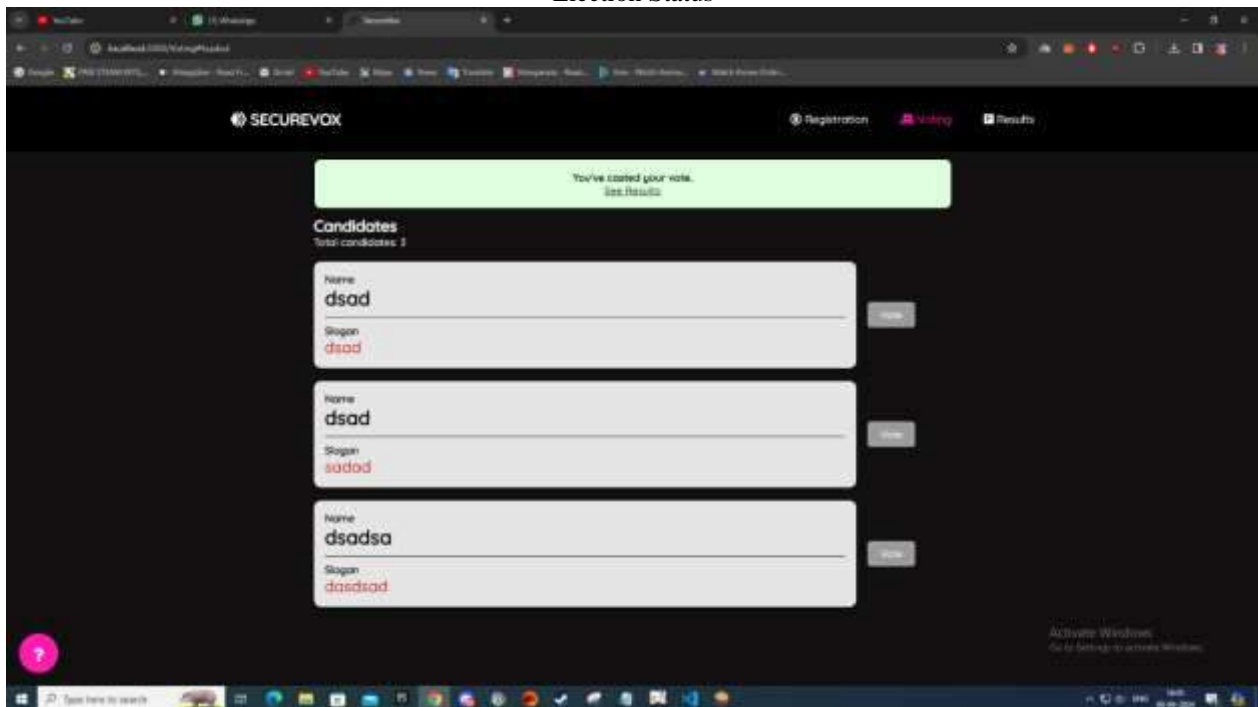
1. **Truffle:** Truffle is used as our development framework for building, testing, and deploying smart contracts. It provides a suite of tools for smart contract development, including compilation, testing, and deployment capabilities.
2. **Solidity:** Solidity is the programming language used to write our smart contracts. It is specifically designed for writing Ethereum smart contracts and allows us to define the behavior of our decentralized voting system.
3. **Ganache:** Ganache is used as our local blockchain network for development and testing purposes. It provides a simulated Ethereum blockchain environment where we can deploy and interact with our smart contracts without incurring actual gas costs.
4. **Node Server:** A Node.js server is utilized for backend operations and integration with external components. It communicates with the frontend interface and interacts with the Ethereum blockchain network via Web3.js library.



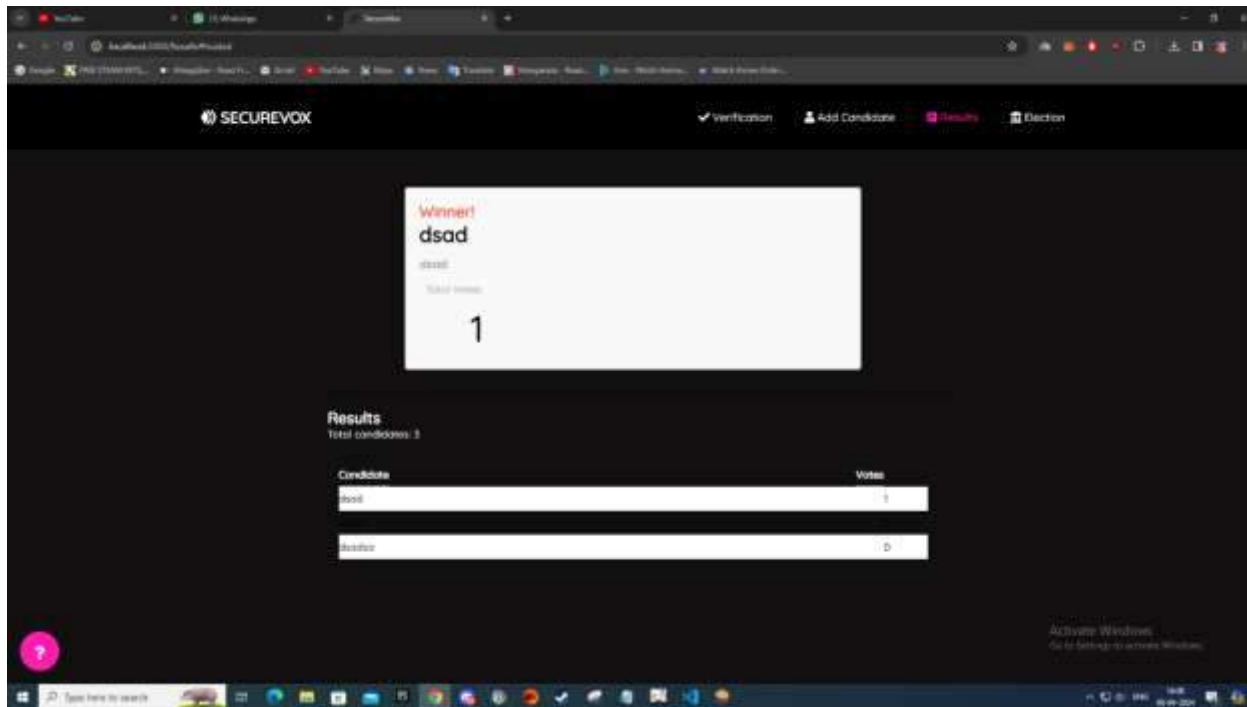
Voter Registration



Election Status



Voting process



Election Result

**Result Analysis**

TC Sr.no	Description	Expected output	Actual output	Pass/Fail
1.	Voter registration	Successful registration of voters	Voter gets registered into the system, waits for being verified by admin	Pass
2.	Voter authentication	Voter verification	The admin verifies voter details/credentials and authenticates them to participate in elections	Pass
3.	Candidate registration	Registration of candidates contesting for elections	Admin adds the candidates name who are about to contest in elections in the ballot	Pass
4.	Voting	Voters select and vote for candidates	The voters use a coin assigned to them so they can vote for a candidate.	Pass
5.	End elections	End of election	The admin ends the election and can view the results and declare them	Pass

**Features**

**Decentralized and Transparent:** Leveraging blockchain technology ensures decentralization and transparency, eliminating the need for intermediaries and providing a tamper-resistant record of the voting process.

**Secure Encryption:** Votes are encrypted using public-private key pairs generated by the Crypto Server, ensuring voter anonymity and privacy.





**Smart Contract Automation:** Smart contracts automate various aspects of the election process, including voter registration, candidate registration, vote casting, and result declaration, reducing manual intervention and enhancing efficiency.

**Voter Authentication:** Authentication mechanisms ensure that only verified voters can participate in the voting process, enhancing security and preventing fraudulent activities.

#### Scope for further research

**Scalability:** Investigate techniques to enhance the scalability of blockchain-based voting systems to accommodate a larger number of voters and transactions without compromising performance.

**Voter Accessibility:** Explore methods to make blockchain-based voting systems more accessible to voters with disabilities or limited access to technology, ensuring inclusivity and equal participation.

**Vulnerability Assessment:** Conduct thorough vulnerability assessments and security audits of blockchain-based voting systems to identify and mitigate potential security threats and vulnerabilities.

#### Conclusion

Human society is on the cusp of the Fifth Industrial Revolution. This entails that the layman should feel more comfortable with machines and automated processes.

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# SMART BUILDING CONTROL THROUGH INTERNET OF THINGS/MACHINE-TO-MACHINE DEVICE MANAGEMENT VIA HETEROGENEOUS WIRELESS NETWORKS

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Article DOI: <https://doi.org/10.36713/epra16417>

DOI No: 10.36713/epra16417

## ABSTRACT

The increasing use of wireless communication technologies has made IoT and machine-to-machine (M2M) connections crucial to a wide range of industries. Smart buildings are an excellent example of an IoT/M2M application. Issues such as a lack of a convergent solution, high costs, restricted wireless transmission range, user-unfriendly interfaces, and the inability to integrate IoT and M2M technologies. Consequently, this article suggests a more effective method for Machine-to-Machine (M2M) and The Internet of things smart building systems: heterogeneous wireless networks that include both WSNs and MCNs. The suggested system is a cost-effective embedded system that includes Several functional actuators, sensors, and modules for Arduino and NodeMCU, ESP32CAM boards allow for data collection and control across a variety of heterogeneous communication methods like Bluetooth, Wi-Fi, and global system for Mobile (GSM). All collected data is issued to the ThingSpeak platform, allowing the building system to be monitored via the Thing Speak webpage or the UR Smarthome app. One of the researchs most important results is that it can give the server precise information with extremely little delay, allowing users to quickly control and monitor remotely the proposed system that consists of several innovative services names indoor applications (fire detection and gas leakage detection, intrusion alarm by ultrasonic, medicine reminder by RTC module, light and fan control, smart door) and outdoor applications (garden irrigation by soil moisture and DHT11, air quality, smart parking ). Our free mobile application UR Smarthome, which is a local server that controls and monitors the building from a distance, is used to plan and execute all of these services that provides remote control and monitor of the building via Bluetooth/ Cellular networks and Wi-Fi access. With its customizable features, this IoT/M2M smart building system can be tailored to the demands of its users, enhancing their quality of life and safety while using less energy. In addition, identifying and lowering risks, it assists in preventing the loss of resources and human lives.

**KEYWORDS**— Converged networks, heterogeneous networks (HetNets), Internet of Things (IoT)/machine-to-machine (M2M), mobile application, mobile cellular networks (MCNs), smart building, wireless sensor networks (WSNs).

## 1. INTRODUCTION

The fields of cutting-edge technologies that are expanding the fastest are the Internet of Things (IoT) and machine-to-machine (M2M), where the number of linked gadgets has now much surpassed that of humans. The Internet of Things (IoT) is defined by the International Telecommunication Union (ITU) as a worldwide infrastructure for the information society that connects real and virtual objects to enable new services. on compatible information and communication technologies, both current and developing [1]. M2M, which is developing characterized as a communication that enables devices to connect with one another across a wired or wireless communication network without the need for human involvement, is seen as a

crucial component of the Internet of Things ecosystem [2]. In an M2M system, network devices are assisted in comprehending and delivering data as well as making decisions via the use of intelligent sensors, sophisticated wireless technologies, and autonomic computing software [3]. Intelligent reflecting surfaces [4], massive MIMO [5], and ambient backscattering [6] are just a few examples of the many wireless communication technologies that have recently evolved. These technologies have significantly increased IoT/M2M technologies' potential capabilities and expanding prevalence are due to the necessity of their convergence to fulfill the ever-increasing requirement of M2M and IoT. Ambient backscatter is one of the emerging wireless communication technologies for large-scale Internet of Things/machine-to-machine



(IoT) applications. It enables data transmission without the need for power from the IoT device, facilitating device-to-device (D2D) and even multi-hop connections. An ultra-low power consumption device can transfer data by reflecting ambient radio frequency (RF) transmitters' far-field electromagnetic (EM) waves. Large-scale IoT/M2M communications may now successfully address the battery issue that low-power devices with high throughput are facing [7], [8], and [9]. Heterogeneous networks, or HetNets, are networks that function on various wireless communication technologies, particularly mobile cellular networks (MCNs) and wireless sensor networks (WSNs). These networks have a wide range of applications in various industrial sectors, including smart cities, home automation, industry, healthcare, and agriculture[10]. Smart buildings are a new category of application that facilitates information flow throughout the building and offers advanced functionalities and services. These enable automated control, monitoring, management, and maintenance of the building's various subsystems and applications in an efficient and integrated manner, either locally or remotely [11]. Wireless network-based IoT/M2M smart building systems, whether MCN or WSN, are the subject of several research articles [1], [2], [3], [4], [5], [6], [7], [8], [9], which will be covered in depth in the related work section. When comparing the proposed system to all of these research works, it can be seen that the disadvantages of current building management systems are as follows: they do not combine IoT and M2M technologies; they rely solely on one or two wireless communication technologies; their wireless transmission range is limited; their user interfaces are typically awkwardly designed; and they are very expensive. As a result, our strategy offers a low-cost, hybrid (local and remote) IoT/M2M-based smart building solution with an intuitive smartphone interface. The suggested system has multiple primary functions, including smart parking, smart lighting, fire and gas detection, garden irrigation, intrusion alarm, smart door, and smart lighting. Our mobile application called "URSmarthome", which

via various HetNets, including cellular networks like 4G or 5G, global system for mobile (GSM) Bluetooth, WiFi, connectivity, , allows for the remote control and monitoring of all these services. Furthermore, all smart devices are connected by the suggested system and monitoring of all these services. Furthermore, all smart devices are connected by the suggested system in a convenient, safe, economical, and energy-efficient manner. This article builds on our earlier research you create a prototype IoT/M2M smart building that makes use of a variety of compatible sensors, actuators, and modules in addition to the UR Smarthome App. Apart from obtaining information from the smart building, the system also retains data in a cloud database, presents it graphically on the ThingSpeak website, and allows for remote monitoring using the URSmarthome app.

## 2. OBJECTIVE

Interest in heterogeneous wireless networks is rising in a number of domains, such as IoT/M2M smart building automation, which in recent years has grown at a very rapid speed. Reduced maintenance costs, less energy use, comfort, peace, entertainment, safety, security, increased productivity, more livable structures, and increased resale value are the key advantages of smart buildings. IoT and M2M technology integration techniques are lacking in most current systems, despite the Internet of Things' broad application in the deployment of smart building systems. The majority of the studies that are currently available suffer from poor user interface design, high pricing, and restricted wireless range connectivity, in addition to relying solely on one or two wireless communication technologies.

The paper suggests employing heterogeneous wireless reaching the more general scenario of smart cities, thanks to the development of IoT/M2M networks to enable adaptive control of IoT/M2M devices in smart buildings, with the aim of decreasing current smart building system functions as a local server to control the building



applications based on heterogeneous wireless and give consumers easy and efficient control over their building by selecting the right connection WSN or MCN through a user-friendly smartphone interface via the UR Smarthome App, independent of time and place. Effective and reasonably priced components are used, along with the free UR Smarthome App, to manage, monitor, and control building conditions and devices across several HetNets. The research contribution is summed up as a design for our own mobile application UR Smarthome, which uses heterogeneous wireless networks to provide adaptive control of IoT/M2M devices in smart buildings. Consequently, the following is a list of contributions that research attempt has made:

1. Examining and evaluating relevant research on IoT/M2M wireless technologies for smart building with the presented approach.
2. Creation, execution, and design of adaptive control for IoT/M2M devices combining Arduino and NodeMCU ESP32 CAM boards with inexpensive, small-sized sensors and actuators linked to HetNets in smart building systems;
3. making use of the IoT platform ThingSpeak and intelligently managing M2M devices to enable the monitoring and control of smart building systems via our free smartphone app "UR Smarthome";
4. suggesting eight cutting-edge services for smart buildings, such as garden irrigation, smart door, smart parking, smart alarm, smart gas and fire detection, smart lighting, smart medication reminders, and IAQ monitoring;
5. verifying that the suggested system works as intended in terms of performance, adaptability, control, and automation.

## 2.1 Literature Survey

Centered on employing a variety of sensors to monitor temperature, fire, and gas in homes, along with an LCD panel to show the sensor values, to monitor appliances over the Internet of Things. The device promptly alerts customers of gas leaks or fires by sending a text message to their mobile phone, turning on the siren, starting the spray engine, and displaying a warning on an LCD screen. The Internet of Things (IoT) has the potential to enhance security by facilitating wireless communication between sensors and transducers through a single chip via Wi-Fi. However, this system is not without its limitations, as the number of users increases and the cost of GSM increases due to SMS charges.

A prototype home system for control and monitoring in that uses Bluetooth, RFID, and heterogeneous wireless networks. A specialized graphical user interface (GUI) programmed in HTML allows the user to monitor the home security status and turn on and off the outdoor lights using a specific Internet protocol (IP) address provided by NodeMCU. The system is based on two components: an automation system built using an Arduino UNO that is responsible for reading and processing various types of sensor values; and an outdoor lighting system and security system using NodeMCU. But the apps that have been put in place are not only incredibly simple and unoriginal, but they also ignore the user's freedom to select their preferred wireless communication method.

IoT@HoMe, a portable automation system for smart homes based on the Internet of Things, was created and produced with NodeMCU serving as the Internet gateway and microcontroller. A variety of actuators manage home device functions in addition to utilizing many sensors to track different building conditions. The primary goal of this project is to develop a portable, cost-



effective, and dependable system that can effortlessly monitor home conditions and control home appliances via the Internet from anywhere at any time. These studies are nevertheless limited in that they only consider the Internet as a means of communication, ignoring its unavailability or disruptions in some areas.

While the proposed M2M-based smart home system offers numerous advantages, it also presents several disadvantages. Firstly, reliance on wireless communication technologies such as 2G/3G/4G and Bluetooth introduces vulnerabilities to security breaches and interference. Hackers could potentially gain unauthorized access to the system, compromising the safety and privacy of the occupants. Additionally, the use of off-the-shelf components like Arduino UNO and inexpensive sensors may result in limitations regarding scalability and reliability. These components may not withstand long-term usage or meet the evolving needs of a smart home environment. Moreover, integrating various functionalities such as alarm systems, automatic doors, and environmental monitoring into a single system increases complexity, making troubleshooting and maintenance challenging for users without technical expertise. Furthermore, dependence on mobile applications for remote control implies reliance on smartphones, which could pose accessibility issues for individuals without compatible devices or reliable network connectivity. Lastly, the cost of implementing and maintaining a comprehensive M2M-based smart home solution may be prohibitive for some users, particularly in regions with limited resources or economic constraints. Thus, while M2M technologies offer promising advancements in home automation, addressing these disadvantages is crucial to ensuring widespread adoption and usability in diverse contexts.

### 3. METHODOLOGY

Lately, there has been a rapid rise in the size of automated environments, starting from the living room and progressing to the apartment, then buildings, and ultimately reaching the more general scenario of smart cities, thanks to the

development of IoT/M2M networks. Limitations. to increase the range of connectivity.

#### 3.1 Proposed System

The IoT/M2M smart building's planned HetNet architecture is made up of mobile-cellular networks and WSNs. Wireless local area networks (WLANs), like Wi-Fi (IEEE802.11x), which support small area connectivity, and wireless personal area networks (WPANs), like Bluetooth (IEEE802.15.1) and RFID, which support short-range connectivity for communication between personal devices, are examples of WSNs that address communication between devices within the building. On the other hand, mobile communication networks (MCNs) serve as the communication channel between devices within a building and those connected to the external network. They comprise wireless wide area networks (WWANs) that employ mobile telecommunications technologies, including 4G (LTE), 3G [universal mobile telecommunications system (UMTS)], and 2G (GSM).

##### 3.1.1. Design of System Architecture:

The suggested architectural plan for an IoT/M2M smart building system based on HetNets gathers data and organizes it in accordance with the functions and services provided by a business using various pieces of recognized hardware. Smart parking, smart garden irrigation, smart doors, smart lighting, smart medication reminders, intrusion alarms are the primary services provided. These services are all set up to operate and observe the building from a distance via cellular networks, such as GSM, 4G, Bluetooth, and WiFi, and the UR Smarthome App. In addition to helping owners, operators, and facility managers increase asset performance and dependability, this IoT/M2M smart building infrastructure design also helps to stop the loss of resources and human lives brought on by unfavourable situations. In addition, the suggested system is inexpensive and energy-

efficient, making it suitable for usage in a variety of establishments on hotels, hospitals, offices and suggested proposed system design is seen in Fig.1.

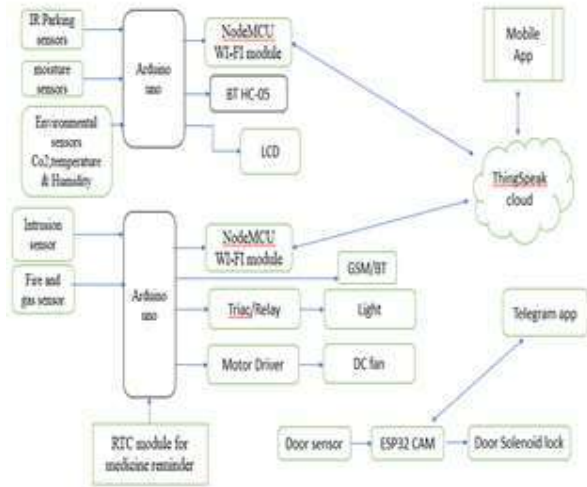


Fig.1 : Proposed System Block Diagram

### 3.1.2 Hardware and Software for the System

Several sensors and actuators are used in the proposed IoT/M2M smart building system, which is based on HetNets networks, to gather data and manage it in accordance with services. The Arduino microcontroller serves as the system's brain. Furthermore, for wireless communication, the NodeMCU board, ESP32 CAM and other modules like the Bluetooth HC-06, Sim8001 are utilized. While the software is detailed below, the primary hardware components are mentioned below. Next, we go over the suggested system's architecture and execution.

## 4. Creating and deploying M2M/IOT smart building services

The simulations and real-world application of IoT/M2M smart building services are the focus of this section. Two types of primary processing units are utilized in the implementation of these services, which include NodeMCU and Arduino. The phone devices'

appliances from a distance, while Arduino will be used to control the other gadgets. ESP 32 cam is used to monitor and control of the smart door application via telegram app. We go into detail about each smart application prototype in the sections that follow.



Fig. 2. Shows the various UR Smarthome App interfaces for the suggested IoT/M2M smart building.

### 4.1 Indoor Applications:

The indoor applications has different types of applications like as fire and gas detection, smart lighting, intrusion alarm this all are implemented by using of Arduino uno, NodeMCU v3, GSM module and BT HC-05. This mention modules are used to give the data through cloud to app and app to cloud. This can be seen in Fig 3.

The proposed system represents a sophisticated solution for environmental monitoring, security surveillance, and remote management. By integrating hardware components, software services, and communication technologies, the system offers a holistic approach to monitoring and managing the environment, ensuring safety, security, and efficiency in various settings such as smart homes, commercial buildings, and industrial

facilities

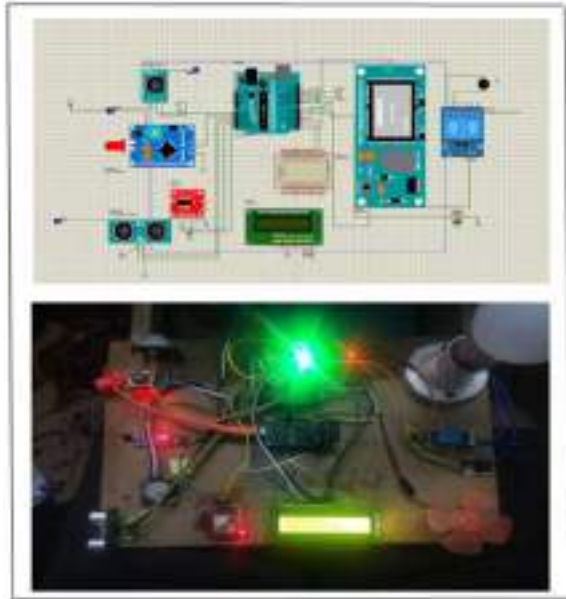


Fig. 3. Indoor Applications in Virtual and practically



Fig. 4: App interface of indoor applications

#### 4.1.1. Systems for Intruder Alarm

People are more concerned about losing their belongings due to the rise in building robberies. Thus, the suggested service shown in Fig. 3 makes use of a GSM module, an

ultrasonic sensor and a buzzer to allow the building's defense against theft or attack. the ultrasonic sensor is used to record distance. When the distance is close, the GSM module sends the building owner brief messages and calls. The LCD screen displays an alarm state, buzzer sounds an alert for theft. This data can be monitored from the ThingSpeak cloud to UR Smarthome app Furthermore, as seen in Fig.4, customers can keep an eye on their building from anywhere at any time using the intrusion alarm interface in the URSmarthome app, which instantly informs users to any risk, as well as our channel on the ThingSpeak platform, which is depicted in Fig.5.



Fig.5: Intrusion alarm system monitoring on ThingSpeak

#### 4.1.2 Intelligent Healthcare Remember

We live longer, healthier lives thanks to medicines. It can be risky, though, to take it incorrectly, to combine specific drugs, or to forget to take it at the appropriate time. These issues are resolved by the suggested IoT/M2M smart medication reminder, which notifies and reminds patients to take the recommended dosage at the appropriate time.

The GSM module, the DS3231 real-time clock module, the LCD screen, the buzzer, and the LEDs are all part of this system. To notify and remind people that it's time to take their medication, The application allows for the customization of the time slot and allows for its modification. The GSM module phones and texts the patient to remind them to take their prescription right away if they are more than 30 minutes late. The user may also remotely manage



and control medication/pill schedules and consumption statistics by utilizing the UR Smarthome app's smart medication reminder interface, as shown in Fig. 4, which will assist them in taking their medication on time and in accordance with their treatment plan. Additionally, it enables instantaneous direct contact. The fig. 6 is shows intrusion, fire , medicine reminder by the message alerts via GSM module.

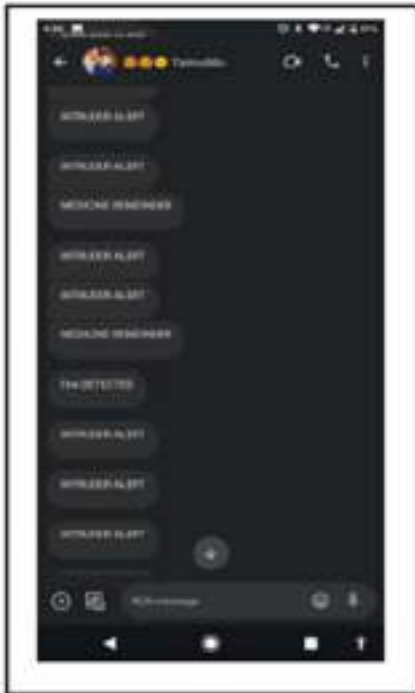


Fig.6: Intrusion, medicine reminder, fire detection messages monitoring via GSM

#### 4.1.3 Gas and Fire Alert System

The purpose of using this suggested procedure for putting out flames and spotting gas leaks is to safeguard people and property from this can be monitored from UR Smarthome app and getting the message alerts via GSM module And as well as the data monitored via serial terminal BT via HC-05, when the fire and gas values exist from fire 0 to 1 and gas levels > 20 Then its will generate an message to presented mobile number likely we can see that interface in fig. 6 for GSM module and fig.4: is used for the fire and gas levels in App interface.

This system can be monitored through ThingSpeak cloud. These values are plotted in graph via cloud server it seen at Fig.7

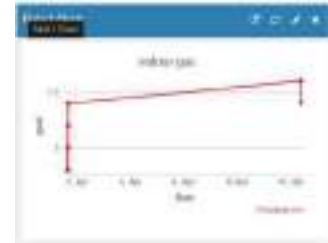


Fig.7: Fire an gas detection graph via ThingSpeak

#### 4.2 Outdoor Applications:

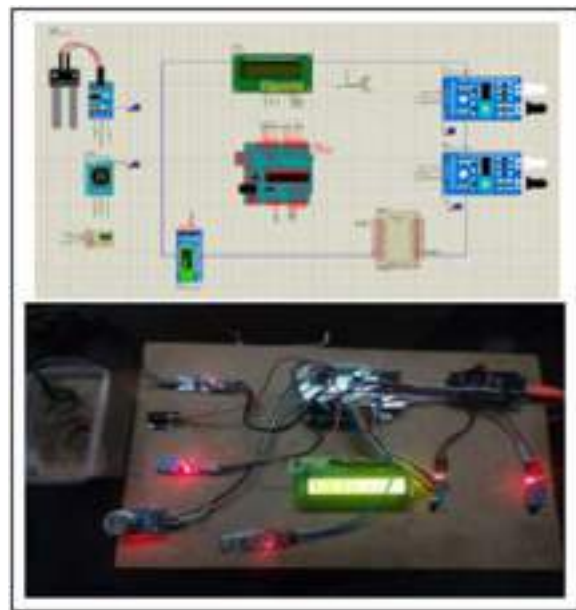


Fig. 8: Outdoor Applications in Virtual and practically.

The outdoor applications consist of different modules like gardening, temperature, humidity, parking slots alarm this all are implemented by using of Arduino uno, NodeMCUv3and BT HC-05 This mention modules are used to give the data

through cloud to app and app to cloud. This can be seen in Fig 8.



Fig.9: App interface of Outdoor applications

#### 4.2.1 Intelligent Parking:

An IoT/M2M-based system called “smart parking” delivers data on the availability of every parking space in real time and chooses the best one. An Arduino uno microcontroller, a NodeMCUboard, infrared sensor(TCRT5000),an LCD, a buzzer components make up the system. Fig. 8 displays the suggested smart parking system prototype.

The system looks for the available parking spots using infrared sensors, determines whether any one are occupied, and updates data with cloud server every 30 seconds. As seen in Fig. 9, the UR Smarthome App's smart parking interface allows for hassle-free parking and allows you to check the availability of parking slots online from anywhere.

This all data are feed to the ThingSpeak cloud for the monitoring purpose and plots are plotted by ThingSpeak this can be seen in Fig. 10. The HC-05 is used to get the data in serial terminal BT app where monitor in certain distance around of 10 meters.

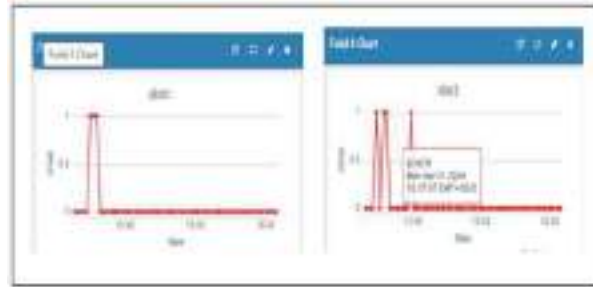


Fig. 10 Intelligent Parking graph on ThingSpeak

#### 4.2.2 Garden Irrigation System:

The irrigation automation system for gardens that is being suggested monitors the temperature, humidity, light levels, and soil moisture of the plants with little to no operator intervention (see Fig. 8). A DHT11 sensor is used to track temperature and humidity levels in the system. A soil moisture sensor measures the percentage of soil wetness to optimize irrigation dose and prevent water waste



Fig.11: Garden Irrigation System graphs on ThingSpeak

Furthermore, this solution makes it easier to manage the irrigation systems and make the necessary adjustments in real-time by enabling remote control and monitoring of the garden irrigation system via the UR Smarthome app (see Fig. 9) and via our channel in ThingSpeak, which is used to view data from the proposed smart garden system remotely (see Fig. 8). Through the use of an intelligent monitoring system, this system maximizes the use of resources (water, electricity, and fertilizers) and irrigation schedule.

### 4.3 Smart Door System:

The proposed system is consist of PIR sensor, ESP32 CAM module, solenoid lock, used an telegram bot to gather the data from ESP32 for the monitoring and controlling purpose. When the application is started from telegram bot by commanding as START it gives so some commands as 1. capture photo 2. Enable flash 3. Disable flash 4. Enable PIR 5. Disable PIR. All this are the commands interface in the telegram smart door bot. The hardware kit is sen in fig.12

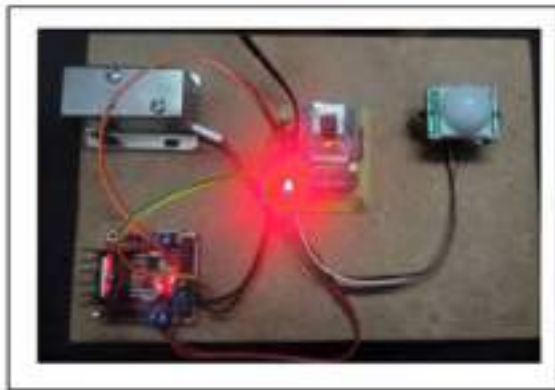


Fig. 12: Smart Door System

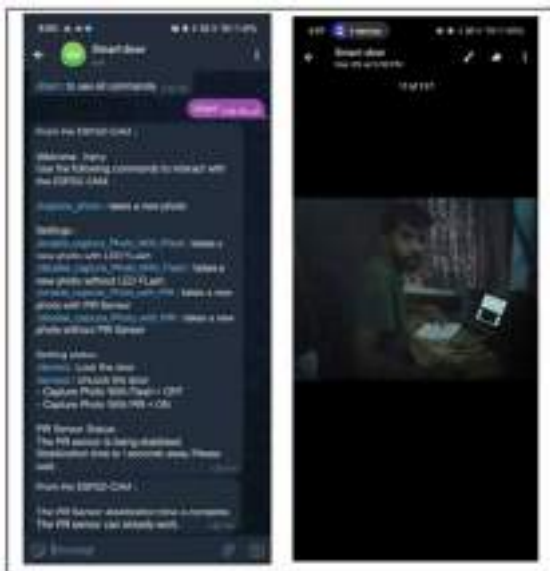


Fig. 13: Telegram Smart Door bot page interface and captured photo from ESP32CAM

When a person comes in front of PIR sensor the sensor detects a motion that motion is a trigger point to the ESP32CAM then the camera captures the person's photo and uploads it to the telegram bot account if the person is known by giving a command as access the lock will unlock within a delay of 5 seconds it will lock.

### 5. RESULTS AND DISCUSSION

The results of the functional testing of the prototype for the proposed IoT/M2M smart building system are discussed in this section. The system includes a number of different services and functionalities, including smart parking, garden irrigation, intrusion alarm, smart door, fire and gas detection, smart lighting, and smart medication reminder. We tested each of these services separately in Section 4, but in this section, the efficacy of the designed system is verified by testing all of its features on the final IoT/M2M smart building model, which was developed to elaborate on the performance and functionality of the suggested approach.

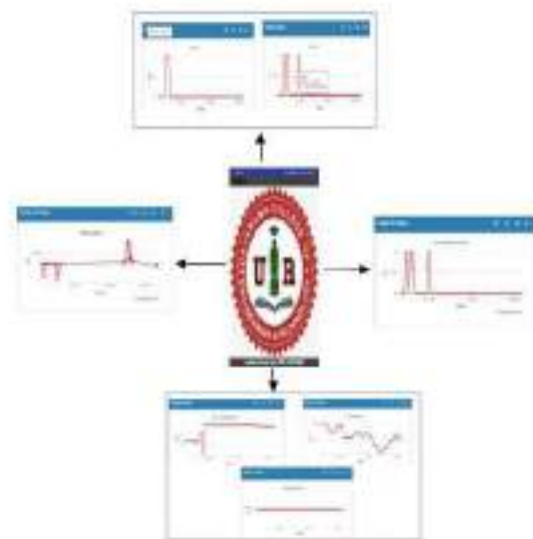


Fig. 14: Sensing results for all the Proposed System

The usage of several sensors, actuators, and shields led to a low power supply and few



connectors. Consequently, we included the Arduino Mega board in addition to the Arduino UNO and NodeMCU to ensure flawless functionality and meet the demands of the IoT/M2M smart building. Designing and implementing an IoT/M2M smart building based on the convergence of two HetNets was our aim. WSNs functioning on Wi-Fi, Bluetooth, and MCNs (such as 4G, 5G, or GSM). Every piece of information gathered from the proposed system was transmitted to the ThingSpeak server, stored in a cloud database, and displayed across four channels. The channels are shown as real-time line graphs on the ThingSpeak website and the Raniso App. The channels receive data from the building sensors at intervals of 15 s. Figure 14.

Our efforts have yielded very satisfying results, as we were able to fulfill our aim of giving the server precise readings. Additionally, because there is extremely little latency, users can effortlessly utilize the Raniso App on their mobile phones to operate and monitor the smart building remotely from any location at any time. Using artificial intelligence to operate appliances by enabling Google Assistant voice commands is another one of this study's breakthroughs. The suggested smart building can be altered to suit the needs and tastes of the user. For instance, the user can use Google Assistant to speak commands to operate the lights, pushbuttons, Bluetooth, Wi-Fi, 4G/5G networks, or an automated system that senses input from the PIR sensor.

## 6. Conclusion

This paper focuses on creating a smart building paradigm for IoT and M2M based on the convergence of WSNs and networks that are mobile-cellular. The suggested system made use of open-source software (IDE, Proteus, and Telegram App and UR Smarthome) and open hardware (Arduino, NodeMCU, ESP32 Cam sensors, modules, and so on). Our research in this

article demonstrates that our suggested approach provides a unique architectural design for an affordable and adaptable system that can be implemented for a range of smart IoT/M2M systems, such as smart grids, smart cities, smart retail, and so forth. For instance, the architectural design for a smart building was given in greater depth, and we recommended a number of key features and services, including smart parking, automated garden watering, intrusion alarm, smart door, fire and gas detection, smart lighting, and smart medication reminders. Through our channels on the ThingSpeak platform and our multi-platform mobile application called "UR Smarthome," which is a local server that enables remote building control via RFID, Bluetooth, and WiFi connectivity as well as cellular networks like GSM, 4G, or 5G, all of these services can be managed and observed remotely. The planned IoT/M2M smart building was created, put into practice, tested, and produced the desired outcomes. Machine learning techniques can be integrated into this smart building system to make it more sophisticated and resilient for use in future studies.

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Article DOI: <https://doi.org/10.36713/epra16417>

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## ABSTRACT

The increasing use of wireless communication technologies has made IoT and machine-to-machine (M2M) connections crucial to a wide range of industries. Smart buildings are an excellent example of an IoT/M2M application. Issues such as a lack of a convergent solution, high costs, restricted wireless transmission range, user-unfriendly interfaces, and the inability to integrate IoT and M2M technologies. Consequently, this article suggests a more effective method for for Machine-to-Machine (M2M) and The Internet of things smart building systems: heterogeneous wireless networks that include both WSNs and MCNs. The suggested system is a cost-effective embedded system that includes Several functional actuators, sensors, and modules for Arduino and NodeMCU, ESP32CAM boards allow for data collection and control across a variety of heterogeneous communication methods like Bluetooth, Wi-Fi, and global system for Mobile (GSM). All collected data is issued to the ThingSpeak platform, allowing the building system to be monitored via the ThingSpeak webpage or the UR Smarthome app. One of the research's most important results is that it can give the server precise information with extremely little delay, allowing users to quickly control and monitor remotely the proposed system that consists of several innovative services names indoor applications (fire detection and gas leakage detection, intrusion alarm by ultrasonic, medicine reminder by RTC module, light and fan control, smart door) and outdoor applications (garden irrigation by soil moisture and DHT11, air quality, smart parking ). Our free mobile application "UR Smarthome," which is a local server that controls and monitors the building from a distance, is used to plan and execute all of these services that provides remote control and monitor of the building via Bluetooth/ Cellular networks and Wi-Fi access. With its customizable features, this IoT/M2M smart building system can be tailored to the demands of its users, enhancing their quality of life and safety while using less energy. In addition, identifying and lowering risks, it assists in preventing the loss of resources and human lives.

**KEYWORDS**— Converged networks, heterogeneous networks (HetNets), Internet of Things (IoT)/machine-to-machine (M2M), mobile application, mobile cellular networks (MCNs), smart building, wireless sensor networks (WSNs).

The fields of cutting-edge technologies that are expanding the fastest are the Internet of Things (IoT) and machine-to-machine (M2M), where the number of linked gadgets has now much surpassed that of humans. The Internet of Things (IoT) is defined by the International Telecommunication Union (ITU) as a worldwide infrastructure for the information society that connects real and virtual objects to enable new devices are assisted in comprehending and delivering data as well as making decisions via the use of intelligent sensors, sophisticated wireless technologies, and autonomic computing software [3]. Intelligent reflecting surfaces [4], massive MIMO [5], and ambient backscattering [6] are just a few examples of the many wireless communication technologies that have recently evolved. These technologies have significantly

services. on compatible information and communication technologies, both current and developing [1]. M2M, which is developing characterized as a communication that enables devices to connect with one another across a wired or wireless communication network without the need for human involvement, is seen as a crucial component of the Internet of Things ecosystem [2]. In an M2M system, network wireless transmission range is limited; their user interfaces are typically awkwardly designed; and they are very expensive. As a result, our strategy offers a low-cost, hybrid (local and remote) IoT/M2M-based smart building solution with an intuitive smartphone interface. The suggested system has multiple primary functions, including smart parking, smart lighting, fire and gas detection, garden irrigation, intrusion alarm,



increased IoT/M2M technologies' potential capabilities and expanding prevalence are due to the necessity of their convergence to fulfill the ever-increasing requirement of M2M and IoT. Ambient backscatter is one of the emerging wireless communication technologies for large-scale Internet of Things/machine-to-machine (IoT) applications. It enables data transmission without the need for power from the IoT device, facilitating device-to-device (D2D) and even multi-hop connections. An ultra-low power consumption device can transfer data by reflecting ambient radio frequency (RF) transmitters' far-field electromagnetic (EM) waves. Large-scale IoT/M2M communications may now successfully address the battery issue that low-power devices with high throughput are facing [7], [8], and [9]. Heterogeneous networks, or HetNets, are networks that function on various wireless communication technologies, particularly mobile cellular networks (MCNs) and wireless sensor networks (WSNs). These networks have a wide range of applications in various industrial sectors, including smart cities, home automation, industry, healthcare, and agriculture[10]. Smart buildings are a new category of application that facilitates information flow throughout the building and offers advanced functionalities and services. These enable automated control, monitoring, management, and maintenance of the building's various subsystems and applications in an efficient and integrated manner, either locally or remotely [11]. Wireless network-based IoT/M2M smart building systems, whether MCN or WSN, are the subject of several research articles [1], [2], [3], [4], [5], [6], [7], [8], [9], which will be covered in depth in the related work section. When comparing the proposed system to all of these research works, it can be seen that the disadvantages of current building management systems are as follows: they do not combine IoT and M2M technologies; they rely solely on one or two wireless communication technologies; their The paper suggests employing heterogeneous wireless reaching the more general scenario of smart cities, thanks to the development of IoT/M2M networks to enable adaptive control of

smart door, and smart lighting. Our mobile application called "URSmarthome", which functions as a local server to control the building via various HetNets, including cellular networks like 4G or 5G, global system for mobile (GSM), Bluetooth, WiFi, connectivity, , allows for the remote control and monitoring of all these services. Furthermore, all smart devices are connected by the suggested system and monitoring of all these services. Furthermore, all smart devices are connected by the suggested system in a convenient, safe, economical, and energy-efficient manner. This article builds on our earlier research you create a prototype IoT/M2M smart building that makes use of a variety of compatible sensors, actuators, and modules in addition to the UR Smarthome App. Apart from obtaining information from the smart building, the system also retains data in a cloud database, presents it graphically on the ThingSpeak website, and allows for remote monitoring using the URSmarthome app.

## 2.OBJECTIVE

Interest in heterogeneous wireless networks is rising in a number of domains, such as IoT/M2M smart building automation, which in recent years has grown at a very rapid speed. Reduced maintenance costs, less energy use, comfort, peace, entertainment, safety, security, increased productivity, more livable structures, and increased resale value are the key advantages of smart buildings.IoT and M2M technology integration techniques are lacking in most current systems, despite the Internet of Things' broad application in the deployment of smart building systems. The majority of the studies that are currently available suffer from poor user interface design, high pricing, and restricted wireless range connectivity, in addition to relying solely on one or two wireless communication technologies.



IoT/M2M devices in smart buildings, with the aim of decreasing current smart building system applications based on heterogeneous wireless and give consumers easy and efficient control over their building by selecting the right connection WSN or MCN through a user-friendly smartphone interface via the UR Smarthome App, independent of time and place. Effective and reasonably priced components are used, along with the free UR Smarthome App, to manage, monitor, and control building conditions and devices across several HetNets. The research contribution is summed up as a design for our own mobile application UR Smarthome, which uses heterogeneous wireless networks to provide adaptive control of IoT/M2M devices in smart buildings. Consequently, the following is a list of contributions that research attempt has made:

1. Examining and evaluating relevant research on IoT/M2M wireless technologies for smart building with the presented approach.
2. Creation, execution, and design of adaptive control for IoT/M2M devices combining Arduino and NodeMCU ESP32 CAM boards with inexpensive, small-sized sensors and actuators linked to HetNets in smart building systems;
3. making use of the IoT platform ThingSpeak and intelligently managing M2M devices to enable the monitoring and control of smart building systems via our free smartphone app "UR Smarthome";
4. suggesting eight cutting-edge services for smart buildings, such as garden irrigation, smart door, smart parking, smart alarm, smart gas and fire detection, smart lighting, smart medication reminders, and IAQ monitoring;
5. verifying that the suggested system works as intended in terms of performance, adaptability, control, and

## 2.1 Literature Survey

centered on employing a variety of sensors to monitor temperature, fire, and gas in homes, along with an LCD panel to show the sensor values, to monitor appliances over the Internet of Things. The device promptly alerts customers of gas leaks or fires by sending a text message to their mobile phone, turning on the siren, starting the spray engine, and displaying a warning on an LCD screen. The Internet of Things (IoT) has the potential to enhance security by facilitating wireless communication between sensors and transducers through a single chip via Wi-Fi. However, this system is not without its limitations, as the number of users increases and the cost of GSM increases due to SMS charges.

A prototype home system for control and monitoring in that uses Bluetooth, RFID, and heterogeneous wireless networks A specialized graphical user interface (GUI) programmed in HTML allows the user to monitor the home security status and turn on and off the outdoor lights using a specific Internet protocol (IP) address provided by NodeMCU. The system is based on two components: an automation system built using an Arduino UNO that is responsible for reading and processing various types of sensor values; and an outdoor lighting system and security system using NodeMCU. But the apps that have been put in place are not only incredibly simple and unoriginal, but they also ignore the user's freedom to select their preferred wireless communication method.

IoT@HoMe, a portable automation system for smart homes based on the Internet of Things, was created and produced with NodeMCU serving as the Internet gateway and microcontroller. A variety of actuators manage home device functions in addition to utilizing many sensors to track different building conditions. The primary goal of this project is to develop a portable, cost-effective, and dependable system that can





at any time. These studies are nevertheless limited in that they only consider the Internet as a means of communication, ignoring its unavailability or disruptions in some areas.

While the proposed M2M-based smart home system offers numerous advantages, it also presents several disadvantages. Firstly, reliance on wireless communication technologies such as 2G/3G/4G and Bluetooth introduces vulnerabilities to security breaches and interference. Hackers could potentially gain unauthorized access to the system, compromising the safety and privacy of the occupants. Additionally, the use of off-the-shelf components like Arduino UNO and inexpensive sensors may result in limitations regarding scalability and reliability. These components may not withstand long-term usage or meet the evolving needs of a smart home environment. Moreover, integrating various functionalities such as alarm systems, automatic doors, and environmental monitoring into a single system increases complexity, making troubleshooting and maintenance challenging for users without technical expertise. Furthermore, dependence on mobile applications for remote control implies reliance on smartphones, which could pose accessibility issues for individuals without compatible devices or reliable network connectivity. Lastly, the cost of implementing and maintaining a comprehensive M2M-based smart home solution may be prohibitive for some users, particularly in regions with limited resources or economic constraints. Thus, while M2M technologies offer promising advancements in home automation, addressing these disadvantages is crucial to ensuring widespread adoption and usability in diverse contexts.

### 3. METHODOLOGY

Lately, there has been a rapid rise in the size of automated environments, starting from the living room and progressing to the apartment, then buildings, and ultimately reaching the more general scenario of smart cities, thanks to the

effortlessly monitor home conditions and control home appliances via the Internet from anywhere. HetNet architecture is made up of mobile-cellular networks and WSNs. Wireless local area networks (WLANs), like Wi-Fi (IEEE802.11x), which support small area connectivity, and wireless personal area networks (WPANs), like Bluetooth (IEEE802.15.1) and RFID, which support short-range connectivity for communication between personal devices, are examples of WSNs that address communication between devices within the building. On the other hand, mobile communication networks (MCNs) serve as the communication channel between devices within a building and those connected to the external network. They comprise wireless wide area networks (WWANs) that employ mobile telecommunications technologies, including 4G (LTE), 3G [universal mobile telecommunications system (UMTS)], and 2G (GSM).

#### 3.1.1. Design of System Architecture:

The suggested architectural plan for an IoT/M2M smart building system based on HetNets gathers data and organizes it in accordance with the functions and services provided by a business using various pieces of recognized hardware. Smart parking, smart garden irrigation, smart doors, smart lighting, smart medication reminders, intrusion alarms are the primary services provided. These services are all set up to operate and observe the building from a distance via cellular networks, such as GSM, 4G, Bluetooth, and WiFi, and the UR Smarthome App. In addition to helping owners, operators, and facility managers increase asset performance and dependability, this IoT/M2M smart building infrastructure design also helps to stop the loss of resources and human lives brought on by unfavourable situations. In addition, the suggested system is inexpensive and energy-efficient, making it suitable for usage in a variety of establishments on hotels, hospitals, offices and

development of IoT/M2M networks. Limitations. to increase the range of connectivity.

### 3.1 Proposed System

The IoT/M2M smart building's planned

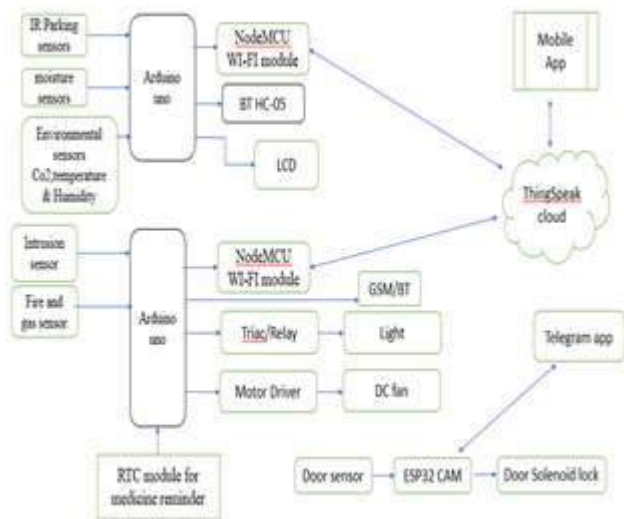


Fig.1 : Proposed System Block Diagram

#### 3.1.2 Hardware and Software for the System

Several sensors and actuators are used in the proposed IoT/M2M smart building system, which is based on HetNets networks, to gather data and manage it in accordance with services. The Arduino microcontroller serves as the system's brain. Furthermore, for wireless communication, the NodeMCU board, ESP32 CAM and other modules like the Bluetooth HC-06, Sim8001 are utilized. While the software is detailed below, the primary hardware components are mentioned below. Next, we go over the suggested system's architecture and execution.

#### 4. Creating and deploying M2M/IOT smart building services

The simulations and real-world application of IoT/M2M smart building services are the focus of this section. Two types of primary processing units are utilized in the implementation of these services, which include

suggested proposed system design is seen in Fig.1.



Fig. 2. Shows the various UR Smarthome App interfaces for the suggested IoT/M2M smart building.

#### 4.1 Indoor Applications:

The indoor applications has different types of applications like as fire and gas detect-

NodeMCU and Arduino. The phone devices' controller, NodeMCU, will be used to operate the appliances from a distance, while Arduino will be used to control the other gadgets. ESP 32 cam is used to monitor and control of the smart door application via telegram app. We go into detail about each smart application prototype in the sections that follow.



Fig. 4: App interface of indoor applications

ion, smart lighting, intrusion alarm this all are implemented by using of Arduino uno, NodeMCU v3, GSM module and BT HC-05. This mention modules are used to give the data through cloud to app and app to cloud. This can be seen in Fig 3.

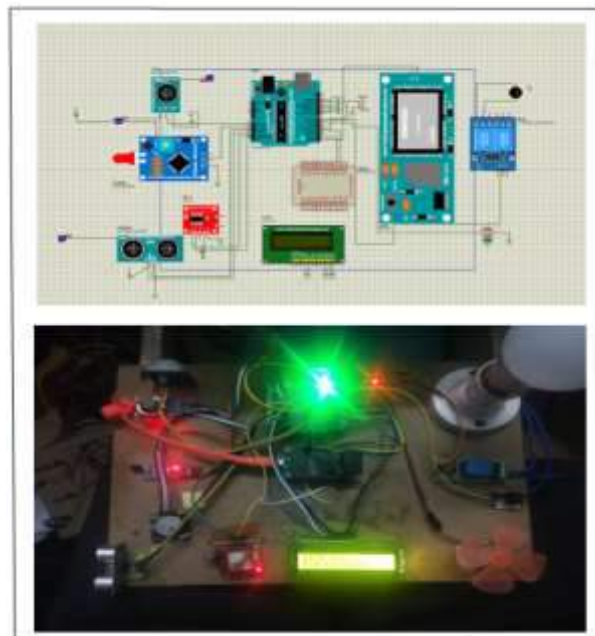


Fig. 3. Indoor Applications in Virtual and practically

#### 4.1.2 Intelligent Healthcare Remember

We live longer, healthier lives thanks to medicines. It can be risky, though, to take it incorrectly, to combine specific drugs, or to forget to take it at the appropriate time. These issues are resolved by the suggested IoT/M2M smart medication reminder, which notifies and reminds patients to take the recommended dosage at the appropriate time.

The GSM module, the DS3231 real-time clock module, the LCD screen, the buzzer, and the LEDs are all part of this system. To notify and remind people that it's time to take their medication, The application allows for the customization of the time slot and allows for its modification. The GSM module phones and texts the patient to remind them to take their prescription right away if they are more than 30 minutes late. The user may also remotely manage and control medication/pill schedules and consumption statistics by utilizing the UR Smarthome app's smart medication reminder

#### 4.1.1. Systems for Intruder Alarm

People are more concerned about losing their belongings due to the rise in building robberies. Thus, the suggested service shown in Fig. 3 makes use of a GSM module, an ultrasonic sensor and a buzzer to allow the building's defense against theft or attack. the ultrasonic sensor is used to record distance. When the distance is close, the GSM module sends the building owner brief messages and calls. The LCD screen displays an alarm state, buzzer sounds an alert for theft. This data can be monitored from the ThingSpeak cloud to UR Smarthome app Furthermore, as seen in Fig.4, customers can keep an eye on their building from anywhere at any time using the intrusion alarm interface in the URSmarthome app, which instantly informs users to any risk, as well as our channel on the ThingSpeak platform, which is depicted in Fig.5.



Fig.5: Intrusion alarm system monitoring on ThingSpeak

#### 4.1.3 Gas and Fire Alert System

The purpose of using this suggested procedure for putting out flames and spotting gas leaks is to safeguard people and property from this can be monitored from UR Smarthome app and getting the message alerts via GSM module And as well as the data monitored via serial terminal BT via HC-05, when the fire and gas values exist from fire 0 to 1 and gas levels > 20 Then its will generate an message to presented mobile number likely we can see that interface in fig. 6 for GSM module and fig.4: is used for the fire and gas levels in App interface.

interface, as shown in Fig. 4, which will assist them in taking their medication on time and in accordance with their treatment plan. Additionally, it enables instantaneous direct contact. The fig. 6 is shows intrusion, fire , medicine reminder by the message alerts via GSM module

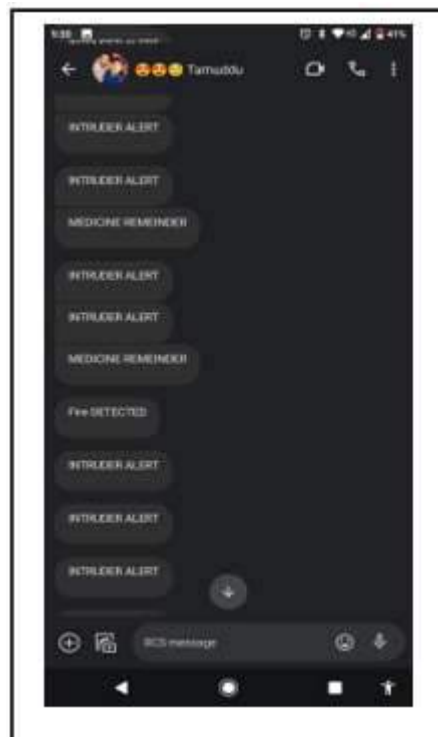


Fig.6: Intrusion, medicine reminder, fire detection messages monitoring via GSM

The outdoor applications consist of different modules like gardening, temperature, humidity, parking slots alarm this all are implemented by using of Arduino uno, NodeMCUV3and BT HC-05. This mention modules are used to give the data through cloud to app and app to cloud. This can be seen in Fig 8.

This system can be monitored through ThingSpeak cloud. These values are plotted in graph via cloud server it seen at Fig.7



Fig.7: Fire an gas detection graph via ThingSpeak



Fig.9: App interface of Outdoor applications

**4.2 Outdoor Applications:**

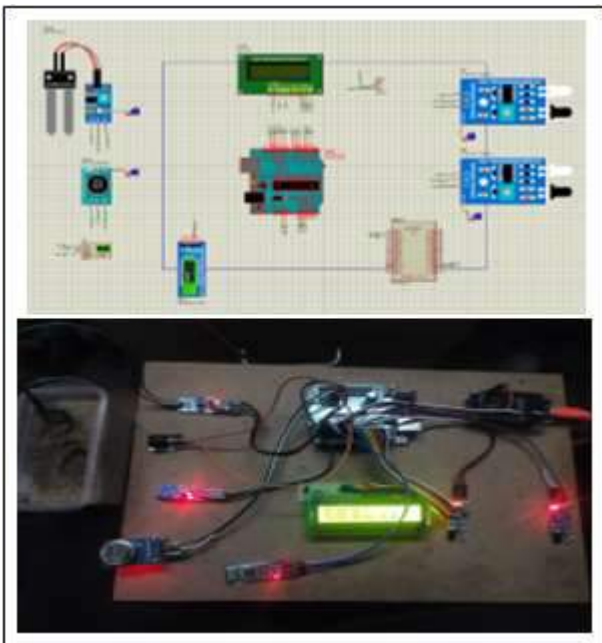


Fig. 8: Outdoor Applications in Virtual and practically.

**4.2.1 Intelligent Parking:**

An IoT/M2M-based system called “smart parking” delivers data on the availability of every parking space in real time and chooses the best one. An Arduino uno microcontroller, a NodeMCUboard, infrared sensor(TCRT5000),an LCD, a buzzer components make up the system. Fig. 8 displays the suggested smart parking system prototype.

The system looks for the available parking spots using infrared sensors, determines whether any one are occupied, and updates data with cloud server every 30 seconds. As seen in Fig. 9, the UR Smarthome App's smart parking interface allows for hassle-free parking and allows you to check the availability of parking slots online from anywhere.

This all data are feed to the ThingSpeak cloud for the monitoring purpose and plots are plotted by ThingSpeak this can be seen in Fig. 10. The HC-05 is used to get the data in serial terminal BT app where monitor in certain distance around of 10 meters.

-nsor, ESP32 CAM module, solenoid lock, used an telegram bot to gather the data from ESP32 for the monitoring and controlling purpose. When the application is started from telegram bot by commanding as START it gives so some commands as 1. capture photo 2. Enable flash

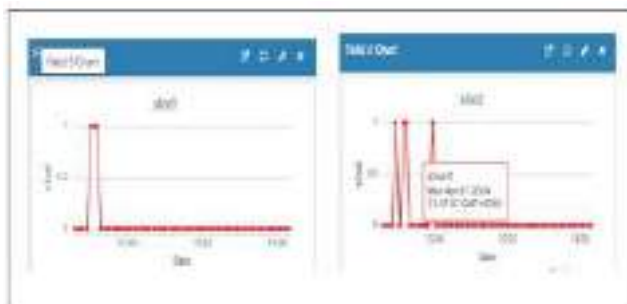


Fig. 10 Intelligent Parking graph on ThingSpeak

#### 4.2.2 Garden Irrigation System:

The irrigation automation system for gardens that is being suggested monitors the temperature, humidity, light levels, and soil moisture of the plants with little to no operator intervention (see Fig. 8). A DHT11 sensor is used to track temperature and humidity levels in the system. A soil moisture sensor measures the percentage of soil wetness to optimize irrigation dose and prevent water waste.



Fig.11: Garden Irrigation System graphs on ThingSpeak

Furthermore, this solution makes it easier to manage the irrigation systems and make the necessary adjustments in real-time by enabling remote control and monitoring of the garden irrigation system via the UR Smarthome app (see Fig. 9) and via our channel in ThingSpeak, which is used to view data from the proposed smart garden system remotely (see Fig. 8). Through the use of an intelligent monitoring system, this system maximizes the use of resources (water, electricity, and fertilizers) and irrigation schedule.

#### 4.3 Smart Door System:

The proposed system is consist of PIR se-

### 5. RESULTS AND DISCUSSION

The results of the functional testing of the prototype for the proposed IoT/M2M smart building system are discussed in this section. The

3. Disable flash 4. Enable PIR 5. Disable PIR. All this are the commands interface in the telegram smart door bot. The hardware kit is sen in fig.12

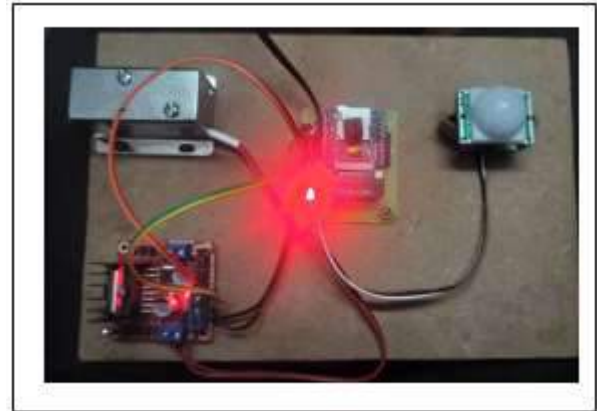


Fig. 12: Smart Door System

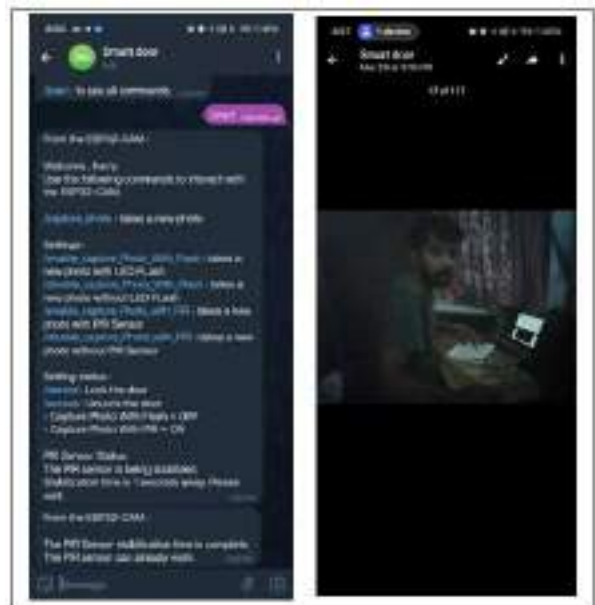


Fig. 13: Telegram Smart Door bot page interface and captured photo from ESP32CAM

When a person comes in front of PIR sensor the sensor detects a motion that motion is a trigger point to the ESP32CAM then the camera captures the person's photo and uploads it to the telegram bot account if the person is known by giving a command as access the lock will unlock within a delay of 5 seconds it will lock.

and displayed across four channels. The channels are shown as real-time line graphs on the

system includes a number of different services and functionalities, including smart parking, garden irrigation, intrusion alarm, smart door, fire and gas detection, smart lighting, and smart medication reminder. We tested each of these services separately in Section 4, but in this section, the efficacy of the designed system is verified by testing all of its features on the final IoT/M2M smart building model, which was developed to elaborate on the performance and functionality of the suggested approach.

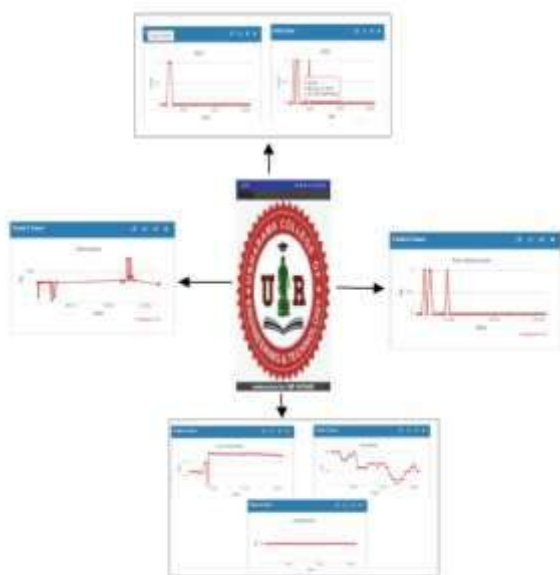


Fig. 14: Sensing results for all the Proposed System

The usage of several sensors, actuators, and shields led to a low power supply and few connectors. Consequently, we included the Arduino Mega board in addition to the Arduino UNO and NodeMCU to ensure flawless functionality and meet the demands of the IoT/M2M smart building. Designing and implementing an IoT/M2M smart building based on the convergence of two HetNets was our aim. WSNs functioning on Wi-Fi, Bluetooth, and MCNs (such as 4G, 5G, or GSM). Every piece of information gathered from the proposed system was transmitted to the ThingSpeak server, stored in a cloud database,

ThingSpeak website and the Raniso App. The channels receive data from the building sensors at intervals of 15 s. Figure 14.

Our efforts have yielded very satisfying results, as we were able to fulfill our aim of giving the server precise readings. Additionally, because there is extremely little latency, users can effortlessly utilize the Raniso App on their mobile phones to operate and monitor the smart building remotely from any location at any time. Using artificial intelligence to operate appliances by enabling Google Assistant voice commands is another one of this study's breakthroughs. The suggested smart building can be altered to suit the needs and tastes of the user. For instance, the user can use Google Assistant to speak commands to operate the lights, pushbuttons, Bluetooth, Wi-Fi, 4G/5G networks, or an automated system that senses input from the PIR sensor.

## 6. Conclusion

This paper focuses on creating a smart building paradigm for IoT and M2M based on the convergence of WSNs and networks that are mobile-cellular. The suggested system made use of open-source software (IDE, Proteus, and Telegram App and UR Smarthome) and open hardware (Arduino, NodeMCU, ESP32 Cam sensors, modules, and so on). Our research in this article demonstrates that our suggested approach provides a unique architectural design for an affordable and adaptable system that can be implemented for a range of smart IoT/M2M systems, such as smart grids, smart cities, smart retail, and so forth. For instance, the architectural design for a smart building was given in greater depth, and we recommended a number of key features and services, including smart parking, automated garden watering, intrusion alarm, smart door, fire and gas detection, smart lighting, and smart medication reminders. Through our channels on the ThingSpeak platform and our multi-platform mobile application called "UR



building control via RFID, Bluetooth, and WiFi connectivity as well as cellular networks like GSM, 4G, or 5G, all of these services can be managed and observed remotely. The planned IoT/M2M smart building was created, put into practice, tested, and produced the desired outcomes. Machine learning techniques can be integrated into this smart building system to make it more sophisticated and resilient for use in future studies.

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# ENHANCING UNDERWATER IMAGE QUALITY THROUGH ADAPTIVE COLOR CORRECTION AND MULTI-SCALE HISTOGRAM EQUALIZATION

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Article DOI: <https://doi.org/10.36713/epra16447>

DOI No: 10.36713/epra16447

## ABSTRACT

Due to the selective attenuation of light in water, underwater images are poorly visible and pose significant challenges in visual activities. The structural and statistical properties of different areas of degraded underwater images are damaged to different levels, resulting in an overall uneven drift of object representation and further degrading the image quality. In order to solve these problems, we introduce a method for enhancing underwater images through multi-bin histogram perspective equalization under to solve the problems caused by underwater images. We estimate the degree of feature variation in each image region by extracting the statistical features of the image and using this information to control feature enhancement to achieve adaptive feature enhancement, thereby improving the visual effect of degraded images. We first design a vibration model that exploits the difference between data elements and regular elements to improve the color correction performance of the linear transformation-based sub-interval method. In addition, a multiple threshold selection method was developed that adaptively selects a set of thresholds for interval division. Finally, a multi-bin sub-histogram equalization method is presented, which performs histogram equalization in each sub-histogram to improve image contrast. Underwater imaging experiments in various scenarios show that our method significantly outperforms many state-of-the-art methods in terms of quality and quantity.

**INDEX TERMS:** Multiple intervals, multi-scale fusion (MF), sub histogram equalization (SHE), underwater image.

## I. INTRODUCTION

Many tasks, such as underwater welding and seabed investigation, require high-quality visual information, yet the complexity of the underwater environment makes obtaining clear underwater photographs challenging [1]. The structure and statistical features of several sections of a collected underwater image are altered. Damage at various levels is caused by selective attenuation based on light wavelength, resulting in uneven global drift in feature representation, as well as a reduction in the contrast and visibility of underwater images; thus, some improvements are required to extract meaningful information from it [2], [3]. Several strategies have been proposed to increase the quality of underwater photographs [4], [5], [6], [7], and [8].

However, most of them overlook the necessity of obtaining statistical information from images, resulting in distortion effects in the produced images. As a result, existing mature vision algorithms face considerable hurdles in meeting the desired performance for



underwater picture augmentation. Several solutions have been developed to address underwater image deterioration. Histogram equalization (HE) is a popular method that offers the benefits of simple calculation and application. However, HE also has problems. For instance, it reduces information entropy (IE) and blurs details in an image. Given these limitations, some representative improvements have been proposed, including the sub histogram equalization (SHE) method [9], [10], [11], [12], [13], [14], [15], and [16].

The SHE approach outperforms HE in terms of image improvement. For example, brightness-preserving bi-histogram equalization [17] separates a histogram into two sub-histograms, with HE applied to each equal area. The dualistic sub image HE approach [18], which was based on SHE, divided a histogram using the original probability density function. Furthermore, Khan et al. [19] suggested a fuzzy double HE approach that employs the histogram's skewness to determine the segmentation threshold. These approaches, however, do not greatly improve underwater photographs since they ignore histogram properties. An image's histogram is typically used to describe the statistical distribution of the image's color. The degradation of underwater photos has a significant effect on the histogram.

To solve underwater image degradation, histograms should be assessed subjectively. Figure 1 depicts some example underwater photos, their polyline and 3-D histograms, and gradient frequency histograms. Polyline histograms graphically depict the histogram's trend and distribution, whereas 3-D histograms exhibit the image's color distribution more clearly. Observing both types of histograms reveals the three important properties of underwater photos.

Furthermore, the gradient frequency histograms of the underwater photos exhibit a left-skewed distribution. Light absorption, scattering, and underwater plankton all have an impact on underwater photographs, hence histograms are typically unequal in distribution, concentration, and deviation. These features then influence the quality of the underwater imaging process, resulting in deteriorated photos. This paper presents a novel underwater picture improvement method called multi-interval sub-histogram perspective equalization (UMSHE) for adjusting the histogram of underwater photos.

### **Problem Statement**

Underwater imaging presents significant challenges due to the absorption, scattering, and attenuation of light in water. These challenges lead to poor visibility, low contrast, and color distortion in underwater images, hindering various applications such as underwater exploration, marine research, and surveillance. The goal of this project is to develop an effective image enhancement system specifically tailored for underwater images, aiming to improve visibility, contrast, and color accuracy. The proposed system should address the following key issues:

1. **Low Visibility:** Underwater environments often suffer from poor visibility due to factors like turbidity and depth. This results in hazy and blurred images with reduced contrast and detail.
2. **Color Distortion:** Light is absorbed and scattered differently across different wavelengths in water, causing color distortion in underwater images. The colors may appear washed out or skewed, making it difficult to accurately interpret the scene.
3. **Low Contrast:** Absorption and scattering of light reduce the contrast between objects in underwater images. As a result, important details may be lost, and the overall quality of the image is compromised.
4. **Noise and Artifacts:** Underwater images are often plagued by noise and artifacts, further degrading image quality and making it challenging to extract meaningful information from the images.

The proposed image enhancement system should effectively tackle these challenges to produce clearer, more vibrant, and visually appealing underwater images. By improving image quality, the system aims to enhance the performance of various underwater imaging applications, including marine biology research, underwater inspection, and underwater archaeology. Additionally, the system should be computationally efficient and robust, capable of handling different underwater environments and conditions.

## **II. RELATED WORK**

Three categories can be used to group existing underwater vision enhancement techniques: deep learning-based approaches, underwater picture enhancement techniques, and underwater image restoration techniques. A. Techniques for Restoring Underwater Images In order to recover image quality, underwater image restoration techniques seek to develop an efficient underwater image deterioration model [20]. Underwater optical imaging-based approaches [24], [25], [26]; polarisation characteristics-based methods [21], [22], [23]; and methods based on prior information [27], [28], [29], [30], [31] are examples of common techniques for restoring underwater images. The degree of polarisation of the background light in two or more photographs of the same scene was calculated by Treibitz and Schechner [21].



In order to estimate the region's haze concentration and depth map, Chen et al. [22] suggested a region-specific estimation technique that made use of the dark channel prior (DCP).

By altering the transmittance of low polarisation, Hu et al. [23] recreated underwater images via transmittance correction. A Jaffe-McGlamery underwater optical image model was simplified by Trucco and Antillon [24] on the premise that forward scattering and homogeneous illumination have an impact on underwater images. By integrating underwater optical properties into the system response function, Hou et al. [25] were able to reconstruct images. A scene depth map was acquired by Song et al. [31], who then used a linear model to estimate the background light. The majority of restoration techniques can address certain issues with underwater image degradation, but their effectiveness is constrained by imprecise estimation of crucial model parameters and a failure to consider the impact of backscattering on optical imaging.

### **B. Underwater Image Enhancement Methods**

Pixel intensity distribution adjustments are made in underwater picture enhancement techniques to improve photos. Spatial domain methods [32], [33], [34], transform domain methods [35], [36], [37], and fusion-based approaches [38], [39], [40] are among the frequently used techniques for underwater photos. To improve the photos, Iqbal et al. [32] extended the saturation (S) components in the Hue and the attenuated G B channel in the RGB colour model. In order to improve underwater photos, Fu et al. [33] suggested a two-step method for single underwater image enhancement (TS) that addressed two subproblems. In the RGB and CIE-Lab colour models, Huang et al. [34] developed relative global histogram stretching (RGHS). Amjad et al.'s [35] wavelet-based fusion technique addressed problems with poor contrast and colour shift. An efficient multiscale correlation wavelet approach (WB) for frequency domain image dehazing problems was presented by Liu et al. [36]. A wavelet-based perspective augmentation framework for underwater photos was proposed by Vasamsetti et al. [37]. Fusion weight maps were recently obtained from damaged underwater photos by Ancuti et al. [38].

All scene images undergo the same processing method, which may lead to an overabsorption or underabsorption of enhancement. The structural and statistical characteristics of underwater photographs are rarely taken into account by these methods, however this is something that has to change in the future.

### **C. Deep Learning Based Methods**

Deep learning techniques are now applied to simple tasks. Recent deep learning techniques applied to underwater images can be categorised into dual generator generative adversarial networks based on the network architecture. However, because the network structure design and training data play a crucial role in the performance of deep learning-assisted approaches, the application breadth of these techniques remains restricted.

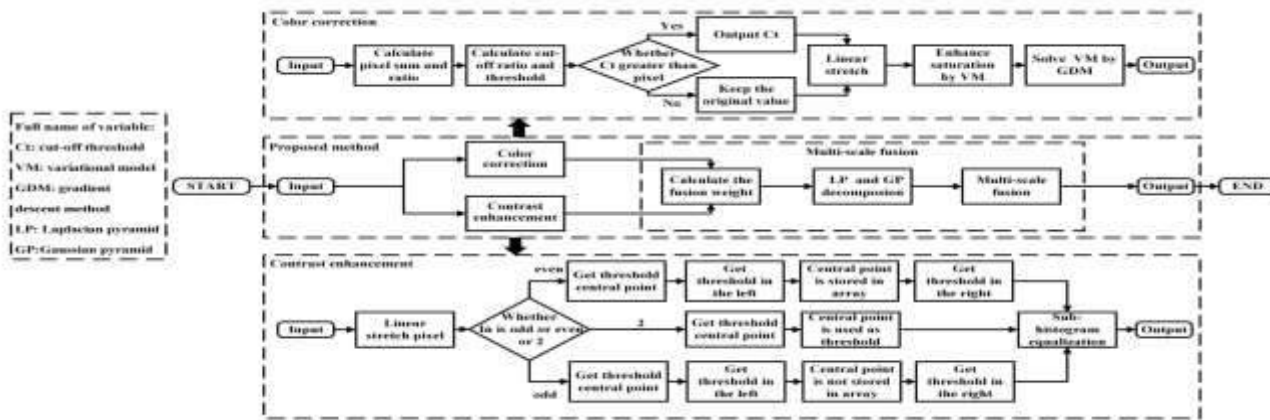
In the field of underwater image enhancement, various techniques and algorithms have been investigated to mitigate the challenges posed by underwater image conditions. Traditional methods typically include histogram equalization, contrast enhancement, and color correction to address issues such as poor visibility, color distortion, and low contrast. Advanced techniques include variants of adaptive histogram equalization (AHE), such as contrast-limited adaptive histogram equalization (CLAHE), which adaptively improves contrast and prevents over-amplification of noise. Recent advances include the integration of machine learning techniques such as deep neural networks for more sophisticated, data-driven enhancement of underwater images. These methods aim to overcome the various challenges presented by underwater imaging conditions and pave the way for improved visual perception and analysis in underwater environments.

## **III. PROPOSED METHOD**

Based on the structural and statistical characteristics of underwater images, a method for enhancing underwater images using perspective equalization of multi-interval subhistograms is proposed to address the problems caused by underwater images. The proposed method consists of color correction, contrast enhancement and multiscale fusion (MF). The flowchart of the detailed steps of the proposed method (see Fig. 2) is divided into three corresponding subgraphs. The various parts of the proposed method are described in detail below.

### **Color Correction**

The suggested method creates a colour correction technique based on an SLVC to address the colour cast and improve the saturation of underwater photos. This technique creates a competitive relationship between the regular item and the data item of the variational model, processes the pixels directly, and eliminates the colour cast by extending and converting the pixels linearly. Lastly, SLVC can successfully adjust colour and increase image colour saturation. This technique can also improve the image's highlight details and is simple to use. The following are the process's primary steps.



**Fig.1 Flowchart of the detailed steps of the proposed method, which consists of three sub-processes: color correction, contrast enhancement and MF.**

First, the pixel sum of a single channel is calculated with

$$S_c = \sum_{i=1}^{P \times Q} I_c(t)$$

Where, I stands for the input image, t for the pixel's grey level, c for the RGB picture's three channels,  $I_c(t)$  for the pixel value in channel c, and P for the number of rows in the modified matrix. supplied by the input picture The symbol Q stands for the quantity of columns, while  $S_c$  indicates the total number of pixels in a certain channel c. Next, the following formula is used to determine the ratio between each channel's maximum total pixel count and its total pixel count:

$$R_c = \frac{\text{Max}\{S_R, S_G, S_B\}}{S_c}$$

Where,  $R_c$  is the ratio of the maximum total pixels to the total pixels of the particular channel c, and Max is the maximum value function. The channel is then divided into three sections using two cutoff ratios to get the cutoff thresholds. The following formulas are used to calculate the cutoff ratios:

$$\varpi_1^c = \theta_1 \times R_c$$

$$\varpi_2^c = \theta_2 \times R_c$$

Where,  $\theta_1$  and  $\theta_2$  are two constants in (0,1) and  $w_c 1$  and  $w_c 2$  stand for the cutoff ratios. As per [47] and the comprehensive experimental validation,  $\theta_1$  and  $\theta_2$  have values of 0.001 and 0.005, in that order. Next, using the lower quantile function, the cutoff levels for the linear transformation are established as follows:

$$e_1^c = F(I_c(t), \varpi_1^c)$$

$$e_2^c = F(I_c(t), \varpi_2^c)$$

Where, F is the lower quantile function and  $e_c 1$  and  $e_c 2$  stand for the cutoff criteria. While the second cutoff threshold returns pixel values more significant than the value of the second cutoff threshold, the pixel values replaced by the first cutoff threshold are smaller than the value of the first cutoff threshold. The following formula is used to get the pixel values and cutoff thresholds:

$$I_e^c(t) = \begin{cases} e_1^c & I_c(t) < e_1^c \\ e_2^c & I_c(t) > e_2^c \end{cases}$$

Where,  $I_e^c(t)$  refers to the postprocessing pixel value. Then, the pixel values are stretched linearly using



$$I_S^c(t) = \frac{I_e^c(t) - e_1^c}{e_1^c - e_2^c} \times 255$$

When a stretched pixel value is indicated by  $I_c S(t)$ . In the end, a variational model with a data term and regularised terms is created to enhance saturation, taking inspiration from [48]. The data term penalises the difference between  $\mu$  and  $I_c S(t)$ , so as to keep the final image from deviating from the restored colour. Regularised terms widen the difference between the R, G, and B components as a way to improve saturation.

$$E(\mu_c) = \frac{1}{2} \sum_t \left( \frac{\mu_c(t) - I_S^c(t)}{I_S^c(t)} \right)^2 - \frac{\alpha}{2} \sum_t \left( (\mu_c(t) - \mu_{c+1}(t))^2 + (\mu_c(t) - \mu_{c+2}(t))^2 \right)$$

Where,  $\mu_c$  stands for the improved image;  $c$  is a 3-D space including the R, G, and B channels of the colour image (that is, R:  $c = 1$ , G:  $c = 2$ , and B:  $c = 3$ ); and  $\alpha$  is a positive parameter that regulates the regular term. By creating a competitive connection, data and regular elements are intended to modify the image's saturation and contrast. When a data item's competitive relationship with Subjective results and the R, G, and B channel histograms are arranged from left to right and a regular object reaches a point of energy minimization, the saturation and contrast are comparatively close to what is produced by visual effects used by humans. The minimizing process is carried out using the gradient descent method on the iterative computation results. The model's Euler-Lagrange derivative is computed as follows:

$$\delta E(\mu_c) = (\mu_c(t) - I_c S(t)) - \alpha (2\mu_c - \mu_{c+1} - \mu_{c+2}) = 0.$$

Then, above equation is solved using the gradient descent approach. The linearly stretched image serves as the starting point for solving below equation.

$$\frac{\partial \mu}{\partial m} = -\delta E(u)$$

Where,  $m$  denotes the timeline of iterative calculations. Then, the above equation is discretized and rewritten as follows:

$$\frac{\mu_c^{k+1}(t) - \mu_c^k(t)}{\Delta m} = \left( \frac{I_S^c(t) - \mu_c^k(t)}{\mu_c^k(t)} \right) + \alpha \left( \frac{2\mu_c^k(t) - \mu_{c+1}^k(t)}{-\mu_{c+2}^k(t)} \right)$$

Where,  $k$  is the number of calculations made in iteration. Following a straightforward left-right identity transformation of below equation, the following is the iteration rule obtained:

$$\mu_c^{k+1} = \mu_c^k (1 - \Delta m (1 - 2\alpha)) + \Delta m (I_S^c - \alpha \mu_{c+1}^k - \alpha \mu_{c+2}^k)$$

Where,  $0 < \Delta m \leq 1/(1 - 2\alpha)$ .

The white balance (AWB) method and the subinterval linear transformation (SLC) method are two two-color correction techniques that are chosen in order to compare and evaluate the efficacy of the SLVC approach. It is possible to determine that the SLVC approach produces better colour correction effects and that the histogram works steadily by comparing the subjective outcomes of various methods with the corresponding three-channel histograms discussed in results section.



### B. Contrast Enhancement

The contrast level of an underwater image has a big impact on the quality and details of the image. Low contrast and blurry details remain concerns even when the SLVC algorithm fixes saturation deterioration and colour casting. Thus, in order to address the poor contrast and fuzzy features of underwater images, this study suggests using the MSHE approach. The MSHE method performs HE by splitting a histogram into several sub histograms. The HE is more effective and the histogram correction is superior when several sub histograms are divided and processed. Furthermore, the MSHE technique improves visual contrast without noise and artefacts. The following are the MSHE method's primary steps.

**Step 1:** Pixel stretching: Because of the diversity of pixel sizes of the supplied underwater images, preprocessing is required. Thus, the following linear stretching operation is performed to ensure that the pixel values are all within [0, 255]:

$$H_c(x) = \frac{(I_c(t) - mi_c)}{(ma_c - mi_c)} \times 255$$

where mac and mic stand for the maximum and minimum pixel values of a single channel image, respectively, and Hc(t) indicates the pixel value following linear stretching. Ic(t) represents the pixel value of the starting image at a specific time.

**Step 2:** Selecting the interval division threshold The interval division criteria that split the histogram into several sub histograms must be established in order to use the MSHE approach. Using the lower quantile approach, a central threshold point (Cp) for the entire histogram is first found. Then, for interval division, a number of thresholds are chosen around the Cp. The statistically lower quantile, which falls between [0.75, 0.8], is the selection criterion used for Cp. This criterion takes into account all of the features of the image gradient frequency histogram's left-skewed distribution.

The fraction of the modest gradient value is significant, and the significant gradient value is tiny, according to the objective law of the picture gradient. A tiny gradient value's interval can be represented by this portion of the interval if the cumulative distribution function's value falls between [0.75, 0.8].

Consequently, the gradient image is divided into large and small gradient parts by the lower quantile limit, which utilises 0.75. It is necessary to equalise the large gradient portion due to its excessively low pixel count, and the tiny gradient portion due to its excessively high pixel count. Consequently, the picture histogram is divided into two sections that require the greatest adjustment using the value that is produced using the lower quantile approach as Cp. Image processing performance is best, according, when the threshold is chosen on both sides of the central point. Numerous experiments also support the appropriateness of this threshold selection. .

When a threshold selection process is carried out, the left and right thresholds are chosen. The product of b times the pixel value variance and the number of times the threshold operation is used to produce all thresholds are then subtracted or added using Cp. The interval division threshold array has 256 as the last item and 0 as the first item. An even number of interval thresholds is required when Ni is odd. Consequently, Cp is only utilised to calculate the other thresholds and is not used as one of the thresholds itself. Ni is used to determine the threshold operation to use. When Ni is even, the threshold calculation procedure is the same on both sides of Cp. A schematic diagram of the threshold selection method is shown in Fig. 4, where Cp represents the central point, Ni denotes the number of thresholds, d indicates the threshold, and n indicates the number of intervals (i.e., Ni is to the left of Cp when Ni is even and Ni is to the left of Cp when it is odd). To select Cp, the number and frequency of the occurrence of each pixel value in the input image are calculated as follows:

$$N = \text{imhist}(H_c(t))$$

$$h = \frac{N}{P \times Q}$$

### C. Multi-Scale Fusion

MF is used to combine the results of contrast enhancement and colour correction, giving each section of the final image a unique appearance based on the input sequence. While most image enhancement techniques have some drawbacks, MF using weight map features may pick the right pixels from each input image and combine them to create a final image. The ability of MF to consistently enhance underwater images using multiscale strategies—even in the absence of prior distance map estimation—is a crucial benefit. Furthermore, the outcomes of the enhancing procedure can be effectively maintained.



**1) Weight Map:** Each input image's contrast, exposure, and saturation weights are determined, and the resulting weight maps are combined to create an aggregated weight map. Next, the total weight is adjusted by adding the total of

$$W = F_C \times F_S \times F_E$$

$$\bar{W} = \left[ \sum_{i=1}^k W \right]^{-1} W$$

Where, FC, FE, and FS stand for the feature a weight of contrast, exposure, and saturation, respectively, and W denotes the aggregated weight map. W stands for the aggregated weight map that has been normalised, and k is the number of input photos.

**2) Fusion:** MF uses a multi-scale approach based on Laplacian and Gaussian pyramids to fuse the weight map with the input map pixel by pixel. The input image is filtered using a low pass Gaussian kernel at each layer by the Gaussian pyramid, which then breaks the image down into the sum of the band pass images. The pyramids of the decomposed input map and weight map are at a consistent level when multi-scale decomposition is finished, and the maps are fused pixel by pixel and reassembled into a into a final image. The equation is as follows:

$$R_l(x) = \sum_{t=1}^k G_t \{ \bar{W}_t \} L_t \{ I \}$$

where  $R_l(x)$  represents the reconstructed result image,  $G_t \{ W^{-t} \}$  denotes the Gaussian pyramid decomposed from the weight map, and  $L_t \{ I \}$  represents the Laplacian pyramid decomposed from the input image.

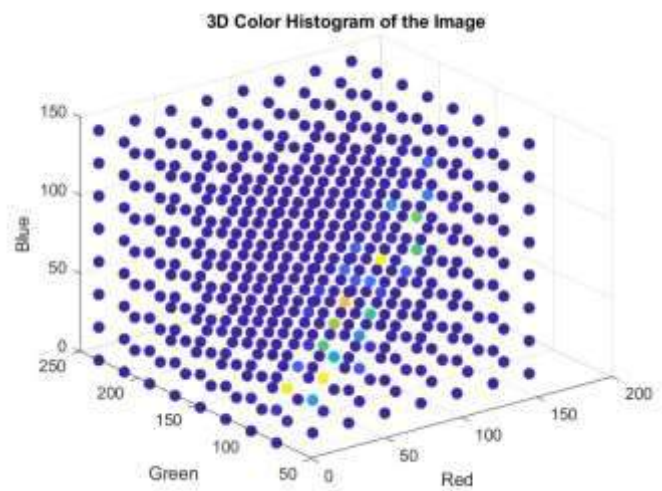
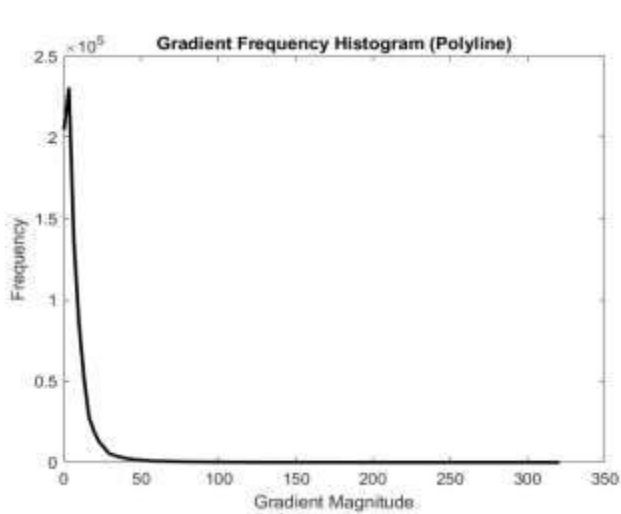
#### IV . RESULT AND DISCUSSION

An ablation experiment, a runtime evaluation, a qualitative evaluation, and a quantitative evaluation are used to assess the underwater image quality produced by the suggested method. Instruments are used in the qualitative evaluation to watch the image or run experiments with repeated observation. After that, a number of testers assess and examine the image quality. Using mathematical techniques, the quantitative assessment computes the image's objective evaluation index and uses the computed data to determine the image's quality. Ten example methods are chosen for this study, and they are contrasted with the suggested way. There are two deep learning methods, four restoration methods, and four enhancement approaches in total.



Thresholding with color correction





Original Gray scale Image



### Original Underwater Image:

The original underwater image that was imported from the file is this one. It acts as the catalyst for the process of improvement. 3D RGB colour space histogram of the original image: This illustration shows a 3D histogram of the RGB colour space. The intensity of the plotted dots indicates the frequency of occurrence of each color channel (Red, Green, and Blue), which is represented by an axis.

**Polyline with Gradient Frequency Histogram:** The gray scale version of the original image's gradient magnitudes is displayed in this graphic as their frequency distribution. It sheds light on how edge strengths or picture gradients are distributed.

### Original UNDERWATER Image

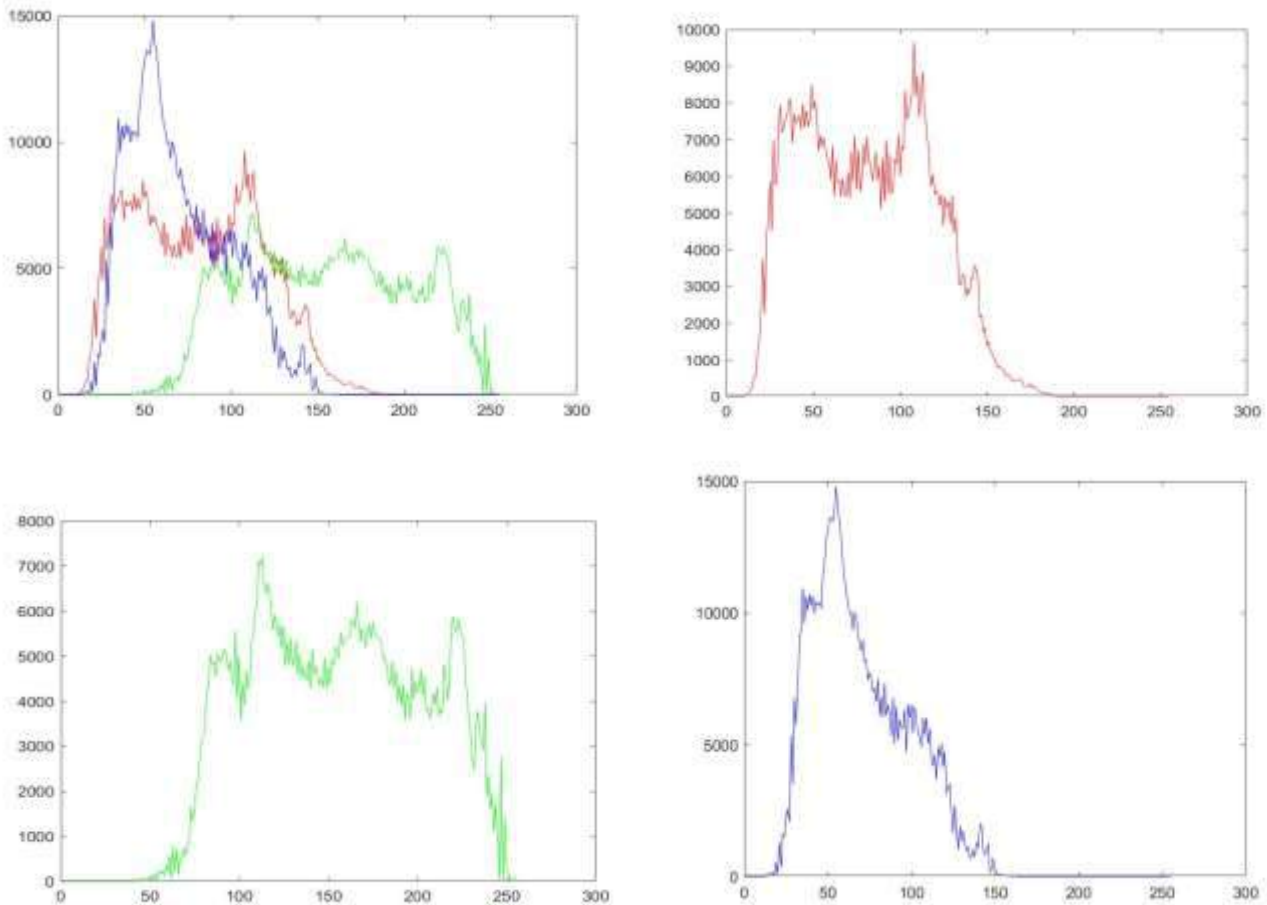
This is the original underwater image converted to grayscale.

### Thresholding with color correction

This figure shows the result of applying a thresholding technique with color correction. It might be a pre-processing step for enhancing image features or improving overall image quality.

### DCP (Histogram Equalization

This figure displays the result of applying histogram equalization, specifically Contrast Limited Adaptive Histogram Equalization (CLAHE) on the input image. It enhances the image's contrast and overall brightness.



### Histograms of RGB Channels

These plots show the histogram distribution of pixel intensities for each RGB channel separately. It helps visualize the distribution of colors in the image.

### ICM Technique

This image demonstrates the result of applying the Iterative Contrast Modification (ICM) technique. It's a method used for enhancing image contrast and improving visual quality.

### Color Channel Correction

This figure represents the result of color channel correction, possibly adjusting color balance or removing color casts in the image.

### Red Compensated

This image shows the result after compensating for the red channel. It might be part of a color correction process to balance color channels.

### SLVC (White Balancing)

This image displays the result of applying White Balancing, aiming to adjust the overall color cast and improve color accuracy.

### MSHE (Gamma Correction)

This image illustrates the result of Gamma Correction. It adjusts the brightness and contrast of the image by applying a gamma function.



**UMSHE-image enhancement**

This image shows the result after sharpening the image using an appropriate image enhancement technique.

ICM Technique



UMSHE-image enhancement



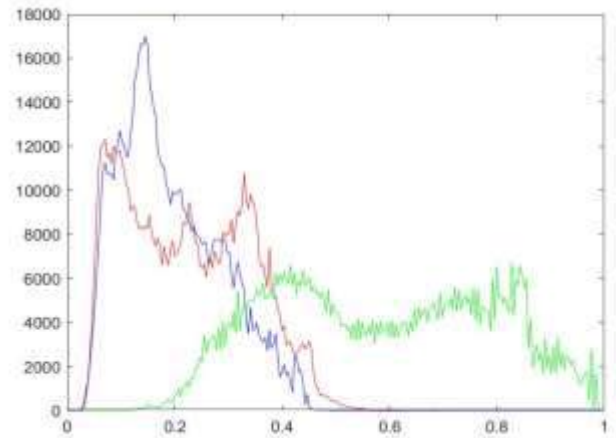
BLVC



Red Compensated



Color Channel Correction



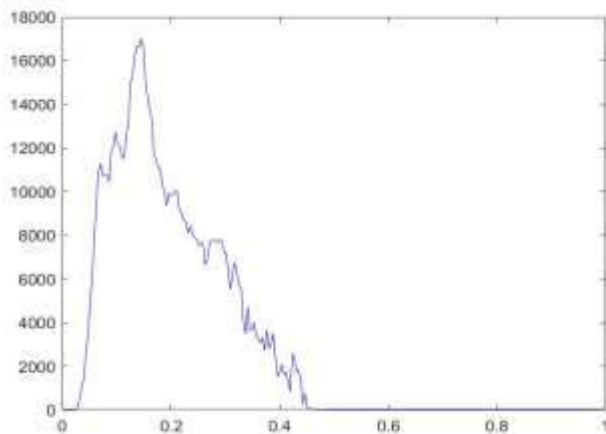
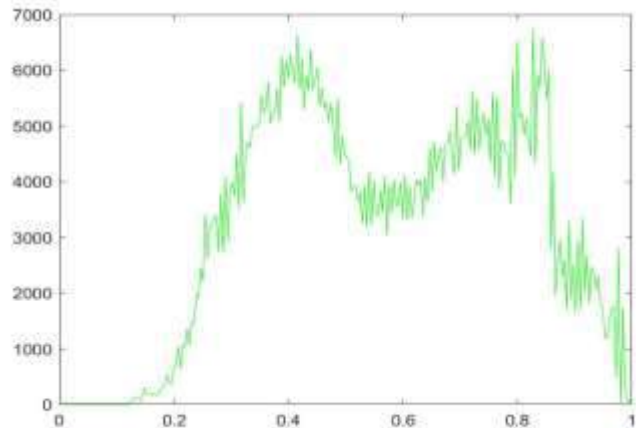
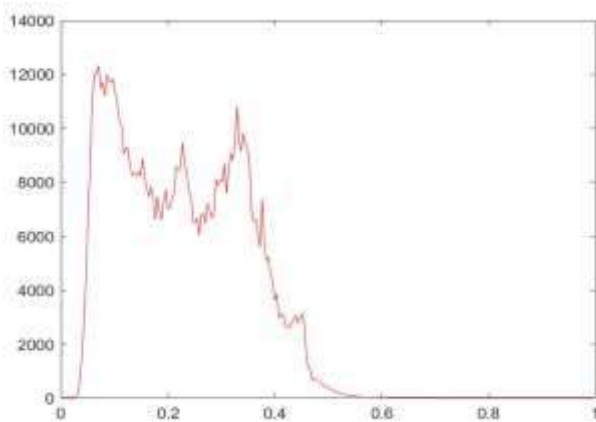


Fig Final Enhanced Image

**Multi-Interval Sub histogram Perspective Equalization Image:**

After using the Multi-Interval Subhistogram Perspective Equalisation approach, the final improved image looks like this. It enhances visual appeal, contrast, and image quality by combining several enhancement techniques. The goal of the image enhancement process is to increase the overall quality and visual look of the original underwater image, and each of these output images reflects a stage or combination of steps in that process.

Analysis of the results obtained:

**Mean:** The mean intensity value of the enhanced image is 0.4594. This gives an indication of the average brightness level of the image.



**Entropy:** The entropy of the enhanced image is 7.7820. Entropy represents the amount of uncertainty or randomness in the image intensity values. Higher entropy indicates more diversity in pixel intensities.

**RMS (Root Mean Square):** The RMS value for each channel of the image is calculated, indicating the root mean square contrast of the image. A higher RMS value suggests higher contrast.

**MSE (Mean Square Error):** The Mean Square Error between the enhanced image and the original grayscale image is calculated for each channel. It quantifies the average squared difference between the pixels of the two images. Lower MSE values indicate better similarity between the images.

**Image Contrast:** The contrast of the image is measured, which is essentially the difference between the maximum and minimum pixel values. Here, the contrast is reported as 0, which might indicate a low contrast image.

**SSIM (Structural Similarity Index):** SSIM measures the similarity between two images. A value closer to 1 indicates high similarity. Here, SSIM is reported as 0.012526, which might indicate a significant difference between the enhanced and original images.

**AG (Average Gradient):** AG measures the average gradient magnitude of the image. It is calculated using the Sobel operator. A higher AG suggests a higher amount of image detail.

**PCQI (Perceptual Contrast Quality Index):** PCQI measures the perceptual quality of the image. Higher PCQI values indicate better image quality.

**UCIQE (Universal Image Quality Index):** UCIQE is another metric for assessing image quality. Higher UCIQE values indicate better image quality.

Each of these metrics provides different insights into the quality and characteristics of the enhanced image. Together, they help in understanding various aspects such as brightness, contrast, similarity to the original image, and overall visual quality.

*Elapsed time is 5.313565 seconds.*

*Mean = 0.4594*

*Entropy = 7.7820*

*RMS = 0.5124*

*MSE = (:,:,1) = 0.0340*

*(:,:,2) = 0.0451*

*(:,:,3) = 0.0146*

*image\_contrast = 0*

*SSIM = 0.012526*

*AG = Inf*

*PCQI = 0.4303*

*UCIQE = 0.5407*

## V. CONCLUSION

This study introduces a novel approach for enhancing underwater images by estimating feature drift across different image regions and leveraging this information to guide enhancement processes. The method begins by estimating the statistical characteristics of the image histograms, specifically tailored for underwater imagery. It then proposes a combined enhancement technique involving color correction and Multi-Scale Histogram Equalization (MSHE). The color correction method, SLVC, targets color cast issues and enhances saturation by employing a variational model for processing, thereby achieving better and more reasonable results. MSHE is subsequently applied to improve contrast and detail information by dividing histograms into multiple intervals and equalizing them separately. Finally, the resulting enhanced images are fused using a fusion technique, resulting in a visually improved final image. Both qualitative and quantitative evaluations demonstrate the effectiveness of the proposed method in addressing color cast, enhancing saturation, contrast, and detail information. Additionally, the method extends Histogram Equalization (HE) to any number of intervals, enhancing its adaptability and performance. While the method shows promise, it still has limitations, such as potential red shading in deep-sea images and a lack of consideration for different underwater scenes and depths. To address these shortcomings, future work will focus on refining



the method to selectively enhance image areas, considering varying scene depths, and adapting enhancement levels to changes in light and depth.

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# ENVIRONMENTAL INFLUENCE IN SHAPING THE INCIDENCE OF BREAST CANCER

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## SUMMARY

*The article examines the problem of the influence of environmental factors surrounding a person at risk of developing cancer. The carcinogenic effects of such toxic factors as occupational hazards, carcinogens contained in water, air, soil, food, food additives, and the degree of their influence on the occurrence of various types of oncological pathology are considered.*

**KEY WORDS:** breast cancer, risk factors, ecology, pollution.

## RELEVANCE

Breast cancer (BC) is one of the pressing medical and social problems of modern oncology. More than 1.3 million cases of the disease are recorded annually worldwide. The incidence of breast cancer tends to increase both in economic development ty (1.0-2.0% per year) and developing countries [3, 6, 19]. In 2015, the number of cases is projected to increase to 1.6 million.

In Russia and the CIS countries in the structure of oncological The highest incidence of breast cancer ranks first among the female population. Incidence of breast cancer ranges from 18-21% in Russia, Belarus, Ukraine, Kazakhstan, Uzbekistan and Kyrgyzstan, to 28-31% in Azerbaijan and Armenia. In the structure of mortality of the female population of Russia, malignant tumors of the mammary gland have the largest share (17.3%) [3, 6, 19].

According to the cancer registry of the Republican Oncology Research Center, in Uzbekistan, breast cancer is in the structure of cancer incidence takes the first ranking place. Registered in 2010 2273 patients with breast cancer were studied. The incidence per 100 thousand population was 8.1: mortality - 3.5: one-year mortality - 1.1; 46.3% of patients were admitted in advanced stages of breast cancer [12].

Characteristic features of malignant neoplasms of the mammary gland are a high growth rate, territorial and geographical uneven morbidity levels, which is associated with the diversity of socio- demographic cultural, environmental, ethnic and individual risk factors [5, 7, 21].

Negative anthropogenic factors not only become detrimental to ecological systems, but also pose a significant danger to the life and health of the population.

Currently, breast cancer is the most common hormone-dependent cancer among women worldwide. The etiology of breast cancer is multifactorial. One of the supposed factors in the increase in the incidence of breast cancer are chemicals - environmental pollutants, including those that damage the endocrine system - endocrine disruptors (ED)[2,3].

Analysis of epidemiological studies, despite their relatively small number, indicates an association between exposure to the studied substances and an increased risk of developing breast cancer in women. Moreover, these substances include not only typical EDs, but also ubiquitous carcinogens, such as polycyclic aromatic hydrocarbons, heavy metals, organic solvents (benzene) and others. However, the importance of exposure during critical periods (in utero, neonatal and young adulthood) was established when chemicals act on cell differentiation and tissue development, which can impair the development of breast tissue and lead to breast cancer in adult women. It is important to emphasize that EDs act at low dose levels, and the induced effects and patterns of their manifestation are the same in animals and humans. In this regard, experimentally proven transgenerational effects, when ED-induced diseases can be transmitted to descendants, are of particular concern [4].

## PURPOSE OF THE STUDY

Analysis of literature data concerning the role of environmental pollutants of various classes in the formation of the incidence of breast cancer.





## RESULTS AND ITS DISCUSSION

The analysis of the full literature indicates numerous experimental and epidemiological studies of chemicals of different classes potentially associated with the risk of breast cancer in humans. It should be noted that in this review we limited ourselves to considering primarily publications over the past 10-15 years, which, according to many researchers, most convincingly prove the involvement of chemical pollution in population growth. Below is a description of individual groups of pollutants.

Single studies indicate an additional increase in breast cancer among women who often used insecticide repellents and pesticides in the household! indoors and outdoors, compared with those who did not use them [7].

In the last decade, chemical compounds associated with consumer goods and products have received particular attention from researchers, including byphenol A (BPA), phthalates, nonniphensols, paints and straighteners. With compounds, semi-brominated fire suppressants (retardants) [1,5].

Despite the mechanisms of carcinogenesis induced by chemical compounds in the Ministry of Health have not yet been elucidated, the experimental and epidemiological data accumulated so far already make it possible to develop and implement appropriate health measures in practice.

Overall, the state of the evidence does not support a significant association between environment and breast cancer risk. Breast cancer mortality and incidence vary slightly across the country [10]. Research on the effects of organochlorines is inconclusive; The most recent data from prospective analyzes do not confirm an association with the development of breast cancer [3]. Ionizing radiation is a known risk factor for breast cancer, but the levels to which the population is exposed are too low to cause an effect. Occupational studies of EMF exposure have been inconclusive; Users of electric blankets may face an increased risk of illness compared to non-users, but these findings require replication. Women exposed to secondhand smoke may face an increased risk of breast cancer, but there is no evidence of a dose effect, and results from studies of direct smoking are not as strong. Based on biological hypotheses, the four pollutants discussed here are considered potential risk factors for breast cancer. There may be other undetected environmental impacts that require assessment. Based on available evidence, with the exception of ionizing radiation, no environmental exposure can be confidently identified as a cause of breast cancer [8].

## CONCLUSIONS

The results of the analysis confirm that the risk of breast cancer is a pressing environmental, hygienic and social problem that requires further research and solutions to issues of protecting the population from the harmful effects of chemical environmental pollutants. Thus, breast cancer is the most common form of malignant tumors among the female population, and the proven association of its increase with the influence of chemical environmental pollution throughout the world made it possible to consider the risk of developing breast cancer as a pressing and environmental problem.

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## **PREVENTION OF COMPLICATIONS AFTER RADICAL OPERATION IN PATIENTS WITH BREAST CANCER**

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### **ANNOTATION**

*The article discusses the development of measures to prevent complications after radical operations in patients with RCD and evaluation of their effectiveness. The study material included 147 patients with verified breast cancer, who underwent radical mastectomy (RM) as part of complex treatment : The frequency and structure of postoperative complications in the entire sample of patients and depending on the use of a complex of preventive measures were analyzed.*

**KEY WORDS:** *breast cancer, surgical treatment, lymphorrhea , prevention.*

### **INTRODUCTION**

Breast cancer occupies one of the leading places in the structure of malignant neoplasms in women of all age groups. Surgical intervention is important in the complex treatment of patients with breast cancer, which involves removing not only the affected breast, but also areas of lymph nodes in areas of potential metastasis [1,5]. In the early postoperative period, the most common complications are impaired lymphovenous drainage with intense or prolonged lymphorrhea , seroma formation , postoperative edema and postmastectomy syndrome, as well as impaired wound healing ( Abass MO, Gismalla MDA, 2018; Madsen R.J. , Esmond N.O., 2016; Marinescu S.A., Bezhinariu K.G., 2019). These complications lead to increased duration and cost of treatment and are responsible for deteriorating quality of life ( Sayegh HE, Asdourian MS, 2017; Josephine D.S., 2019). Therefore, it is very important to study the factors contributing to the development of postoperative complications and develop measures to prevent them[6,8].

Breast cancer (BC) in women is one of the main causes of mortality among the female population worldwide and ranks first in the structure of malignant neoplasms [3, 7, 8]. By 2020, the annual incidence of breast cancer is predicted to increase to 2,000,000 [6]. Improvements in early diagnosis and the systematic use of adjuvant therapy have significantly improved the results of treatment of patients with early breast cancer, which is reflected in the continued decline in the mortality rate from breast cancer in a number of Western countries. In Russia, breast cancer also ranks first in the structure of the incidence of malignant neoplasms (MNT). In 2008, the prevalence of breast cancer per 100,000 population was 328.8, 52,469 new patients were registered, stage I–II was diagnosed in 62.7% of patients [1].

In the treatment of breast cancer, the surgical method is dominant. In recent years, there has been an evolution of surgical approaches from radical Halstead mastectomy before breast-conserving surgery. Loss of an organ in 96.1% of patients leads to mental disorders . These are affective disorders (mood disorders), body dysmorphomania and body dysmorphophobia disorders ( excessive negative attitude towards body defects and fear of losing the mammary gland), nosophobic disorders (fear of tumor recurrence). The main reasons for the occurrence of these disorders are the diagnosis of breast cancer and a pronounced postmastectomy defect, and subsequently social maladjustment (loss of a job, becoming disabled, family breakdown, emotional isolation, etc.) [7, 8].

**The purpose of the study** was to develop measures to prevent complications after radical operations in patients with RCD and evaluate their effectiveness.

### **MATERIAL AND METHODS**

The baseline and results of surgical treatment were analyzed in 147 women with RD, whose average age was 49.1±11.6 years (26–82 years), who underwent radical surgical interventions: radical mastectomy (RM) or radical breast resection ( RGC) with lymph node dissection (LND) in the Andijan branch of the RSNPTSORiR . All patients were treated in accordance with current clinical guidelines. 113 (76.9%) women underwent Madden RME , and 34 (23.1%) underwent RGG. All patients underwent 2-3 order DLV and lymph node drainage. 139 (94.6%) patients received chemotherapy, 49 (33.3%) patients received neoadjuvant therapy (NAFT); hormonal therapy - 17 (11.6%) women (12 of them after a course of CT). 83 (56.5%) patients received adjuvant radiotherapy.



The frequency and structure of postoperative complications in the entire sample of patients and depending on the use of a set of preventive measures were analyzed.

## RESEARCH RESULTS AND DISCUSSION

Complications in the early period after surgery for RRD were identified in 76 (51.7%) patients. The most common complication was postoperative swelling of the limb, which was observed in 60 (40.8%) patients, grade I - in 23 (20.7%), grade II - in 33 (55%) and grade III - in 4 (6, 7%). Intense and/or prolonged lymphorrhea was observed in 37 (25.2%) patients, seroma ( lymphocele ) - in 33 (22.4%). Wound infection was detected in 18 (12.2%) patients, necrosis of the wound edge - in 15 (10.2%).

Most complications in the early postoperative period were associated: 24 (16.3%) patients had 1 complication, 53 (36.1%) had a combination of 2 or more complications.

## CONCLUSION

Thus, radical operations with DLV in patients with RRD are characterized by a fairly high incidence of early postoperative complications, associated mainly with impaired lymphovenous outflow. Analysis of the incidence of complications depending on baseline demographic and clinical data revealed a significant association only with BMI. Treatment methods had no significant associations, but there was a marked increase in the incidence of complications after RPG and adjuvant radiotherapy. Although it is DLV that leads to the development of these disorders, it remains a necessary element of radical surgery, in particular, with N-positive status, T3-4, TNRMZ, which indicates the need for a complex of preoperative preparation tools , improvement of surgical techniques and postoperative management of patients.

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# **A DESCRIPTIVE STUDY TO ASSESS THE ANXIETY TOWARDS PEDOPHILIA AMONG MOTHERS OF ADOLESCENT GIRLS IN SELECTED RURAL COMMUNITY AT BHOPAL (M.P.)**

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## **ABSTRACT**

*The study investigated the anxiety levels of mothers of adolescent girls towards pedophilia in a rural community in Bhopal, India. Using a non-experimental descriptive design, the study surveyed 30 mothers with a structured questionnaire measuring anxiety levels. Results revealed 56.6% of mothers had moderate anxiety levels, while 43.4% exhibited severe anxiety. Age, marital status, educational background, family type, religion, and occupation were significantly associated with anxiety levels. Mothers aged 30-40 years, those who were married, and those with higher education levels experienced greater anxiety. Mothers from nuclear families and those regularly exposed to mass media also exhibited higher anxiety levels. The study emphasizes the need for targeted interventions and culturally sensitive approaches to support mothers and families in this rural community.*

**KEYWORDS:** *Descriptive study, knowledge, pedophilia, purposive sampling.*

## **INTRODUCTION**

Pedophilia (alternatively spelled paedophilia) or is the paraphilia, or sexual deviation, of being sexually attracted, primarily or exclusively, to prepubescent children. A person who exhibits such an attraction is called a pedophile. As with most paraphilias, the majority of those affected by the condition are men. Pedophilia is acknowledged to be a complex psychiatric disorder; however, acting on pedophilic urges is considered morally and criminally wrong in almost all cases. There are treatments available for the disorder, but the rates of success have been mixed.

The use of the term "pedophile" to describe all child sexual offenders is problematic, especially when seen from a medical standpoint, as the majority of sex crimes against children are perpetrated by situational offenders rather than people sexually preferring prepubertal children (DiLorenzo1981).

Pedophilic disorder, known as pedophilia, involves recurrent intense sexual urges towards and fantasies about prepubescent children. It is characterized by distress or interpersonal difficulty due to these attractions. The condition has been studied extensively since the 1980s and is mostly documented in men, though it also occurs in women. The causes of pedophilia are not conclusively established, though some correlations with neurological abnormalities and psychological pathologies have been noted. There is no known cure for pedophilia, but therapies are available that can reduce the incidence of child sexual abuse.

Pedophilic disorder requires that the individual be at least 16 years old and at least 5 years older than the child involved. Sexual urges or behavior must involve a child who is 13 years of age or younger, and the thoughts or behaviors must persist for at least six months for a clinical diagnosis. A significant percentage of individuals with pedophilia were sexually abused as children, though most adults who were abused do not develop the disorder.

In many societies, pedophilia is considered a serious offense, and convicted pedophiles may be listed on a sex offender's register. While the majority of reported child victims are girls, research shows that 60% of the victims are boys, and non-touching victimization is predominantly against girls. Men are more likely to perpetrate pedophilia, but when women are offenders, they tend to target younger children.

## **STATEMENT OF THE PROBLEM**

**A descriptive study to assess the anxiety towards pedophilia among mothers of adolescent girls in selected rural**



community at Bhopal (M.P.)

## **BACKGROUND OF THE STUDY.-PARAPHILIAS**

Paraphilia's are sexual disorder Characterized by specialized sexual fantasies and intense sexual urges and practices that are usually repetitive and distressing to the person. The special fantasy, with its unconscious and conscious components, is the path genomic element. Sexual arousal and orgasm being associated phenomena. The influence of the fantasy and its behavioral manifestations extend beyond the sexual sphere to pervade the person's life. The major function of sexual behavior for human being are to assist in bonding to express and enhance love between two person and to procreate.

Paraphilic arousal may be transient in some person's who act out their impulses only during period of stress or conflict.

## **OBJECTIVE OF THE STUDY**

1. To assess the anxiety towards pedophilia among the mothers of adolescent girls in selected rural community at Bhopal (M.P.).
2. To determine association between selected demographic variables and anxiety towards pedophilia.

## **RESEARCH HYPOTHESIS**

- H<sub>1</sub> :- There will be significantly high anxiety towards pedophilia among mothers of adolescent girls in selected rural community at Bhopal (M.P.)
- H<sub>2</sub> :- There will be significant association between selected socio-demographic variable and anxiety towards pedophilia among mothers of adolescent girls in selected rural community at Bhopal (M.P.)

## **ASSUMPTION**

1. The anxiety towards pedophilia is significantly high among mothers of adolescent girls.
2. It is assumed that anxiety is influence by the selected demographic variables.

## **DELIMITATION**

### **INCLUSION CRITERIA**

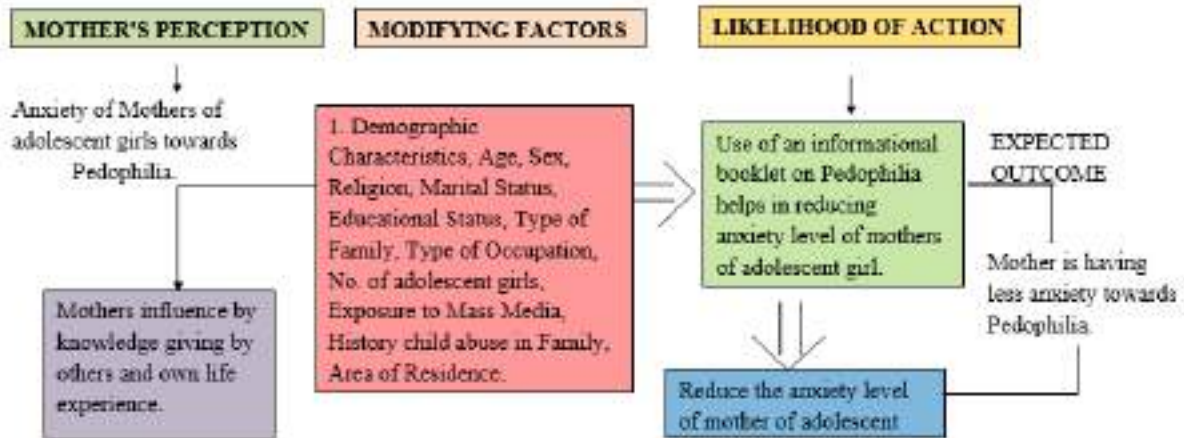
- 30 Subject from selected rural community Village kalapani, Bhopal.
- Sample available at the time of study.
- Sample willing to participate in the study.

### **EXCLUSION CRITERIA**

1. Subject who are not residing at selected rural Community.
2. Sample who are not available at the time of study.
3. Sample who are not willing to participate in the study.

## **SIGNIFICANCE OF STUDY**

1. To identify the anxiety Level of mothers of adolescent girls in selected rural community at, Bhopal (M.P.)
2. To encourage the mothers to express their feelings and anxiety towards pedophilia.
3. To create a positive attitude in the mother.
4. To provide a information regarding pedophilia, their prognosis and treatment.
5. To strengthen the mothers which will help their girls to cope with the problem



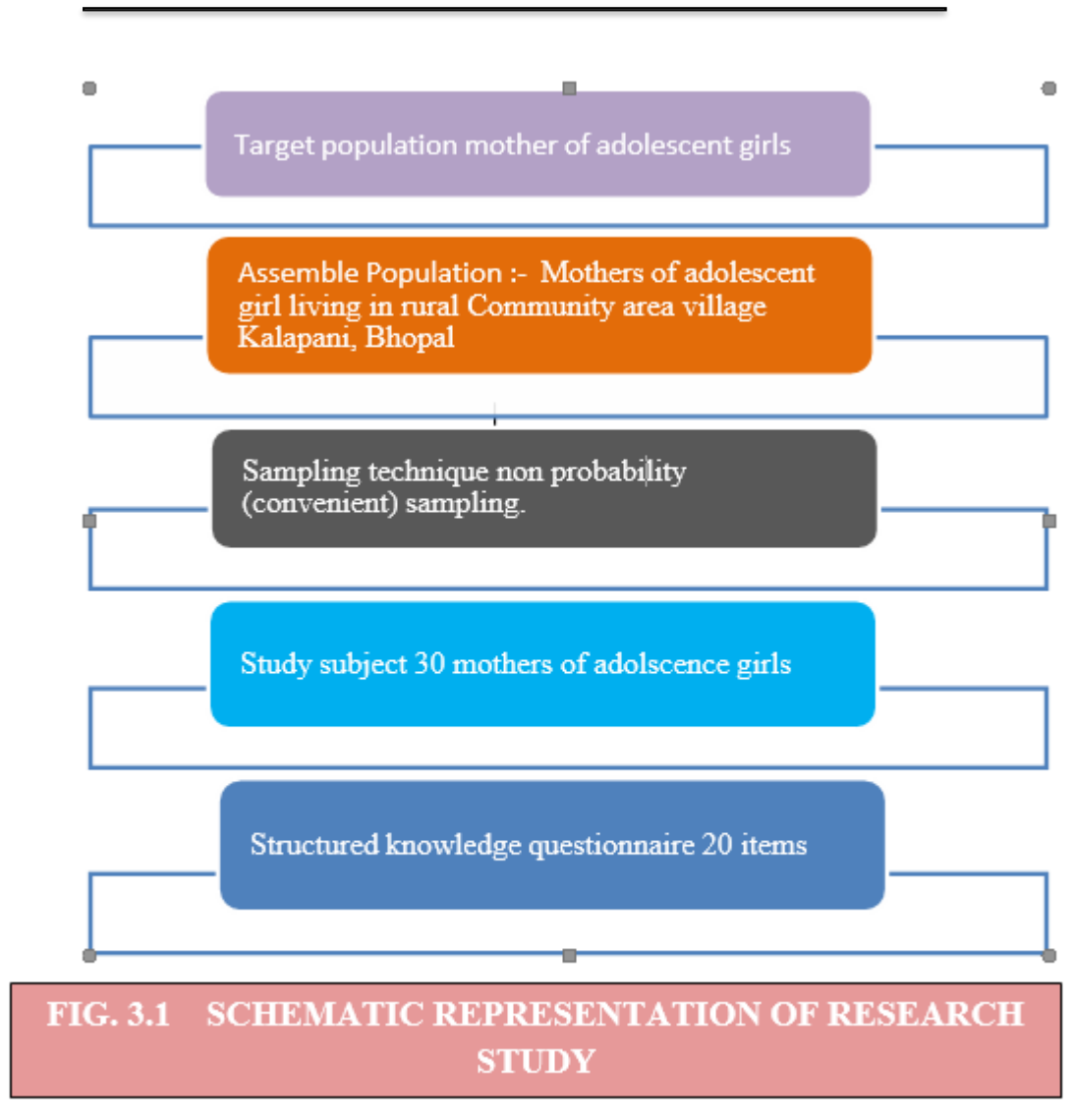
**FIG. 1.1 CONCEPTUAL FRAMEWORK BASED ON HEALTH BELIEF MODEL.**

The review of literature has been organized under following:-

- ❖ Literature related to anxiety regarding pedophilia.-
- ❖ Literature related to Knowledge regarding to Pedophilia.
- ❖ Literature related to causes of pedophilia :-
- ❖ Literature related to after effect of pedophilia :-

## METHODS

The setting is selected at Village Kalapani Bhopal. The sample size was 30 mother of adolescent girls. The tool consists of section first demographic proforma consisting of 09 item, section 2 Questionnaire consisting of 20 items. The content validity was stabilized by subjecting the tool to experts in this field. The final data was collected from 03April 2018 to 16 April 2018



### VARIABLES

Variables are qualities, properties are characteristics of the person things situation on that change or vary. The variables included in this studies are independent variables& dependent variables.

### INDEPENDENT VARIABLES

It include informational booklet regarding Pedophilia to develop a Positive attitude in mothers of adolescent girls towards Pedophilia.

### DEPENDENT VARIABLES

It includes in the present study anxiety of mothers of adolescent girls with pedophilia.

### ATTRIBUTED VARIABLES

It includes mothers age, marital status, religion, occupational status, educational status, type of family, No. of adolescent girls, exposure to mass media, history of child abuse in family, area of resident

### SETTING OF STUDY

Setting is a location & condition in which data collection take place in the study. This study was conducted in rural community area Village Kalapani Bhopal. The reason for selecting this area was investigators interest to assess the anxiety of mothers of adolescent girls towards pedophilia.The geographical proximity of the setting & availability of the required sample were also considered while selecting the study group.





## POPULATION

Research population is also known as a well defined collection of individuals or objects known to have similar characteristics all individuals or object within a certain population usually have a common binding, characteristics or traits.

Polit&hungler(1999) define a population as the totality of all subjects that confirm to a set of specification, comprising, the entire group of persons that is of interest to the researcher and to whom the research results can be generalized.

The population is all elements (individuals, objects or substances) that meet certain criteria for inclusion in a study. The population will depend on the sample criteria and the similarity of subjects in these various settings (Burns N. & grove S.K., 2002).

In present study population comprised the mothers of adolescent girls living in rural community area in village kalapani Bhopal.

## SAMPLE & SAMPLE SIZE

Sample a subset containing a characteristics of a large population or a portion, piece or segment that is representation of a whole who participate in the research study.

The sample used for this study was 30 mothers of adolescent girls who are living in the community area in village Kalapani Bhopal those who fulfill the inclusion & exclusion criteria.

Lobiodo-wood and Haber (1998) describe a sample as a portion or a subset of the research population selected to participate in a study, representing the research population.

## SAMPLE TECHNIQUE

Sampling is the process of selecting a representative part of population thus a carefully carried out a sampling process helps to draw a sample that represent the characteristics of the population from which the sample is draw.The Sample should be a representation of the general population.

The investigation had utilized non probability convenient sampling technique had been used for the selection of the subject

## ETHICAL CONSIDERATION

The researcher had taken permission from the Parshad of Village Kalapani Bhopal to conduct the research study. Consent was taken from the mothers of adolescent girls before data collection.

## RELIABILITY OF THE TOOL

The reliability of an instrument is the degree of consistency with which it measures an attribute it is supposed to be measuring.

Reliability of a research instrument is the extent to which the instrument yields the same results or repeated measures.

The tool was administered to five mothers of adolescent girls other than the main study sample to establish the reliability.

The internal consistency was computed using Karl Pearson's Correlation Coefficient formula and with split half technique.

$$R = 2r \div 1(n - 1)r$$

R: Reliability coefficient of whole test

R: Reliability coefficient of correlation of half test

A value of 0.68 for structured knowledge questionnaire was obtained. Hence, the tool was considered to be moderately reliable. After validation, tool modified according to suggestion of Expert's & prepared the final tool.



**RESULTS**

Distribution of subjects according to socio demographic variables -  
N = 30

Demographic Variables		Frequency	Percentage %
Age	15-20 Years	1	3.4
	20-30 Years	7	23.3
	30-40 Years	18	60
	40-50 Years	4	13.3
	50 Above	0	0
Marital Status	Married	22	73.4
	Divorced	4	13.3
	Widow	04	13.3
	Seperated	0	0
Educational Status	Primary	22	73.4
	Secondary	4	13.4
	Graduate	2	6.6
	Uneducated	2	6.6
Religion	Hindu	14	46.6
	Muslim	13	43.4
	Christian	3	10
	others	0	0
Type of Family	Nuclear	16	53.4
	Joint	14	46.6
Type of Occupation	Daily wages	7	23.4
	Private	9	30
	Government	0	0
	Self Employed	8	26.6
	Other	6	20
No. of Adolescent Children	1	8	26.7
	2	10	33.3
	More	12	40
Exposure to mass media	TV	16	53.3
	Radio	11	36.7
	Newspaper	3	10
	Magazine	0	0
History of child abusing family	Yes	0	0
	No	30	100

**Interpretation**

Table No. 4.1 shows the demographic information of mothers of adolescent girls. Those who are participated in the following study.

**1. Distribution of age**

The socio-demographic variables related to age indicates that 3.4% mother's were of aged 15-20 years. 23.3% of them were 20-30 years, 60% of them were 30- 40 years, 13.3% of them were of 40-50 years & 0% of them were above 50 years.

**2. Distribution of marital status**

The socio-demographic variables related to marital status that 73.4% of mothers were married. 13.3% of them were divorced. 13.3% of them were widow & 0% of them were separated.



**3. Distribution of Educational Status**

The socio-demographic variables related to educational status that 73.4% mothers have primary education, 33.4% have secondary education, 6.6% have graduate, 6.6% have uneducated.

**4. Distribution of Religion**

The socio-demographic variables related to religion that 46.6% were Hindu, 43.3% were Muslim, 10% were Christian and 0% were others.

**5. Distribution of Type of Family**

The socio-demographic relate to type of family indicates that 53.4% of them were from Nuclear Family and 46.6% of them were from Joint Family.

**6. Distribution of Type of Occupation**

The socio-demographic variables related to type of Occupation indicates that 23.4% of them were Daily wages, 30% of them were Private workers, 0% of them were Government workers, 26.6% of them were self employed, 20% of them were other occupation.

**7. Distribution of No. of Adolescent Children**

The socio-demographic variables related to Number of adolescent children indicates that 26.7% were of mothers have only 1 child, 33.3% have 2 children & 40% have more childrens.

**8. Distribution of Exposure to mass media**

The socio-demographic variables related to Exposure to mass media indicates that 53.3% of them have TV, 36.7% have Radio, 10% have Newspaper & 0% have Magazine.

**9. Distribution of History of Child abuse in family**

The socio-demographic variables related to History of child abuse in family indicates that 100% mothers have No History of child abuse

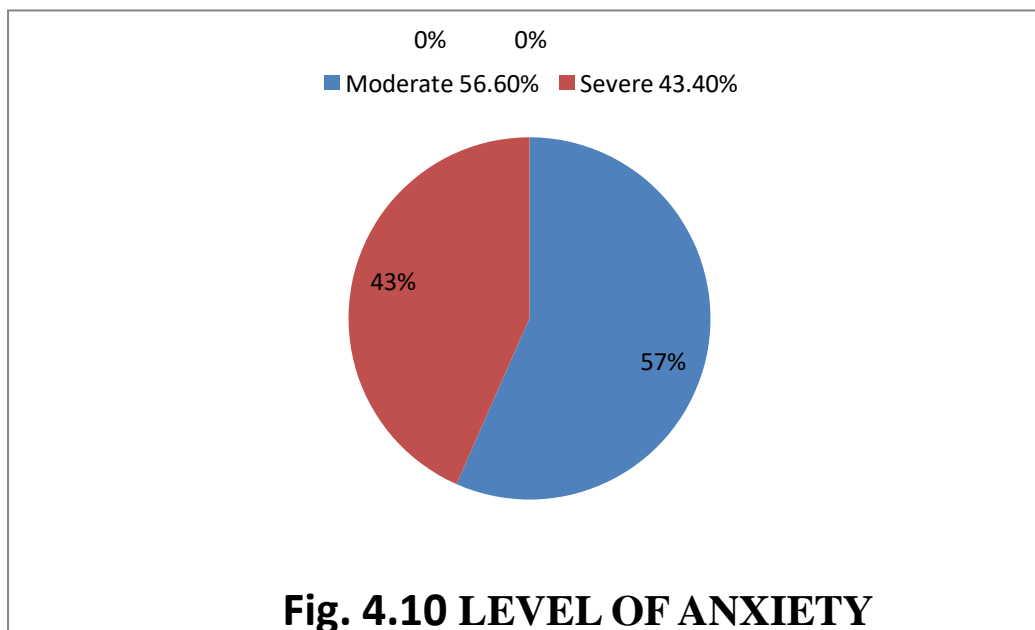
**Assessment of Anxiety of Mothers of Adolescent Girls Towards Pedophilia.**

**Table 2: Distribution of subjects according to level of anxiety**

Level of Anxiety	No. of subjects/Frequency	Percentage
Mild	0	0%
Moderate	17	56.6%
Severe	13	43.4%
Total	30	100%

**Interpretation of anxiety level :-**

Table No. 2 shows the mothers of adolescent girls test anxiety level on pedophilia in pretest 56.6% mothers having moderate anxiety and 43.4% as them are having severe anxiety and none as them have mild anxiety.



**Fig. 4.10 LEVEL OF ANXIETY**



**Table – 3 Mean Percentage of Anxiety score.**

Anxiety	Assessment Scores	Mean	SD	CV	Mean %
Towards Pedophilia	367	12.2	2.8	0.229	0.033%

**Interpretation of Anxiety score**

The above table shows that assessment of anxiety among mothers of adolescent girl towards pedophilia. They are having 0.033% of anxiety.

**Scoring Pattern**

- <35% - Mild
- 36-60% - Moderate
- 61-100% - Severe

In the present study Comparison according to knowledge level shows that among the respondents, The result of this study is mean percentage is 12.2%, Standard deviation is 2.8 %, Coefficient value is 0.229 and mean percentage is 0.223%.

**Association between the socio demographic variables and the anxiety towards pedophilia.**

**Table No. 4 Association between Anxiety of mothers of adolescent girls and their Selected Demographic variables.**

P=>0.05

Socio demographic variables		Frequency and %	Mild	Moderate	Severe	Significance Test
Age	15-20 years	1 (3.4%)	0	0	1	χ <sup>2</sup> Value = 4.81 P= 0.05, df=8, **
	20-30 years	7 (23.3%)	0	6	1	
	30-40 years	18 (60%)	0	8	10	
	40-50 years	4 (13.3%)	0	3	1	
	above 50	0 (0%)	0	0	0	
Marital Status	Married	22 (73.4%)	0	14	8	χ <sup>2</sup> Value = 2.03 P=0.05, df = 6, **
	Divorce	4(13.3%)	0	1	3	
	Widow	4(13.3%)	0	02	02	
	Separated	0(0%)	0	0	0	
Educational Status	Primary	22(73.4%)	0	14	8	χ <sup>2</sup> Value = 4.23 P=0.05, df = 6,**
	Secondary	4(13.3%)	0	1	3	
	Graduate	4(13.3%)	0	02	02	
	Uneducated	0(0%)	0	0	0	

Religion	Hindu	14(46.6%)	0	12	2	χ <sup>2</sup> Value = 8.95 P=0.05, df = 6,**
	Muslim	13(43.4%)	0	4	9	
	Christian	3(10%)	0	1	2	
	Other	0(0%)	0	0	0	
Type of Family	Nuclear	14(53.4%)	0	11	3	χ <sup>2</sup> Value = 5.1 P=0.05, df = 2,**
	Joint	16(46.6%)	0	6	10	
Type of Occupation	Daily wages	7(23.4%)	0	5	2	χ <sup>2</sup> Value = 1.52 P=0.05, df = 6,**
	Private	9(30%)	0	4	5	
	Government	0(0%)	0	0	0	
	Self employed	8(26.6%)	0	4	4	
	Other	6(20%)	0	4	2	
No. of Adolescent	1	8(26.7%)	0	4	4	χ <sup>2</sup> Value = 0.75
	2	10(33.3%)	0	7	3	



Children	More	12(40%)	0	6	6	P=0.05, df = 4,**
Exposure to Mass Media	TV	16(83.3%)	0	9	7	χ <sup>2</sup> Value = 0.85 P=0.05, df = 6,**
	Radio	11(36.7%)	0	7	4	
	Newspaper	3(10%)	0	1	2	
	Magazine	0(0%)	0	0	0	
History of Child Abuse in Family	Yes	0	0	0	0	χ <sup>2</sup> Value = 0 P=0.05, df = 2,**
	No	30	100	17	13	

**Interpretation**

Table No. 4 reveals that there is significant association between socio- demographic variables and the anxiety level of mothers of adolescent girls towards pedophilia such as age of Mother (4.81), Marital status (2.03), Educational Status (4.23), Type of Family (5.1), Religion (8.95), type of Occupation (1.52) are significantly associated with their test of anxiety score. These types of association are statistically significant and it was calculated using pearson chi-square test.

**SUMMARY, CONCLUSION, IMPLICATION AND LIMITATION**

The research study aimed to assess the anxiety of mothers of adolescent girls towards pedophilia in a selected rural community in Bhopal, India. A sample of 30 mothers was chosen using non-probability convenient sampling. The study found that 56.6% of mothers had moderate anxiety and 3.3% had severe anxiety regarding pedophilia. Hypothesis testing revealed a significant association between selected socio-demographic variables, such as age of mother, marital status, educational status, type of family, religion, and type of occupation, and the level of anxiety towards pedophilia.

The study methodology included a non-experimental descriptive design, and data was collected using a structured questionnaire with 20 items to assess anxiety among mothers of adolescent girls. Data analysis utilized descriptive and inferential statistics, including chi-square tests, to establish significant associations. The findings highlighted that socio-demographic variables were statistically significant factors influencing anxiety levels towards pedophilia.

The study has implications for nursing education, practice, and research, emphasizing the need for incorporating topics such as cultural and moral aspects of child protection into nursing curriculum. Nursing practice can involve counseling and educational programs for youth on pedophilia prevention, and community education can promote awareness and safety practices. Future research could involve larger sample sizes and different settings to explore the relationship between anxiety and socio-demographic factors further.

Limitations of the study included a restricted sample size and setting (village Kalapani, Bhopal) and a short data collection period (one week). Additionally, language barriers limited the study to participants who understood English or Hindi. Recommendations for future research suggest broader studies across various populations and investigating factors influencing maternal anxiety towards pedophilia.

**INTERPRETATION AND CONCLUSION**

Study was very effective in increasing the knowledge regarding anxiety towards pedophilia among mother of adolescent girl and given health education to them

Findings of this study in relation to other earlier conducted studies also showed that the parents of Adolescent girls have poor knowledge regarding paedophilia

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# FRAUD DETECTION IN UPI TRANSACTIONS USING ML

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Article DOI: <https://doi.org/10.36713/epra16459>

DOI No: 10.36713/epra16459

## ABSTRACT

*Significant obstacles to financial security have arisen as a result of the quick uptake of Unified Payments Interface (UPI) for online transactions and a commensurate rise in fraudulent activity. This paper suggests a novel fraud detection method that makes use of cutting-edge machine learning (ML) algorithms to address this urgent issue. It focuses on integrating a Hidden Markov Model (HMM) into the UPI transaction process. In order to enable the system to identify departures from these learnt behavior's as possibly fraudulent, the HMM is trained to predict the typical transaction patterns for particular cardholders. The suggested system uses a variety of contemporary approaches, such as Kmeans Clustering, Auto Encoder, Local Outlier Factor, and artificial neural networks, to improve algorithmic diversity and flexibility to changing fraud patterns. In addition to addressing issues like test data creation for training and validation, the system emphasizes a heuristic approach to solving high-complexity computational problems, guaranteeing efficacy in a variety of settings. This study, which is positioned as a proactive and adaptable solution, emphasizes how crucial it is to stop UPI fraud and provides a thorough foundation for reliable fraud detection in the ever-changing world of online transactions.*

## INTRODUCTION

The emergence of online banking has caused a paradigm shift in the current financial transaction landscape, providing individuals and organisations globally with unmatched ease and efficiency. But there are drawbacks to this digital transformation as well, the most significant of which is the growing frequency of fraudulent activity in online transactions. The swift expansion of online banking services has made it easier for bad actors to take advantage of weaknesses, which puts the security and integrity of financial systems at serious risk. Furthermore, the COVID-19 pandemic's start has acted as a trigger, quickening the shift to remote operations and raising the possibility of fraudulent activity in the digital sphere. It is therefore more important than ever to create reliable fraud detection systems in the face of the epidemic highlight how important it is for both customers and financial institutions to strengthen their defences against fraud. The increasing trend of financial transactions occurring on digital platforms underscores the need for advanced security measures and flexible approaches to protect the integrity of online banking systems.

## Existing System

Regarding the field of online banking fraud detection, the systems that are now in place primarily depend on conventional techniques and rule-based methods. In order to identify potentially fraudulent transactions, these systems frequently use static rules and thresholds, usually based on established patterns or anomalies. Although these systems have shown some degree of effectiveness, they have shortcomings in terms of accuracy, scalability, and adaptability, especially when it comes to sophisticated and ever-evolving fraud techniques.

A prevalent obstacle within the current framework is its dependence on static rules, which may not be able to identify subtle or evolving patterns that point to fraudulent activity. Furthermore, the rule-based approach frequently finds it difficult to manage the subtleties and intrinsic complexity of transaction data, particularly given the ever-changing environment of online banking transactions.

The current system's vulnerability to false positives and false negatives is another drawback. Static rules have the potential to unintentionally identify genuine transactions as fraudulent (false positives) or fail to identify actual fraudulent activity (false negatives), which can result in inefficiencies, unhappy customers, and financial losses for financial institutions as well as consumers.

Furthermore, particularly in the context of the Unified Payments Interface (UPI), the current systems would find it difficult to handle the enormous volume and variety of transaction data generated in real-time. The scalability and computing efficiency needed to efficiently process and analyse large-scale transaction datasets may be lacking in traditional methodologies.





Overall, even though the current systems have been very helpful in detecting fraud in online banking transactions, they urgently need to be improved in order to handle the new dangers and complexity that come with doing business in the digital sphere. To improve the efficacy, precision, and flexibility of fraud detection systems, sophisticated machine learning and artificial intelligence approaches customised for online banking transactions must be implemented.

### Disadvantages

- Limited adaptability
- Scalability challenges
- Limited feature extraction
- Insufficient model interpretability

### Proposed System

We present a unique strategy that uses convolutional neural networks (CNNs) for increased fraud detection in online banking transactions in order to overcome the shortcomings of current fraud detection systems. Compared to conventional rule-based approaches, our suggested solution has various advantages, including better accuracy, flexibility, and scalability. We support the use of convolutional neural networks (CNNs) as the primary technology for online banking transaction fraud detection. Especially in image analysis tasks, CNNs have shown impressive skills in feature extraction and pattern detection. We intend to leverage CNNs' capacity to automatically learn hierarchical characteristics and identify complex patterns suggestive of fraudulent activity by applying them to transactional data. Important elements of the system we've suggested include:

**Adaptive Learning:** Unlike static rule-based systems, our suggested approach makes use of CNN-enabled adaptive learning techniques. With the ability to dynamically modify their internal representations and adjust their parameters in response to incoming data, these neural networks are able to react in real-time to evolving fraud trends and new threats. Its ability to adjust strengthens the system's defences against changing fraud strategies and guarantees steady advancement over time.

**Feature extraction and transformation:** To extract pertinent characteristics from transactional data and turn them into interpretable representations for fraud detection, our suggested approach makes use of CNNs. CNNs can identify subtle patterns and abnormalities that may escape conventional rule-based methods by automatically learning discriminative features from raw transactional attributes. The method of feature extraction improves the accuracy with which the system can distinguish between authentic and fraudulent transactions.

**Real-time Processing:** Our suggested solution allows for real-time fraud detection and response in high-volume transaction environments like the Unified Payments Interface (UPI) by utilising the parallel processing powers of CNNs. CNNs streamline the simultaneous processing of massive amounts of transaction data, making it easier to identify fraudulent activity quickly and take prompt action to prevent losses. Despite the inherent complexity of CNNs, we have given priority to interpretability and openness in our suggested solution. We include methods for illustrating and interpreting CNN decision-making processes so that interested parties can comprehend the reasoning behind reported transactions and develop faith in the dependability of the system. Our technology facilitates cooperation between users, regulators, and internal auditors by improving interpretability, which in turn promotes responsibility and adherence to regulatory standards.

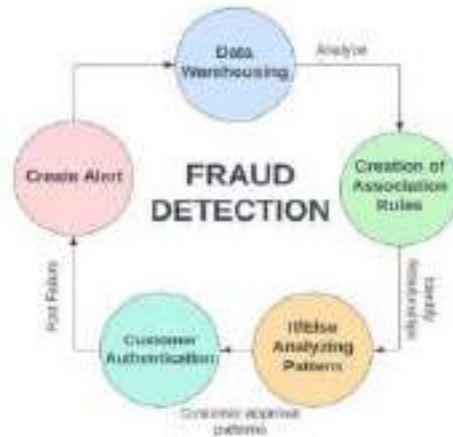
**Continuous Monitoring and Evaluation:** To evaluate the efficacy and performance of our suggested system over time, it is equipped with mechanisms for ongoing monitoring and assessment. We make sure that the fraud detection system is continuously optimised and improved by examining user feedback, comparing model predictions to ground truth labels, and monitoring important performance metrics like precision, recall, and F1-score. The overall effectiveness and dependability of the system are increased by this iterative process, which permits ongoing enhancement and adaptability to changing fraud environments.

### Advantages

- Enhanced accuracy
- Adaptability to changing patterns
- Continuous improvement
- Comprehensive fraud detection
- Scalability and efficiency
- Real time detection

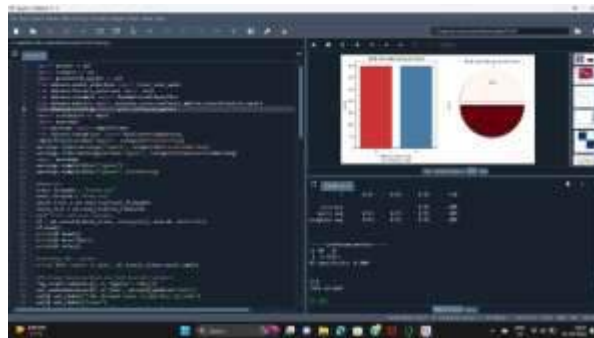


**Block Diagram**

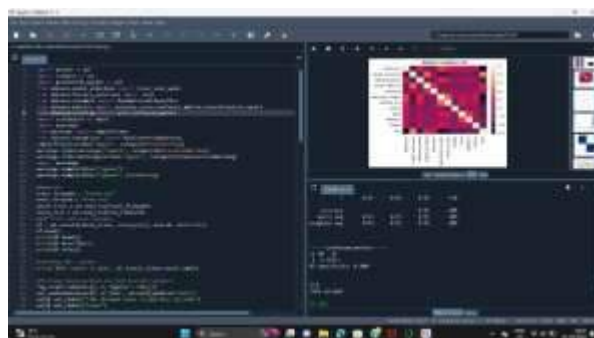


**Fig 1 : System Diagram for UPI fraud Detection using machine learning**

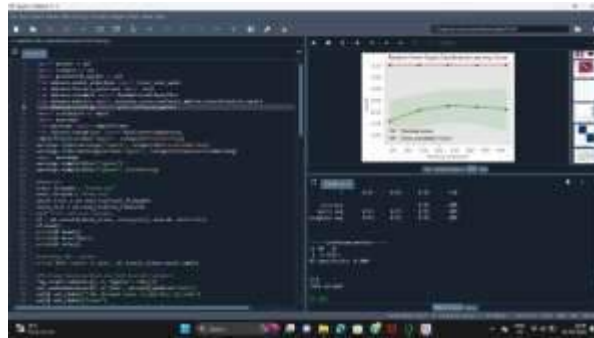
**RESULTS**



**Fig 2: Dataset of Fake Account Count**



**Fig 3: Dataset Correlation Plot**

**Fig 4 : Regression Forest Digits Classification Learning Curve**

## CONCLUSION

We have gone through several phases of data collection, pre-processing, algorithm selection, and system implementation in this extensive effort to create a strong fraud detection system. The end result is a solution that has the potential to greatly improve the security and dependability of financial transactions. We started our trip by obtaining a large and comprehensive dataset that included complex transactional information, which served as the foundation for our later investigations.

Setting up a strong basis for later model training required the first stage of data pre-processing. We carefully addressed issues, including the dataset's unequal class distribution, using calculated pre-processing techniques to reduce biases and guarantee the stability of our models. Methods like standardisation-based feature scaling and careful treatment of missing data played a crucial role in getting the dataset ready for efficient model training.

The selection of algorithms was an important factor in guaranteeing the effectiveness of the system in detecting fraudulent actions. We made sure our system could detect a wide range of fraudulent patterns by implementing a diverse ensemble of machine learning algorithms, from more sophisticated techniques like convolutional neural networks to more conventional methods like logistic regression and decision trees. With the contributions of each algorithm, a comprehensive fraud detection system that could handle a variety of fraud scenarios was created.

The system architecture was crucial in guaranteeing scalability, efficiency, and usability during the development and deployment stages. By using technologies like Flask, HTML, CSS, Python, and other programming languages, we were able to smoothly integrate the fraud detection system into the current financial infrastructure, increasing its usability and accessibility for both stakeholders and end users. The seamless deployment and functioning of the system in real-world settings were made possible by this harmonious technology integration.

The fraud detection system is a major improvement in protecting financial transactions from fraudulent activity, as we can see when we consider the results of our work. It is crucial to preserving the integrity and reliability of financial systems because of its capacity to precisely detect fraudulent transactions while reducing false positives. But our adventure doesn't end here. Maintaining protection and security in the ever-changing world of financial transactions will require constant system improvement and refinement to meet changing fraud trends and new security risks. We are prepared to meet upcoming challenges and protect the integrity of financial systems around the globe with a dedication to innovation and vigilance.

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## DEEP LEARNING FOR VISUAL RECOGNITION

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Article DOI: <https://doi.org/10.36713/epra16464>

DOI No: 10.36713/epra16464

### ABSTRACT

*The design and development of an advanced object detection system are presented in this work, which was guided by a thorough literature review and feasibility assessment. The literature review emphasises how object detection techniques have evolved, highlighting the shift from conventional techniques to deep learning approaches. Important developments are highlighted, such as feature pyramid networks, anchor-based localization, and region-based and single-stage detectors. Furthermore, offered are insights about assessment metrics, transfer learning, and data augmentation. A feasibility study assesses the suggested system's operational, technological, and financial viability and finds that it is highly feasible in each of these areas. The architecture of the system is modular and scalable, including backend services, data management, an object detection engine, and a user interface among its constituent parts. Specifications for both functional and non-functional needs are provided, which direct the development of the system. The development phases, resource allocation, development process, and quality assurance procedures are all outlined in the implementation plan. Through the integration of deep learning techniques, the suggested system seeks to achieve high-performance object identification capabilities that are appropriate for a variety of applications while being scalable, reliable, and user-friendly.*

### INTRODUCTION

As a fundamental job in computer vision, object detection is necessary for many applications, including augmented reality, autonomous cars, and surveillance. Accuracy, speed, and scalability issues arise from the use of hand-crafted features and specialized algorithms in traditional object detection approaches. Significant progress has been made in object detection with the introduction of deep learning, namely convolutional neural networks (CNNs), which offer enhanced performance and efficiency. This project aims to design a new object detection system, improve scalability, accuracy, and speed, assess performance on various datasets and scenarios, and investigate real-world applications. This project attempts to advance object detection technology and enable the creation of intelligent systems that can comprehend visual data with previously unheard-of efficiency through rigorous experimentation and review. The format of the paper is as follows: The issue statement, purpose, scope, and outline of the study are presented in Section 1. A review of the literature is given in Section 2, which summarizes the methods and developments in object detection to date. In Section 3, the suggested object detection system's system requirements are outlined, and its viability is examined. The system architecture, implementation strategy, and quality control procedures are described in Section 4. The experimental findings and performance assessment are shown in Section 5. The report is finally concluded in Section 6, which also outlines future research directions and summarizes major findings.

### Existing System

Conventional object detection systems rely on manually designed features and machine learning methods, which frequently have issues with scalability, accuracy, and speed. These systems usually need intricate pipelines with phases for feature extraction, selection, and classification, which results in subpar performance and computational inefficiencies.

Utilising region-based techniques, such as the region-based convolutional neural network (R-CNN) and its variations, is a common strategy in classical object detection. Although these approaches use deep learning models and region proposal techniques to attain reasonably high accuracy, their sluggish inference speeds and large computational requirements render them unsuitable for real-time applications.

Sliding window-based techniques are another popular approach. In these methods, a classifier is applied to each window to detect the presence of objects, and a window of a fixed size is gradually moved over the image. Although sliding window techniques are conceptually straightforward, they are ineffective because they necessitate a thorough search across a large number of windows,



which results in a substantial computing overhead.

Furthermore, objects with different scales, orientations, and degrees of occlusion are sometimes difficult for conventional object identification algorithms to detect. Their usefulness in real-world circumstances is limited due to their incapacity to handle complex situations like partially visible scenes, congested environments, and object occlusions.

Advanced object detection systems that use deep learning to achieve higher accuracy, faster inference speeds, and improved scalability are becoming more and more necessary to meet these difficulties. We will examine the suggested system, which uses cutting-edge deep learning methods—specifically, the You Only Look Once version 3 (YOLOv3) algorithm—to get around the drawbacks of conventional methods in the parts that follow.

## DISADVANTAGES

- **Limited accuracy:** In difficult situations with cluttered backgrounds or low-resolution photos, traditional algorithms may not be able to recognize objects with enough accuracy.
- **sluggish inference speed:** A lot of the systems in use today have sluggish inference speeds, which makes them unsuitable for real-time applications like surveillance or driverless cars.
- **Lack of scalability:** Conventional methods could find it difficult to manage a variety of item types or grow to enormous datasets.
- **Complexity:** Handcrafted features and many phases are common in the pipelines of traditional object identification systems, which results in complicated designs and subpar performance.

**Proposed System:** We suggest a unique strategy that makes use of cutting-edge deep learning techniques and simplified architectures to accomplish reliable and effective object detection in order to overcome the shortcomings of the current object detection systems. The principal constituents and attributes of our suggested system encompass:

**End-to-End Deep Learning Architecture:** The end-to-end deep learning architecture used in our suggested system combines object location, feature extraction, and classification into a single neural network model. More effective training and inference are made possible by this simplified method, which does away with the requirement for intricate pipelines and manually created features.

**Single-Stage Object Detection:** Our suggested system uses a single-stage object detection paradigm, in contrast to conventional techniques that depend on multi-stage pipelines. Our method increases computational efficiency and streamlines the detection process without compromising accuracy by directly predicting bounding boxes and class probabilities from raw input photos.

**Backbone Network:** The basis for feature extraction and representation learning in our suggested system is the backbone network. We efficiently extract high-level characteristics from input photos by utilising state-of-the-art convolutional neural network (CNN) architectures like ResNet, EfficientNet, or MobileNet.

**Feature Pyramid Network (FPN):** Our method uses a feature pyramid network (FPN) to overcome scale variances and enhance object detection performance across various resolutions. FPN improves the network's capacity to identify objects at various scales by combining characteristics from various abstraction levels.

**Anchor-Based Localization:** To anticipate bounding boxes for object localization, we utilise anchor-based localization methods. Our approach is able to precisely localise objects of varying sizes and shapes inside the input photos by inserting anchor boxes of different aspect ratios and scales across the feature maps.

**Effective Training and Inference:** The focus of our suggested approach is on effectiveness during the training and inference phases. During training, we take advantage of optimisation strategies including learning rate scheduling, gradient clipping, and batch normalisation to speed up convergence while maintaining stability and robustness. We also investigate model quantization and compression techniques to minimise model size and computational complexity for faster inference on devices with limited resources.

**Data Augmentation and Regularisation:** We use data augmentation and regularisation approaches to improve our model's robustness to fluctuations in the input data and to boost its generalisation capabilities. We enhance the training dataset and encourage the model to learn invariant features by randomly transforming the training photos, such as rotating, scaling, and cropping.

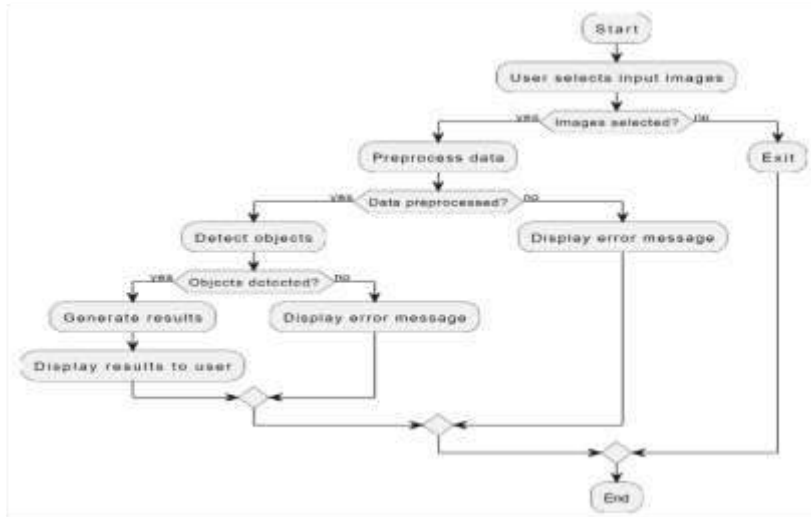
**Transfer Learning and Fine-Tuning:** To tailor pre-trained models to particular object identification tasks, our suggested approach makes use of transfer learning and fine-tuning techniques. Our approach achieves state-of-the-art performance with limited labelled data by bootstrapping the training process and accelerating convergence by initialising the network using weights learned from large-scale image datasets (e.g., ImageNet).



**Advantages**

- Efficient single-stage detection.
- High accuracy.
- Scalability and adaptability.
- Enhanced robustness and generalization.
- Optimization for resource constrained devices.

**Block Diagram**



**Fig1 : System Diagram for Deep Learning for Visual Recognition**

**RESULTS**





## CONCLUSION

Further investigation into the possible effects and ramifications of the Image Caption Generator system for different stakeholders and sectors is required. Let's examine each facet in greater depth:

**Effective Creation of Captions:** Not only is the system's ability to create captions quickly a technological achievement, but it also represents a significant advancement in accessibility and inclusivity. The system enables people with visual impairments to freely access and understand visual content by automating the process of describing visuals. This is a big step in the direction of building a more inclusive digital world where users of all skill levels can easily interact with multimedia material.

**User-Friendly Interface:** Ensuring that the system's benefits are available to a broad variety of users, including those with low technical expertise, is why a user-friendly interface is of the utmost importance. The system creates a favourable user experience by providing clear instructions, an intuitive design, and responsive feedback systems. This encourages increased adoption and utilisation among a variety of user demographics.

**Robust Testing:** Ensuring the system's stability and dependability depends on the thorough testing carried out throughout the development lifecycle. Developers can find and fix any flaws, mistakes, or performance bottlenecks in the system by methodically comparing its performance to a large collection of test cases. Building end users' and stakeholders' trust and confidence in the system requires an iterative process of testing and improvement.

**Scalability and Adaptability:** The system's scalability and adaptability are critical to its long-term viability and relevance as technology continues to advance quickly. Developers may easily implement new features, incorporate advances in deep learning research, and adjust to changing user demands and preferences by building the system with modularity and flexibility in mind. By taking this future-proofing approach, the system is guaranteed to stay at the forefront of innovation and to provide value in the long run.

**Possible Uses:** The Image Caption Generator system's adaptability makes it possible to apply it in a wide range of contexts and businesses. By adding insightful captions to images and videos, the technology can improve the visual content's accessibility and engagement on social media. It can help with decision-making and product discovery in e-commerce by automatically creating thorough descriptions for product photos. The method can aid in learning and comprehension in the classroom by giving written explanations for diagrams and visual concepts. In the medical field, it can help practitioners analyse and understand medical imaging data more efficiently.

Through the utilisation of the system's capabilities in these diverse fields, entities and individuals can discover novel avenues for creativity, effectiveness, and inclusion. The Image Caption Generator system has the power to significantly alter how we interact with visual content in the digital age, whether through increasing user engagement, increasing accessibility, or optimising workflows.

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# ISANG DISKURSONG PAGSUSURI SA ANTAS NG WIKA NA GINAMIT NG MGA MAG-AARAL SA KANILANG ISINULAT NA SPOKEN WORD POETRY

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Article DOI: <https://doi.org/10.36713/epra16486>

DOI No: 10.36713/epra16486

## ABSTRAK

*Ang layunin ng diskursong pagsusuri na pananaliksik na ito ay makagawa ng isang diskursong pag-aanalisa sa antas ng wika na ginagamit ng mga piling mag-aaral sa pagsulat ng kanilang spoken word poetry. Bilang karagdagan, layunin nito na matukoy ang antas ng wika na ginamit nila sa kanilang pagsulat ng spoken word poetry at mapag-alaman kung paano nakaaapekto ang kaalaman sa paggamit ng iba't ibang antas ng wika sa pagbuo ng kaisipan o kahulugan ng kanilang tulang isinulat bilang isang uri ng panitikan. Ang pananaliksik na ito ay nakatuon lamang sa pagsusuri ng mga antas nga wika na ginamit ng mga mag-aaral sa Baitang 7 sa pagsulat ng kanilang orihinal na spoken word poetry. Aabot sa 30 akda ang ginamit sa pananaliksik na ito. Pumili ang mananaliksik ng mga mag-aaral mula sa iisang paaralan mula sa Sangay ng Davao Oriental. Ang mga tema ayon sa antas ng wika na natagpuan sa mga piling akda ay ang sumusunod: impormal na wika – balbal, kolokyal, lalawiganin; at pormal na wika. Samantala, ang mga temang nabuo mula sa paghimay-himay sa mga taludtod at saknong upang masagutan ang pangalawang tanong ay ang sumusunod: mga kabiguan ng pusong nagmamahal, mga paghanga ng pusong nagmamahal, at mga kahilingan ng pusong nagmamahal. Gayundin, ang mga temang nabuo mula sa paghimay-himay sa mga taludtod at saknong upang masagutan ang pangatlong tanong ay ang sumusunod: nakapaglalarawan ng ideya, nakapagpapahayag ng damdamin, at nakagagawa ng mga simbolismo. Ang aking pag-aaral ay mahalaga dahil ito ay nagbibigay-diin sa kahalagahan ng pagsusuri sa antas ng wika sa spoken word poetry, na nagpapalalim sa ating pag-unawa sa kultura at lipunan. Ito ay nagbubukas ng mga pinto ng kaalaman at kaalaman sa mga damdamin at ideya na ipinapahayag ng mga manunulat sa kanilang mga tula. Sa pamamagitan ng pag-unawa sa mga antas ng wika na ginagamit sa spoken word poetry.*

**MGA SUSING SALITA:** *Filipino, Baitang 7, spoken word poetry, panitikan, mga mag-aaral, probinsya ng Davao Oriental*

## INTRODUKSYON

Sa mabilis na pag-unlad ng panahon higit na nagiging dinamiko ang wika lalo itong nakiaangkop sa makabagong panahon. Bunga nito, nahihirapan ang isang akademikong komunidad lalo na ang mga mag-aaral na mailapat ang angkop na paggamit ng antas ng wika sa larangan ng komunikasyon. Sa kabila ng pagiging malikhain ng mga Pilipino sa paghabi ng mga tula, nagiging suliranin sa mga mag-aaral ang pagsulat ng kulturang popular ang spoken word poetry kung kung anong angkop n antas ng wika ang gagamitin upang higit na lilitaw ang kasiningan ng kanilang ginawang panambitang panulaan.

Sa kasalukuyang panahon, ang paggamit ng iba't ibang antas ng wika sa pagsulat ng spoken word poetry ay nagpapakita ng malawakang hamon sa mga estudyante sa iba't ibang bahagi ng mundo. Ayon sa isang pag-aaral sa Estados Unidos, ang mga mag-aaral ay nahihirapan sa pagtukoy kung aling antas ng wika ang angkop gamitin sa kanilang mga tula, na nagreresulta sa mga gawang kulang sa pagiging epektibo at pagtugon sa inaasahang emosyonal na epekto (Santos, 2020). Sa United Kingdom, isang pagsusuri ang nagbigay-diin sa kahalagahan ng pagsasanay sa mga estudyante sa paggamit ng formal at informal na wika upang mapabuti ang kalidad ng kanilang spoken word poetry, lalo na sa aspektong pangkultura at panlipunan. Sa Australia, napag-alaman na ang kawalan ng malinaw na gabay sa paggamit ng antas ng wika ay nagdudulot ng pagkalito sa mga mag-aaral, na siyang nakakaapekto sa kanilang kakayahang magpahayag ng kanilang mga ideya at damdamin sa masining na paraan (Reyes & Lim, 2019).



Sa Tarlac, Pilipinas, natuklasan ang tila paglayo ang mga estudyanteng Pilipino mula sa mga pormal na pamantayan sa akademikong pagsusulat. Mas pinipili ng mga estudyanteng Pilipino ang isang impormal na estilo kumpara sa pormal na estilong hinihingi ng mga alituntunin ng akademikong pagsulat (Gustilo et al., 2018). Gayundin, natuklasan ang isang nakababahalang kalakaran tungkol sa labis na paggamit ng iba't ibang antas ng pormalidad sa wika ng mga estudyante. Nagdudulot ito ng higit na kalituhan at unti-unting pagkawala ng kakanyahan sa paggamit ng pormalidad ng wika lalo na sa paghabi ng tula (Mendoza, 2023).

Bilang guro sa ikapitong baitang sa isa sa mga pampublikong paaralang sekondarya ng Sangay ng Davao Oriental kapansin-pansin ang pagkakamali ng mga mag-aaral sa pormalidad ng pagkakagamit ng wika sa mga isinulat na mga akdang pampanitikan lalong-lalo ang panambitang panulaan. Mababanaag ang hayagang paggamit nila ng magkaibang antas ng wika na nahihirapang maiangkop sa kanilang sariling katha. Bunga nito, nakahanda rin ang mananaliksik na ipresenta ang pag-aaral na ito sa mga gagawing palihan sa Filipino maging sa paglathala sa nito sa mga publikasyon. Sa huli, ang pagsasakatuparan ng pag-aaral na ito ay malaking tulong upang ang suliranin sa paggamit ng angkop na antas ng wika ay malinang sa mga mag-aaral. Magiging tugon din ito sa lumalalang suliranin sa *learning gap*, *learning loss* dulot ng pandemya.

Gayunpaman, may mga pag-aaral na ginawa na may kaugnayan sa paksa katulad ng pag-aaral ni Akhtar at Riaz (2019) na Isang Kwalitatibong Pagsisiyasat sa Pormalidad sa Akademikong Pagsulat ng mga Mag-Aaral sa Pamamagitan ng Pagsisiyasat sa Kanilang Stylistic Competence. Gayundin ang pag-aaral ni Larsson at Kaatari (2019) na Pag-iimbestiga sa Pagiging Komplikado ng Syntactic sa Pagsulat ng mga Mag-aaral sa Pamamagitan ng Pagsubok sa iba't ibang mga Hakbang sa mga Antas ng Pormalidad. Dagdag dito, ang pag-aaral nina Amina at Amira (2019) na Pag-iimbestiga sa Kamalayan ng mga Mag-aaral sa mga Pinakaraniwang Katangian ng Gramatika at Leksikal ng Pormalidad sa Pagsulat ng mga Akademikong Sanaysay subalit ang lahat ng mga pag-aaral ay nakatuon lamang sa pormalidad ng paggamit ng wika sa sinuri sa kanilang mga sinulat na sanaysay taliwas sa pag-aaral an ito na nakatuon sa antas ng wikang ginamit sa mga isinulat *spoken word poetry*.

Ang pag-aaral na ito ay may malaking kabuluhan sa konteksto ng edukasyon at kultura sa Pilipinas. Sa pamamagitan ng pag-unawa sa antas ng wika na ginagamit ng mga mag-aaral, masisilayan natin kung paano nila ipinahayag ang kanilang mga damdamin, ideya, at karanasan sa isang malikhaing paraan. Bukod dito, ang pag-aaral na ito ay makatutulong sa mga guro at tagapagtaguyod ng wika na higit na maunawaan ang dinamikong kalakaran ng wika sa kabataan, na siyang maaaring maging gabay sa paghubog ng mas epektibong mga estratehiya sa pagtuturo ng literatura at pagpapaunlad ng kritikal na pag-iisip sa mga estudyante. Sa huli, ang pag-aaral na ito ay isang mahalagang kontribusyon sa patuloy na pagsulong ng wika at sining sa Pilipinas, lalo na sa larangan ng makabagong pamamaraan ng pagpapahayag tulad ng *spoken word poetry*.

### **Mga Layunin ng Pag-aaral**

Layunin ng kwalitatibong pag-aaral na ito na makagawa ng isang diskursong pag-aanalisa sa antas ng wika na ginagamit ng mga piling mag-aaral sa pagsulat ng kanilang *spoken word poetry*. Isasagawa ang pag-aaral na ito sa piling paaralan ng Sangay ng Davao Oriental na nakatuon sa ikapitong baitang.

Ang pag-aaral na ito ay nakatuon sa penomenong may kinalaman sa diskursong pag-aanalisa sa antas ng wika na ginagamit ng mga piling mag-aaral sa pagsulat ng kanilang *spoken word poetry*. Ito ay nangangahulugan na ang mga orihinal na akda ng mga mag-aaral ay mabibigyan ng pagkakataon na maintindihan at mabigyan ng interpretasyon. Masusuri din ang estruktura ng kanilang mga akda partikular na sa antas ng wika na kanilang ginagamit. Bilang karagdagan, layunin nito na matukoy ang antas ng wika na ginamit nila sa kanilang pagsulat ng *spoken word poetry* at mapag-alaman kung paano nakaaapekto ang kaalaman sa paggamit ng iba't ibang antas ng wika sa pagbuo ng kaisipan o kahulugan ng kanilang tulang isinulat bilang isang uri ng panitikan.

### **Mga Katanungan sa Pananaliksik**

1. Anong antas ng wika ang nangigibabaw sa mga isinulat na *spoken word poetry* ng mga piling mag-aaral?
2. Ano ang kapakinabangang hatid sa paggamit ng antas ng wika sa pagbuo ng mensahe sa mga isinulat na *spoken word poetry* ng mga mag-aaral?

### **METODOLOHIYA**

Sa pag-aaral na ito, ang pangunahing layunin ng mananaliksik ay gamitin ang isang kwalitatibong disenyo sa pananaliksik na nakatuon sa pag-aanalisa ng diskurso. Ang metodolohiyang ginamit ay tinatawag na Diskursong Pagsusuri (DA), na tumutukoy sa pagsusuri ng mga kahulugan na nabubuo sa pamamagitan ng wika at komunikasyon, kasama ang mga konteksto at proseso nito. Hindi kinakailangan ang mga partisipante sa pag-aaral na ito, sapagkat nakatuon ito sa pagsusuri ng mga teksto o materyal na kaugnay sa pag-aaral ng antas ng



wika sa mga orihinal na spoken word poetry ng mga mag-aaral mula sa Baitang 7. Ang mga piyesa ng spoken word poetry ay sapat na bilang 30 ayon sa rekomendasyon ni Hyland at Jiang (2017).

Ang mga kriterya para sa pagpili ng spoken word poetry ay dapat na orihinal na isinulat ng mga mag-aaral sa Baitang 7, naisumite bilang isa sa mga gawain ng Baitang 7 ayon sa kasanayang pampagkatuto ng DepEd, at hindi bababa sa limang talata. Ang mga pangalan ng may-akdang mag-aaral ay hindi ibubunyag bilang pagrespeto sa kanilang privasiya.

Matapos ang pagkalap ng datos, isinagawa ang maingat at sistematisadong pagsusuri sa mga spoken word poetry gamit ang balangkas mula kay Masauding (2020). Ipinapakita ng prosesong ito ang kahusayan sa metodolohikal na pag-aaral at nag-ambag sa pag-unawa sa kultura at lipunan na ipinapahayag sa pamamagitan ng spoken word poetry.

## MGA RESULTA

### Mga Antas ng Wika na Ginamit sa mga Piling *Spoken Word Poetry*

Ang mga Talahanayan 1 ay naglalahad ng iba't ibang tema batay sa antas ng wika na kinabibilangan ng mga saknong ng isinuring akda at sinasaad din ang pangunahing ideya ng mga nakalap na bahagi ng tula ayon sa uri nito. Naging batayan sa pagsusuri ng mananaliksik ang linggwistikang balangkas ni Masauding (2020) na kung saan hinati ang antas ng wika sa impormal na kinapapalooban ng balbal, kolokyal at lalawiganin. Samantala, ang pambansa at pampanitikan naman ay napablang sa pormal na wika. Hindi na isinali ang impormal na antas na lalawiganin dahil lahat ng akda ay hindi gumamit o walang makitang lalawiganin na antas. Ang mga tema ayon sa antas ng wika na natagpuan sa mga piling akda ay ang sumusunod: impormal na wika – balbal, kolokyal, at pormal ay ang pambansa at pampanitikan.

Sa balbal na uri ng impormal na wika, may labing-isang akda na gumamit ng mga salitang balbal. Ang mga ito ay makikita sa iba't ibang saknong. Ilan sa mga salitang balbal na ginamit ay *hay*, *oops teka*, *tayka*, *jowa*, *Coca-cola*, *tinapa*, *sana all*, *hayst*, *ex*, *ILY*, *teka*, *da best*, *okey*, *crush* at iba pa.

### Talahanayan 1a

Impormal na Antas ng Wikang Balbal na Nangingibabaw sa mga Isinulat na *Spoken Word Poetry* ng mga Piling Mag-Aaral

Antas ng Wika	Saknong na Kinapapalooban ng Balbal na Antas ng Wika	Pagsusuri
Impormal na Wika – Balbal	<i>Hay, san ba ako magsisimula sa paggawa nitong tula? (T2S1)</i>	Ang katagang <i>Hay</i> ay maituturing na isang impormal na salita na nasa antas ng wikang balbal dahil ito ay isang impit na buntung-hininga na nagpapakita ng pagkadismaya o pagkabahala. Hindi ito maaaring gamitin sa mga aakdemikong sulatin ay ito ay nagagamit lamang sa impormal na paglalahad.
	<i>Oops teka dumilim ang kalangitan nang bigla-biglaan (T2S6)</i>	Mapapansin sa taludtod na ito ang paggamit ng impormal na wikang balbal na <i>teka</i> bilang pamalit sa salitang pormal na sandali lang. Ang <i>teka</i> ay kadalasang maririnig sa usapan ng magkaibigan o sa mga pormal na usapan.
	<i>Pero teka teka..ka gwapohan lang ba ang ating pag-uusapan? (T21S5)</i>	Ipinapakita sa taludtod na ito ang paggamit ng impormal na mga salitang <i>teka teka</i> ay isang pag-uulit na nagpapalakas ng ideya ng paghinto o pagmuni-muni. Napapabilang ito sa balbal na antas ng wika ay ginamit lamang ito sa impormal na usapan at naging pamalit lamang sa pormal na salitang sandali lang.
	<i>Pero tayka bago tayo magsisimula ibabahagi ko muna ang aking pangalan (T3S1)</i>	Ang salitang <i>tayka</i> ay maituturing na balbal na na antas ng wika na nagiging pamalit sa salitang impormal pa rin na balbal na <i>teka</i> . Ginamit ito sa mga impormal na usapan gayundin sa mga impormal na talakayan.
	<i>Dahil minsan tayo ay nagpapadala sa mga taong mambobola yung tipong gagawin ka niyang rebound kasi yong jowa niya may mahal na pa lang iba. (T6S5)</i>	Napabilang ang <i>mambobola</i> sa antas ng wikang balbal dahil naging pamalit ito sa salitang pormal na manloloko. Madalas itong nagagamit bilang pagtukoy sa taong magaling magsalita at mangako bagkus hindi niya ito tinutupad.



	<p><i>Jowa sila ba yung taong nagpapasaya sayo o sila yung mananakit sayo. (T18S2)</i></p>	<p>Isang balbal na antas ng wika ang salitang <i>jowa</i> na kung saan naging pamalit ito sa pormal na salitang kasintahan. Gayunpaman ang balbal na salitang ito ay gumamit ng pagpapalit ng pantig napamamaraan sa pagbuo ng balbal na salita na pinalitan ng pantig ang /asa/ ng /jo/ na nagiging <i>jowa</i> na bilang impormal na saltang katawagan sa isang kinakasama.</p>
	<p><i>Katawang Coca-cola pero mukhang tinapa (T6S7)</i></p>	<p>Gayundin ang salitang <i>Cola-cola</i> ay salitang balbal na ginamit na pamalit sa salitang pormal na may magandang hugis ng katawan. Katulad ng pampalamig na <i>Coca-cola</i> na may pakurbang hugis ito na inihalintulad sa katawan ng isang babae</p>
	<p><i>Hayst lagi kitang minamasdan umaasang ako'y iyong tingnan (T12S2)</i></p>	<p>Nagiging baryant ng <i>hay</i> ng <i>hayst</i> na higit pang pinasisidhi ang nauna na kung saan parehong napabilang sa antas na wikag balbal. Ito aay mga sambitla na hindi makikita sa konteksto ng pormal na wika. Isa itong pabuntung-hininga ng pagkadismaya.</p>
	<p><i>Dahil nakilala kita at minahal ko sana ng sobra kaya sana maging masaya sa makalawang minamahal ko at dito nagtatapos ang paalala ko sayo Ex!Ily (T14S4)</i></p>	<p>Isang laganap ang paggamit ng ingklitik na <i>EX</i> bilang katawagan at pamalit sa salitang hindi na kayo. Gayundin kabaligtaran ito ng tsek na ibig sabihin hindi tama. Kaya kailangang palitan, kalimutan at itama. Samantalang ang <i>ILY</i> ay ang pagpapaikli ng salitang hiram na <i>I LOVE YOU</i></p>
	<p><i>Crush kapag ikay aking nakikita para akong lumilipad sa ulap (T30S1)</i></p>	<p>Ang salitang <i>Crush</i> ay isang universal na salitang balbal na higit na nauunawaan ng karamihan na ginamit bilang pamalit sa salitang pormal na hinahangaan. Gayunpaman ang balbal na salitang ito ay nagkaroon pa nang malalim na konotasyon na maliban sa hinahangaan kay may pagkagusto sa isang tao.</p>
	<p><i>At siya ang nagchaga sa akin at siya ang da best para sa akin. (T26S2)</i></p>	<p><i>Nagchaga</i> (mula sa <i>tiyaga</i> o <i>effort</i>) at <i>da best</i> ay mga halimbawa ng salitang balbal na ginagamit para ipahayag ang pagpapahalaga at pasasalamat sa isang tao dahil sa kanilang pagsisikap at pagiging mahalaga. Nagiging impormal at napabilang ito sa balbal na antas ng wika dahil walang ingklitik na /da/sa Filipino gayundin pinaghalo ito sa salitang Ingles na <i>best</i>.</p>

**Talahanayan 1b**

Impormal na Antas ng Wikang Kolokyal na Nangingibabaw sa mga Isinulat na *Spoken Word Poetry* ng mga Piling Mag-Aaral

Antas ng Wika	Saknong na Kinapapalooban ng Antas ng Wika	Pagsusuri
	<p><i>Isa, dalawa, tatlo, ako'y nandito Apat, lima, anim, pito, ako'y nalilito Ako'y naging dramatik. (T1S1)</i></p>	<p>Ang paggamit ng <i>ako'y</i> bilang pamalit sa pormal na salitang <i>ako</i> ay kadalasan mangyayari sa mga akdang pamapanitikan lalo na sa tula. Ang pagpapaikli na ito ay hindi tinatanggap sa mga akademikong sulatin ang pagpapaikli na salitang ito ay impormal at napabilang sa kolokyal.</p>
	<p><i>Ang sarap balik-balikan nung tayo'y munting musmus pa lamang magsaya't sumigaw, isigaw na magbalik ang ating araw. (T2S9)</i></p>	<p>Ang pagpapaikli sa panghalip <i>tayo</i> at paggamit ng pandiwang pangawing na <i>ay</i> na dapat ang pahayag sa pormal ay <i>tayo</i> subalit pinaikli ito ng <i>tayo'y</i> na kung saan nangyayari ang impormal na paggamit ng wika at ito ay tinatawag nating kolokyal.</p>
		<p><i>Yong</i> ay impormal na wika mula sa pormal na pinaikling anyo ng <i>iyong</i> gayundin ang mga <i>'di</i> ay ang pagpapaikli ng mga salitang hindi. Ang nabuong kataga sa ginawang pagpapaikli</p>



<b>Impormal na Wika – Kolokyal</b>	<i>Hi ex ako nga pala 'yong sinalo mo at siya binitawan sa huli Sana 'di na lang kita nakilala sana 'di na lang kita minahal. (T5S1)</i>	ay hindi maituturing na pormal na kataga at ito ay ay impormal at napabilang sa kolokyal.
	<i>Iyan din ang mga araw na pinagsisihan ko, umalis ka iniwan mo 'ko na may galit sa'yo Noon pa galit na ako sa'yo.(T8S4)</i>	Mapapansin sa taludtod na ito ang paggamit ng sa'yo na kung saan pinapaikli nito ang panghalip na sa inyo. Ginamit ito upang higit na mapadali ang paglalahad gayundin ang nababawasan nito ang bilang ng pantig sa bawat taludtod na kung saan ang pagpapaikling ito ay impormal at ito ay isang kolokyal.
	<i>Unan ang aking matalik na kaibigan sa ligaya't kalungkutan Saksi ang unan kung ga'no kasakit ang aking nararamdaman. (T11S1)</i>	Ang ligaya't ay pinaikling anyo ng pormal na wika na ligaya at, ga'no ay pinaikling anyo ng gaano, na parehong nagiging impormal na wika dahil sa ginawang pagpapaikli at ang pagpapaikling ito ay tinatawag na kolokyal.
	<i>Ako ay 'andito na naman nakamasid sa kalawakan, umaasang ako ay iyong pagmasdan Ngunit hindi kita kayang mahawakan at mahagkan, nais ko sanang ika'y angkinin (T12S1)</i>	Makikitaan din ng paggamit na impormal na wikang kolokyal ang taludtod na ito dahil sa pagpapaikli ng mga panghalip na nandito at ikaw ay na na ginawang 'andito at ika'y na ang isang impormal na wikang kolokyal.
	<i>Pagmamahal sa kapwa ko ang lagi kung dala't dinadama sa bawat ngiti at yakap sa bawat tulong na aking naibigay (T22S1)</i>	Sa taludtod lumitaw ang paggamit ng salitang dala't na mula sa salitang pormal na dala at. Ang pagpapaikling ito ay hindi natatanggap sa akademikong sulatin kaya ang paggamit nito ay maituturing na impormal at nasa categoryang kolokyal dahil may ginawang pagpapaikli.
	<i>Kahit sa panaginip man lang o 'di kaya'y makausap ay masaya na rin ako. Hangang dito na lang ako paalam sa'yo na sana'y masaya kayo sa isa't isa (T30S4)</i>	Mapapansin sa saknong na ito ang paggamit ng apat na impormal na salitang kolokyal una ang 'di na katumbas sa pormal na hindi; pangalawa ang kaya'y na sa halip na kaya ay; sa'yo na sa halip sa pormal ay sa inyo at ang huli ang sana'y na sa pambansa ay sana ay. Gayundin naging madalas ang pagpapaikli na ito dahil sa bilang ng pantig kaya pinaikli ng mga mag-aaral na nagdulot sa paggamit ng kolokyal.

**Talahanayan 1c**

Pormal na Antas ng Wikang Pambansa na Nangingibabaw sa mga Isinulat na Spoken Word Poetry ng mga Piling Mag-Aaral

Antas ng Wika	Saknong na Kinapapalooban ng Antas ng Wika	Pagsusuri
	<i>Hinihiling na sa pagdilal ng mga mata ay makita ang masayang mga mukha, tawanan na kay sarap pakinggan sa ilalim ng asul na kalangitan, na kung saan lumilipad sa kanilang Kalayaan. (T1S7)</i>	Sa pahayag na ito, ang pormal na wika ay ginamit upang na kung saan hindi naman naglalahad ng paggamit ng matalinghagang salita kaya maituturing lang itong pambansa o isang istandard na paggamit ng pormal na wika.
	<i>Maglaro tayo ng habulan at patintero umakyat sa puno at yero basta ang mahuli talo. (T2S4)</i>	Bagaman ang aktibidad na inilarawan ay kaswal, ang paraan ng pagpapahayag gamit ang pormal na wika manapa ay hindi ito gumamit ng mga malalalim na paglalarawan o hindi literal na pagpapakahulugan ng mga salita kaya napabilang lamang ito sa pambansa.
	<i>Natulog ako na ikaw ang kasama, pero paggising ko iba na pala ang iyong</i>	Ang saknong ay nagpapakita ng tayutay na pangitain subalit mababakas pa rin ang ang konteksto sa paggamit ng pormal na



<b>Pormal na Wika - Pambansa</b>	<i>sinisinta, akala ko ako pa pero siya na pala. (T6S3)</i>	wika na hindi kailangang gamitan ng imahe para maunawaan ang taludtod kaya maikategorya itong pambansa.
	<i>Lumalabas sa utak ko na <b>para lang tayong baliw</b>, sayang ang ating ginawa, na tayo rin ang nagwasak, pira-piraso nating ginawa pira-piraso din nating sinira. (T18S4)</i>	Mapapansin ang paggamit ng pormal na wika rito ay naglalarawan ng pagsisipi at pag-amin sa pagkawasak ng isang relasyon. Gayundin madaling naunawaan ang taludtod dahil gumamit lamang ito ng mga payak subalit pormal na salita ito ay pambansa.
	<i>Ang <b>pag-ibig sa kapwa ko ay walang hangganan</b> ito ay patuloy na nagbibigay ng lakas at pag-asa at sa bawat araw ng aking nilalakbay may pagmamahal sa kapwa ko ang lagi kung dala at dinadama. (T22S4)</i>	Sa pahayag na ito, ang pormal na wika ay ginamit upang ipahayag ang isang walang pag-iimbot na pagmamahal. Sa paglalarawan sa kapangyarihan hatid ng pag-ibig ay mga karaniwang paglalarawan ang ginamit na subalit pormal ng ito ay maituturing na pamabansa na paggamit ng wika.
	<i>Ang mahal kong ina siya ang <b>unang inspirasyon</b> ko sa aking buhay wala nang iba. (T25S1)</i>	Sa inilalahad sa taludtod bilang paglalarawan sa isang ina ay gumamit lamang ng mga karaniwang paglalarawan at payak na paggamit ng wika. Taglay man nito ang katangian ng isang isang tula kahit hindi malalalim na salita ang ginamit at ito ay pambansa.
	<i><b>Abot-kamay</b> nila ang bunga pagsisikap dahil marami siyang naging katuwang. (T27S1)</i>	Ginamit sa taludtod ang pormal na paglalahad na at payak na paglalarawan. Maituturing itong pambansa dahil naging karaniwan lamang ang ginawang paglalarawan kaya madali lang itong naunawan.

**Talananayan 1d**

Pormal na Antas ng Wikang Pampanitikan na Nangingibabaw sa mga Isinulat na *Spoken Word Poetry* ng mga Piling Mag-Aaral

Antas ng Wika	Saknong na Kinapapalooban ng Antas ng Wika	Pagsusuri
<b>Pormal na Wika-Pampanitikan</b>	<i>Subukan ninyong <b>bumaba sa kalupaan at iwanan ang kalangitan</b> upang makita sa inyong mga mata ang mga taong walang kamuwang-muwang. (T1S5)</i>	Makikita sa taludtod na ito paggamit ng mga matatalinghagang salita na ginamit ang mga salitang kalangitan at kalupaan sa paglalarawan na pagwawangis. Ginamit sa akda ang mga salitang ito na may mataas na antas ng wika na tinatawag na pampanitikan.
	<i><b>Oras ay tumatakbo</b> at alaala ay naglalaho, utak ay nagbabago ngunit ang pagibig ng taong totoong nagmamahal sayo ay hinding hindi magbabago. (T7S11)</i>	Ang pahayag ay gumamit ng tayutay na pagsasatao na kung saan upang higit mailarawan niya ang alaalang naglalaho gumamit ito ng masining na paglalahad. Naging mataas ang antas ng wikang ginamit na napabilang ito sa pampanitikan.
	<i>Dito sa puso ko ikaw ang ilaw kong mahal, isang <b>ilaw ng tahanan</b>, wala ka man ngayon pero mananatiling nakatatak, nakaguhit sa kalangitan ang isang ilaw ng tahanan. (T8S9)</i>	Sa paggamit ng pormal na wika, na nagtataglay ng simbolismo ay maituturing na sa mataas na antas na pampanitikan na gamit ng wika. Ang ilaw ng tahanan na isang simbolismo na mula sa salitang pambansa na ina.
	<i>Ngunit sinta, huwag kang mag-alinlangan dahil <b>kagaya ng kalawakan</b> ikaw ay aking hinahangaan, Nais kong maging bituin upang magpasikat sa iyo, mabigay ang kinang na mas lalong nagpapaganda sa iyo. (T12S3)</i>	Mapapansin sa taludtod ang ang mag-aaral ay gumamit ng pagtutulad na uri ng tayutay upang mailarawan ang kanyang minamahal. Malinaw na ang paggamit ng masining na paglalahad o tayutay ay isang pangangailangan ng isang tula at ang antas ng wikang ito ay pampanitikan.



	<p><i>Umaasa ako na kanyang pakinggan tulad ng buwan ang sarap mong pagmasdan, Ikaw ang aking ilaw kapag naliligaw ako sa madilim na kagubatan. (T19S1)</i></p>	<p>Makikita sa taludtod ang ang mag-aaral ay gumamit ng pagtutulad na uri ng tayutay upang mailarawan ang kanyang minamahal sa isang buwan. Malinaw na ang paggamit ng masining na paglalahad o tayutay ay isang pangangailangan ng isang tula at ang antas ng wikang ito ay pampanitikan</p>
	<p><i>Sinubukan kung maglaro ng ulan kung saan umaasang kaya nitong hugasan ang aking kalungkutan, at sakit na aking nararamdaman. (T20S6)</i></p>	<p>Ang pormal na wika sa pahayag na ito ay nagpapahiwatig ng paggamit ng mataas na antas ng wika na maituturing na pampanitikan. Isang patayutay na paglalahad ang ginawa na kung saan kinapapalooban ito ng simbolismo.</p>
	<p><i>Nang makita kita muli ay agad na huminto ang aking mundo. Gwapo, isang salita limang letra ngunit sa iisang tao ko lamang nakikita. (T21S3)</i></p>	<p>Gumamit ng pormal na wika ang taludtod subalit nasa mataas ito na antas ng wika. Gumamit ito ng pagsasatao na uri ng tayutay. Isa itong mapaparaan upang higit na maging masining ang paglalahad.</p>
	<p><i>Siguro para ka nga talagang bituin ang lapit mong tingnan pero ang layo mong abutin. (T24S4)</i></p>	<p>Sa taludtod na ito mapapansin ang paggamit ng tayutay na pagtutulad na kung saan inihahambing sa isang bituin ang taong kanyang hinahangaan. Naging masining ang ginawang paglalahad na isang pangangailangan sa isang tula. Ito ay nasa mataas na antas na wika na maituturing na pampanitikan.</p>
	<p><i>Walang oras o araw na gusto kong makita ang gwapo niyang mukha, makita ang labi niyang mapupula matang kumikislap na parang bituin na simbolo ng aking damdamin. (T30S1)</i></p>	<p>Sa pahayag na ito, ang pormal na wika ay ginamit na nasa mataas na antas. Gumamit ito ng tayutay na pagtutulad upang ilarawan ang isang masidhing paghanga at pag-ibig. Kaya malinaw na ang paggamit ng wika sa taludtod na ito ay nasa antas na pampanitikan.</p>

**Talahanayan 2**

**Kapakinabangang Hatid sa Paggamit ng iba't ibang Antas ng Wika sa Pagbuo ng Mensahe ng mga Isinulat na Spoken Word Poetry**

<p><b>Pakinabang na Hatid sa Pagbuo ng Mensahe Gamit ang Antas ng Wika</b></p>	<p><b>Mga Taludtod at Sagnong mula sa mga Piling Akda</b></p>	<p><b>Pagsusuri</b></p>
	<p><i>Tanaw ko ang bawat paglubog ng araw na kasabay ding pumatak ang aking mga luha, naitanong sa sarili pa'no ba malimutan ang lumbay na naramdaman (T18S5)</i></p>	<p>Inilahad sa sagnong ang kalumbayang nadarama ng persona sa tula. Higit na napapalitaw ang damdaming kanyang naramdaman dahil sa paggamit sa paggamit ng mga pandiwang paglubog ng araw at pagpatak ng luha upang mapalutang ang lungkot na naramdaman. Gayundin ang paggamit ng antas na wikang kolokyal na pa'no na nabibigyan-diin nito ang lungkot at kalumbayan.</p>
	<p><i>Sinubukan kung maglaro sa ulan kung saan umaasang kaya nitong hugasan ang aking kalungkutan, at sakit na aking nararamdaman (T20S6)</i></p>	<p>Higit na lumulutang ang ang damdaming naghihinagpis sa persona ng tula sa paggamit nito ng tayutay at pandiwa. Ginamit niya dito ang pahayag na maglaro sa ulan upang mahugasan ang kanyang kalungkutan na nagpapalitaw sa damdamin ng persona. Gayundin sa paggamit ng antas ng wikang pampanitikan nailalarawan nang husto ang damdaming nais ipahayag.</p>





Nakapagpapahayag ng Damdamin	<p><i>Ang pag-ibig sa kapwa ko ay walang hangganan ito ay patuloy na nagbibigay ng lakas at pag-asa at sa bawat araw ng aking nilalakbay may pagmamahal sa kapwa ko ang lagi kung dala at dinadama (T22S4)</i></p>	<p>Nailantad ng persona ang kanyang nararamdamang damdamin dahil sa maayos na pagkakagamit ng pang-uri sa huling taludtod na walang hangganan. Sa taludtod na sa bawat araw nilakbay na kung saan gumamit na man ng pandiwa upang malutang ang damdamin ng persona ng tula. Gayundin angg paggamit ng pambansang antas ng wika upang higit niyang mailahad ang kanyang damdamin.</p>
	<p><i>'Di maalis sa isipan ang araw na lumisan ka, Ang araw na 'yon na nagmarka sa puso; Hanggang ngayon 'di ma wala-wala ang poot na aking nadarama. (T8S4)</i></p>	<p>Tuwirang naipapahayag ang damdaming nangingibabaw sa saknong sa paggamit ng ng mga ng parehong pandiwa at pang-uri sa mga taludtod. Maging sa paggamit ng kolokyal na antas ng wika. Sa pahayag na 'di maalis at 'di mawala-wala na isang kolokyal ay higit at pandiwa na nakatutulong sa paglalahad sa poot na damdaming naranasan ng persona.</p>
	<p><i>Na nandyan lagi sila. Na ipinapadama sa'yo na ika'y mahalaga. Na para bang hindi nila kaya pag ika'y nawala kaya ako'y nagpapasalamat sa aking pamilya (T17S4)</i></p>	<p>Lumilitaw sa saknong ang kaligayang nadarama sa persona ng tula. Madaling itong napapalutang dahil sa paggamit ng mga kolokyal na salita maging sa paggamit ng pang-uri upang higit na mailarawan ang damdaming nadarama. Sa paggamit ng ika'y mahalaga, ika'y nawala at ako'y nagpapasalamat higit na nabibigyang-diin ang damdaming nagpapasalamat.</p>
	<p><i>Pagmamahal sa kapwa ko ang lagi kung dala't dinadama sa bawat ngiti't yakap sa bawat tulong na aking naibigay katumbas nito ang pagkawala ng aking lumbay (T22S1)</i></p>	<p>Bakas sa saknong ang paggamit ng pahayag na dala't dinadama; ngiti't yakap na kung saan ito ay mga na mga kolokyal sa pinagsamang pandiwa at pang-uri. Higit itong nakatutulong upang tuwirang mapalitan ang damdaming nais ipahayag sa saknong na siya ay nasasaktan na ito ay nawawala dahil sa pagpapaabot nito ng tulong.</p>
	<p><i>Hinahangaan kita 'di mo lang alam. Subalit lubos akong nasasaktan dahil damdamin ko'y 'di mo napansin ang masaklap ang pagtingin mo sa iba'y ibinaling ika'y nagkagusto sa aking kaibigan 'di ko akalain (T15S3).</i></p>	<p>Hayagan ang damdaming nasasaktan na naramdaman ng persona sa tula sa paggamit nit ng mga mga pahayag na 'di mo...sa iba'y ibinaling at 'di ko akalain na kung saan gumamit ito ng kolokyal na antas ng wika. Gayundin sa paggamit ng angkop na panggamit ng mga pandiawa sa paglalarawan ng damdamin sa saknong na madali nitong naipapahayag ang damdaming nasasaktan.</p>
	<p><i>Kahit sa panaginip man lang o hindi kaya ay makausap ay masaya na rin ako. Nang mapawi ang damdaming nagsusumamo. Subalit ang pamamaalam ay bibitawan nang mawakasan ang damdaming nasasaktan Hanggang dito na lang ako paalam sana masaya ka. (T30S3)</i></p>	<p>Sa taludtod na damdaming nagsusumamo at damdaming nasasaktan ay naging hayagan napapalitan. Maging ang damdamin sa persona ng tula nailalarawan nang husto dahil sa paggamit ng mga pang-bay sa saknong na ito dahil na rin sa paggamit ng pormalidad na wika ang antas ng wikang pambansa. Gayundin maging sa huling taludtod na sa kabila ng pagtanggap bakas ang damdaming naghihinagpis.</p>
	<p><i>Animo isa kang bula, na bigla na lang nawala. Sa pagpupuyos ng</i></p>	<p>Masusuri sa saknong na ito ang damdaming napopoot ng persona sa tula. Nailatag niya ito sa pamamagitan ng paggamit ng mga angkop na pandiwa. Higit na naihayag</p>



	<p><i>aking damdamin patuloy kang hindi nagpakita. Kaya hindi moa ko masisi sa aking pagdaramdam at ikaw ay aking sumbatan (T30S5).</i></p>	<p>ang kanyang galit sa mga taludtod dahil sa paggamit ni ng antas ng Wikang Pambansa bagkus pormal ang pagkalalahad subalit nabibigyan pa rin nito ng aliw-iw ng saknong.</p>
	<p><i>Akala ko nang palayain kita, maging okey na. Subalit lubos akong nasasaktan nang malaman sa beshy ko iba ikaw ay nakipagsuyuan ( T10S2)</i></p>	<p>Higit na napapalutang ang damdaming nasasaktan sa saknong dahil sa paggamit ng angkop na mga pandiwa maging sa antas na wikang balbal na ginamit. Sa taludtod na okey na at malaman sa beshy at mga salitang slang na higit ginamit upang higit na mailarawan ang nasasaktan na persona sa tula.</p>
	<p><i>Crush kapag ikay aking nakikita para akong lumilipad sa ulap. Hindi ko mailarawan ang sobrang saya. Para isang brainda na hindi ko mapigilang pagtawa. Ang saya-saya ng aking nadarama(T30S1)</i></p>	<p>Naging makatotohanan ang pagpapalutang ng persona sa tuwang kanyang naranasan dahil sa paggamit nito ng mga salitang balbal na crush at brainda (brain damage) Gayundin madaling ang pagpapahayag ng damdamin sa saknong dahil naging maayos ang paggamit ng mga pandiwa na itinatambal sa kanyang paglalarawan.</p>
	<p><i>Pa'no na ngayon ang aking pangungulila, Kung kelan keta kelangan saka ka nawawala. Ba't ka bigla na lang nagtampo ngayon sugatan ang puso at damdamin lubusang nagsusumamo(T23S1)</i></p>	<p>Masasalamain sa saknong ang lumulutang na damdamin ng persona sa tula. Gumamit ang saknong ng mga pandiwa na pangungulila, nagtampo at nagsusumano na nakabubuo ng damdaming nasasaktan. Higit itong nabibigyan ng diin dahil sa paggamit nito ng mga salitang kolokyal na pa'no, kelan, kelangan at ba't na naging susi sa paglalahad sa pagpapalitaw ng damdaming nangungulila at nagsusumamo.</p>
<p>Nakapagpapahayag ng Kaisipan</p>	<p><i>Madilim man ngayon ang aking dinadaan, gayundin tinatahak ko ang krus na daan. Kaya ipinikit ko ang aking mga mata ituloy ang paghakbang ( T1S5)</i></p>	<p>Kakikitaan ang saknong ng paggamit ng mga hindi tuwirang pahayag o konsepto tulad ng <i>madilim ang dinaraan at tinatahak ang krus na daan</i> na mga napabilang sa pampanitikan na antas ng wika. Manapay nakatutulong ang mga tayutay na ito upang magkaroon ng kasiningan ang saknong gayundin napapalutang ang kaisipang hindi naging madali ang hinarap niyang hamon ang mga pagsubok.</p>
	<p><i>Naniniwala ako sa kasabihang sa makapal na ulap lilitaw rin ang liwanag. Kaya positbo ako sa muling paglabas ng araw hindi man ngayon subalit maaaring bukas. (T5S2)</i></p>	<p>Lantad sa saknong ang paggamit ng naratibong konotasyon na sa <i>makapal na ulap lilitaw din ang liwanag</i>. Pahayag na napabilang sa pampanitikan antas ng wika. Naging masining ang paglalahad gayundin ang kaisipang nagpapakita ng pag-asa ay higit na napapalitaw.</p>
	<p><i>Basang-basa man ako ngayon; Subalit gayunman hindi kita susukuan. Dahil ang natatangi kong magiging payong na nais mahawakan(T5S3).</i></p>	<p>Ipinapakita sa saknong ang kaisipan nais ihatid ng persona sa tula ang kanyang positibong panliligaw sa kabila ng mga hamon kanyang nararanasan. Sa pamamagitan ng paggamit ng mga pahayag na ulang hindi susukuan at ang payong na nais mahawakan napapalitaw ang pinag-ugnay na kaisipan sa tulong ng mga pormal na salitang ginamit ang pambansa.</p>
	<p><i>Kung ang bulaklak ay nalalanta; Maging ang mga matitigas na bato ay natitibag, Ang puso ko ang kaya ay patuloy na umaasa sa pagsinta? ( T5S5)</i></p>	<p>Pansin sa saknong pagpapalitaw ng kaisipang pagsuko sa persona ng tula. Hindi man ito hayagan subalit sa ginawang paghahambing nito sa bulaklak na nalalanta gayundin ang matitigas na bato na natitibag naging makulay ang paglalahad ng kaisipan sa paggamit na rin ng pormal na wika na sa antas na pambansa.</p>
	<p><i>Kung ang mga damo ay natutuyo; gayundin ang mga halaman na diniligan sa hapon ay naglulunoy;</i></p>	<p>Napapalitaw ng persona ng tula ang kaisipang pagtanggap. Sa pamamagitan ng paglatag nito sa mga konsepto sa damong natutuyo at sa halamang naglulunoy at ang tanging pagluha</p>



	<p><i>Damdamin ko pa kaya na wala ng nagpapahalaga Kaya tanging pagluha na lang ang aking magawa( T5S2)</i></p>	<p>na lamang ang kanyang magawa ay nakapagbibigay ng ideya. Gayundin ang paggamit ng pormal na wikang pambansa ay higit nakatutulong sa paglalahad ng kaisipan.</p>
	<p><i>Dahil minsan tayo ay nagpapadala sa mga taong mambobola yung tipong gagawin ka niyang rebound kasi yong jowa niya may mahal na pa lang iba (T6S5)</i></p>	<p>Bakas sa saknong ang paggamit ng balbal na antas ng wika. Ginamit niya ang salitang mambobola bilang pamalit sa taong mahilig pagpaasa o hindi tumutupad sa pangako. Sa paggamit nito higit na nailalahad ang kaisipan sa saknong.</p>
	<p><i>Sa simula sinasulyapan niya ako, Napayuko at napahiya naman ang prinsesa ninyo. Nakikilig habang nilapitan niya ako, Hanggang inabot ang pulang oras... ako ay napangiti (T8S3)</i></p>	<p>Lubos na napapalitaw ng kaisipang pagtanggap sa pag-ibig. Sa huling taludtod ng saknong na inaabot ang pulang rosas...ako ay napangiti. Higit na naging maayos ang paglalahad ng kaisipan dahil sa paggamit ng mga pormal na wika sa saknong.</p>
<p>Nakapagbibigay ng Simbolismo</p>	<p><i>Siguro para ka nga talagang bituin ang lapit mong tingnan pero ang layo mong abutin (T24S8)</i></p>	<p>Ipinakita sa saknong nag paggamit simbolismo. Ang paghahambing ng persona sa kanyang hinahangaan sa isang bituin na ang madaling makita subalit napakahirap abutin ay naging epekto upang maging masining ang paglalahad. Gayundin sa simbolismong ito nagagamit ang antas na pampanitikan dahil sa paggamit ng tayutay.</p>
	<p><i>Abot-kamay nila ang bunga ng puno dahil balik at ko ang ginawang tuntungan (T27S1)</i></p>	<p>Bakas sa saknong ang pagpapalitaw ng simbolismo. Ginamit nito ang puno at bunga ay ginamit bilang simbolo ng sakripisyo at pagtulong sa iba, na nagpapakita ng kabutihang loob naging di literal ang paglalahad dahil ito ay nasa mataas na antas ng wikang pampanitikan</p>
	<p><i>Tanaw ko ngayon ang bahaghari sa matingkad nitong kulay. Nakaakit-akit lalo na sa akin na isang maralita. Ang pangarap nawa ay aking matamasa ( T3S4)</i></p>	<p>Pansin sa saknong ang paggamit ng salitang bahaghari na kung saan ginamit ng persona bilang simbolo sa kanyang pangarap at pagsisikap. Gayundin sa paggamit ng simbolong ito nabibigyang katangian sa lampas na literal pagpapakahulugan ang kanyang pangaraap. Gayundn sa paggamit ng pormal na wika higit na nalulutang ang simbolismo sa saknong.</p>
	<p><i>Walang oras o araw na gusto kong makita ang gwapo niyang mukha, makita ang labi niyang mapupula matang kumikislap na parang bituin na simbolo ng aking damdamin (T30S1)</i></p>	<p>Lantad sa saknong ang pagpapalitaw ng persona sa pagnanais niyang masinalayan ang kanyang sinisinta. Gayundin gumamit ito ng mga simbolismo upang higit na mailarawan ang taong kanyang irog sa paghahambing nito sa isang kumikislap na bituin kaya gumamit ito ng antas ng wikang pampanitikan.</p>
	<p><i>Relasyong binuo na tulad ng telepono na pag bagong bili, paglalaanan ng oras, hindi</i></p>	<p>Masasalamin sa saknong ang paggamit ng telepono bilang simbolo ng bagong relasyon na puno ng pag-asa at pangako na ito ay aalagaan at hindi basta-basta susukuan, na nagpapahiwatig ng kahalagahan ng pangako. Higit na naging maayos ang paggamit ng simbolismo sa tulong pormal na wika na sa antas pambansa.</p>



	<p><i>pababayaan at hindi iiwan ng basta-basta lang (T4S5)</i></p>	
<p>Nakapagdagdag ng Kagandahan sa Tula</p>	<p><i>Unan ang aking matalik na kaibigan sa ligaya't kalungkutan Saksi ang unan kung ga'no kasakit ang aking nararamdaman (T11S1)</i></p>	<p>Makikita sa saknong ang paggamit ng bagay na unan bilang simbolo sa isang matalik na kaibigan. Naging matagumpay ang pagpapalitaw ng larawang-diwa sa isang kaibigan sa simbolismong ito. Sa pamamagitan ng pagwawangis na tayutay na sa antas pampanitikan nailalahad ng persona ang kanyang damdamin gamit ang simbolismo.</p>
	<p><i>Ang mahal kong ina siya ang unang inspirasyon ko sa aking buhay wala nang iba (T25S1)</i></p>	<p>Makikita sa saknong nag paggamit na pormal na wikang na sa antas ng pambansa. Ang simpleng pagpapahayag na ito ay nagpapakita kagandahan sa tula dahil nailalarawan nito ang damdamin ng pagmamahal at paghanga sa ina.</p>
	<p><i>Pero bakit palagi ka na lang tumatakbo sa isipan ko? 'Yong tipong inutusan ako ng kaldero pero plato yong dinala ko (T6S2)</i></p>	<p>Malinaw na ang saknong ay gumamit ng pormal na wika at nasa antas ito ng wikang pambansa. Ang paggamit ng karaniwan at payak na pagkalarawan ay higit na nakatutulong upang maging maayos at malinaw nag isang tula na nakapagdadagdag sa kagandahan ng isang tula.</p>
	<p><i>'Yung tipong ang saya-saya nila habang magkasama 'Yung tipong pakiramdam nila ay wala silang problemang dinadala 'Yung tipong nasa harapan mo na siya pero naghanap pa rin siya ng iba (T7S5)</i></p>	<p>Ipinakita sa saknong ang kombinasyon ng paggamit ng kolokyal at pampanitikan na antas ng wika na higit na nakapagdagdag ng kagandahan sa tula. Ang paggamit ng 'yung na isang kolokyal sa naging panimula sa bawat taludtod na ginawang aliterasyon o pag-uulit na uri ng tayutay. Higit na napapalitaw nito ang kasiningan ng isang tula sa anapora ginamit bilang pag-uulit sa bawat taludtod.</p>
	<p><i>Ako'y 'andito na naman nakamasid sa kalawakan, umaasang ako'y iyong pagmasdan Ngunit hindi kita kayang mahawakan at mahagkan, nais ko sanang ika'y angkinin (T12S1)</i></p>	<p>Gayundin sa saknong na ito mapapansin ang paggamit ng kolokyal na antas ng wika na upang higit na mabigyang kagandahan ang tula. Higit na napalilitaw ng persona imahe sa paggamit ng 'andito maging ang at ang mga panghalip na ako'y na nalalapatan ng angkop na tugma sa bawat taludtod.</p>
	<p><i>Pangarap ang sandata sa laban, Pangarap na bumuo sa aking katatagan. Pangarap na mag-aahon sa kahirapan .Kaya hindi ko ito bibitawan( T10S4).</i></p>	<p>Ipinakita sa tula ang ang paggamit n tayutay na alitersyon na anapora. Mapapansin ang apat na taludtod ang paulit-ulit na paggamit ng salitang pangarap sa bilang unang salita sa bawat taludtod na higit na nakapagbibigay ng kagandahan sa tula. Gayundin gumamit din na pormal na wikang pambansa ang buong saknong na nakatutulong sa kagandahan ng tula.</p>
<p><i>Nakaiirita ka sa aking paningin, sobra ka kasing nagpapansin, Sa katawang Coca-cola pero mukhang tinapa. Kaya mabuti ng tumahimik ka na. (T6S7)</i></p>	<p>Dama sa saknong ang pagkainis ng persona sa tula. Kaya mapapansin sa saknong ang paggamit ng salitang Coca-cola na isang balbal na salita upang ilahad ang ang di pagkagusto sa kanyang nakikita. Gayundin higit na nakatutulong ang paggamit ng salitang ito upang masining na mailarawan ang hugis ng katawan na nakapagdagdag sa kagandahan sa isang tula.</p>	
	<p><i>Isa, dalawa, tatlo, ako'y nandito Apat, lima, anim, pito, ako'y nalilito</i></p>	<p>Ipinakita sa saknong ang paggamit ng elementong talinghaga sa pamamagitan ng paglapat ng tayutay na lalong nakapagdagdag ng kagandahan sa saknong. Mapapansin din ang paggamit ng magkasusunod na bilang na kung saan may</p>



Nakapagdagdag Kabisaan sa Likha ng	<p><i>Ako'y naging dramatikong (T1S1)</i></p>	<p>aliterasyon na ako'y sa huling taludtod na sa antas ng kolokyal.</p>
	<p><i>Ang sarap balik-balikan nung tayo'y munting musmos pa lamang magsaya't sumigaw, isigaw na magbalik ang ating araw (T2S9)</i></p>	<p>Mapapansin sa saknong ang paggamit ng persona sa pahayag na <i>munting musmos</i>. Isang salita na pamalit sa bata pa. Ginamit ang salitang ito na may kariktan o piniling salita upang higit na mabibigyang kagandahan ang isang tula. Gayundin na antas na pambansa ang mga salitang ginamit sa saknong dahil sa pormalidad ng pagkagagamit nito.</p>
	<p><i>Ayy sandali meron nga bang tayo? Na nagsimula noon sa mahal kita magtatapos sa paalam na at sana'y maging kaibigan pa rin kita. (T4S8)</i></p>	<p>Bakas sa saknong ang paggamit ng elemento ng tula tugma. Maliban pa gumamit ito ng pangitain sa pagtatanong na <i>meron bang tayo?</i> Na gumamit sa paglapat ng kolokyal sa meron. Sinundan din ito ng pagbabalik-tanaw sa sinabi ng persona na <i>noon mahal kita</i> at winakasan ang saknong ng <i>sana'y maging kaibigan kita</i>. Malinaw na pinagsama-sama ang mga elemento ng tula upang higit na magkaroon ng kabisaan ang likhang tula.</p>
	<p><i>Hi ex ako nga pala yong sinalo mo at binitawan sa huli; Ang sinisinta mong iniwan mo sa ere Sana 'di na lang kita nakilala Sana 'di na lang kita minahal (T5S1)</i></p>	<p>Pansin sa nabuong saknong ang pagsasanib ng mga elemento ng tula upang mapalutang ang paghihinayang ng persona. Sa paggamit tugmaan sa una at pangalwang taludtod ay nakapagbibigay ng indayog sa tula. Gayundin ang pangatlo at huling taludtod ay gumamit ng aliterasyon na <i>sana'y</i> na isang kolokyal na higit na nakaakit sa awdiyens.</p>
	<p><i>Oras ay tumatakbo at alaala ay naglalaho, utak ay nagbabago ngunit ang pag-ibig ng taong totoong nagmamahal sayo ay hinding hindi susuko (T7S11)</i></p>	<p>Dama ang emosyon sa persona na lumilitaw sa tula dahil sa mga elementong inilapat sa saknong. Una, ang paggamit ng talinghaga sa tayutay na personipikasyon sa oras ay tumatakbo. Gayundin gumamit ito ng kariktan sa pagpili ng salitang alaala ng naglalaho na pinipili ang mga salita upang makapagbigay nang aliw-iw at indayog. Maliban sa pagkaroon nito ng tugma ay ang paggamit ng antas na wikang pampanitikan ay nakapagbigay ng kabisaan sa likhang tula.</p>
	<p><i>Lumalabas sa utak ko na para lang tayong baliw, sayang ang ating ginawa, na tayo rin ang nagwasak, pira-piraso nating ginawa pira-piraso din nating sinira (T18S4)</i></p>	<p>Bakas sa saknong lumulutang na kabisaan sa likhang tula. Naisakatuparan ito dahil sa paggamit ng magkaibang element. Una, ang pagkagamit niya niya ng talinghaga sa tayutay pagsalungat sa <i>ating ginawa, at winasak</i>. Gayundin ang paggamit ng aliterasyon na anapora bilang panimula sa pangatlo at huling taludtod ng tula. Maliban ang paggamit ng antas na wikang pampanitikan ang higit na nakatutulong sa kabisaan sa likhang tula.</p>
	<p><i>Nang makita kita muli ay agad na huminto ang aking mundo. Gwapo, isang salita limang letra ngunit sa iisang tao ko lamang nakikita (T21S3)</i></p>	<p>Litaw ang kabisaan sa isang likhang tula sa saknong na ito dahil sa paggamit ng magkaibang elemento na nakapupukaw ng emosyon ng awdiyens. Una ang paggamit ng elementong talinghaga sa paggamit ng tayutay na pagmamalabis sa taludtod na <i>huminto ang mundo</i>. Gayundin ang paggamit ng tugma sa bawat taludtod maliban pa, ang paggamit ng salitang balbal na <i>gwapo</i> na ginamit sa pamamaraan pagbilang sa bawat letra ay higit na nakapupukaw sa pag-iisip ng awdiyens.</p>



### **Pangwakas na Pahayag**

Sa pagtatapos ng tesis, natuklasan ng mananaliksik ang kanyang mga personal na karanasan at mga aral mula sa malalim na pag-aaral tungkol sa wika at panitikan, lalo na sa mundo ng spoken word poetry. Ang bawat yugto ng pagsasaliksik ay nagsilbing mahalagang hakbang patungo sa pag-unawa sa iba't ibang dimensyon at epekto ng wika na ginagamit sa ganitong uri ng sining. Ang bawat tula at bawat salitang kanyang napakinggan ay nagbigay-daan upang mas maramdaman ang damdamin at pagnanais ng mga manunulat na ipahayag ang kanilang mga personal na saloobin at karanasan.

### **REKOMENDASYON**

Ang pagsusuri na ito ay nagpapakita ng kahalagahan ng pag-unawa sa antas ng wika na ginagamit ng mga mag-aaral sa spoken word poetry. Mahalaga ang pagtutok ng mga guro sa pagpapahayag ng damdamin at ideya ng mga mag-aaral sa pamamagitan ng wika. Dagdag pa, ang kakayahan ng mga mag-aaral sa paggamit ng simbolismo at pagpapahayag ng damdamin ay nagpapakita ng kanilang kritikal na pag-iisip at pag-unawa sa kultura at tradisyon. Bilang rekomendasyon, mahalaga ang patuloy na paggamit ng mga makabagong pamamaraan sa pagsasaliksik, pagsusuri sa epekto ng spoken word poetry sa lipunan at kultura, at pagsusuri sa iba't ibang estilo at tema nito. Sa ganitong paraan, mas mapalalim pa ang ating kaalaman sa kahalagahan at implikasyon ng spoken word poetry sa ating lipunan at kultura.

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## EVALUATION OF HYDRO ALCOHOLIC EXTRACT OF CLERODENDRUM INFORTUNATUM LEAF FOR ANTI-ASTHMATIC ACTIVITY

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Article DOI: <https://doi.org/10.36713/epra16461>

DOI No: 10.36713/epra16461

### ABSTRACT

The present study is directed towards the hydroalcoholic extract of *Clerodendrum infortunatum* leaf categorized by antiasthmatic plants. Many herbal formulations are available for asthma but scientific validation and standardization is very difficult for this formulations. Phytochemical evaluation of the crude drugs such as ash value, extractive value were carried out and complies the limit given by quality standards of medicinal plants (ICMR). The fingerprint analysis was carried out for the *Clerodendrum infortunatum*, and compared the  $R_f$  values with gallic acid for the confirmation. The prepared hydroalcoholic extract of *Clerodendrum infortunatum* was subjected to determination of physical and chemical evaluations and the results complies as per the standards. The pharmacological findings concluded that the hydroalcoholic extract of *Clerodendrum serratum* could reverse asthmatic condition and reduced the total and differential WBC cell count in BALF, retained protein and MDA level in lung tissue, increased intact mast cells thus preventing its degranulation and mediators release. This Polyherbal hydroalcoholic extract of *Clerodendrum serratum* formulation is could be a promising new therapeutic approach for the treatment of clinical asthma. The stability studies and clinical trials to be carried out in future.

**KEY WORDS:** Hydro alcoholic extract, *clerodendrum infortunatum*, Antiasthmatic activity, Finger print analysis

### INTRODUCTION

The medicinal properties of plant species have made an outstanding contribution in the origin and evolution of many traditional herbal therapies. These traditional knowledge systems have started to disappear with the passage of time due to scarcity of written documents and relatively low income in these traditions [1]. Traditional systems of medicine continue to be widely practised on many accounts. Population rise, inadequate supply of drugs, prohibitive cost of treatments, side effects of several allopathic drugs and development of resistance to currently used drugs for infectious diseases have led to increased emphasis on the use of plant materials as a source of medicines for a wide variety of human ailments. Global estimates indicate that 80% of about 4 billion population cannot afford the products of the Western Pharmaceutical Industry and have to rely upon the use of traditional medicines which are mainly derived from plant material [2]. This fact is well documented in the inventory of medicinal plants, listing over 20,000 species. In spite of the overwhelming influences and our dependence on modern medicine and tremendous advances in synthetic drugs, a large segment of the



world population still likes drugs from plants. In many of the developing countries the use of plant drugs is increasing because modern life saving drugs are beyond the reach of three quarters of the third world's population although many such countries spend 40-50% of their total wealth on drugs and health care. As a part of the strategy to reduce the financial burden on developing countries, it is obvious that an increased use of plant drugs will be followed in the future [3].

Plant material includes juices, gums, fatty oils, essential oils, and any other substances of this nature. Herbal medicines may contain excipients in addition to the active ingredients. Medicines containing plant material combined with chemically defined active substances, including chemically defined, isolated constituents of plants is not considered to be herbal medicines. Exceptionally, in some countries herbal medicines may also contain, by tradition, natural organic or inorganic active ingredients which are not of plant origin [4].

## **MATERIALS AND METHODS**

### **Materials**

The Marker compounds such as Piperine, Gallic acid and Bovine serum albumin all are Sigma chemicals and 1,1,3,3, Tetramethoxy propane Himedia laboratories. Methanol, Chloroform, n-Butanol, Benzene, Toluene, Isopropyl alcohol, Acetone are from Ranbaxy laboratories ltd. Mumbai.

## **METHODOLOGY**

### **Processing of Herbals**

All the plants were subjected into processing which includes initially, other than the plant parts (foreign matters) such as grass, sand mud, and other plant parts was removed manually to ensure the plant quality. Plant materials are cutting into the small chops; barks are cut by longitude, to ensure the drying. Shade drying method was followed to maintain the chemical constituents of the plant. All the dried chop of plants were packed separately in the cover and kept in suitable storage condition for avoiding the moisture [5].

### **Physiochemical Constant Determination [6-8]**

#### **Ash value**

The ash remaining after ignition of medicinal plant materials is determined by three different methods which measure total ash, acid-insoluble ash and water-soluble ash

- Total ash
- Acid insoluble ash
- Water soluble ash.

The total ash value method is designed to measure the total amount of material remaining after ignition. This includes both "physiological ash", which is derived from the plant tissue itself, and "non-physiological" ash, which is the residue of the extraneous matter (e.g. sand and soil) adhering to the plant surface.

Acid-insoluble ash is the residue obtained after boiling the total ash with dilute hydrochloric acid and igniting the remaining insoluble matter. This measures the amount of silica present, especially as sand and siliceous earth.

Water-soluble ash is the difference in weight between the total ash and the residue after treatment of the total ash with water. The ash of any organic material is composed of their non-volatile inorganic components controlled incineration of crude drugs results in an ash residue consisting of an inorganic material (silica).

#### **i. Total Ash**

Weighed accurately 2 g of the air dried crude drugs in tarred silica dish and incinerated at a temperature not exceeding 450°C until free from carbon then cooled and weighed. This was repeated till the constant weight was obtained. The percentage of ash with reference to the air dried drug was calculated.

#### **ii. Acid Insoluble Ash**

The ash obtained in the total ash was boiled with 25 ml of dil. HCl for 5 minutes. The insoluble ash was collected on ash less filter paper and washed with hot water. The insoluble ash was transferred to a tarred silica crucible incinerated at the temperature 650°C until free from carbon. The crucible was cooled and weighed. The entire procedure was repeated till a constant weigh is observed. The percentage of the total ash was calculated with reference to the weight of the air dried drug.

#### **iii. Water Soluble Ash**

The ash obtained in the total ash was boiled with 25 ml of water for 5 minutes. The insoluble ash was collected on ash less filter paper and washed with hot water. The insoluble ash was transferred to a tarred silica crucible incinerated at the temperature 650°C until free from carbon. The crucible was cooled and weighed. The entire procedure was repeated till a constant weigh is observed. The percentage of the total ash was calculated with reference to the weight of the air dried drug.





**iv. Sulphated Ash:** The obtained in the total ash was treated with Conc. Sulphuric acid and kept at 850°C, until free from phosphates and silicates. The crucible was cooled and packed. The entire procedure repeated until constant weight. The percentage of sulphated ash was calculated with reference to air dried drug.

#### **Extractive Values**

This method determines the amount of active constituents extracted with solvents from a given amount of medicinal plant material. It is employed for materials for which as yet no suitable chemical or biological assay exists. The extraction method involves, hot extraction and cold maceration. Different solvents like water, alcohol and ether were used.

This technique determines the amount of active constituents in a drug when extracted with solvents. The extraction of any crude drug with a particular solvent yields a solution containing different phyto constituents. The composition of these phyto constituents in that particular solvent depends upon the nature of the drug and solvent used [9].

Types of extractive values

- Water soluble extractive
- Alcohol soluble extractive
- Ether soluble extractive
- Hexane soluble extractive
- Ether soluble extractive gives information about the drugs containing fixed oils and coloring matter presents.
- Hexane soluble extractive gives information about the drugs containing fatty materials.

#### **i. Water Soluble Extractive**

5 g of the air dried coarse drug powder taken in a Stoppard flask and macerated with 100 ml of water for 24 hours, shaking frequently during every six hours and allowed to stand for 24 hours. It was then filtered rapidly taking precaution against loss of the solvent. 25 ml of filtrate was evaporated to dryness in a tarred flat bottom dish and dried at 105°C to constant weight and weighed. The percentage of the water soluble extractive was calculated with reference to the air dried drug.

#### **ii. Ethanol Soluble Extractive**

5 g of the air dried coarse drug powder taken in a stoppered flask and macerated with 100 ml of ethanol of the specified strength, in a closed flask for 24 hours, shaking frequently during every six hours and allowed to stand for 24 hours. It was then filtered rapidly taking precaution against loss of the solvent. 25 ml of filtrate was evaporated to dryness in a tarred flat bottom dish and dried at 105°C to constant weight and weighed. The percentage of the ethanol soluble extractive was calculated with reference to the air dried drug.

#### **Extraction of Selected Plant Materials**

*Clerodendrum Infortunatum* leaf was subjected to 7 days maceration with methanol and water (1:1).

#### **Recovery of Extracts**

Extract was recovered by using rotary evaporator (Buchi), which is operated under reduced pressure and low temperature, in this large space is available for evaporation of solvent, and less chance to charring the constituents. All the plant extract recovered by this technique.

#### **Qualitative Analysis of Extracts [10-15]**

**Phytochemical Studies:** Qualitative Phytochemical tests were carried out for all prepared extracts.

##### **A. Test for Alkaloids**

To the solvent free extract, 50 mg is stirred with few ml of dilute HCl then shake well and filtered. The filtrate was used for the following tests:

1. **Dragendorff's test:** To the filtrate (0.5 ml), few drops Dragendorff's reagent was added, appearance of orange brown precipitate indicates the presence of alkaloids.
2. **Hager's test:** To the filtrate (0.5 ml), few drops Hager's reagent was added, appearance of yellow precipitate indicates the presence of alkaloids.
3. **Mayer's test:** To the few ml of filtrate, a drop or two of Mayers reagent added by the side of the test tube. A white or creamy precipitate indicates the test as positive.
4. **Wagner's test:** To the few ml of filtrate, a drop or two of Wagners reagent added by the side of the test tube. A reddish-brown precipitate confirms the test as positive.



## B. Test for Glycosides

**General test for glycosides:** Coarsely powdered plant material 1 gm was introduced in to two different beakers. To one of the beaker sulphuric acid (5 ml) was added while water (5 ml) was added to the other beaker. The two beakers were heated for 3 minutes and the contents filtered in to labeled test tubes. The filtrate was made alkaline with sodium hydroxide (0.5 ml) and allowed to stand for 3 minute. The presence of reddish brown precipitates in the filtrate was taken as positive for glycosides.

**For detection of glycosides:** 50 mg of extract is hydrolysed with concentrated hydrochloric acid for 2 hrs. On a water bath, filtered and the hydrolysate was subjected to the following test.

**Borntrager's test:** The filtrate (0.5 ml) was boiled with (0.5 ml) dilute  $H_2SO_4$  and filtered. To the cold filtrate an equal volume of benzene-chloroform was added. To the separated organic layer ammonia solution (0.5 ml) was added, appearance of pink or red colour in the ammonia layer indicates the presence of glycosides

**Legal's Test:** 50 mg of the extract was dissolved in pyridine; sodium nitroprusside solution was added and made alkaline using 10% sodium hydroxide. Presence of glycosides is indicated by the pink color.

## C. Test for the Steroidal Glycosides

**Preparation of test extract solution:** The extract was prepared with water and 1 volume of 10% v/v sulphuric acid solution was added. The mixture was heated on the water bath for half an hour and the hydrolyzed extract was extracted with the  $CHCl_3$ . The  $CHCl_3$  layer was separated and concentrated. The test for steroid /phytosterol was carried out on the concentrated fraction.

## D. Test for Steroids / Phytosterol

**Preparation of the test extract solution:** the extract was refluxed separately with alcoholic solution of potassium hydroxide till complete saponification. The saponified extract was diluted it water and unsaponifiable matter was extracted with diethyl ether. The ethereal extract was evaporated and the residue (unsaponifiable matter) was subjected to the following test by dissolving the residue in chloroform.

1. **Salkowski reaction:** To the 0.5 ml of test sample solution 0.5 ml of chloroform and con. $H_2SO_4$  was added and shaken well. Appearance of red color in the chloroform layer and appearance of yellow fluorescence in the acid layer indicates the presence of steroids.
2. **Liebermann –Burchard reaction:** To the test sample solution, 1 ml of chloroform and 1 ml of acetic anhydride was added and mix well. To the above solution 2 drops of conc. $H_2SO_4$  was carefully added along the side of test tube. Appearance of red, then blue and finally green color indicates the presence of steroids.

## E. Test for Phenolic compounds

1. **Ferric chloride test:** To the samples solution, few drops of ferric chloride solution were added. Appearance of green colour indicates the presence of phenolic compounds.
2. **Lead acetate test:** To the 0.5 ml of sample solution, 0.5 ml of 10% lead acetate solution was added. Appearance of white precipitate indicates the presence of phenolic compounds.

## F. Test for Flavonoids

1. **Shinoda test:** To the sample solution (0.5 ml), 0.5 ml of 95% ethanol, few drops concentrated HCl and 0.5 g magnesium turnings were added. Appearance of pink color indicates the presence of flavonoids.
2. **Zinc test:** To the sample solution (0.5 ml), 0.5 ml of dilute HCl & zinc dust was added. Appearance of pink color indicates the presence of flavonoids.
3. **Alkaline reagent test:** To the sample solution (0.5 ml), few drops of 10% ammonium hydroxide solution was added. Appearance of yellow fluorescence indicates the presence of flavonoids.
4. **G. Test for Carbohydrates** The extract is dissolved in 5 ml of water and filtered. The filtrate is subjected to the following test:
  1. **Molish test:** To 2 ml of filtrate, two drop of alcoholic solution of  $\alpha$ -naphthol was added, this mixture is shaken well and 1 ml of concentrated sulphuric acid was added slowly along the sides of the test tubes and allowed to stand. A violet ring indicates the presence of carbohydrate.
  2. **Fehling's test:** 1 ml of filtrate was boiled on the water bath with each 1 ml of Fehling solution A and B. A red precipitate indicate the presence of sugar



3. **Benedict's test:** To 0.5 ml of the sample solution, 0.5 ml of Benedict's reagent was added. The mixtures were heated on boiling water bath for 2 min. A characteristic red color precipitate indicates the presence of sugars.

4. **Barfoed's test:** To 1 ml of filtrate, 1 ml of Barfoed's reagent was added and heated on the boiling water bath for 2 min. Red precipitate indicates the presence of sugar.

#### H. Test for Saponins

1 ml of the sample solution was diluted with distilled water and made up to 20 ml. The suspension was shaken in a graduated cylinder for 15 min. 2 cm layer of foam indicates the presence of saponins.

#### Test for Protein /Amino acids

The extract is dissolved in 10 ml of distilled water and filtered through Whatmann No.1 filter paper and the filtrate is subjected to test for protein and amino acids.

**Ninhydrin test:** Two drops of freshly prepared 0.2% ninhydrin reagent was added to the extract and heated. Development of blue color indicates the presence of proteins, peptides or amino acids.

**Biuret test:** An aliquot of 2 ml of filtrate was treated with one drop of 2% copper sulphate solution. To this, 1 ml of ethanol was added, followed by excess of KOH pellets. Pink color in the ethanolic layer indicates the presence of protein.

**Millon's test:** to the 2 ml of filtrate, few drops of millon's reagent are added. A white precipitate indicates the presence of proteins.

**J. Test for Triterpenoid:** Preparation of test extract solution: The test solution was prepared by dissolving the extracts in  $\text{CHCl}_3$ .

**Salkowski test:** Few drops of concentrated  $\text{H}_2\text{SO}_4$  was added to the test solution of the extract, the solution was shaken and on standing lower layer turns golden yellow indicating the presence of triterpenoid.

**Liebermann – Burchard reaction:** To the test sample solution, 1 ml of chloroform and 1 ml of acetic anhydride was added and mixed well. To the above solution 2 drops of  $\text{Con.H}_2\text{SO}_4$  was carefully added along the side of test tube. Appearance of red, then blue and finally green color indicates the presence of steroids.

#### K. Test for Saponin

**Preparation of sample:** The solution was prepared by dissolving the extract in water.

**Foam Test:** The test solution was shaken vigorously. The formation of foam, which is stable for 15 min, was considered as positive for saponin.

#### Quantitative Analysis [16-18]

Estimation of herbal drugs by advanced chromatographic techniques which are most reliable and widely used for the estimation of herbal drugs in their formulation. They are;

- HPTLC
- HPLC
- GC

#### Herbal Drugs

Herbal drugs and herbal drug preparations are complex mixtures of compounds, from medicinal point of view, the drug in its entirety must be considered as the active principle. This can create several problems for the analyst

- For many herbal drugs and extracts thereof, the extract chemical composition is not known.
- Because of natural variability, the qualitative and quantitative composition of the raw materials may vary considerably.
- The quantitative content of known active or inactive components of the drug (markers) is not sufficient as a criterion of quality.
- The presence of other substance must be established for proper identification well.
- The availability of chemical and botanical reference materials is limited in many cases because the active constituents have not yet been investigated.



Most analytical questions can be suitably answered on the basis of chromatographic fingerprints, which best represent the complexity of the analyte. For that highest resolving power using a detector allowing positive identification the best choice. GC/MS, HPLC/DAD/MS, HPLC/NMR, such analytical tool is costly and time consuming.

## HPTLC

A. HPTLC is able to provide either equally suitable results with complementary information and can help in a decision making process.

- Some of the advantage of HPTLC shall be reemphasized at this point, analysis time is comparatively short and many samples can conveniently be compared side by side on the same plate. This is particularly important for screening and selection of raw material and for process control during manufacturing.
- The fingerprint can be optimized for certain targeted compounds. even if some components migrate with the solvent front and others remain at the application position, the fingerprint always represents the sample in its entirety. Unlike column chromatography, it is not problematic if portions of the sample can be analyzed in several different samples without modification to the sample preparation step.
- The lower resolution power can be advantage, because small insignificant differences between samples due to natural variability will not be visible. It is therefore often easier to define acceptance criteria that have to be met by the sample.

The extreme flexibility of detection, the convenience of specific derivatization and the possibility of multi able detections without repeating the chromatography are particularly useful for fingerprint analyses because the chromatogram can be visualized.

- HPTLC plates are not only reported as peak data but can also be presented and communicated as images.

## A. Standard Preparation

### Piperine and Gallic acid

10 mg of standard Piperine and Gallic acid were dissolved in 10 ml of methanol individually and used for HPTLC quantification at a concentration of 1 mg/ml.

## B. Sample Preparations

### Raw material

1000 mg of raw material was extracted with 10 ml of methanol at a slight warm condition. This solution was filtered in Whatman filter paper to get a clear solution and used for HPTLC analysis at a concentration of 100 mg/ml.

### Extracts

100 mg of extract was extracted with 10 ml of methanol at a slight warm condition. This solution was filtered in Whatman filter paper to get a clear solution and used for HPTLC analysis at a concentration of 10 mg/ml.

## Pharmacological Study

### Induction of asthma [19-22]

#### I. Preparation of ovalbumin (OVA) suspension for sensitization

For sensitization the ovalbumin (OVA) suspension was prepared in the concentration of 2mg/ml in phosphated buffered saline (PBS). This suspension was precipitated with aluminium hydroxide gel (Al(OH)<sub>3</sub>) in the ratio of 1:1, which was added as an adjuvant.

#### II. Airway challenge

For airway allergen challenge 1% w/v OVA suspension was prepared in phosphated buffered saline (PBS) and then the animals were sensitized by exposing to the aerosol of ovalbumin with the help of a commercially available spray the output of the spray was 3ml/min. The procedure for sensitizing the animals was carried in a Perspex made histamine chamber.

#### III. Sensitisation procedure

The animals (180-220g) were sensitised intradermally with ovalbumin (OVA) precipitated with aluminium hydroxide gel in PBS on 0<sup>th</sup> day for the short(15 day) study group. The sensitisation procedure was followed by airway challenge on 1<sup>st</sup>, 3<sup>rd</sup>, 5<sup>th</sup>, and 7<sup>th</sup> day. A last airway challenge was performed 18 hours before sacrificing the animals for 21 days.

## Antiasthematic screening [23-25]

### I. Total WBC and differential count

The bronchoalveolar lavage fluid (BALF) was collected and centrifuged at 170g for 10 minutes. The pellets obtained after centrifugation were resuspended in 0.5ml of PBS and a thin smear was prepared on a slide. Then the smeared slide was air dried and then stained for ten minutes using Giemsa stain. The slide was then subjected to distilled water for the purpose of de-staining. Counter staining was later



carried out using May Grunwald stain. The differential count was carried out using a digital light microscope (Motic, Japan, Cat. No.B-1 series) at 100X magnification by oil immersion technique.

## II. Estimation of Total protein from lung tissue homogenate

Estimation of protein was done by Lowry's method, which requires 4 different solutions namely: solution A, solution B, solution C, and solution D. Solution A is the mixture of sodium carbonate (2%), sodium tartarate (0.05%), and sodium hydroxide (4%). Solution B contains freshly prepared copper sulphate solution (1%). Solution C contains 9 parts of solution A mixed with 1 part of solution B and solution D contains the Folin-Ciocalteus reagent.

**Step I-** 0.2, 0.4, 0.6, 0.8 ml of the supernatant was pipetted out and 1 ml of the working standard was added into a series of test tubes.

**Step II-** 0.1 ml and 0.2 ml of the sample extract was pipetted out into two other test tubes.

**Step III-** The volume was made up to 1 ml in all the test tubes with double distilled water and a test tube with 1ml of water was served as the blank.

**Step IV-** 5 ml of reagent C was then added to each tube including the blank. They were then mixed well and allowed to stand for 10 minutes.

**Step V-** 0.5 ml of reagent D was then added, mixed well and incubated at room temperature in dark for 30 minutes. Blue color was developed.

**Step VI-** Readings were taken at 660 nm.

**Step VII-** A standard graph was plotted and the amount of protein in the sample was calculated. The standard graph was drawn by plotting concentration values on X axis and optical density values on Y axis. Amount of protein was expressed as  $\mu\text{g/gm}$  or  $100\text{gm/}$  sample.

## III. Estimation of malonyldialdehyde (MDA) from lung tissue.

An incubation mixture was prepared as shown in the following table

**Table 2: Sequence of the dilutions to be followed for MDA estimation**

Ingredients	Volume
Tissue homogenate	0.5 ml (lung)
8.1 sodium dodecyl sulphate (SDS)	0.2 ml
20% acetic acid solution (adjusted to pH 3.5 with in NaOH /0.1N HCl solution)	1.5 ml
0.8% aqueous solution of thiobarbituric acid to pH7.4 with in NaOH /0.1N HCl solution)	1.5 ml

The incubation mixture was made up to 5.0 ml with double distilled water and then heated in boiling water bath for 30 minutes. After cooling, the rate chromogen was extracted into 5ml of a mixture of n-butanol and pyridine (15:1 v/v), centrifuged at 4000 rpm for 10minutes. The organic layer was then separated and its absorbance was measured at 532nm. 1, 1, 3, 3-tetra ethoxypropane (TEP) was used as an external standard and the level of lipid peroxides was expressed in nmoles of lipid peroxidation units /mg tissue. The calibration curve for TEP was prepared by the above described procedure taking TEP as standard. Linearity was obtained over the range of 80-240 nmoles of TEP.

## IV. Estimation of lung tissue Myeloperoxidase (MPO) concentration

Neutrophil sequestration in lung was quantified by measuring tissue myeloperoxidase activity. Tissue samples (200mg) were thawed, minced, homogenized in 20 mM phosphate buffer solution (PH 7.4), centrifuged (10,000 $\times$ g, 10 mts, 4 degree Celsius) and the resulting pellet was resuspended in 50 mM phosphate buffer (PH 6.0) containing 0.5% w/v hexadecyltrimethylammonium bromide (HTAB). The suspension was subjected to four cycles of freezing and thawing and further disrupted by sonication (40 secs). The sample was then centrifuged (10,000g, 5 mt, 4 degree Celsius) and supernatant used for MPO assay.

## V. Preparation of MPO assay solution;

MPO assay solution was prepared by mixing 107.6 ml of distilled water 12 ml of 0.1M sodium phosphate buffer (PH 7.0), 0.192 ml of guaiacol and 0.4 ml of 0.1M hydrogenperoxide. 20  $\mu\text{l}$  of lung homogenate was mixed with 980  $\mu\text{l}$  of MPO assay solution. The generation of tetraguaiacol was measured spectrophotometrically at 470 nm and the change of optical density per minute was calculated from the formula.

Units/ml =  $\Delta \text{OD}/\text{min} \times 45.1$  and expressed as U/mg of protein. One unit of enzyme is defined as the amount that consumed 1  $\mu\text{mol}$  of hydrogenperoxide/min.



### Statistical Analysis

The collected data were subjected to appropriate statistical tests like one-way ANOVA (Analysis of Variance) followed by an appropriate post hoc analysis such as Bonferroni post test multiple comparison tests. P values of less than 0.01 were considered significant. The analysis was carried using Graph pad Instat software of version 4.

## RESULTS AND DISCUSSION

### Pharmacognostical Studies

#### A. Ash value

The ash value viz total ash, acid insoluble and water soluble ash and sulphated ash were performed for all the crude drugs. All the results were complies with quality standards of Indian Medicinal Plants (ICMR) and shows the considerable quality.

**Table 3: Ash value of selected medicinal plants**

S. No	Parameter	<i>Clerodendrum Infortunatum</i>
1.	Total Ash (w/w)	11.60
2.	Acid insoluble ash (w/w)	04.61
3.	Water soluble ash (w/w)	05.79
4.	Sulphated ash (w/w)	01.93

#### B. Extractive Values

The water soluble extractives and alcohol soluble extractives were performed for all the crude drugs.

**Table 4: Extractive values of selected medicinal plants**

S. No.	Parameters	<i>Clerodendrum Infortunatum</i>
1.	Water soluble extractive value (w/w)	01.67
2.	Alcohol soluble extractive value (w/w)	04.75

#### C. Extraction

The extraction was carried out for all the selected plants by maceration method using suitable solvents.

**Table 5: Percentage yield of the selected medicinal plants**

S.No.	Selected Plant Name	Percentage yield in w/w
1.	<i>Clerodendrum Infortunatum</i>	03.4%

### Phytochemical Studies

Qualitative Phytochemical tests were carried out for all the selected plant extracts. The results reveal that carbohydrates, phytosterols are present in all the selected species, proteins, fixed oils and fats, gums and mucilages were absent in all the plants.

**Table 6: Result of qualitative analysis**

S.no.	Phytochemicals	<i>C. Infortunatum</i>
1	Alkaloids	+ve
2	Carbohydrates	+ve
3	Glycosides	-ve
4	Saponins	+ve
5	Proteins	-ve
6	Fixed oils & Fats	-ve
7	Phytosterols	+ve
8	Steroidal Glycosides	-ve
9	Phenolic tannins	-ve
10	Flavonoids	-ve
11	Gums and mucilages	-ve
12	Volatile oils	-ve
13	Triterpenoids	+ve

**Qualitative and Quantitative Analysis by HPTLC**

Finger print analysis was carried out for *Inula racemosa* by comparing the  $R_f$  values of standard.

**Fingerprint analysis of *Clerodendrum Infortunatum*****I. *Clerodendrum Infortunatum* (Raw material)**

Totally 7 peaks observed in *Clerodendrum Infortunatum*, in this sixth peak with  $R_f$  value of 0.65 was matched with standard  $\beta$  - sitosterol (0.65) and confirmed the presence of  $\beta$ -sitosterol in the raw material.

**II. *Clerodndrum Infortunatum*, (Extract)**

Totally 7 peaks observed in *Clerodendrum Infortunatum* in this sixth peak with  $R_f$  value of 0.65 was matched with standard  $\beta$ -sitosterol (0.65) and confirmed the presence of  $\beta$ -sitosterol in the extract.

**Table 7: Result of HPTLC analysis I**

S.No.	Sample	Marker compounds	Standard $R_f$ values	Sample $R_f$ values	Amount of Marker Compound % w/w	
					Tablet	Capsule
1	<i>Clerodendrum Infortunatum</i>	Finger print	0.65	0.65	-	-

**B. HPTLC standardization**

Quantification of marker compound was carried out by HPTLC technique for the formulation and all the chromatographic condition.

**Table 8: Fingerprint Analysis of *Clerodendrum Infortunatum***

S.No	Sample	No. of peaks	$R_f$ values
1	<i>C. Infortunatum</i> Raw material	8	0.04, 0.16, 0.21, 0.28, 0.47, 0.65, 0.76
2	<i>C. Infortunatum</i> Extract	7	0.02, 0.21, 0.29, 0.32, 0.46, 0.65, 0.98

The results of Fingerprint analysis of *C. Infortunatum* shows that 3 common peaks were observed in raw material, extract, tablet and capsule formulation. This confirmed the presence of *C. Infortunatum* in both the formulations.

**Pharmacological Screening****Result Description****1. Total and differential WBC count**

The results revealed that there was a significant ( $p < 0.001$ ) reduction in the number of total and differential WBC cells in treatment groups, when compared to the ova sensitized control. When compared with the saline control, less significant ( $P < 0.05$ ) increase in WBC total count was observed in standard drug treated and hydroalcoholic extract of *Clerodendrum Infortunatum* treated groups.

**2. Effect of Polyherbal formulation on quantity of lung protein.**

The lung protein was estimated. The level of lung protein was significantly ( $P < 0.001$ ) less or reduced in sensitized control when compared with normal control. The lung protein level in standard drug treated group was not protected as that of hydroalcoholic extract of *Clerodendrum Infortunatum*. The lung protein was significantly ( $P < 0.001$ ) protected or not degraded in hydroalcoholic extract of *Clerodendrum Infortunatum*.

**3. Effect of Polyherbal formulation on Lipid peroxidation (MDA)**

When compared with the ova sensitized control, treatment with hydroalcoholic extract of *Clerodendrum Infortunatum* significantly ( $p < 0.001$ ) decreased the MDA level. The lipid peroxidation in sensitized control was higher than that of other groups. The standard drug treatment could not reduce the MDA level as that of hydroalcoholic extract of *Clerodendrum Infortunatum*. Meanwhile the test drug treatment significantly ( $P < 0.001$ ) reduced the MDA levels when compared with sensitized control.

**4. Effect of Polyherbal formulation on Myeloperoxidase enzyme**

When compared with ova sensitized control, treatment groups showed significant ( $P < 0.001$ ) decrease in the Myeloperoxidase enzyme activity. The standard drug treated group's MPO level was significantly lower than that of sensitized control groups. The treatment with hydroalcoholic extract of *Clerodendrum Infortunatum* significantly ( $P < 0.001$ ) reduced the MPO level in experimental groups.

**5. Mast cell stabilization activity of Polyherbal formulation**

The percentage of intact mast cells was significantly ( $P < 0.001$ ) increased in treatment groups when compared with the ova sensitized control. The standard drug treated groups showed more number of intact mast cell when compared with sensitized control. There was a significant ( $P < 0.001$ ) high number of intact mast cell observed when treated with hydroalcoholic extract of *Clerodendrum Infortunatum*



**V – RESULTS**

**Table 9: Effect of hydroalcoholic extract of *Clerodendrum Infortunatum* on WBC and differential count**

Treatment	Dose	WBC Cells/mm <sup>3</sup>
Control- I	1ml/kg	4202.68±0.521
Control-II (Sensitized control )	2mg/ml (OVA)	8912.54±0.74 <sup>***</sup>
Standard drug (Ketotifen & Dexamethasone p.o)	0.072mg/kg and 0.090mg/kg	4148.181±2.23 <sup>ns,###</sup>
hydroalcoholic extract of <i>Clerodendrum Infortunatum</i>	5mg/kg	4052.68±0.98 <sup>ns,###</sup>

Values are mean ± SEM; n=6 number of animals in each group

<sup>\*\*\*</sup>P<0.001 vs control-I

<sup>ns</sup>P>0.05 vs control -I

<sup>###</sup>P<0.001 vs sensitized control-II

One way ANOVA followed by Bonferroni multiple comparison test.

**Table 10: Effect of Polyherbal formulation on Tissue protein**

S.No	Treatment groups	Dose	Total tissue Protein(Mg/gm)
1	Control-I (Normal)	1ml/kg	6.148±0.1002
2	Control-II (Sensitized control)	2mg/ml	2.821±0.0031 <sup>***</sup>
3	Standard drug (Ketotifen+Dexamethasone,p.o)	0.072 and 0.090mg/kg	2.941±0.0178 <sup>***</sup>
4	hydroalcoholic extract of <i>Clerodendrum Infortunatum</i>	05mg/kg	4.819±0.00189 <sup>*,###</sup>

Values are mean ± SEM; n=6 number of animals in each group

<sup>\*\*\*</sup>P< 0.001, <sup>\*</sup>P<0.05 vs Control

<sup>###</sup>P<0.001 vs Control

One way ANOVA followed by Bonferroni multiple comparison tests.

**Table 11: Estimation of Malonyldialdehyde (MDA)**

S.No	Treatment groups	Dose	MDA (nM of MDA/mg of protein×10 <sup>3</sup> )
1	Control-I (Normal)	1ml/kg	0.91±0.1290
2	Control-II (Sensitized control)	2mg/ml	1.51±0.1201 <sup>***</sup>
3	Standard drug (Ketotifen+Dexamethasone,p.o)	0.072 and 0.090mg/kg	0.81±0.1131 <sup>**,###</sup>
4	hydroalcoholic extract of <i>Clerodendrum Infortunatum</i>	05mg/kg	0.74±0.00146 <sup>**,###</sup>

Values are mean ± SEM; n=6 number of animals in each group

<sup>\*\*\*</sup>P< 0.001, <sup>\*\*</sup>P< 0.01 vs control

<sup>###</sup>P<0.001 vs ova sensitized control.

One way ANOVA followed by Bonferroni multiple comparison tests.





**Table 12: Estimation of Myeloperoxidase (MPO) concentration**

S.No	Treatment groups	Dose	Myeloperoxidase (U/g of protein)
1	Control-I (Normal)	1ml/kg	0.1971±0.10211
2	Control-II (Sensitized control)	2mg/ml	0.4182±0.0414***
3	Standard drug (Ketotifen+Dexamethasone,p.o)	0.072and 0.090mg/kg	0.188±0.00324*.,###
4	hydroalcoholic extract of <i>Clerodendrum Infortunatum</i>	5mg/kg	0.172±0.0330**.,###

Values are mean ± SEM; n=6 number of animals in each group.

\*\*\*P<0.001, \*\*P<0.01, \*P<0.05, <sup>ns</sup>P>0.05 vs control

###P<0.001 vs Sensitized control

One way ANOVA followed by Bonferroni multiple comparison tests.

**Table 13: Mast cell stabilizing activity**

S. No	Treatment groups	Dose	CPD. 48/80	Intact mast cells (%)
1	Control-I (Normal)	1ml/kg	100µg/ml	88.35±0.34
2	Control-II (Sensitized control)	2mg/ml	100µg/ml	18.42±0.1436***
3	Standard drug (Ketotifen+Dexamethasone,p.o)	0.072 and 0.090mg/kg	100µg/ml	84.34±0.5676###
4	hydroalcoholic extract of <i>Clerodendrum Infortunatum</i>	5mg/kg	100µg/ml	83.91±0.071###

Values are mean ± SEM; n=6 number of animals in each group

\*\*\*P<0.001 vs control-I

###P<0.001 vs sensitized control

One way ANOVA followed by Bonferroni multiple comparison test

## DISCUSSION

The antiasthmatic activity of the hydroalcoholic extract of *Clerodendrum Infortunatum* was assessed and studied by standard procedure Rats were being selected for the anti-asthmatic screening activity; since experimental data suggests that most characteristics feature of human asthma including pathological change can be duplicated in rats.

This study the total and differential cell count from BALF was increased two fold in ova treated animals and less significant increase in treatment groups was observed. During asthmatic attack because of antigenic response of the allergen, it is a common phenomenon that the WBC count seems to be increased. Treatment with hydroalcoholic extract of *Clerodendrum Infortunatum* might have reduced the migration of number inflammatory cells in the BALF and hence reduced the number total and differential of leukocyte count.

Myeloperoxidase enzyme activity is an index of polymorphonuclear leukocyte accumulation. Within seconds of binding to a foreign particle neutrophils increase their oxygen consumption to 100 folds. During respiratory burst, myeloperoxidase (MPO) enzyme activity



in neutrophils will be increased. Myeloperoxidase a constituent of neutrophil would be a marker for elevated neutrophil count. The ability of the hydroalcoholic extract of *Clerodendrum Infortunatum* in MPO activity reduction, pointed that there was a significant reduction in migration of neutrophils in to the lung tissue and hence protects the tissue from damage to inflammatory mediators.

Mast cells play a key role in the pathogenesis of asthma. It is known that the physiological stimulus for the release of inflammatory mediators from mast cells is provided by the combination of antigen with specific antibody fixed on the cell surface. This combination is believed to transiently increase the permeability of the membrane to calcium ions for the secretory process to occur.

Compound 48/80 induced secretion from mast cells share a common requirement as far as the presence of calcium is concerned. Compound 48/80 can utilize intracellular calcium store to initiate the release process even in the absence of calcium in the extracellular medium. However anaphylactic release requires the presence of calcium in the extracellular medium which moves in to the cell via calcium gates in the membrane

Although oxygen is essential for life, its transformation to ROS may provoke uncontrolled reactions. Lipids are more susceptible macromolecules and are present in the form of polyunsaturated fatty acids (PUFA). ROS attack PUFA in the cell membrane leading to a chain of chemical reactions called lipid peroxidation. During initiation; the free radicals react with fatty acid chain and release lipid free radical which reacts further with molecular oxygen to form lipid peroxy radical. Peroxy radicals again react with fatty acid to produce lipid free radical and this reaction is propagated. During termination process two radicals react with each other and the process comes to an end. This process of fatty acid break down produces hydrocarbon gases (ethane or pentane) and aldehydes.

## SUMMARY AND CONCLUSION

In present study medicinal plants which are having scientific evidence for therapeutic efficacy were selected in less number. In this combination, bronchodilator, antihistaminic, antioxidant and anti inflammatory category of plants were used. Phytochemical evaluation of the crude drugs such as ash value, extractive value were carried out and complies the limit given by quality standards of medicinal plants.

The fingerprint analysis was carried out for the *Clerodendrum Infortunatum*, and compared the  $R_f$  values with gallic acid for the confirmation. The prepared hydroalcoholic extract of *Clerodendrum Infortunatum* was subjected to determination of physical and chemical evaluations and the results complies as per the standards. The pharmacological findings concluded that the hydroalcoholic extract of *Clerodendrum Infortunatum* could reverse asthmatic condition and reduced the total and differential WBC cell count in BALF, retained protein and MDA level in lung tissue, increased intact mast cells thus preventing its degranulation and mediators release. This Polyherbal hydroalcoholic extract of *Clerodendrum Infortunatum* formulation is could be a promising new therapeutic approach for the treatment of clinical asthma. The stability studies and clinical trials to be carried out in future.

## Acknowledgement

I would like to thank Principal sir (Dr. Kamal Has-san) St. Mary's Group of Institutions, Deshmukhi (Village), Pochampally (Mandal), Yadadri Bhuvanagiri (Dist), Telangana-508284, India.

**Conflict of Interest:** The authors attest that they have no conflict of interest in this study.

**Funding Support:** The authors declare that there is no financial support for the current study.

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# PSYCHOLOGICAL COMPARISON OF “I”-CONCEPT AND SUFISM

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## ANNOTATION

*Self-concept a developing system of a person’s ideas about himself is of great importance in the psychological self-improvement of a person. Sufism is also a means of self-education of the individual. Although they look the same in appearance, they are essentially different from each other. This article provides a comparative analysis of the Self-concept and Sufism in relation to personal self-improvement.*

**KEY WORDS:** *Self-concept, system of ideas, religion, sufism, self-improvement, attitude, self-esteem, self-knowledge, structure of the “Self” concept, internal conflict, subjective perception, presentation.*

## INTRODUCTION

In the book “Big Psychological Dictionary”, prepared by B.G. Meshcheryakova and V.S. Zinchenko, the Self-concept is defined as follows: “Self-concept (English: Self-concert) is a developing system of a person’s ideas about himself, including: a) awareness of one’s physical, intellectual, characterological, social and other properties; b) self-esteem; c) subjective perception that influences one’s own personality” [4.636].

Main part. Below we will briefly consider the history of the emergence and development of the “I” concept. “I” - the concept arose and developed in the 1950s on the basis of phenomenological, humanistic psychology. Representatives of this psychology A. Maslow, K. Rogers, in contrast to behaviorists and Freudians, tried to consider the holistic human “I” as a fundamental factor in individual behavior and development. Symbolic interactionism (C. Cooley, J. Mead) and the concept of identity (E. Erikson) had a significant influence on the emergence of this concept. However, it should be recognized that the first theoretical studies in the field of the concept of “I” belong to W. James, who considered the individual “I” (I) as a product of interaction between “I” and as an object (I).

“I” - the concept is defined by D. Motsumoto in his book “Psychology and Culture” as follows: “The sense of “I” is very important and is associated with the definition of one’s thoughts, feelings and actions, with the assessment of the world, the inclusion of oneself and others in this world, as well as other people, is inextricably linked with the assessment of relationships with places, objects and events” [6.55]. Simply put, our sense of self is the center of our being, unconsciously and automatically influencing our every action, thought and emotion.

The famous anthropologist Clifford Geertz defines the "Self" as follows: "The Self" is a limited, unique, more or less integrated, motivational and cognitive universe, a dynamic center of consciousness, emotion, judgment and action, which constitutes a unique characteristic whole and thus, it a being opposed to similar other goals, as well as to the social and natural environment" [6.55-56]. This definition is also characteristic in that it reveals important features of the concept of “I”.

It is known that there are cases when the concept of "I" is usually explained as a set of self-directed attitudes. This direction is typical for representatives of the Georgian school of psychology under the leadership of D. Uznadze. “I”-concept as an institution consists of three components: a) a cognitive component - the image of “I”, which includes the content of a person’s ideas about himself; b) is an affective (emotional-value) component, including emotional aspects of one’s attitude towards oneself, emotional attitude towards certain aspects of one’s personality and activities, etc.; c) behavioral component - characterizes the appearance of cognitive (knowledge) and evaluative components in behavior.

We interpret this situation from the point of view of Sufism. It is known that cognition of the quality of images of “I” is an important stage of self-knowledge. It is important to know whether a certain quality (such as greed) is bad or good. This is also a level of self-awareness. This is the ability of a believer. J. Rumi writes about this situation: “If you consider this something bad, then near your



soul must have seen something different and great. That is why they seem ugly and defective to us. Only those who drink fresh water notice that the water is salty. That is, the quality of any object is known through its opposite. These things appear ugly to your heart because Almighty God has adorned your heart with the light of faith. If your hearts were not like this, you would not look at such things" [7.78]. Therefore, the role of the cognitive component requires two conditions: firstly, a person's knowledge of his qualities in general, and secondly, knowledge of the essence of these qualities, that is, good and bad.

It is worth noting that knowledge is lacking here. His reaction to what he knows is also necessary. This situation is associated with an affective component. At this stage, a person needs to make an emotional assessment of shortcomings and qualities, that is, he must hate his shortcomings and be proud of his positive qualities. Hatred and pride are the fates of the emotional world. J. Rumi said that if a person does not hate his own shortcomings as much as the shortcomings of others, he cannot go towards perfection. Rumi writes about this: "A person is not ashamed of his baldness and baldness. He easily reaches out his wounded hand to the food and licks it. This does not disgust him. But if he sees a small chip or wound on someone's hand, he stops eating and feels disgusted. People have bad qualities, just like bald people and chipmunks. When these bad qualities are his own, he never hates them; when someone else has them, he hates them" [6.31]. According to Rumi, human happiness lies in developing the ability to hate one's own shortcomings.

At the behavioral stage, he seeks to get rid of those qualities that he hates. As a result of certain efforts, the elimination of negative qualities leads to the purification of the soul.

We can say that the "I" concept is a psychological mechanism that serves to improve a person.

The "I" concept is a holistic structure; all its components seem relatively independent, but they interact with each other. It may be conscious or unconscious. It embodies such things as the content of self-images, the complexity and hierarchy of these images, their subjective significance for a person, as well as their internal integrity and consistency, mutual consistency and stability over time.

In psychology, the complex structure of the "I" concept is interpreted in different ways. For example, R. Burns presents the "I" concept in the form of a hierarchical structure. At the top of the "I" concept is the concept of "global self". It is specified in a set of personal attitudes of a person. These attitudes have different modalities: 1) "real self" (how I think I look in reality); 2) "ideal self" (what I would like to be); 3) "mirror me" (how people imagine me). Each of these modalities embodies a number of aspects - "physical self", "mental self", "emotional self" [4.636].

The discrepancy (difference) between the "ideal self" and the "real self" serves as the basis for a sense of self-esteem and is an important source of personality development. However, a significant difference between them can cause internal personal conflicts (conflict). This causes various negative and unpleasant experiences in its place. It is known that internal personality conflicts are of greater importance in a person's life.

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The question of "I" belongs to the humanistic approach. There is a theory of self-actualization, the founders of which are K. Rogers and A. Maslow. In their opinion, the child's self-image, that is, the concept of "personal self," is the child's personal actions that develop in accordance with the situations that arise in front of the child. So, the concept of "I" is an experience created in communication with other people, and it develops on the basis of people's attitude towards their behavior. Rogers calls this imaginative system the "real self."

A person has a "Self" in terms of his ideal appearance, in other words, who he wants to be, what he wants to be, and this is called the "ideal self".

It is known that each of us has a strong need for self-esteem, which wants people to feel positive about themselves or about what they do. An important psychological situation can be observed here. If other people allow another person to have emotions, feelings, thoughts and behaviors that suit them, and that person also acts according to their desires, then he is hiding his true feelings and thoughts.

As a result, we lose our selfhood and this creates a division between the "real self" formed by the environment and the part of the psyche that we are forced to deny. This mental separation is the source of a person's nervousness. If on the contrary, that is, people



accept you for who you are, you do not hide your true emotions, feelings and thoughts, and as a result, there is an opportunity for balanced personality development. Thus, the greater the discrepancy between the “ideal self” and the “real self,” the more a person improves. J. Godefroy writes about this: “According to the concept of K. Rogers, a person’s “real self” most often encounters a contradiction between the “ideal self,” reflecting what a person would like to become, and the demands of society, which manifests itself. “According to the concept of C. Rogers, a person’s “real self” more often In all, he faces a contradiction between the “ideal self,” reflecting what a person would like to become, and the requirements of society, which manifest themselves, as a rule, in the form of a conditional attitude towards his actions” [5.39].

Let's try to interpret this situation from the point of view of Sufism. In Sufism, there are two different forms of “I”: the “social self” and the “true self”. The “social self” is a set of socially defined, constantly changing roles. The “True Self” is the whole that forms the basis of human life, a part of a relatively higher being. The “True Self” is a reflection of the “Islamic nature” hidden or preserved in the depths of the spiritual world of man. (When a child is born, he comes into the world with Islamic fitrah). R. Frager and J. Fadiman write: “The teaching of the Sufis is the quest to change people's idea of who they really are and to replace the social “I” with the true “I” [8.508]. If the “social self” is replaced by the “true self,” then instead of perception (direct understanding and acceptance of events and things), a person has insight (specific understanding and acceptance of events and things based on their meaning). This prevents division in the human personality and ensures the integrity of the personality. As a result, various internal personal conflicts do not arise. Dualism in the human psyche will be eliminated. This is also a step towards liberation. Internal personal conflicts cause instability in a person.

## CONCLUSION

The heart of a Sufi is filled with a sense of stability. These are the ones who have found their “true self”. The person in them does not change, but a process of internal self-identification occurs in them.

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## "TARIHI TABARI" IS AN IMPORTANT SOURCE FOR STUDYING THE HISTORY OF ISLAM

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### ABSTRACT

*The article informs about the famous historian and commentator Allama Aba Ja'far al-Tabari. Also, the role of his work "Tarikh al-Umam wa-l-Muluk" dedicated to the interpretation of the verses of the Holy Qur'an and the history of nations and kings in the study of Islamic history, the opinions of the researchers who are engaged in the history of Islam and the author are described.*

**KEY WORDS:** *al-Tabari, Tarikhi Tabari, Tarikh al-umam wa-l-muluk, nagkoi, Jame'u-l-bayan fiy ta'wili-l-Qur'an.*

Abu Ja'far Muhammad ibn Jarir al-Tabari was born in the year 839 in the city of Amul, the capital of Tabaristan, in a Persian family. He went to the cities of Rai, Baghdad, Kufa, Basra, and Fustot in search of knowledge. He was a scholar of history, tafsir, jurisprudence and hadith. He received the rank of imam of mufassirs<sup>1</sup>. In his youth, he went to Baghdad to learn from Imam Ahmed ibn Hanbal (780-855), but the Imam had died<sup>2</sup>. Allama often quarreled with the Hanbalis in Baghdad. His supporters saw the Hanbalis as their enemies<sup>3</sup>. The enmity of the two sides reached such a level that al-Tabari's supporters held his funeral at night, fearing that they would riot at the funeral of the scholar<sup>4</sup>.

At the root of such disagreements is the fact that al-Tabari himself was the founder of the sect. He first followed the Shafi'i school and later founded the "Jariri" school. His sect was slightly different from Shafi'ism. The sect of Jarirism lasted only two centuries after his death<sup>5</sup>.

Allama wrote more than 20 works during his life. "Jame'u-l-bayan fiy ta'wili-l-Qur'an"<sup>6</sup>, which gained fame under the name "Tafsir Tabari", is considered by researchers as the first perfect source written in the direction of tafsir. It is true that the work contains a lot of hadiths and even Israelite narrations of different degrees of authenticity or weakness. However, this commentary has much more useful information. Allama used simple, fluent sentences to explain the interpretation of the verses of the Holy Qur'an, so that the person who reads it will understand the meanings of the Qur'an and enjoy the charm of the Arabic language.

The study of Islamic history cannot be imagined without "Tarikh al-Umam wa-l-Muluk". His work on the history of prophets and kings is also known as "Tarihi Tabari"<sup>7</sup>. These two works of his have received the status of encyclopedias of their fields. According to F. Sezgin, "Tabari is one of the great representatives of the science of the Muslim world. The scientist became known to the world through two monumental works"<sup>8</sup>. Muhammad Abul-Fadl, while researching the history of Ibrahim Tabari, expresses the following thoughts about the scholar: "He is like a snowman who knows nothing but the Qur'an, a muhaddith who knows nothing but hadith, a jurist who knows nothing but fiqh, and a grammarian who knows nothing but the Arabic language. Due to his profound knowledge and intelligence, he reached the level of a university that walks on two legs"<sup>9</sup>.

<sup>1</sup> Yakut al-Hamawi. *Mu'jam al-udabo*. - Beirut: Dar al-gharb al-Islami, 1993. - Volume 6. - B. 2445.

<sup>2</sup> Mary J. W. *Medieval Islamic Civilization. An Encyclopedia*. - New York. London: Routledge, 2005. P. 791.

<sup>3</sup> Prozorov S. M. *Khrestomatiya po Islam*. - M.: Nauka, 1994. - T. 1. - S. 50.

<sup>4</sup> Mary J. W. *Medieval Islamic Civilization. An Encyclopedia*. - New York. London: Routledge, 2005. P. 791.

<sup>5</sup> Ali A., Thiam I. D., Talib Y. A. *The Different aspects of Islamic culture: Islam in the World today; Islam and the Muslim world today*. - UNESCO Publishing, 2016. - P. 24.

<sup>6</sup> This interpretation is interpreted in different ways in Arabic: 1. جامع البيان في تفسير القرآن 2. جامع البيان في تأويل القرآن

<sup>7</sup> al-Tabari. *Tarikhul-umam wa-l-muluk: 8 volumes*. - Cairo, 1982.

<sup>8</sup> Fuat Sezgin: *Geschichte des Arabischen Schrifttums*. - Leiden: Brill, 1967. - B.323.

<sup>9</sup> محمد أبو الفضل إبراهيم - Muhammad Abul-Fadl Ibrahim (1900-1980) was an Egyptian expert on the Arabic language, who prepared the critical text of many works written in the Middle Ages. In particular, he studied "Arab Days" (Ayyamu-l-arab), Arabic short stories, as well as the works of Arab scholars during Jahiliyat and Islam.





In writing his work, Tabari made good use of the works of a number of historians who passed before him. For example, Saif ibn al-Tamimi<sup>10</sup>, Abu Mikhnaf<sup>11</sup>, al-Madoini<sup>12</sup>, Ibn Shabba, al-Waqidi<sup>13</sup>, Nasr Ibn Mazahim<sup>14</sup>, Abu Mashar Sinadi<sup>15</sup>, Ibn Ishaq and a number of other historians can be counted.

At the same time, emphasizing the compilativeness of Tabari's works significantly loses the author's creative approach to the source. In the 20th century, thanks to the researches of N.A. Mednikov and Yu. Wellhausen, it became known that Tabari used his sources in an original way. In his "history" he singled out the author or group of authors he considered the most reliable, as N.A. Mednikov noted, "He chose a leader for himself." Tabari sometimes chooses Muhammad ibn Sa'id, sometimes Ibn Sa'd, sometimes Waqidi, sometimes Saif ibn Umar. In most cases, Tabari mentions the narration of the event, which he considers reliable from his point of view, at the beginning of the story, and then he narrates other narrations without a final conclusion.

The history of Tabari from the creation of the world to 302/914-15 was published in 1901<sup>16</sup> by Dutch orientalist de Goeje<sup>17</sup>. In 1960-1969, Muhammad Abul-Fadl Ibrahim published an Arabic version of the book in 11 volumes based on the text of the European edition<sup>18</sup>.

Mansur ibn Nuh, one of the leaders of the Samanid dynasty, who lived in the second half of the 10th century, abridged the history of Abu Muhammad ibn Muhammad Bal'ami Tabari and translated it into Persian. The work "*Tarīhi Tabari*" in Persian became popular in the Near and Middle East and was translated into other Eastern languages. Researcher I.A. According to Kolesnikov, the critical text of Balamy's translation has not reached us<sup>19</sup>.

The second half of the 9th century The importance of this work of the famous historian Tabari, who lived in the first quarter of the 10th century, is incomparable in the study of the first three centuries of the history of the Muslim world. Medieval authors often refer to his work as a source. The cumulative nature of the work, which preserves all the events familiar to Tabari, allows him to imagine the diversity of the traditions of oral transmission of information. Based on this, he determines the directions of criticism of the first sources. Tabari can be considered as the last historian-traditionist to ensure the completeness of isnads by carefully studying the generation of informants and creating an opportunity for readers to understand the narrations that are contradictory to the events.

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<sup>10</sup> Sayf ibn Umar al-Asadi al-Tamimi (d. 170/715) is an Arab historian. Lived in Baghdad. He wrote works called "Jamal", "al-Futuh al-kabir" and "ar-Ridda". At-Tamimi was from the tribe of Banu Tamim, and his narrations were not accepted by the scholars because he covered the events based on the ideas of sabiya (tribalism) and sided with his tribe. However, he has gained the attention of historians because of his ability to describe events with mastery and consistency, in some cases providing detailed information only by himself.

<sup>11</sup> Abu Mikhnaf Lut ibn Yahya al-Azdi (d. 157/774) - a native of Kufa, had a strong inclination towards Shiism. al-Tabari used Abu Mikhnaf's works "Futuh al-Sham wa al-Iraq" to describe the beginning of the campaigns.

<sup>12</sup> Ali ibn Muhammad al-Madoini (752 - 839) is a historian and literary critic. He was born in Basra, lived in Madain and took the nickname "al-Madaini" and died in Baghdad. He collected a lot of information about the Arab campaigns, the Prophet's biography, the history of the caliphs and poets. He is interpreted as the teacher of the Akhbaris, and he wrote many works on the history of the caliphs. Al-Tabari quoted information about the events of "Jamal" and "Siffin" from al-Madoini.

<sup>13</sup> al-Waqidi Muhammad ibn Umar (747-822 years) is one of the first historians. He was born in Madinah and moved to Baghdad with the work of a judge and died there. His works are: "Al-Maghazi", "Fath Ifriqiya", "Fath al-A'jam", "Fath Misr wa al-Iskandaria" and "Fath ash-Sham". At-Tabari took the history of the killing of the caliph Uthman ibn Affa mainly from the information of al-Waqidi and enriched it with the reports of Saif ibn Umar, Umar ibn Shabba and Ibn Ishaq (as-Sulami. *Manhaj kitaba at-ta'rih al-Islami*. -B. 444).

<sup>14</sup> Nasr ibn Mazahim (d. 212 A.H.) was from Kufa and strongly inclined to Shiism. He was severely criticized by scholars for his faith and weak memory (al-Zahabi. *Miyzan al-i'tidol*. - B. 253-254).

<sup>15</sup> Abu Mashar al-Sinadi Najih ibn Abdurrahman (d. 170/787) was a jurist, scholar and historian. He lived in Medina and died in Baghdad. He wrote the work "Kitab al-Maghazi". Al-Tabari received information about Haj emirs, wars, warriors, governors of the region from this historian.

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<sup>17</sup> Michael Jan de Goeje - (1836-1909). Dutch historian, Arabist-Orientalist. The Middle Ages published critical texts of the works of Arab historians, geographers and travelers. In particular, he prepared the critical text of the works of Istakhri, Ibn Hawqal, Muqaddasi, Qudami, Ibn Khordadbeh and al-Balazuri.

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## **SOCIAL AND ECONOMICAL IMPORTANCE OF ENTREPRENEURSHIP IN UZBEKISTAN**

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### **ABSTRACT**

*The description and understanding of the social importance of entrepreneurship is becoming an object of mutual scientific debate. In recent years, the social function of entrepreneurship is important as it covers different areas and directions of entrepreneurship.*

*In this article, a widespread definition of small business is depicted, its industrial organization and social obligations are revealed, and the specific functioning mechanisms in the Uzbek regions are classified.*

**KEYWORDS:** *entrepreneurship, small business, social entrepreneurship, social functions, social technologies, digital economy, innovation.*

### **INTRODUCTION**

The problems related to the deeper development of small business activity and entrepreneurship are important, which, with its social institutions and social functions, solve the problems of the formation of private entities and entrepreneurial activity. The stability of social systems, the creation of jobs and employment, the rapid growth of the population require the growing needs and requirements.

Small and medium size business and private entrepreneurship are an important element of economic expansion, increasing employment and income. Over the past five years of the second president of the Republic of Uzbekistan, Mr. Shavkat Mirziyoyev, numerous government decrees and resolutions have been adopted to lay out comprehensive support to representatives of entrepreneurs. In particular, the President said that the most important way to improve the standard of living is the development of entrepreneurship and small business (Lapasov, 2020).

The social functions of entrepreneurship contribute to social changes, improvement and development of the system through the participation of an economic entity in solving a specific social problem. Although one of the priorities in the development of entrepreneurship is the social changes happening in a society, at the same time, the factor of financial interest also plays a special role, allowing survival in society.

### **METHODS**

In the process of conducting scientific research in the field of social functions and specific features of entrepreneurship, its essence was revealed in the method of scientific abstraction. Using the methods of analysis of the effectiveness of the social functions of entrepreneurialism in the economy is conducted. Also, with the use of inductive methods, it became possible to form scientific conclusions and their features in particular cases.

### **RESULT**

As a result of studying and analyzing the social functions of entrepreneurship, it will be possible to effectively solve the problem of poverty and unemployment in the country. This will increase the sources of income received by the population, increase income and serve to reduce poverty, which is a serious problem for the country. At the same time, it forms the middle class, which is the basis for the sustainable development of democracy and a market economy.

### **ANALYSIS**

According to preliminary estimates, 12-15% or 4-5 million people in Uzbekistan are poor.

The President said that poverty reduction should be solved not by increasing the amount of monthly pensions or mass lending, but by vocational training, financial literacy, entrepreneurship, improving infrastructure, educating children, quality treatment, and the introduction of targeted pensions as (Narmanov Ulugbek, 2020) pointed out.



According to the State Statistics Committee, in 2022, the economically active population of Uzbekistan amounted to 15,071.3 thousand people, of which 13.8 million (89.5%) are employed, 1.55 million are unemployed, that is, the unemployment rate rose to 13.5%.

In Uzbekistan, with the aim of organizing targeted, individual and systemic work with each person, a completely new system has been introduced - an "iron notebook" for working with families in need of material assistance and support, as well as a "women's notebook" and "youth notebook" have been introduced to support women and young people in need of social, economic, legal, psychological support, knowledge and vocational training.

By the end of 2021, the State Fund for the Support of Entrepreneurship under the Agency for the Development of Entrepreneurship provided 8,919 women entrepreneurs with guarantees in the amount of 6.8 billion sums (about 650 thousand US dollars), 26.450 women entrepreneurs - compensation in the amount of 4.5 billion sums (more than 420 thousand US dollars) on loans.

**Distribution of the employed population by type of ownership**

	2018	2019	1st quarter of 2020	2nd quarter of 2020	3rd quarter of 2020	4th quarter of 2020
<b>Governmental sector</b>	2427,0	2463,3	2549,0	2572,6	2594,6	2497,0
<b>Non-governmental sector (private sector)</b>	10810,4	11077,8	10889,6	10164,0	10610,7	10742,5
<b>Unemployed persons registered with the labor authorities</b>	220,9	187,7	32,1	73,2	33,7	37,1

*Source: State Statistics Committee of Uzbekistan*

According to 2020, 19% of the employed population, that is, 2.49 million people work in the public sector, their number increased by 33.7 thousand in a year. 81%, that is, 10.7 million people are employed in the private sector, in relation to 2019, their number decreased by 335.3 thousand.

As the economy develops, the poor become the middle class and the middle class the rich. To reduce poverty and form a middle class, we must empower people to work and improve the working environment for the functioning of social entrepreneurship.

## DISCUSSION

In western G7 countries, the use the term social entrepreneurship and social functions of entrepreneurship are used interchangeably, and a relatively new term is considerably new. It only became noticeable a few decades ago, but its use can be found throughout history. People who paid attention to social enterprises or the social functions of entrepreneurship studied and created entrepreneurship in order to eliminate social problems or make positive changes in the socio-economic system.

M. Granovetter said that economic activity is carried out in the social sphere of business and, consequently, the economic activity of the company is influenced by the culture in which it is rooted. Social entrepreneurship can be compared to entrepreneurship in business in one of the ways. The recognition of opportunities is the basis of social entrepreneurship, also he says the current research is focused on social entrepreneurs, those are not on the process of social entrepreneurship. As a result, a very small number of studies have revealed the need to recognize the opportunities and factors that influence social entrepreneurship. Usually, entrepreneurial vigilance allows us to fully use the information we have received, which others have not found, for our own benefit (Granovetter, 2018).

The most important tasks are assigned to small business and entrepreneurship in the pursuit of national interests and the implementation of priorities, the implementation of digital economy programs. Growing number of employees in the field of small business and entrepreneurship, self-employment and independence of a certain able-bodied segment of the population is considered as a specific social indicator. It is known that small business is the subject of research in many scientific areas, primarily social and economic. In their time, A.Smith, Y.Shumpeter, P.Druker and others paid special attention to this issue.

According to V.Radaev, a well-known expert in economic sociology, in the description of entrepreneurship in Y.Shumpeter's works, he studied entrepreneurship not as a specific profession or a separate class, but as a function performed by different subjects (S. Mirzaliev, 2020).

Y.Shumpeter's definition of entrepreneurship includes three main components: organizational performance, profitability, demonstration of change, which are widely used throughout theoretical research and practical management activities.



In the process of full transition from the stages of institutionalization, small business and entrepreneurship as an element of content formation in the socio-economic system was strengthened in the social consciousness of workers, as well as citizens, as a social institution. In this case, we understand the social tasks of small business and entrepreneurship as its activities, the tasks related to the regulation of relations in the socio-economic system, the system of social labor relations, the implementation of social control by strengthening relationships and ensuring stability. The study of quality characteristics by studying small business and entrepreneurship as a social group is associated with the identification of its specific features as a subject of socio-economically active processes, based on its essence and content. Clearly, in an environment where small business and entrepreneurship remain important, A.Yu. Chepurenko put forward his developments and cited in the SWOT analysis (Gutnikova et al., 2020).

**SWOT analysis of small business entrepreneurship as an active subject of socio-economic processes.**

<b>Strengths</b>	<b>Weaknesses</b>	<b>Capabilities</b>	<b>Risks</b>
Modest Start-Up Capital	Finite (Local) Market	Large Enterprise	Bankruptcy Onset
High Efficiency	Limited Growth	Balanced Development	Peak Growth
Elasticity	Dependence on changes in market conditions	Strong market share	Ease of entry of competitors into the market
Independence	Lack of a strong supporter	Creative self-expression	Weakness of the effect on external pressure

Source:(Gutnikova et al., 2020).

The analysis of quality indicators of small business entrepreneurship as a social entity is related to the widespread definition of its role and tasks in the socio-economic development of a society.

In the realization of this goal, the application of an approach to social wealth, tradition, allows to achieve the highest efficiency.

In this process, small business and entrepreneurship is manifested as a socio-economic system, which, from one point, performs certain social functions, and from the other point, aims itself as an object of management in projecting socio-economic benefits.

Firstly, it is obligatory to differentiate the main institutional characteristics of small business entrepreneurship: excessive personal attitudes and relationships in the selection of staff; informal labor relations (absence of an employment contract in employment); high level of universality of workers in small enterprises (low level of professionalism), low level of complexity of production technologies, the predominance of unsecured forms of employment in wages, the proportional interest of workers in the final result of the enterprise.

Empirically, there are positive processes in the management of small business and entrepreneurship, which include amount of public confidence, participation in the implementation of socially important programs in geographical development, increased quality of goods and services, the amount of small business entrepreneurship and the creation of new decent jobs each year. dynamics, scientific and innovative potential, etc.

Small business and entrepreneurship play an important socio-economic role in the economy, one of the main ones is that it accompanies to the formation of a middle class that provides political and economic stability. In any society, the middle class has a special place in boosting the economy.

Another important task is to produce a wide range of goods and services in the context of stratification and individualization of consumer demand.

Small business and entrepreneurship is an opportunity to showcase your creative potential. It clearly shows the connection between production results and the interests of workers.

Small business is an independent economic activity focused on the local market of goods and services, the capital of which is limited, the owner and the entrepreneur was one person. Areas of traditional small business activity are small-scale and individual production of goods, retail trade, services and catering, transport, healthcare.

The work of small businesses is guaranteed by local natural conditions, consumer demand, and traditional specialization. This type of business is constantly evolving. As the structure of the needs of the region's population changes, so does the structure of local small businesses. The peculiarity of this small business group is that the family capital accumulated on the basis of work, first of all, is not dependent on local markets, there is no tendency to shift capital to other activities or regions.



One of the directions of development of small businesses is the creation of large incentives by the region in this area, that will increase the number of small businesses entities. This process will address another important social issue, namely the employment of socially vulnerable groups - young workers, women, the disabled, retirees, raising their living standards by creating their own small businesses, increasing the production experience of young professionals creates conditions.

## CONCLUSIONS

The growth and support of small business private entrepreneurship in Uzbekistan provides a unique priority to the current government. It solves a certain level of social problems, while solving the problem of unemployment among the young population, rise the number of economically active population, create new jobs at low cost, reduce income inequality, improve regional infrastructure, middle class formation, potential, active and entrepreneurial training of personnel, implementation of technological and technical innovations, creation of a free competitive environment, more efficient use of resources, improvement of interaction between sectors and industries of the economy.

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# FORECASTING THE EFFECTIVENESS OF INNOVATION AND INVESTMENT ACTIVITIES OF OIL AND GAS INDUSTRY ENTERPRISES BASED ON CROWDSOURCING STRATEGY

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## ABSTRACT

*This article takes the basics of forming a complex of crowd models as a national strategy and forecast indicators developed on the basis of its practical application, on the basis of which the results are analyzed for the coming years and explanations of effectiveness are described.*

**KEY WORDS:** *crowd models, mass assessment, innovation, innovation, stability, financial flow, modernization, fundamentals of strategic management.*

Today, working with software and developing each strategy and model has become a traditional strategic management activity. Programming methods are not complex, algorithmic approaches in strategies and models have improved economic engineering activities. The application, based on a crowdsourcing model, is in practice considered an efficient platform that mainly acts as a central technology service.

Forecasting based on crowdsourcing model is a widely used forecasting method in developed countries. The significance of forecasting based on a crowdsourcing model in making major strategic and operational decisions of developed oil and gas enterprises is not only innovative, but also occupies a high place in alternative enterprise management due to the probable performance indicators of investment activities. Its main advantage when tabulating forecast indicators is that in this forecast the need for relevant data on the indicators of previous years is not very great. Companies such as UBS (financial services company), AbbVie (pharmaceutical company), and Procter & Gamble (consumer products manufacturer) widely use forecasting methods based on crowdsourcing models.

Crowdsourced forecasting takes into account the following aspects and summarizes the indicators:

1. Status quo of the organizational and economic situation when studying the trend of the consensus forecast level changes are made in the coating;
2. Quality scores are also taken into account when predicting based on the crowdsourcing model;
3. Able to highlight the most important indicators when aggregating forecast indicators;
4. Forecasting the market U and X in the forecast based on the crowdsourcing model and the probability-based forecasting method opens up opportunities for widespread application;

1. Industry-specific open innovation market risk reduction and mitigation services are considered as a forecasting outcome.

Based on the crowdsourcing strategy, an improved understanding of the crowdsourcing model is acquired in terms of its ability to complement each other in the development of innovation and investment activities of oil and gas industry enterprises and ensure the rational application of strategic planning measures . in ensuring continuity of production. The crowd-directive strategy can be used in other sectors and areas of industry to increase the efficiency of innovation and investment activities.

Based on the crowdsourcing strategy, we use several forecasts to predict the effectiveness of innovation and investment activities of oil and gas enterprises. In this case, we schematically apply the combined forecasting method for the crowdsourcing model developed by Korean economists Tae Hwa Ri and Kyungwan Ryu:<sup>1</sup>

$$y^T + 1 = \beta_0 + \beta_1 x^T + 1,1 + \beta_2 x^T + 1,2 + \beta_{kx_0}^T + 1, k + e^T + 1(1);$$

$$C_j: y = \beta_0^j l + \beta_1^j x_1 + \beta_2^j x_2 + \dots + \beta_e^j x_e + e^j(2);$$

As a result of connecting and intersecting combinations, a matrix equation is formed:

<sup>1</sup> Rhee T., Keunquan R. *Crowdsourcing economic forecasting: combining individual forecasts using Bayesian model averaging*, 2022, 100-125. <http://sje.ac.kr/xml/28120/28120.pdf>



$$\Leftrightarrow S_j: y = X_j \begin{pmatrix} \beta_0^j \\ \beta_1^j \\ \vdots \\ \beta_j^j \end{pmatrix} + e^j(3);$$

$$\Leftrightarrow S_j: y = X\beta^j + e^j(4).$$

As part of the management strategy of Uzbekneftegaz JSC, practical guidance on the above methods and a forecast of the most necessary technical and economic indicators are summarized.

**3.3 – Table**

**- Economic Indicators Based on the use of crowdsourcing strategy in Uzbekneftegaz JSC, in percentage (2023 – 2032)<sup>2</sup>**

No	K – name of indicators	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
1	2	3	4	5	6	7	8	9	10	eleven	12
1.	Technological update	3.8	3.4	3.6	3.3	4.1	4.4	4.6	3.7	5.0	5.3
2.	Production efficiency	3.9	3.6	3.9	3.4	3.9	4.2	4.3	4.0	4.4	4.4
3.	Innovation activities	2.84	2.4	2.5	1.8	2.2	2.3	2.6	2.3	3.1	3.6
4.	Reducing production costs	0.9	1.4	1.9	1.4	1.8	2.1	2.5	2.2	2.6	2.7
5.	Intellectual capital	0.7	0.8	1.1	1.0	1.4	1.7	2.0	2.2	2.4	2.5
6.	Personnel shortage	0.4	0.4	0.2	0.2	0.3	0.2	0.2	0.2	0.1	0.2
7.	Professional growth	1.6	1.3	1.3	1.4	1.4	1.3	1.6	1.6	1.7	1.7
8.	Investment activities	5.85	5.5	5.8	4.9	5.3	5.7	6.0	5.5	6.6	6.8
9.	Transportation and storage	2.25	2.5	2.6	2.6	2.9	2.9	3.0	3.0	3.2	3.2
10.	Digital transformation	2.67	2.7	3.3	3.0	3.5	4.0	4.4	4.2	4.5	4.7
11.	Employee motivation	5.5	5.2	5.2	5.2	5.1	5.2	5.2	5.2	5.3	5.5

Technological innovation is projected to grow at an average rate of 4.8 percent over the next 10 years, with a 1.6-fold increase by 2032 compared to 2023. Although the updating of technological tools at the level of enterprises within a joint stock company does not cover fundamental changes, measures that can have a positive impact on the indicator of technological growth are considered within the framework of clustering, while ensuring the ratio of economic stable growth of enterprises to each other . As a result, the speed of continuous production increases, the production cycle is accelerated, technical and technological problems are eliminated during such types of labor activities as exploration, drilling, digging, processing, as well as transportation and storage. This is important for the rapid development of industry in the country.

It is worth noting here that for the rapid development of innovative and investment activities of oil and gas enterprises at the strategic level of “crowddirecting”, a “crowdsourcing” (crowddirecting) model, flexible to classifications of low cost and economic status, is used with the aim of proportional development of domestic industrial enterprises. To determine the effectiveness of improvement, Figure 3.3, presented on page 98 of the dissertation, presents a forecast of the effectiveness of innovation and investment activities with the transformation of digital technologies into the enterprise system for the period 2023-2032. percent and based on the application of the crowdwriting strategy presented in table 3.3, according to the forecast of technical and economic indicators, the average indicator for 2023 allowed an increase of 2.76 percent. Having determined the sum of both indicators, we see that the efficiency of innovation and investment activities of society and enterprises within society increases by 7.4 percent. It's also worth noting that most of this figure is made proportional to current data .

As a result of technological renewal, by 2032 production efficiency will increase by 1.2 times, and the average growth rate will be 7.6 percent. In 2024, production efficiency increased by 0.1%, but this is a large amount in terms of product and its monetary equivalent. In 2025, the efficiency index increased by 0.3 percent compared to 2024, and by 2026 it is likely to decrease by 0.3 percent. This is due to the fact that in combinatorial-matrix correlation regression, continuous growth of indicators leads to rapid decline of the enterprise, and this is observed with negative S, taking into account the decrease in indicators.

<sup>2</sup>Author's development





The growth rate of innovation activity within the framework of crowdsourcing is expected to be significant: in 2032 the probability of obtaining results is 1.7 times greater than in 2023, and only in 2024 - 0.3 percent compared to 2023, and in 2025-2024 - 0.1. percentage growth is expected. By 2026, the percentage share for this indicator decreased to 1.8%, but its steady growth can be observed in the coming years. In particular, in 2027 - 0.4%, in 2028 - 0.1% compared to 2027, in 2029 - 0.3% compared to 2028, and a sharp increase will be observed in 2031 and 2032 .

The change in the share of production cost reduction in a joint stock company will average 3.8% over the next 10 years. Achieving sustainable growth in product competitiveness is a complex socio-economic activity and an organization is expected to achieve successful results in this regard. For example, in 2024 it is expected to increase by 0.8% compared to 2023, and in 2026 – by 0.5% compared to 2025. It is expected that the reduction in production costs will be achieved due to the large impact of innovation and investment activities, and technological updates.

Intellectual capital is expected to grow by 3.1% by 2032 compared to 2023, taking into account important aspects such as access to technological tools, higher education, participation in innovation and career growth in the case of a joint stock company. forecast given. In 2023, this figure was 0.4 percent, and by 2032 it is expected to increase 6 times. Between 2023 and 2032, the change in growth rate will be 1.1 percent, representing steady progress. Overall, this organization can be considered a successful result, and its chain of results will increase its influence on the development of intellectual investment activities and increase its investment attractiveness by increasing it by several positions in international indicators.

Staffing shortages are the result of either a valuable employee's career advancement or his or her inability to secure a permanent position in each enterprise. At the same time, for Uzbekneftegaz JSC it will average 2.9% over the next 10 years. While this kind of chaos can arise within a meritocracy, it is likely that these metrics are based on their contribution to innovation performance.

Investment activity is projected at 5.3% in 2023, in 2024 compared to 2023 this figure will increase by 0.2%, in 2025 it will increase by 0.5% compared to 2023. This figure is expected to increase by 0.5% in 2027, despite the possibility of a decrease of 0.9% in 2026. The average growth rate over the next 10 years will be 10 percent. This is considered relevant in ensuring the investment attractiveness of the sector and can significantly reduce the share of risk in portfolio performance. As a result, the procedure for working with investment projects in the country will expand and their implementation will increase. This has a significant impact on the further development of our national economy.

Forecast indicators of the crowdsourcing strategy for transport and warehousing activities average 2.8% for the period from 2023 to 2032. In 2023 it was 2.2 percent, and by 2032 it is expected to grow another 1.4 times. Transportation and storage activities in the oil and gas industry mean the implementation of processes associated with the transportation and underground storage of containers, however, the scope of application of the crowd-directing strategy involves the interpretation of these activities as crowd-framing, that is, the participation of digital technologies in transportation and a forecast is given for the effectiveness of using innovative developments in the field storage. The growth trend of this indicator is considered stable and shows a stable 100-110 percent . This means a 78% increase in the likelihood of eliminating wait and delivery issues while maintaining production continuity.

Digital transformation is expected to reach 1.7 percent in 2023, with this figure expected to triple by 2032. Average growth over the next 10 years will be 3.6 percent. The implementation of the digital transformation process means the transformation of one's infrastructure into a digital one by providing it with digital technologies, starting from management activities and ending with the functioning of production in the fields. Accelerating future changes in the field requires regular updating of digitalization technologies. After all, all production processes in the oil and gas industry are mobile by nature, and by re-selecting and assembling these digital technologies, there is the potential to accelerate technological decline. Accordingly, it is necessary to ensure that digital transformation is carried out with attention to this aspect.

Employee motivation is aimed at expanding the capabilities of the enterprise and the employee by highlighting the researched forecast indicators within the framework of crowdfunding, within the framework of which employee training is carried out, assignment of appropriate positions in career growth, and financial incentives. It is formed by digitizing the employee's initials and the evaluation given to him in exchange for the employee's performance and contribution to his work. This is hidden crowdfunding, which means that the owner of the development, work management and similar project documents or private activities is secretly informed only of his contribution and votes are given to him. Transparent crowdfunding implies incentives for an employee who ensures the fulfillment of the requirements specified in the contract. Crowdfunding forms the basis for assessing the contribution of management to increasing the efficiency of labor in the production of groups and management teams. In our case, all this is taken into account, and the average growth is 5.2 percent, which means stable performance of crowdfunding. It also takes into account meritocracy and the innovation-diffusion state , and it is assumed that production specialists and talent holders will work in harmony



to ensure the effectiveness of crowdsourcing activities. All such chain connections serve to effectively increase the main technical and economic indicators in ensuring balanced production.

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## FORMULATION AND EVALUATION OF AMPHOTERICIN B LOADED NANOSPONGES FOR TOPICAL DELIVERY

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Article DOI: <https://doi.org/10.36713/epra16413>

DOI No: 10.36713/epra16413

### ABSTRACT

*In this work, solvent evaporation was used to create nanosponges, which were then combined with Amphotericin B to create a gel. The Nanosponges formulations were made utilising the solvent evaporation process with PVA acting as a co-polymer and rate-retarders HP-β Cyclodextrin and HPMC K4M. Fourier Transform Infra-Red (FTIR) spectroscopy was used to determine the drug's compatibility with formulation ingredients. We looked at the drug entrapment effectiveness, production yield, and surface shape of nanosponges. Using scanning electron microscopy, the Nanosponges' shape and surface morphology were investigated. Scanning electron microscopy demonstrated that the Nanosponges were spherical and porous. SEM images showed that the Nanosponges were spherical in all of their variations, but at larger ratios, drug crystals were visible on the surface of the nanosponge. An increase in the polymer concentration led to an increase in the drug/polymer ratio (1:1 to 1:3), which is growing in order. However, beyond a certain concentration, it was found that the particle size reduced as the drug-to-polymer ratio developed. All formulations have an average particle size that falls between 331.5 and 463.9 nm. The range of 82.21 to 97.78% was found for the drug content of various formulations. The drug release of the optimised formulation was found to be 94.92 % in 9 hours, while the entrapment efficiency of the other formulations ranged from 92.75 to 94.45%. According to stability experiments, the optimised gel formulation remained stable for a period of 15 days.*

**KEYWORDS** - Amphotericin B, HP β-Cyclodextrin, Nanosponges, Drug Delivery System.

### INTRODUCTION

Nanosponges are porous polymeric delivery systems that are small spherical particles with large porous surface. These are used for the passive targeting of cosmetic agents to skin, there by achieving major benefits such as reduction of total dose, retention of dosage form on the skin and avoidance of systemic absorption. These nanosponges can be effectively incorporated onto topical systems for prolonged release and skin retention thus reducing the variability in drug absorption, toxicity and improving patient compliance by prolonging dosing intervals. Nanosponges can significantly reduce the irritation of drugs without reducing their efficacy. The size of the nanosponges ranges from 250nm-1µm in diameter. Nanosponges are porous, polymeric microspheres that are mostly used for prolonged topical administration. Nanosponges are designed to deliver a pharmaceutically active ingredient efficiently at minimum dose and also to enhance stability, reduce side effects, and modify drug release profiles.



The Nanosponge Delivery System (MDS) is a unique technology for the controlled release of topical agents and consist of macro porous beads, typically 10-25 microns in a diameter, loaded with active agent. When applied to the skin, the nanosponge releases its active ingredient on a time mode and also in response to other stimuli (rubbing, pH, etc.). MDS technology is being used currently in cosmetics, over the counter (OTC) skin care, sunscreens and prescription products.

## MATERIALS AND METHODS

### MATERIALS

The gift sample Amphotericin B is from Hetero Labs Hyderabad, while the Polyvinyl alcohol (PVA) and HPMC K4M polymers are from Colorcon Goa and other polymers such as HP  $\beta$  cyclodextrin, Xanthan gum, Guar gum and Karaya gum from B.M.R.Chemicals, Hyderabad, Propylene Glycol (ml), Ethanol and Triethanolamine (2% v/v) (ml) are from Narmada Chemicals, Hyderabad.

### METHODS

#### PRE-FORMULATION STUDIES

Prior to the development of nanosponge dosage form, it is essential that certain fundamental physical and chemical properties of the drug molecule alone and when combined with excipients are determined. This first learning phase is known as pre-formulation. The overall objective of the pre-formulation is to generate information useful to the formulator in developing stable and bioavailable dosage forms which can be mass produced.

#### Determination of absorption maximum ( $\lambda_{max}$ )

The wavelength at which maximum absorption of radiation takes place is called as  $\lambda_{max}$ . This  $\lambda_{max}$  is characteristic or unique for every substance and useful in identifying the substance. For accurate analytical work, it is important to determine the absorption maxima of the substance under study. Most drugs absorb radiation in ultraviolet region (407nm), as they are aromatic or contain double bonds. Accurately weighed 10mg Amphotericin B separately was dissolved in 10 ml of methanol in a clean 10ml volumetric flask. The volume was made up to 10ml with the same which will give stock solution-I with concentration 1000 $\mu$ g/ml. From the stock solution-I, 1ml was pipette out in 10ml volumetric flask. The volume was made up to 10ml using methanol buffer to obtain stock solution-II with a concentration 100 $\mu$ g/ml. From stock solution-II, 1ml was pipette out in 10ml volumetric flask. The volume was made up to 10ml using methanol buffer to get a concentration of 10 $\mu$ g/ml.

#### Drug excipient compatibility study

The drug and excipient compatibility was observed using Fourier Transform – Infra Red spectroscopy (FT-IR). The FT-IR spectra obtained from Bruker FT-IR Germany (Alpha T) was utilized in determining any possible interaction between the pure drug and the excipients in the solid state. The potassium bromide pellets were prepared on KBr press by grounding the solid powder sample with 100 times the quantity of KBr in a mortar. The finely grounded powder was then introduced into a stainless steel die and was compressed between polished steel anvils at a pressure of about 8t/in<sup>2</sup>. The spectra were recorded over the wave number of 4000 to 400cm.

#### Preparation of Nanosponges

**Table 1**  
**Formulation table of Amphotericin B loaded nanosponges**

S. No	Excipients	F1	F2	F3	F4	F5	F6
1	Amphotericin B (gm)	1.0	1.0	1.0	1.0	1.0	1.0
2	PVA (gm)	1.0	1.0	1.0	1.0	1.0	1.0
3	HPMC K 4M (gm)	1.0	1.5	2.0	--	--	--
4	HP $\beta$ cyclodextrin	--	--	--	1.0	1.5	2.0
5	Ethanol (ml)	10	10	10	10	10	10
6	Water	100	100	100	100	100	100

#### Method of Preparation of Nanosponges

Nanosponges using different proportions of  $\beta$ -cyclodextrin, HP  $\beta$ -cyclodextrin, HPMC KM4 as rate retarding polymer and co-polymers like polyvinyl alcohol were prepared by solvent evaporation method. Disperse phase consisting of Amphotericin B (1gm) and



requisite quantity of PVA dissolved in 10 ml solvent (ethanol) was slowly added to a definite amount of PVA in 100ml of aqueous continuous phase, prepared by using magnetic stirrer. The reaction mixture was stirred at 1000 rpm for three hours on a magnetic stirrer for 2 hours. The nanosponges formed were collected by filtration through whatman filter paper and dried in oven at 50°C for 2 hours. The dried nanosponges were stored in vacuum desiccator to ensure the removal of residual solvent.

### Evaluation parameters of Nanosponges

The Nanosponges were evaluated for various parameters

Entrapment efficiency

Scanning electron microscopy

Particles size and shape

### Entrapment Efficiency

The 100mg of the Amphotericin B weight equivalent nanosponge was analyzed by dissolving the sample in 10ml of distilled water. After the drug was dissolved 10ml of clear layer of dissolved drug is taken. Thereafter the amount of drug in the water phase was detected by a UV-spectrophotometric method at 407nm (U.V Spectrophotometer, systronics). The test was repeated with another nanoparticulate sample. The amount of the drug in the suspension was analyzed by centrifugation at 500rpm for 5 mins and by measuring the concentration of the drug in the clear supernatant layer by the UV-spectrophotometric method. The concentration of the drug is determined with the help of calibration curve. The amount of drug inside the particles was calculated by subtracting the amount of drug in the aqueous phase of the suspension from the total amount of the drug in the nanoparticle suspension. The entrapment efficiency (%) of drug was calculated by the following equation.

$$\% \text{ of Drug entrapment} = \frac{\text{Mass of drug in nanosponge}}{\text{Mass of drug used in formulation}} \times 100$$

### Scanning Electron Microscopy

The morphological features of prepared nanosponges are observed by scanning electron microscopy at different magnifications.

### Particle size and shape

Average particle size and shape of the formulated nanosponges was determined by using Malvern Zetasizer ZS using water as dispersion medium. The sample was scanned for determination of particle size.



**Figure 1**

**Photography representation of Malvern zeta sizer used for finding particle size & zeta analysis**

### Formulation of Nanosponge loaded gel:

The polymer was initially soaked in water for the gel for 2 hrs and dispersed by agitation at 600rpm by using magnetic stirrer to get smooth dispersion. Triethanolamine (2% v/v) was added to neutralise the pH. The previously prepared optimized nanosponge was thereby added and permeation enhancer's Propylene glycol were added as ethanolic solution to the aqueous dispersion. The composition of nanosponge gels is shown in table 4:



**Table 2**  
**Formulation of Nanosponge loaded gel**

Ingredients	F7	F8	F9
Optimize Nanosponge(mg)	400	400	400
Xanthan gum	100		
Guar gum		100	
Karaya gum			100
Propylene Glycol(ml)	1	1	1
Distilled Water(ml)	5	5	5
Triethanolamine(2% v/v)(ml)	1	1	1

### Visual Appearance and Clarity

Visual appearance and Clarity was done under fluorescent light against a white and black back ground for presence of any particulate matter.

### pH

The pH of the prepared in-situ gelling system after addition of all the ingredients was measured using pH meter.

### Drug Content uniformity

Drug content uniformity of prepared in-situ gelling systems was carried out using Spectrophotometric method. The assay of these formulations was carried out by pipetting 1 ml of all optimized formulations, and it was diluted up to 100 ml of Simulated Tear Fluid (pH 6.8). The formulations were shaken for 2-3 min, until it gives a clear gel solution. The solution was filtered through Millipore membrane filtrate (0.45um) and the absorbance was measured at 407 nm using UV-Visible spectrophotometer.

### In-Vitro Gelation

The Gelling capacity of the formulations containing different ratio of poloxamer and HPMC was evaluated. It was performed by placing a drop of polymeric solution in vials containing 1 ml of Simulated Tear Fluid, freshly prepared and equilibrated at 37°C, and visually assessed the time for gelation as well as time taken for the gel to dissolve.

### Rheological Studies

It is the important factor to determine the residence time of drug in the eye by considering the viscosity of the instilled formulation. The prepared solutions were allowed to gel at physiological temperature and then the viscosity determination was carried out by using Brookfield viscometer (Brookfield DV+Pro, Brookfield Engineering Laboratories, Middleboro, MA, USA).

### In vitro Drug Release studies of nanosponge gel formulations

In vitro evaluation studies of topical gel were performed using dialysis membrane method. The membrane was soaked for 12hr in 0.1NHCl and the receptor compartment was filled with 6.8pH phosphate buffer. Test vehicle equivalent to 100mg was applied evenly on the surface of the membrane. The prepared membrane was mounted on the cell carefully to avoid entrapment of air bubbles under the membrane. The whole assembly was maintained at 37°C, and the speed of stirring was kept constant (600 rpm) for 12 hrs. Aliquots of drug sample (4mL) was taken at 1hr time intervals and replaced with equal amount of freshly prepared buffer. Each experiment was performed in triplicate. The drug analysis was done using UV spectrophotometrically at 247nm.

### Modelling of Dissolution Profile

In the present study, data of the in vitro release were fitted to different equations and kinetic models to explain the release kinetics of Amphotericin B from the matrix tablets. The kinetic models used were Zero order equation, First order, Higuchi release and Korsmeyer-Peppas models.

## RELEASE ORDER KINETICS

### Mathematical models

Different release kinetic equations (zero-order, first-order, Higuchi's equation and Korsmeyer-peppas equation) were applied to interpret the release rate of the drug from matrix systems for the optimized formulation. The best fit with higher correlation ( $r^2$ ) was calculated.



**Zero-order model**

Drug dissolution from dosage forms that do not disaggregate and release the drug slowly can be represented by the equation

$$Q_t = Q_0 + K_0t$$

**First Order Model**

Release behavior generally follows the following first order equation:

$$\text{Log } C = \text{Log } C_0 - kt/2.303$$

**Higuchi model**

In a general way the Higuchi model is simply expressed by following equation

$$Q = K_H \cdot t^{1/2}$$

**Korsmeyer-Peppas model**

Korsmeyer et al.(1983) derived a simple relationship which described drug release from a polymeric system equation. To find out the mechanism of drug release, first 60% drug release data were fitted in Korsmeyer-Peppas model,

$$M_t / M_\infty = Kt^n$$

In this model, the value of n characterizes the release mechanism of drug as described in the following table.

**Table 3**

**Drug transport mechanisms suggested based on ‘n’ value.**

S. No	Release exponent	Drug transport mechanism	Rate as a function of time
1	0.5	Fickian diffusion	$t^{-0.5}$
2	$0.45 < n < 0.89$	Non -Fickian transport	$t^{-n-1}$
3	0.89	Case II transport	Zero order release
4	Higher than 0.89	Super case II transport	$t^{-n-1}$

To find out the exponent of n the portion of the release curve, where  $M_t / M_\infty < 0.6$  should only be used. To study the release kinetics, data obtained from in vitro drug release studies were plotted as log cumulative percentage drug release versus log time.

**Stability studies**

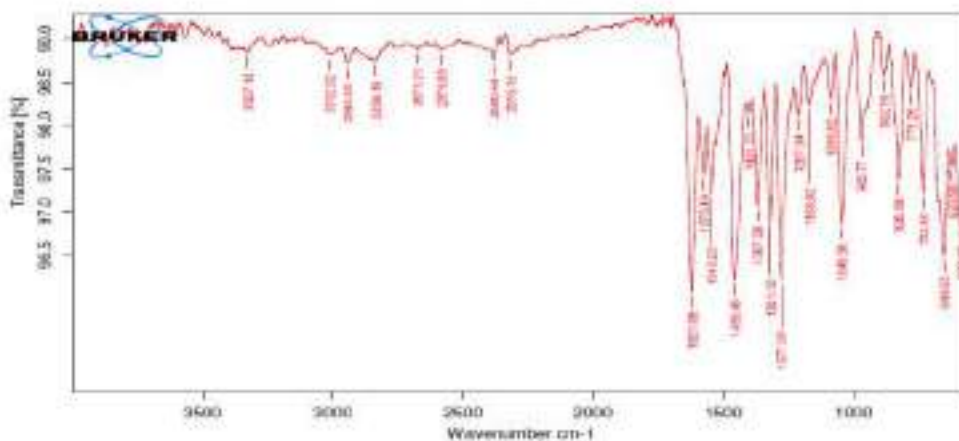
The optimized formulation were kept for stability studies for 3 months at room temperature ( $30 \pm 2^\circ\text{C}$ ), at refrigerator temperature ( $4 \pm 2^\circ\text{C}$ ) and at accelerated condition ( $40 \pm 2^\circ\text{C}$ , 75%RH) in programmable environmental test chamber (Remi) to determine physical and chemical stabilities. The formulation was evaluated visually and for entrapment efficiency and drug release after 5, 10 and 15 days.

**RESULTS AND DISCUSSION**

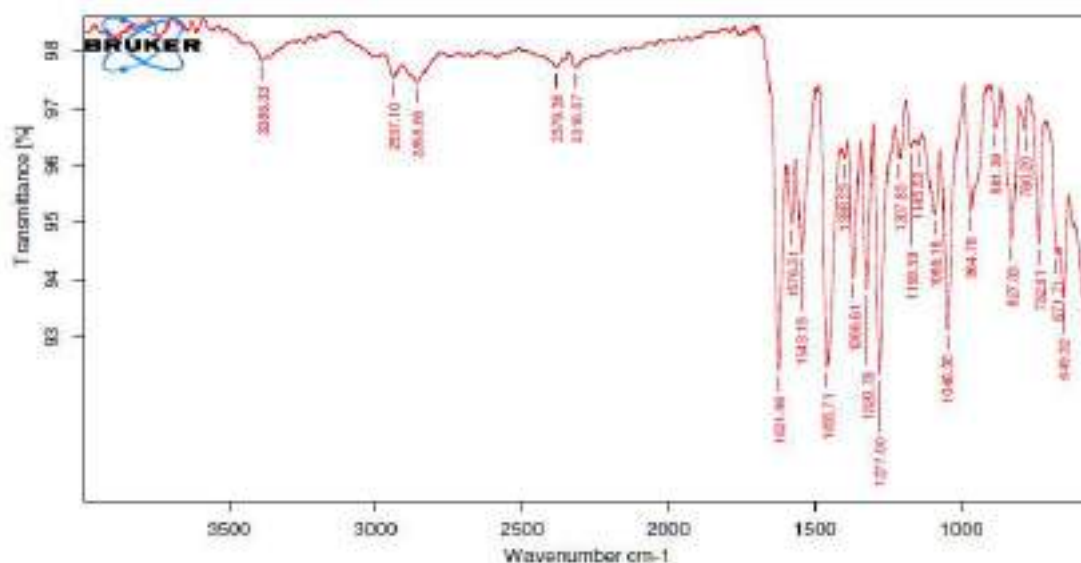
**PREFORMULATION STUDY**

**Drug excipient compatibility**

Drug and excipient compatibility was confirmed by comparing spectra of FT-IR analysis of Pure drug with that of various excipients used in the formulation.



**Figure 2 FTIR Spectra of Pure Drug**



**Figure 3**  
**FTIR Spectra of drug and excipients**

#### Spectral data

The major functional groups are primary amine, nitro, and carbonyl group

Obtained peak in IR spectra are as follows.

#### IR (KBr) cm-1

732.50-732.61(CH- bending), 1169 (C=C stretching), 1277 (C-O stretch in aromatic compound), 1456 (C-C “oop” in aromatic compound) 1543 (N-N stretching).The spectral data confirm the structure of the compound.

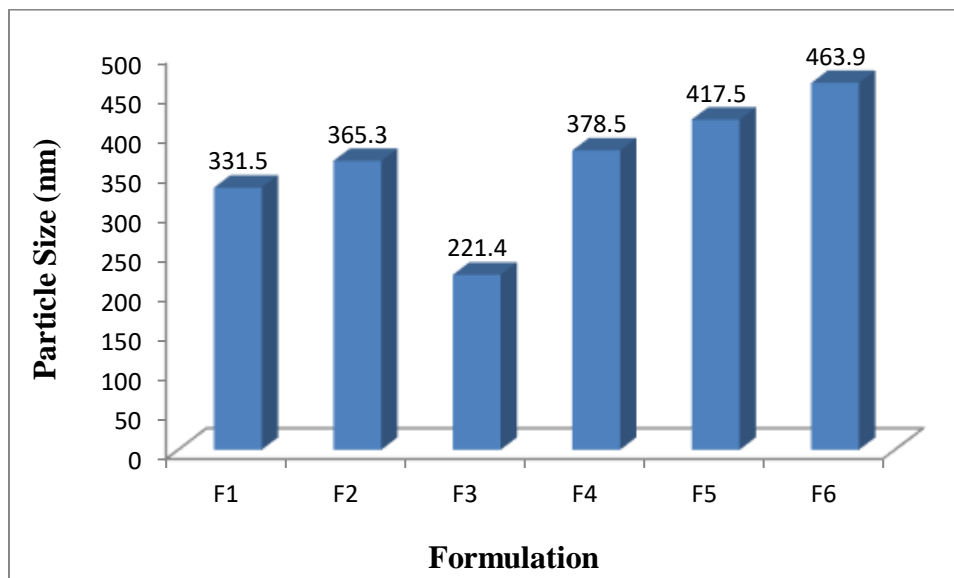
It indicates that the drug was intact and has not reacted with the excipients used in the formulation and hence they are compatible. Hence, it can be concluded that the drug is in free-state and can release easily from the polymeric network in the free form.

### EVALUATION STUDIES

#### A) Particle size analysis of Nanosponges

The particle size of the nanosponge was determined by optical microscopy and the nanosponges were found to be uniform in size. The average particle size of all formulations ranges from 331.5 nm to 463.9 nm which is in increasing order due to the increase in the concentration of polymer but after certain concentration it was observed that as the ratio of drug to polymer was increased, the particle size decreased. This could probably be due to the fact that in high drug to polymer ratio, the amount of polymer available per nanosponge was comparatively less. Probably in high drug-polymer ratios less polymer amounts surround the drug and reducing the thickness of polymer wall and nanosponges with smaller size were obtained. By performing the particle size analysis, it is concluded that the formulation has the particle size varies with the concentration of polymer drug ratio.



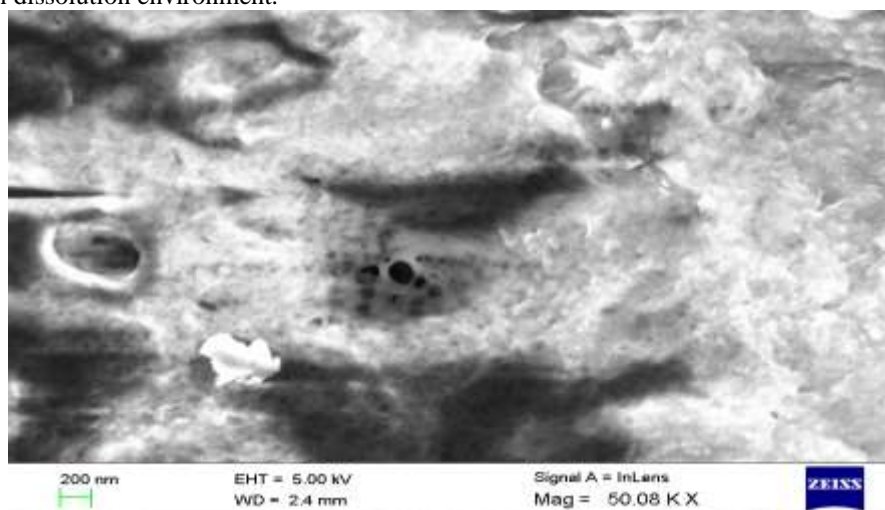


**Figure 4**  
**Particle size of Nanosponges**

#### **B) Morphology determination by scanning electron microscopy (SEM)**

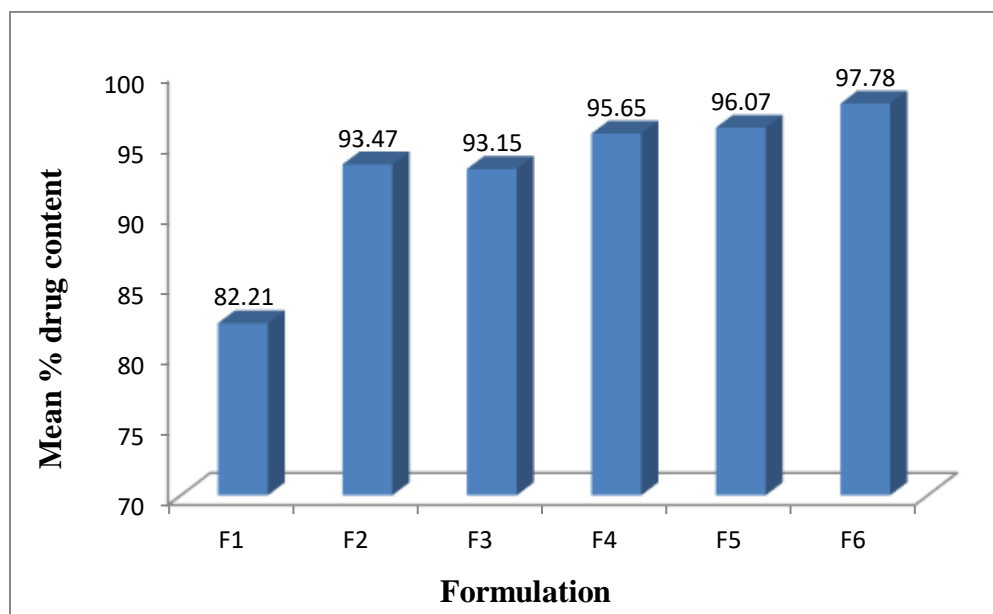
Scanning electron microscopy (SEM) was used to determine the Morphology of the prepared nanosponges. SEM is useful for characterizing the morphology and size of microscopic specimens with particle size as low as 10 -10 to 10 -12 grams. The sample was placed in an evacuated chamber and scanned in a controlled pattern by an electron beam. Interaction of the electron beam with the specimen produces a variety of physical phenomena that, when detected, are used to form images and provide elemental information about the specimens.

It was observed that the nanosponges were spherical, and uniform with no drug crystals on the surface. The shape of the nanosponges affects the surface area and surface area per unit weight of spherical nanosponges. The irregular shape of the particles may affect dissolution rate present in dissolution environment.



**Figure 5**  
**Nanosponges structure optimized formulation (F3)**

**Drug content:** The drug content of the formulated Nanosponges (F1-F6) was found in the range of 82.21 to 97.78% respectively.



**Figure 6**

**Drug content of Formulated Nanosponges**

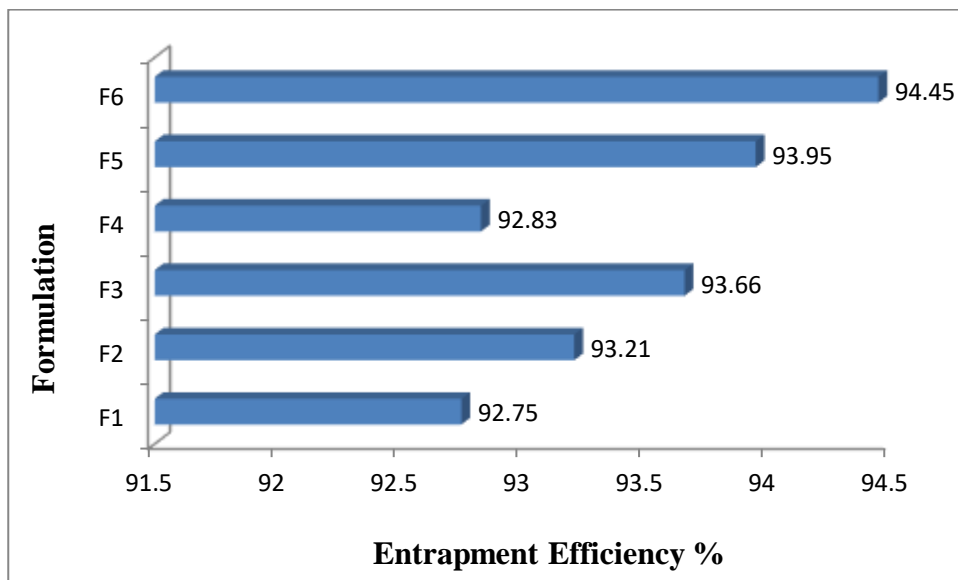
The percentage of drug content of formulation F1 was found to be 82.21%, formulation F2 was found to be 93.47%, formulation F3 was found to be 93.15%, formulation F4 was found to be 95.65%, formulation F5 was found to be 96.07%, and formulation F6 was found to be 97.78%.

**Entrapment efficiency**

It is calculated to know about the efficiency of any method, thus it helps in selection of appropriate method of production. After the preparation of formulations the Practical yield was calculated as Nanosponges recovered from each preparation in relation to the sum of starting material (Theoretical yield).

It can be calculated using following formula.

$$\text{Entrapment efficiency} = \frac{\text{Practical yield}}{\text{Theoretical yield}} \times 100$$



**Figure 7**  
**Entrapment efficiency of Nanosponges**

The entrapment efficiency of formulation F1 was found to be 92.75%, formulation F2 was found to be 93.21%, formulation F3 was found to be 94.66%, formulation F4 was found to be 92.83%, formulation F5 was found to be 93.95% and formulation F6 was found to be 93.42%. Among all the formulations F3 shows high entrapment efficiency of 94.66%.

**Table 4**  
**Evaluation Parameters of Nanosponges**

S. No	Formulation code	Particle size (nm)	Mean % drug content	Entrapment efficiency %
1	F1	331.5	82.21	92.75
2	F2	365.3	93.47	93.21
3	F3	221.4	93.15	93.66
4	F4	378.5	95.65	92.83
5	F5	417.5	96.07	93.95
6	F6	463.9	97.78	94.45

**Visual Appearance and Clarity**

**Table 5**  
**Visual appearance and clarity of all (F7-F9) formulations**

Formula	Appearance	Clarity
F7	Transparent	Clear
F8	Transparent	Clear
F9	Transparent	Clear

The clarity and appearance of the all formulations (F7-F9) were observed clear and transparent and the formulations were liquid at both room temperature and refrigerated conditions.



### pH Measurement

All the formulations have satisfactory pH ranging from 6.7 to 6.9, which is acceptable for ocular delivery.

### Drug Content Uniformity

The drug content of the formulated gels was found in the satisfactory ranging from 94.37 to 97.21 %.

**Table 6**  
**pH measurements and Drug content of formulated gels (F7-F9)**

Formulation	pH	Drug content
F7	6.6	94.37 ± 0.48
F8	6.7	96.43 ± 0.62
F9	6.8	97.21 ± 0.73

### Gelling Capacity

**Table 7**  
**Gelling capacity of all formulations (F7-F9)**

Formulation	Gelling capacity at 25 °C	Gelling capacity at 37°C
F7	---	+
F8	----	++
F9	---	+++

+ Gelation within 50-60 seconds dissolves rapidly

++ Gelation within 60 seconds and remains stable for 3 hours

+++ Gelation within 60 seconds and remains stable for 6 hour

All the formulations showed instantaneous gelation when contact with buffer. However the nature of the gel formed depended on the concentration of the polymer used.

### Rheological Studies

**Table 8**  
**viscosity studies of formulations:**

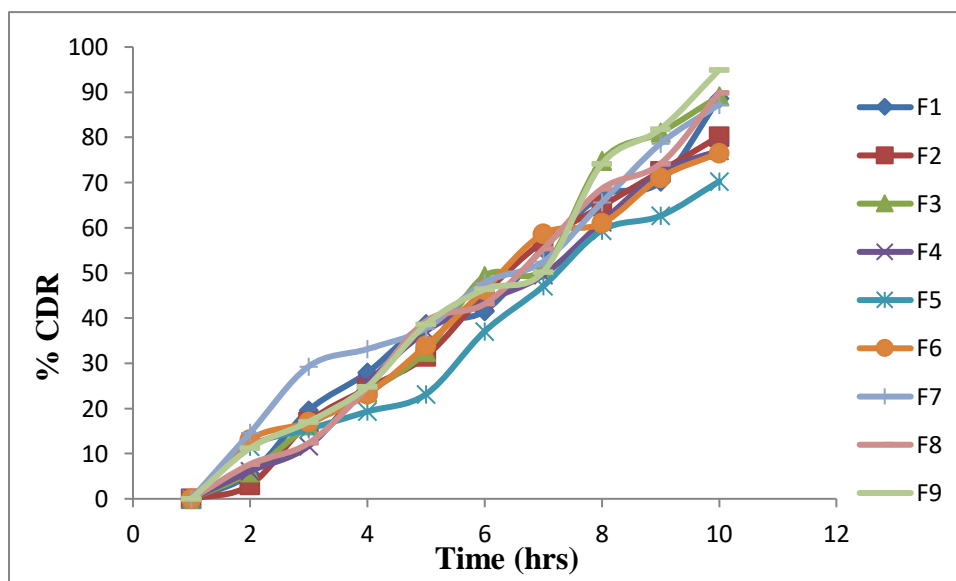
Angular Velocity (rpm)	F7	F8	F9
10	103.0	107.1	113.3
100	96.0	97.2	98.4

The viscosity of the formulations was evaluated by a Brookfield DV 3 programmable rheometer, using varying the angular velocities or shear rate. The viscosity of formulations F7-F9 ranged from 96.0 to 113.3cps.at 100 rpm. As the angular velocity increased viscosity decreased indicating no thixotropic property.



**Table 9**  
***In vitro* diffusion studies of Amphotericin B Nanosponge incorporated gel**

S. No	Time (Hrs)	% of Drug release								
		F1	F2	F3	F4	F5	F6	F7	F8	F9
1	1 Hrs	5.54	3.06	5.96	8.12	6.58	13.14	14.64	7.68	11.23
2	2 Hrs	19.62	16.96	16.24	11.71	15.42	16.98	29.32	12.36	17.06
3	3 Hrs	27.96	24.46	23.59	25.63	19.32	23.16	33.16	24.64	24.80
4	4 Hrs	38.68	31.58	32.64	37.12	23.16	33.94	37.72	39.32	38.64
5	5 Hrs	41.58	45.42	49.32	43.68	37.06	46.31	47.86	43.16	46.38
6	6 Hrs	55.42	57.06	50.91	49.54	47.08	58.64	52.48	55.32	50.22
7	7 Hrs	67.06	64.8	74.81	61.24	59.42	60.98	65.60	68.64	74.12
8	8 Hrs	70.19	72.48	81.10	72.26	62.64	71.11	78.62	74.19	81.86
9	9 Hrs	88.64	80.22	89.12	77.12	70.26	76.56	87.28	89.86	94.92

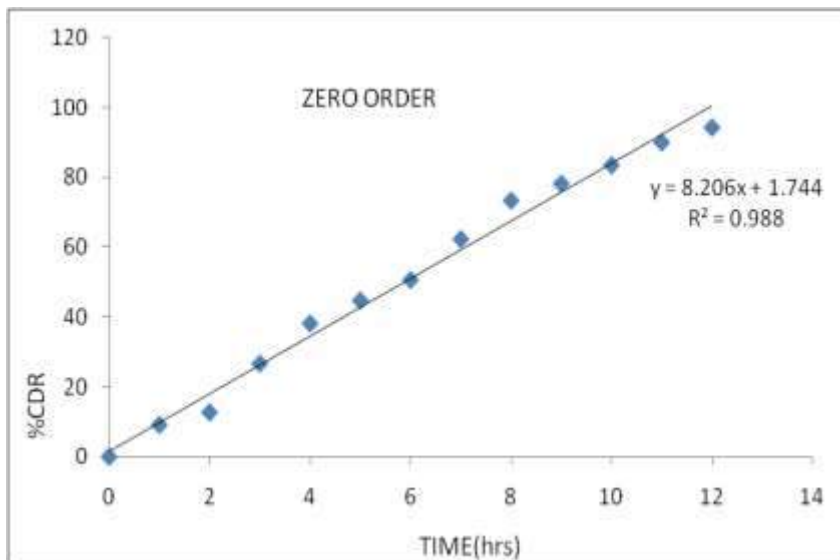


**Figure 8**  
**Percentage of drug release graph F1-F9**

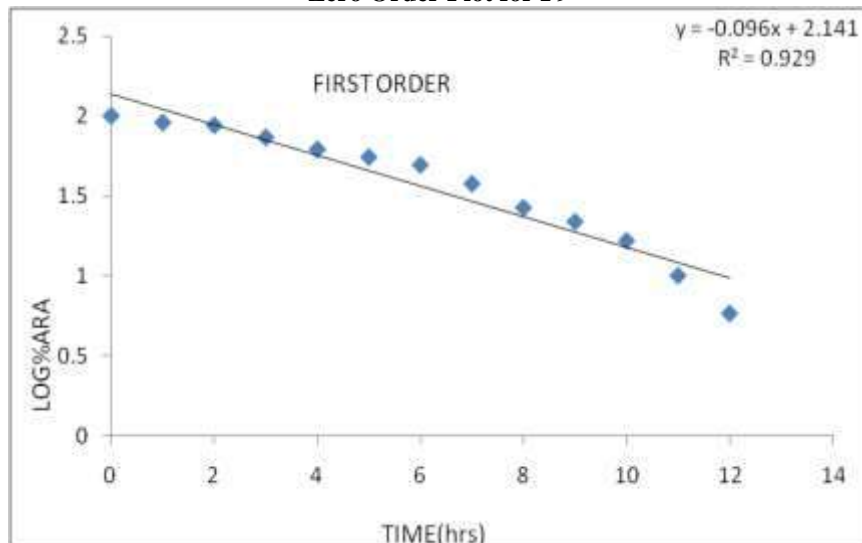
From the above invitro studies it was observed that the formulations containing xanthan gum, guar gum and karaya gum as polymers shows that the maximum drug release was found in the nanosponge formulation containing Karaya gum, whereas xanthan gum and guar gum didn't show sustained drug release. So formulation F9 containing karaya gum was considered as the optimized formulation. Drug release kinetics was performed for F9 formulation.



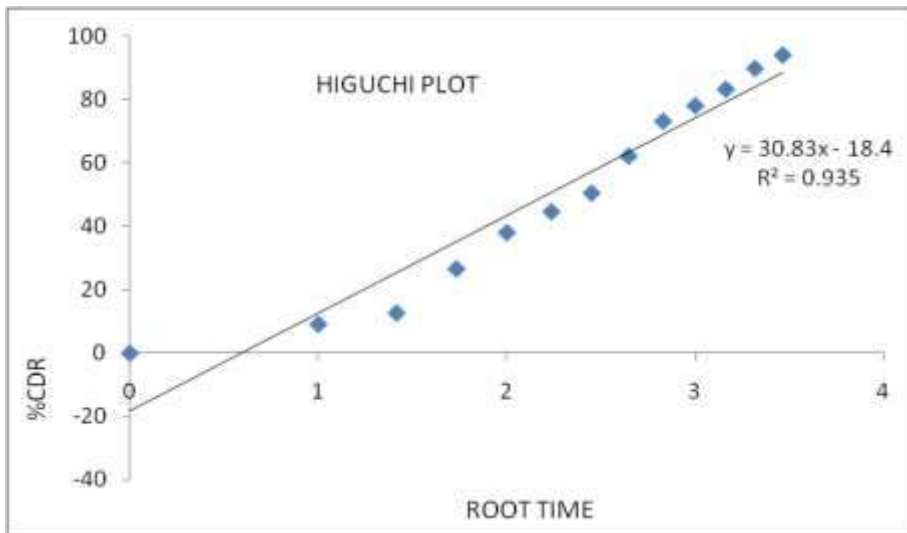
**Kinetics Analysis for F9**



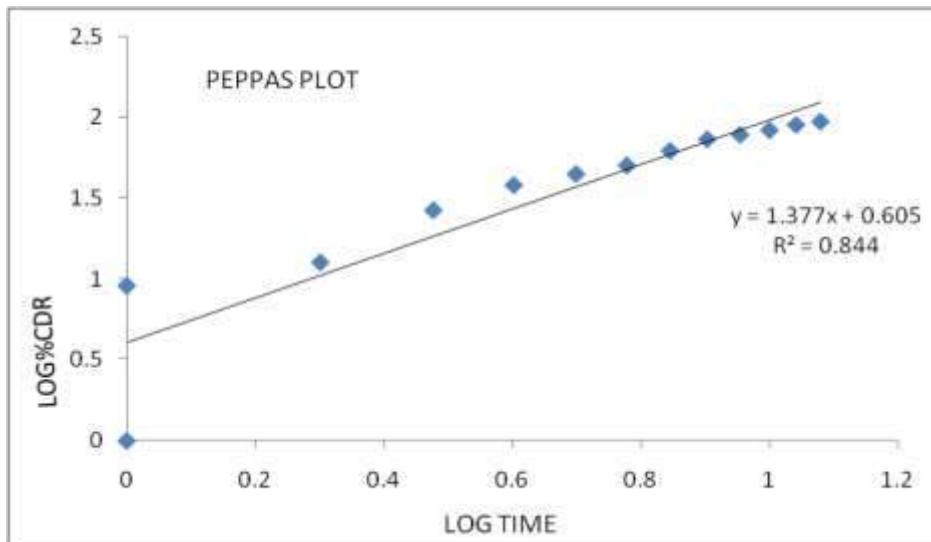
**Figure 9**  
**Zero Order Plot for F9**



**Figure 10**  
**First Order Plot for F9**



**Figure**  
**Higuchi Plot for F9**



**Figure 12**  
**Korsmeyer Peppas Plot for F9**

**Regression values of F9**

**Table 10**  
**Regression values**

S. No	Zero order	First order	Higuchi	Peppas
Code	R <sup>2</sup>	R <sup>2</sup>	R <sup>2</sup>	R <sup>2</sup>
F9	0.988	0.929	0.935	0.844

The optimized formulation F9 has coefficient of determination ( $R^2$ ) values of 0.988, 0.929, 0.935 and 0.844 for Zero order, First order, Higuchi and Korsmeyer Peppas respectively. A good linearity was observed with the Zero order, the slope of the regression line from the Higuchi plot indicates the rate of drug release through the mode of diffusion and to further confirm the diffusion mechanism, data was fitted into the Korsmeyer Peppas equation which showed linearity with n value of 1.382 for optimized formulation. Thus n value



indicates the Super case transport mechanism. Thus, the release kinetics of the optimized formulation was best fitted into Higuchi model and showed zero order drug release with super case transport mechanism.

### Stability studies

**Table 11**  
**Gelling capacity of all formulations (F9)**

Formulation	Gelling capacity at 25 °C	Gelling capacity at 37°C
5 <sup>th</sup> day	+++	+++
10 <sup>th</sup> day	+++	+++
15 <sup>th</sup> day	+++	+++

### Drug Content Uniformity:

**Table 12**  
**Drug content of Formulated gels:**

Formulation Code	Drug content
5 <sup>th</sup> day	99.04 ± 0.61
10 <sup>th</sup> day	98.82 ± 0.15
15 <sup>th</sup> day	98.86 ± 0.58

From the stability studies of Nanosponges loaded gel using karaya gum, it was observed that the drug content and gelling capacities were found to be satisfactory as there was not much decrease in the gelling capacity and drug content at the time of formulation and after the 15days.

### CONCLUSION

The optimized formulation F9 has good gelling property with pH of 6.8, and drug content of 97.21% and coefficient of determination ( $R^2$ ) values of 0.988, 0.929, 0.935 and 0.844 for Zero order, First order, Higuchi and Korsmeyer Peppas respectively. A good linearity was observed with the Zero order, the slope of the regression line from the Higuchi plot indicates the rate of drug release through the mode of diffusion and to further confirm the diffusion mechanism, data was fitted into the Korsmeyer Peppas equation which showed linearity with n value of 1.382 for optimized formulation. Thus n value indicates the super case transport mechanism. Thus, the release kinetics of the optimized formulation was best fitted into Higuchi model and showed zero order drug release with super case II transport mechanism. The stability studies revealed that the formulated Nanosponge gel was found to be stable for the period of 15days.

### Acknowledgement

I would like to thank Principal sir (Dr. Kamal Has-san) St. Mary's Group of Institutions, Deshmukhi (Village), Pochampally (Mandal), Yadadri Bhuvana-giri (Dist), Telangana-508284, India.

**Conflict of Interest:** The authors attest that they have no conflict of interest in this study.

**Funding Support:** The authors declare that there is no financial support for the current study.

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# **PATTERN, PREDICTORS AND MANAGEMENT OF STUDENTS' CLASSROOM CONDUCT DISORDERS IN POLYTECHNICS IN NIGERIA**

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Article DOI: <https://doi.org/10.36713/epra16479>

DOI No: 10.36713/epra16479

## **ABSTRACT**

*The study investigated the pattern, predictors and management of students' classroom conduct disorders in polytechnics in Nigeria. The descriptive survey design was adopted for the study. 390 randomly selected lecturers from 13 polytechnics as sample. The sample consisted of 236 (60.5%) males and 154 (39.5%) females, federal polytechnics 129 (33%),*

*state polytechnics 151 (39%) and private polytechnics 110 (28%). Three instruments (Pattern of Classroom Conduct Disorders Index, Predictors of Classroom Conduct Disorders Scale and Management of Classroom Conduct Disorders Checklist) were used for data collection. Two tailed t-test was used to test for significance on the pattern, predictors and management of classroom conduct disorders. Based on the results, significant difference was found in the mean response of male and female lecturers in the*

*11 (P – CCDI) subscales measured on the pattern of students' classroom conduct disorders. Also, significant difference was found in the mean response of male and female lecturers in 3 (P – CCDS) subscales measured on the predictors of students' classroom disorders. A further significant difference was found in the mean response of male and female lecturers in 9 (M – CCDC) subscales measured on the impact of lecturers management strategies of students' classroom conduct disorders. It was recommended among others that federal and state governments should resuscitate bursary and scholarship awards for students, polytechnic management should develop. Strategies in dealing with students having personality abnormalities and polytechnic management should ensure that lecturers abide by the terms of their employment in order to maintain acceptable conduct.*

## **INTRODUCTION**

It was unthinkable some decades ago that students in higher institutions will exhibit classroom conduct disorders. Lindgren in Bukar (2021) sees conduct disorder as, “consisting of behaviour that is grossly disturbing to others and may in fact be directed against them, in that it is hostile, aggressive, disruptive and/or disobedient”. Chukuma (2011) notes that, “conduct disorders are the type that are more likely to come to the attention of teachers”. Chukuma (2011) posits further that, “any behaviour that interferes with teaching and learning can be considered a behaviour problem”. That is the case with conduct disorders. These conduct disorder problems were only associated with primary school pupils. For instance, Lindgren in Chukuma (2011) reports that, conduct problems are more likely to affect the behaviour of children who are relatively free of anxiety – that is, who do not have enough “normal anxiety” to feel any concern for the rights and feelings of others or for the consequences and implication of their behaviour. In this sense, conduct disorders in the classroom is associated with immaturity. Later, conduct disorders crept into secondary school students thereby disrupting teaching and learning. For instance, soldiers in 1977 were sent to secondary schools to maintain discipline (Chukuma, 2000; Arikewuyo & Dosumu in Bukar, 2021; Chukuma, 2011). Now, students in higher institutions are displaying the same conduct disorders usually exhibited by pupils and students in secondary schools due to immaturity. Chukuma (2022) observed several classes where lectures took place and notes that conduct disorders are endemic in higher institutions. The concern now is that higher institution students are not supposed to be found with these conduct disorders because they are thought to be matured. The consequence of conduct disorders in the classroom is serious because it disrupts teaching and learning. This concern is also borne out of the fact that the manifestation of behavioural problems within the school system obstructs teaching and learning thereby derailing the entire purpose of the educational system; if not checked appropriately (Owusu & Manger in Chukuma, 2011).



### ***The Problem***

Polytechnic students are thought to be matured and that is why the kind of disciplinary measures taken in primary and secondary schools are not meted out on them. However, it has been observed by lecturers that conduct disorders exist among students of polytechnics in the class room thereby causing disruptions of lectures. Due to the consequences they have on teaching and learning, lecturers have been forced to manage the problem. These measures are yet to be empirically determined.

While the pattern and predictors of conduct disorders among primary school pupils and secondary school students have been determined empirically (Arikewuyo & Dosumu in Bukar, 2021; Chukuma, 2000 & Chukuma, 2011), those of the polytechnics are yet to be empirically determined. Also, it is not clear whether the management strategies of lecturers' are making impact on students' classroom conduct disorders because of their prevalence. Therefore, the present study is directed at determining the pattern, predictors and the impact of management strategies of lecturers in dealing with classroom conduct disorders of polytechnic students during lectures. It is hypothesized that:

- a. Lecturers will not differ significantly in their opinion on the pattern of students' classroom conduct disorder.
- b. There is no significant difference among lecturers in their opinion on the predictor of students' classroom conduct disorders.
- c. There is no significant main impact of lecturers' strategies on the management of students' classroom conduct disorders.

### **Justification**

The prevalence of conduct disorders among polytechnic students during lectures has been observed. The consequence is that they disrupt teaching and learning. The study can be justified because the findings will provide lecturers information on the pattern of conduct disorders once they occur in the class room so that attention can be drawn to them. Besides, the findings of the study will assist lecturers in identifying the predictor of conduct disorders in the class room. This will enable them to adopt effective strategies in containing conduct disorders. Sometimes, lecturers adopt some strategies to manage classroom conduct disorders. Yet, the conduct disorders persist. The findings of the study will expose lecturers to strategies that are effective in managing conduct disorders in the classroom during lectures.

## **LITERATURE REVIEW THEORETICAL FRAMEWORK**

### ***Conflict Theory of Conduct Disorders***

There is a theoretical position supported by empirical evidence on the desirability or undesirability of conduct disorders in the classroom during lectures (Arikewuyo & Dosumu in Bukar, 2021). This position argues that conflicts, controversies, breakdown in communication and differences in perceptions among groups (including students) with regards to acceptable and unacceptable norms of behaviours, values, beliefs and expectations are normal integral parts of schools as social organizations that are located in particular socio-economic and cultural communities. Instead of being perceived as dysfunctional, these conflicts, controversies and differences in perceptions should be used to promote among teachers and students, better understanding and the development of social reasoning abilities. Rather, these conflicts should be used to create friendly, humane and cooperative classroom climates that are conducive to optimal social and emotional development, learning and teaching (Schwartz & Bilsky in Bukar, 2021; Valsiner & Cairns in Chukuma, 2011; Nicholls & Hazard, 1993; Schwartz, 1994).

### ***Reinforcement Theory of Conflict Disorders***

This Theory belongs to the behaviourist school (Bruno in Bukar, 2021). It explains that the problem of the individual is one of adjustment to adaptive behaviours that conforms to the norms of society. This explanation is on learning that has nothing to do with motivational and emotional state. The Theory is based on operant principle of conditioning in which actions are shaped by their consequences. This means, behaviours are contingent upon reinforcers.

For quite some time it has been observed that students in the polytechnic system in Nigeria have been exhibiting conduct disorders in the classroom during lectures. These have taken a toll on lecturers who have to cope with managing conduct disorders and the delivery of lectures. According to Lindgren in Chukuma (2003), "conduct problems consist of behaviour that is grossly disturbing to others and may in fact be directed against them, in that it is hostile, aggressive, disruptive and/or disobedient". It sometimes involves delinquency and psychopathology (Chukuma, 2011). Researchers such as Quay in Chukuma (2011) and Vonisser et al in Bukar (2021) posit that conduct disorder is characterized by overt aggression, both verbal and physical, disruptiveness, negativism, irresponsibility and defiance of authority – which are all at variance with the behavioural expectations of the school and other social institutions.

Non-conforming behaviours (Arikewuyo & Dosumu in Bukar, 2021) are those actions that cannot be tolerated within the school system.



They are behaviours of deviations from the set norms of the society, which are considered to be disruptive and have negative effect on educational development. Ordinary observation by Chukuma (2022) while lecturing and watching other lectures in the classroom elsewhere in polytechnics reveal late attendance, low attention, side talk, movement, distraction, hunger, poor writing material possession, excuses, sleeping, yawning and noise. Others are absent mindedness, poor grasping level, gross indiscipline, obstruction, whispering, making phone calls and watching video films from phones while lectures are on in the classroom. Chukuma (2022) also reveals that lecturers were busy managing (controlling) their classes alongside lecturing which often wear them down.

Several predictors of conduct disorders in the school system (Al-Hassan in Bukar,2021; Chukuma, 2011) have been explained as in conflict, non-conformity, familybackground, peer group pressure, rebellious disposition and gender. In all of these, lecturers are to contend with these predictors in order to prevent them from occurring (Chukuma, 2000).

In order to manage classroom conduct disorders, Chukuma (2022) observes that lecturers send students away from the class when they disturb, prevent them from entering the class when they are late, warn them, report students to authorities, counsel students, seize handsets, arrange test when some students are not in class, change their sitting positions and leave the class in protest of conduct disorders. However, there are no empirical data on the effectiveness of these classroom management strategies. Arikewuyo and Dosumu in Bukar (2021) note that, “the inability of parents, teachers and society to assess the causes and management of these behaviours may impede the development of social reasoning among adolescents in schools”.

## METHODOLOGY

### *Research Design*

Descriptive survey method was adopted for the study. This method was found suitable because of the possibility of reaching the subjects in scattered locations in Nigeria (Afolabi, 1993 in Chukuma, 2022). Again, it will be possible to gather data from a sample of the population and to generalize the findings obtained from an analysis of the sample to the entire population (Afolabi, 1993 in Chukuma, 2009: 104). Osuala (2001 in Chukuma, 2000: 104) also posits that, “surveys identify present conditions and point to present needs”.

### *Sample*

Baseline socio-demographics of the participants reveal that they are made up of lecturers who are the objects of the study. 390 participants took part from 13 selected polytechnics. These consist of Federal Polytechnic, Oko 40, Federal polytechnic, Nasarawa 30, National Institute of Construction Technology, Uromi 35, Yaba College of Technology 40, Kogi State Polytechnic, Lokoja 30, Tatari Ali Polytechnic, Bauchi 35, Edo State Polytechnic, Usen 20, Akwa Ibom State Polytechnic, Ikot Osurua, Ikot Ekpene 40 and Adamawa State Polytechnic, Yola 30, Bellarks Polytechnic, Kwale, Delta State 20, Bolmor Polytechnic, Dugbe, Ibadan 20, Citi Polytechnic, Dutse Alhaji, Abuja 20, Kings Polytechnic, Ubiaja, Edo State 30. The participants consisted of 236 (60.5%) males and 154 (39.5%) females, federal polytechnics 129 (33%), state polytechnics 151 (39%) and private polytechnics 110 (28%). the study was delimited to federal, state and private polytechnics in Nigeria.

### *Instrumentation*

The following instruments were used for data collection:

- a. Pattern of Classroom Conduct Disorders Index (P – CCDI)

The P – CCDI was developed by the researchers as a self-report scale to identify the pattern of classroom conduct disorders among polytechnics students. The design of the P – CCDI is clustered around two sections namely socio-demographics such as gender, student, lecturer and name of institution. The other section is designed on a Likert-type five point scale with response mode of strongly agree, agree, undecided, disagree and strongly disagree. In scoring the items, respondents would have a possible total score of 5 ranging from 1 – 5 which represents a respondent’s opinion. The higher the score, the more influenced the respondent is by the scale. Respondents would be required to tick against a response that represents their opinion. In all, the scale is a 14 item questionnaire. A test-retest reliability reported a Pearson r of 0.63 for the scale. The present study adopted the P – CCDI as an effort in identifying the pattern of polytechnic students’ classroom conduct disorders due to its high reliability in pilot studies.



**b. Predictors of Classroom Conduct Disorders Scale (P – CCDS)**

The P – CCDS is a paper and pencil test development by the researchers as a self- report scale to identify the polytechnic students’ classroom conduct disorders. The design of the P – CCDS is clustered around two sections namely socio- demographics such as gender, student, lecturer and name of institution. The other section is designed on a Likert-type five point scale with a response mode of strongly agree, agree, undecided, disagree and strongly disagree. Each answer in the P – CCDS is scored on a scale value of 1-5. The higher the score, the more influenced the respondent is by the scale. The respondents are required to tick against the response that best represent their opinion. In all, the scale is a 9 item questionnaire. A test-retest reliability reported a Pearson r of 0.58 and was found usable in the study.

**c. Management of Classroom Conduct Disorders Checklist (M – CCDC)**

The M – CCDC was developed by the researchers as a self-report scale to measure the impact of lecturers’ management of polytechnic students’ classroom conduct disorders. The design of the M – CCDC is clustered around two sections namely socio-demographics such as gender, student, lecturer and name of institution. The other section is designed on a Likert-type four point scale with response modes of not at all, at times, some of the time and most of the time. Each answer in the M – CCDC is scored on a scale value of 0 – 3. The higher the score, the more influenced the respondent is by the scale. The scale was developed as a paper and pencil test that would require the respondents to tick against a response that represents their opinion. In all, the scale is a 13 item questionnaire. A test-retest reliability reported a Pearson r of 0.71 for the scale.

**Procedure**

Four research assistants assisted in the administration of the instrument which lasted for four weeks. They were specially trained on the procedures of the exercise which includes behaviour problems of students and the technical nature of some aspects of the instrument.

**Data Analysis**

The statistical technique used in the study is the two tailed t-test to test for significance. Confidence level is set at 0.05.

**RESULTS**

Hypothesis 1: Lecturers will not differ significantly in their opinion on the pattern of students’ classroom conduct disorders.

Results of the test are presented in a pooled summary in Table 1:

**Table 1: t – test Summary on Pattern of Students’ Classroom Conduct Disorders.**

Variables	Df	t	P	t-Crit.	Sig.
Students’ late class attendance.	388	1.42	0.158	1.96	NS
Students’ attention at lecture is low.	388	2.20	.028	1.96	S
Side talk among students during lectures.	388	2.71	0.11	1.96	S
Students’ movement during lectures.	388	.48	.630	1.96	NS
Students’ distraction during lectures.	388	2.33	0.41	1.96	S
Students’ exhibition of poor writing material possession during lectures.	388	3.01	0.22	1.96	S
Students’ excuses for lack of requirement in class during lectures.	388	2.66	0.61	1.96	S
Students’ noise making during lectures.	388	2.99	.70	1.96	S
Students’ incompatibility during lectures.	388	0.18	0.28	1.96	NS
Students’ absent mindedness during lectures.	388	3.48	0.66	1.96	S
Students’ inability in putting down note during lectures.	388	2.01	.28	1.96	S
Students’ unpreparedness for lectures.	388	2.22	.42	1.96	S
Low grasping level of students’ during lectures.	388	2.55	0.24	1.96	S
Students’ obstruction during lectures.	388	2.01	0.26	1.96	S
N = 390					p <0.05



Results in Table 1 indicate significant difference in the mean response of male and female lecturers in 11 (P – CCDI) subscales measured as in students’ attention at lectures is low ( $t = 2.20$ ,  $df = 388$ ,  $p < 0.05$ ), side talk during lectures ( $t = 2.71$ ,  $df = 388$ ,  $p < 0.05$ ), students distraction during lectures ( $t = 2.33$ ,  $df = 388$ ,  $p < 0.05$ ), students’ exhibition of poor writing material possession during lectures ( $t = 3.01$ ,  $df = 388$ ,  $p < 0.05$ ), students’ excuses for lack of requirement in class during lectures ( $t = 2.66$ ,  $df = 388$ ,  $p < 0.05$ ), students’ noise making during lectures ( $t = 2.99$ ,  $df = 388$ ,  $p < 0.05$ ), students’ absent mindedness during lectures ( $t = 3.48$ ,  $df = 388$ ,  $p < 0.05$ ), students’ inability in putting down note during lectures ( $t = 2.01$ ,  $df = 388$ ,  $p < 0.05$ ), students’ unpreparedness for lectures ( $t = 2.22$ ,  $df = 388$ ,  $p < 0.05$ ), low grasping level of student during lectures ( $t = 2.55$ ,  $df = 388$ ,  $p < 0.05$ ) and students’ obstruction during lectures ( $t = 2.01$ ,  $df = 388$ ,  $p < 0.05$ ).

However, there was no significant difference in the mean of male and female lecturers in 3 (P – CCDI) subscales measuring students’ late class attendance ( $t = 1.42$ ,  $df = 388$ ,  $p < 0.05$ ), students’ movement during lectures ( $t = .48$ ,  $df = 388$ ,  $p < 0.05$ ) and students’ incompatibility during lectures ( $t = 0.18$ ,  $df = 388$ ,  $p < 0.05$ ).

**Hypothesis 2:**

There is no significant difference among lecturers in their opinion on the predictors of students’ classroom conduct disorders.

Results of the test are presented in a pooled summary in Table 2:

Table 2:t – test summary on Predictors of Students Classroom Conduct Disorders

Variables	Df	t	P	t-Crit.	Sig.
Conflict with school system.	388	0.81	0.11	1.96	NS
Non conformity with school rules and regulation.	388	1.24	0.22	1.96	NS
Family background.	388	0.26	0.31	1.96	NS
Peer group pressure.	388	1.01	0.64	1.96	NS
Rebellious disposition.	388	0.82	0.12	1.96	NS
Gender.	388	0.17	0.41	1.96	NS
Personality profile.	388	2.01	0.10	1.96	S
Lecturer subject incompetence.	388	3.04	0.20	1.96	S
Lecturer conduct.	388	2.84	0.06	1.96	S

N = 390

p < 0.05

Results in Table 2 indicate significant difference in the mean response of male and female lecturers in 3 (P – CCDS) subscales measuring personality profile ( $t = 2.01$ ,  $df = 388$ ,  $p < 0.05$ ), lecturer subject incompetence ( $t = 3.04$ ,  $df = 388$ ,  $p < 0.05$ ) and lecturer conduct ( $t = 2.84$ ,  $df = 388$ ,  $p < 0.05$ ). However, results also indicate no significant difference in 6 (P – CCDS) subscales measuring conflict with school system ( $t = 0.81$ ,  $df = 388$ ,  $p < 0.05$ ), non conformity with school rules and regulations ( $t = 1.24$ ,  $df = 388$ ,  $p < 0.05$ ), family background ( $t = 0.26$ ,  $df = 388$ ,  $p < 0.05$ ), peer group pressure ( $t = 1.01$ ,  $df = 388$ ,  $p < 0.05$ ), rebellious disposition ( $t = 0.82$ ,  $df = 388$ ,  $p < 0.05$ ) and gender ( $t = 0.17$ ,  $df = 388$ ,  $p < 0.05$ ).

**Hypothesis 3:**

There is no significant main impact of lecturers’ strategies on the management of students’ classroom conduct disorders.

Results of the test are presented in a pooled summary in Table 3:



Table 3: t – test Summary on Impact of Lecturers’ Management Strategies of Students’ Classroom Conduct Disorders.

Variables	Df	T	P	t-Crit.	Sig.
Send students away from classroom for disturbance.	388	2.01	0.10	1.96	S
Prevent students from entering classroom for late coming.	388	2.11	0.09	1.96	S
Warning against late coming.	388	0.78	0.63	1.96	NS
Report students to school authority.	388	2.55	0.33	1.96	S
Counsel students.	388	1.22	0.41	1.96	NS
Rebuke students.	388	1.31	0.22	1.96	NS
Ignore students.	388	0.58	0.28	1.96	NS
Seize handsets in use during lectures.	388	2.17	0.14	1.96	S
Arrange test when some students are not in class.	388	2.02	0.16	1.96	S
Change their sitting positions.	388	.67	0.52	1.96	NS
Walk out of class in protest.	388	.17	0.23	1.96	NS
Reduction in test scores as punishment.	388	2.18	0.19	1.96	S
Give students more assignment.	388	2.14	0.21	1.96	S
Threat of failing students.	388	2.16	.101	1.96	S
Strict on disciplinary rules.	388	3.34	0.06	1.96	S
Praise for good conduct.	388	0.24	.610	1.96	NS

N = 390

p < 0.05

Results in Table 3 indicate significant difference in the mean response of male and female lecturers in 9 (M – CCDC) subscales measuring send students away from classroom for disturbance (t = 2.01, df = 388, p < 0.05), prevent students from entering classroom for late coming (t = 2.11, df = 388, p < 0.05), report students to school authority (t = 2.55, df = 388, p < 0.05), seize handsets in use during lectures (t = 2.17, df = 388, p < 0.05), arrange test when deviant students are not in class (t = 2.02, df = 388, p < 0.05), reduction in test scores (t = 2.18, df = 388, p < 0.05), give students more assignments (t = 2.14, df = 388, p < 0.05), threat of failing students (t = 2.16, df = 388, p < 0.05) and strict on disciplinary rules (t = 3.34, df = 388, p < 0.05).

However, results also indicate no significant difference in 7 (M – CCDC) subscales measuring counsel students (t = 1.22, df = 388, p < 0.05), rebuke students (t = 1.31, df = 388, p < 0.05), ignore students (t = 0.58, df = 388, p < 0.05), change sitting position due to side talk (t = .67, df = 388, p < 0.05), walk out of class in protest (t = .17, df = 388, p < 0.05) and praise for good conduct (t = 0.24, df = 388, p < 0.05).



## SUMMARY OF MAJOR FINDINGS

The following major findings were generated in the study:

1. Significant difference exist in the mean response of male and female lecturers in 11 (P – CCDI) subscales measuring the pattern of students’ classroom conduct disorders asfollows:
  - a. Students’ attention at lectures is low.
  - b. Side talk during lectures.
  - c. Students’ distraction during lectures.
  - d. Students’ exhibition of poor writing material possession during lectures.
  - e. Students’ excuses for lack of requirement during lectures.
  - f. Students’ noise making during lectures.
  - g. Students’ absent mindedness during lectures.
  - h. Students’ inability in putting down note during lectures.
  - i. Students’ unpreparedness for lectures.
  - j. Low grasping level of students during lectures.
  - k. Students’ obstruction during lectures.
2. Significant difference exist in the mean response of male and female lecturers in 3 (P – CCDS) subscales measuring the predictors of students classroom conduct disordersduring lectures as follows:
  - a. Personality profile.
  - b. Lecturer subject incompetence.
  - c. Lecturer conduct.
3. Significant difference exist in the mean response of male and female lecturers in 9 (M – CCDC) subscales measuring the impact of lecturers management strategies ofstudents’ classroom conduct disorders as follows:
  - a. Send students away from classroom for disturbance.
  - b. Prevent students from entering classroom for late coming.
  - c. Report students to school authority.
  - d. Seize handsets in use during lectures.
  - e. Arrange test when deviant students are not in class.
  - f. Reduction in test scores as punishment.
  - g. Threat of failing students.
  - h. Strict on disciplinary rules.
  - i. Give students more assignments.

## DISCUSSION

The main objective of the study was to determine the pattern, predictors and the impact ofstudents’ classroom disorders in polytechnic in Nigeria. The discussion is presented inthe following:

### *Pattern of Students’ Classroom Conduct Disorders*

From the results and analysis, the study found significant differences in the mean response of male and female lecturers in 11 (P – CCDI) subscales measuring students’ attention at lectures is low, side talk during lectures, students’ distraction during lectures, students’ exhibition of poor writing material possession during lectures, students’ excusesfor lack of requirement during lectures, students’ noise making during lectures andstudents absentmindedness during lectures. Others are students’ inability in putting down notes during lectures, students’ unpreparedness for lectures, low grasping level of students during lectures and students’ obstruction during lectures. These findings are consistent with those of Chukuma (2022) that students of polytechnics display lateattendance, low attention, side talk, movement, distraction, hunger, poor writing material possession, watching video films from phones while lectures are on and so on. These findings can be justified in the following:

- a. The poor economic situation in Nigeria has rendered the people poor. Most aspects of the finding have to do with poverty among students – a situation where they lack writing materials, sleep in class and low grasping due to hunger, move up and downin search of one thing or the other, obstruct classes because they want to go and look for money and come late to school or even be absent due to lack of transport fare.





b. The perception of students about education is what is manifesting in this pattern of classroom conduct disorders – where students see education as not contributing to their well-being. When students graduate, they cannot find jobs and make comparison between themselves with those who did not attend higher institutions; but are well to do, make students to exhibit this kind of behaviours in the classroom.

c. Curriculum irrelevance may make students to exhibit patterns of classroom conduct disorders. Alhassan (1992) reports that;

*There are three main ways in which pupils, (likewise polytechnic students) experience of the curriculum could be adverse: if they found it irrelevant if they would not meet the demand it made; and if it left them with a sense of failure.*

The findings are further consistent with that of Turner (1975) in Chukuma (2011) that identified teacher (this applies to lecturers also) weakness in skill areas.

#### *Predictors of Students' Classroom Conduct Disorders*

From the results and analysis, the study found significant differences in the mean responses of male and female lecturers in 3 (P – CCDS) subscales measuring personality profile, lecturer subject incompetence and lecturer conduct. These findings are consistent with that of Chandler in Chukuma (2011), “that delinquent boys were less able than non- delinquent boys to take the perspective of another person”. That is, the cognitive capacity to appreciate other peoples’ views was severely lacking. This is the case with some polytechnic students as a result of personality abnormalities resulting in strong arguments in classrooms that are unnecessary and disturbing. The findings are also consistent with those of Alhassan (1992) on teacher conduct that, “ten teachers (25%) highlighted abuse of office – in the staff-room or irregular attendance by their colleagues as developments that may likely influence pupils into playing truancy”. This conduct of teachers in primary/secondary schools are also found among lecturers. Sometimes, students react to it. According to Alhassan (1992), “it has also been observed that truanting teachers do not have respect in school”. Sometimes too, students copy truancy from lecturers. For instance, Alhassan (1992) remarks that, “negative models are likely to be provided by teachers starting lesson late and ending them early”.

#### *Management of Classroom Conduct Disorders*

From the results and analysis, the study found significant differences in the mean responses of male and female teachers in 9 (M – CCDC) subscales measuring send students away from classroom for disturbance, prevent students from entering classroom for late coming, report students to school authority, seize handsets in use during lectures and arrange test when deviant students are not in class. Others are give students more assignment, reduction in test scores as punishment, threat of failing students and strict on disciplinary rules. These findings are consistent with the observation of Chukuma (2022), that these strategies have proved effective in managing polytechnic students’ conduct disorders – that is, the stricter the lecturers on managing classroom disorders, the more the students comply with the treatment. However, the findings are inconsistent with those of Biddle (1964) in Chukuma (2011) that, “a warm, firm, democratic or emphatic teacher is the most competent”. The findings are also inconsistent with that of Adzenga (1986) in Chukuma (2011) that, “authoritarian approaches to human relationship are ineffective”. Incidentally, the findings represent authoritarian approaches. Notwithstanding, the findings can be justified:

- a. It has been observed that lecturers who apply these management strategies on behaviour compliance have been more successful (Chukuma, 2022).
- b. There are students who will want to test the will of lecturers of which only these approaches in the findings will be effective.
- c. Some students may outsmart lecturers in their management of classroom conduct disorders. For instance, Flaherty (1976) reports that, “where the disruptive student is intelligent, such a student will outsmart the teachers and parents in their treatment plan and may not comply with it”.
- d. The findings do not relate to corporal punishment; but one of adjustment initiatives by lecturers for compliance.

## **CONCLUSION**

Based on the findings of the study, it is concluded that:

1. The pattern of students’ classroom conduct disorders are:
  - a. Students’ attention at lectures is low.
  - b. Side talk during lectures.



- c. Students' distraction during lectures.
  - d. Students' exhibition of poor writing material possession during lectures.
  - e. Students' excuses for lack of requirement during lectures.
  - f. Students' noise making during lectures.
  - g. Students' absent mindedness during lectures.
  - h. Students' inability in putting down note during lectures.
  - i. Students' unpreparedness for lectures.
  - j. Low grasping level of students during lectures.
  - k. Students' obstruction during lectures.
2. The predictors of students classroom conduct disorders are:
    - a. Personality profile.
    - b. Lecturer subject incompetence.
    - c. Lecturer conduct.
3. The management of students' classroom conduct disorders for impact are:
    - a. Send students away from classroom for disturbance.
    - b. Prevent students from entering classroom for late coming.
    - c. Report students to school authority.
    - d. Seize handsets in use during lectures.
    - e. Arrange test when deviant students are not in class.
    - f. Reduction in test scores as punishment.
    - g. Threat of failing students.
    - h. Strict on disciplinary rules.
    - i. Give students more assignments.

### Recommendations

Based on the results and conclusion of the study, the following recommendations are made:

- a. Government should resuscitate bursary and scholarship awards provided by the Federal Government and state governments to students due to chronic poverty among students.
- b. School authorities should organize orientation for students on the need for education.
- c. Government, the National Board for Technical Education and polytechnic managements should review the curricular of polytechnics to meet current needs of students.
- d. Polytechnic management should develop strategies in dealing with students with personality abnormalities in order to reduce conflict with lecturers.
- e. Polytechnic managements should ensure that competent lecturers are employed.
- f. Polytechnic management should ensure that lecturers abide by the terms of their employment in order to maintain acceptable conduct.
- g. Lecturers should be strict on disciplinary rules in order to ensure compliance by students.

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## **ANALYSIS OF FOREIGN EXPERIENCE OF TRAINING FUTURE ENGINEERS FOR INNOVATION ACTIVITY**

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### **ABSTRACT**

*The article deals with the training of engineering technologists for innovative activity in the context of global trends and best practices of international education. The main attention is paid to the analysis of key aspects such as cluster approach in education, participation in international programmes, innovative teaching methods and cooperation with industrial partners. Examples of successful practices from leading universities around the world, such as MIT, Aalto University and Technical University of Munich (TUM) are presented. Based on the analysis of foreign experience, recommendations are offered to improve the system of training engineers-technologists in Uzbekistan, aimed at integrating modern technologies and teaching methods, expanding international cooperation and strengthening links with industry.*

**KEY WORDS:** *innovation activity, training of engineering technologists, cluster approach, international educational programmes, project-oriented learning, interdisciplinary programmes, cooperation with industry.*

### **INTRODUCTION**

In today's world, where innovation is becoming the basis of economic growth and a key factor in solving global problems, the role of process engineers is particularly important. These professionals, working at the forefront of technological developments, play a key role in the process of creating and implementing new technologies, which in turn contributes to sustainable development and improved quality of life on a global scale. Their skills and knowledge are the basis for the development of new products, processes and services that open up new opportunities for business, science and society as a whole. In light of the need to adapt to the ever-changing technological environment, educational systems in many countries of the world prioritise the training of process engineers with innovative thinking and the ability to adapt quickly to new realities.

Foreign experience of implementation of cluster policy at the state level in various countries with developed industrial economy is analysed. The relevance of formation and development of scientific-innovative clusters in Uzbekistan is substantiated [1]. The proposed training technology called cluster is aimed at reducing the dropout rate of students in technical universities. It involves the generalization of fundamental knowledge, practical experience and subject activity, turning education into a dialogue of communication and joint activity [2]. The role of innovative industrial clusters in ensuring sustainable development of the region, especially in knowledge-intensive and high-tech sectors of the economy, is emphasised [3]. A comparative analysis of the implementation of cluster policy in foreign and Russian practice is carried out, the characteristic features of clusters and their role in improving the competitiveness of territories and economies are highlighted [4]. Industrial clusters, having advantages in the concentration of resources, can create a favourable entrepreneurial environment and increase the chances of success for young entrepreneurs [5].

The cluster approach in education, which acts as a strategy for integrating theory and practice, highlights key elements aimed at better preparing students for real-life professional environments. Firstly, practical experience gained by students while working on actual projects allows them to apply and deepen theoretical knowledge, contributing to the development of professional skills and competences, which is the basis for a successful career [6]. Secondly, the active participation of employers in the educational process, including contributions to curriculum development and teaching, ensures that the educational content is updated in line with current labour market requirements. Finally, co-operation between educational institutions and industry in the field of innovation and technology transfer accelerates the introduction of innovations into production, thus strengthening the competitiveness of the economy at the international level [7].

The cluster approach finds its application in various countries, demonstrating effective co-operation between educational institutions and industry. In Germany, for example, clusters in the fields of mechanical, electronics and automotive engineering, such as the Automotive Cluster in Bavaria, promote synergies between academia and industry. In the US, the Manufacturing USA programme is leading to the creation of innovative institutes, including the Lightweight Manufacturing Institute (LMI) in Detroit, which focuses



on lightweight materials research for the automotive industry. And in Finland, the "Education for Innovation" programme strengthens links between educational institutions and companies, as seen in the cooperation between Aalto University and companies in the fields of IT, design and biotechnology [8].

The cluster approach forms an educational ecosystem in which education, research and the business community cooperate to develop specialists ready to innovate and work effectively in a dynamic economy.



**Figure 1: The co-creation stages of the innovation process**

In addition to this, international educational programmes such as ERASMUS+, Fulbright programme, dual degree systems, MIT International Science and Technology Initiatives (MISTI) and Global Engineering Education Exchange Program (Global E3) play a key role in broadening students' horizons and contribute to their professional and personal development in the international arena [9].

ERASMUS+ is known as a significant initiative of the European Union, providing students with the chance to study, internship and participate in projects across Europe, while promoting their linguistic and cultural development. The Fulbright Programme opens doors for scholars to leading US universities, facilitating academic exchange and professional development. Dual degree systems create bridges between educational institutions in different countries, offering students the opportunity to study in different cultural and academic contexts. MIT International Science and Technology Initiatives (MISTI) provide students with opportunities for internships and research opportunities, collaborating with MIT faculty and students to deepen scientific knowledge and skills. Finally, the Global Engineering Education Exchange Programme (Global E3) facilitates exchange experiences for engineering students by providing educational opportunities at partner universities and participation in global projects.

International educational programmes contribute significantly to the globalisation of the educational process by strengthening professional interaction between different countries and contributing to the creation of an international community of qualified professionals. They open new perspectives for the exchange of knowledge and cultural enrichment.

Modern educational methods such as project-based learning, interdisciplinary programmes, partnerships with industry and the introduction of advanced technologies are reforming the approach to learning, making it more relevant and impactful.

Project-based learning allows students to directly apply theoretical knowledge to practical work, fostering professional and communication skills and increasing their motivation. Interdisciplinary programmes provide students with a holistic understanding of different aspects of knowledge, improving critical thinking and the ability to solve complex problems. Interaction with industrial partners enriches the educational process with relevant practical knowledge and skills, while the use of modern technologies, including 3D printing, virtual reality and artificial intelligence, increases interactivity and understanding of the material, preparing students for careers in high-tech industries [10].



These educational methods not only enhance the learning process, but also prepare students to be effective in a dynamic and innovative world where multidisciplinary analyses and complex problem solving skills are valued. Leading universities such as the Massachusetts Institute of Technology (MIT), Aalto University and the Technical University of Munich (TUM) serve as examples of best practices in education, illustrating innovative strategies in teaching and co-operation with industry. MIT stands out for its project-based learning and partnerships with leading companies, as well as its integration of design, management and technology through programmes like IDM and Media Lab. Aalto University is known for its emphasis on creativity and interdisciplinary approach, providing an innovative educational environment in its schools of design and engineering. TUM is distinguished by its unique collaboration with business and the integration of educational and industrial space, which facilitates the commercialisation of research. Thus, these institutions have demonstrated how deep integration between the academic environment and industry can enrich the educational experience and foster innovative thinking and entrepreneurship among students.

Based on the above, in conclusion, it can be said that incorporating practical experience, international exchange, interdisciplinary programmes and modern technology into the educational process is critical for the training of qualified process engineers. The experience of educational institutions, such as MIT, Aalto University and TUM, demonstrates successful integration of academic learning with industrial and research activities, contributing to innovative development and professional growth of students.

To develop such practices in Uzbekistan, lead the development of university-industrial clusters, actively participate in international educational programs, apply modern teaching methods, stimulate scientific research and strengthen the infrastructure for innovation. Such actions contribute to the creation in Uzbekistan of a power system for training process engineers who are ready to contribute to the innovative development of the country and its integration into the global threat.

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# **REALIZING THE ESSENCE OF THE CALL FOR PEACE AND SAFENESS TO THE UZBEK PEOPLE, OUR NATION AND OUR MILITARY SHOULD ALWAYS BE VIGILANT AND AWARE**

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*During the terrible war years, our country showed its high humanistic qualities. Thousands of people of different nationalities who were brought to Uzbekistan were given shelter, kindness and humanity were shown, and our country shared its last bread with them.*

Shavkat Miromonovich Mirziyoyev

The Uzbek people are peace-loving people. We appreciate it. Is there any nation or people in the world that does not value peace and safety?

Remembering our compatriots who showed courage in the fight against fascism in the years of the Second World War, paying respect to their memory is a noble value, and the wide celebration of the Day of Remembrance and Appreciation every year has become an integral part of our spirituality. This process is related to eternity, and it also encourages the younger generation to appreciate the value of our peaceful life and clear sky today and to be thankful for such prosperous times.

More than half a million of the 2 million Uzbeks who took part in the war, which was the most terrible and bloodiest massacre in the history of mankind, died. Because of the war, many families were left without their breadwinners, children became orphans, and women became widows.

That's why I will never forget that in times of peace and security, our honorable fathers and kind mothers are the crown of our country. As long as we appreciate them and keep them calm, we will never be less. At present, in a complex and dangerous time, when various contradictions are intensifying, and the danger of terrorism and extremism is increasing, the value and importance of the priceless gift of peace is increasing more and more.

As the President of the Republic of Uzbekistan Shavkat Mirziyoyev said: *“We deeply understand the essence of the call, the Uzbek people need peace and security, without forgetting that each of us is responsible for peace, we must always be alert and aware”* at the speech of at the reception ceremony dedicated to the Day of Remembrance and Appreciation on May 9, 2017 [1].

## **A SUNNY LAND THAT SAVED, SHELTERED**

The war was far from Uzbekistan. But the terrible fire and sad shadow of the war was not only over the country, but over every house. From babies with no milk teeth to elders with beards falling to their chests, they were left on the abhorrent war trail. Until delivering to the destination, triangular “black letters” turned yellow and wrinkled like the face of a soldier who died at the front did not miss any house. What was the number of people who lost their lives, wandered in search of bread, and suffered from hunger and malnutrition?

Famine, dearth, destitution, hunger, scarcity - there were enemies who invaded the country. There was no one to stand in their way. Thousands of people surrendered. Heart-shaking screams from the houses where the “black letter” came from did not stop. This war was a mourning for many.

Fast trains were heading towards the refuge of Uzbekistan. Factories, manufactories, machine tools moved in three trains. About 170 factories were evacuated to Uzbekistan from areas where bombs and missiles were constantly exploding and were restarted in a short period of time. During 1941-1942, 17,500 wagons loaded with the equipment of relocated industrial enterprises were transported.



The world was on fire. The sky was on fire. The bosom of the sunny land was wide. Therefore, Uzbekistan has become a fortress of salvation for thousands of people and children who are suffering from hunger and agony. Tashkent was known as the city of bread.

The Uzbek people who came out to meet the people arriving on the trains heading east from the places where the war was going on, to give them a place in their house, and share their food with them, could not fit in the territory of the North station.

Our people accommodated everyone. They did not act arrogantly. They sent their children to the front and shared a loaf of bread with the hungry babies from the war zones. They didn't complain, they didn't give up. For our people, there is no difference of nationality or religion, only high-status humanity is the most important. There were starving babies with bulging eyes, sad faces, and hopeless looks. Uzbekistan welcomed them with open arms. No one had seen such kindness anywhere. Such devotion was not even in their imagination. But after the train arrived at the Tashkent railway station, there were no homeless people, the hosts took them under their protection.

The Uzbek people shared the last piece of bread they had with the people who came out of the death grip of the war. They collected hay, dried fruits and survived and fed their children.

The trains did not return from the sunny land empty-handed. For example, in 1942, a group of republic representatives went to Leningrad to deliver 600 wagons of flour and meat, 100 wagons of rice, and 60 wagons of dried fruit. How many have not been recorded in history! This is the fact that kindness, childishness, virtues are the lifeblood and bloodline of our nation!?

Rizamat Musamuhamedov, a famous gardener, academician of the Academy of Sciences of Uzbekistan, who created thousands of hectares of gardens and vineyards during his lifetime, was 60 years old when the war started. Following his grandson to the war, the father put dried fruits in the wagon and followed him to the battlefield. The patriotism of Hasan ata Islamov, who loaded Uzbekistan's sweet-sugar fruits on wagons and delivered them to the frontline fighters, became the basis for the creation of the film "Apples of the Forty-First Year".

#### **TRIBUTE TO THE MEMORY OF BIG-HEARTED PEOPLE**

Uzbekistan has given shelter to hundreds of thousands of people displaced from Russia, Ukraine, Belarus, Moldova and other places, showing examples of kindness and care. The lives of those who were evacuated from the places where military operations are being carried out were saved. Men and women, elderly and children condemned to war torture were provided with shelter, clothes and food. Uzbek families took 200,000 orphans into their care, did not treat them less than their children, raised them without scolding or hurting them. Let's give another example. Antonina Khlebushkina received 200 hungry children brought from the war zones to the Children's Home with 160 beds. Although their former students were dispersed to their own countries by fate, they still remember Tashkent, Khlebushkina, the mother of the Children's House, with gratitude.

It is known to the whole world that Shoahmad Shomahmudov, a master blacksmith from Tashkent, adopted 14 orphans of different nationalities. The sacrifice of this family during the war years became the prototypes of writer Rakhmat Faizi's novel "Hazrati Inson", "You Are an Orphan" and other films. Everyone knows that the family of Hamid Samadov from Kattakorgan took in 13 orphans, Muazzam Jorayeva and Ashirkhojayev from Bukhara took in 8 orphans. How many more we don't know!..

#### **FROM ZANGIOTA DISTRICT OF TASHKENT**

We acknowledge the contribution of the people of Uzbekistan during the Second World War. In 1941, the population of Uzbekistan in our country was over 6.8 million. After the start of the war, about 2 million of our compatriots went to the front, and more than 500,000 of them died on the battlefields. More than 200,000 compatriots were awarded orders and medals, 301 of our compatriots were awarded the title of Hero of the Soviet Union, more than 70 of them were awarded the third-class Order of Honor.

During the Second World War, Uzbekistan made a significant contribution to the victory by producing and sending the following items to the front: 2,100 aircraft, 17,340 aircraft engines, over 2 million aerial bombs, 5 armored trains, 2,200 field kitchens, 1 million grenades, 17,100 mortars, and 22 million mines.

During the Second World War, 682 Japanese prisoners were brought to Uzbekistan. They were involved in hard work on various charges and were persecuted. There was even a policy of not burying the dead. But this situation was not allowed in Uzbekistan.

The cemeteries where the Japanese were buried were preserved. Japanese people know this well. They have great love for the Uzbek people. Mutual cooperation between Uzbekistan and Japan is strengthening and developing. The creation of a Japanese





garden in Tashkent and the raising of the statue of Alisher Navoi in Japan are the result of long-standing friendship and fraternal ties.

Even in the most difficult times, our forefathers gave shelter to people of other nationalities and shared bread with them. During difficult and trying times, Uzbekistan became a second Motherland, a fortress of salvation and a refuge for them. Their descendants were born, studied, matured and gained prestige here. These generations consider Uzbekistan as their motherland and serve for its development.

According to the laws of life, many things are forgotten and unremembered over time. But there is a great truth in this bright world that never changes, never gets old. The memory of people who showed courage and bravery in the way of the freedom of the homeland and the people, and the happiness of future generations is always alive! We are all indebted to our ancestors who showed bravery on the battlefields of the Second World War and contributed to our happy life by working behind the front lines. It is also clear that our country, which showed its high humanistic qualities during the war years, will forever remain in the memory of humanity as a bright page of history. Uzbekistan was recognized as a country of kindness, which gave shelter to thousands of people of different nationalities brought from the hotbeds of war. This tenacity, this courage is a lesson for today's generations [2].

In a land where human dignity is honored, the spirit of ancestors is always happy. May this year was full of changes. The fact that human dignity and honor were glorified in the updated Constitution, which came into force from the very first day, made me very happy, at the same time, the Decree "On the encouragement of the participants of the Second World War" was very encouraging. It is the happiness of our nation that our people were lucky enough to see the reforms under the protection of the law and the state. Peace and serenity and placidity are needed for happiness. It is not for nothing that they say that a family that fights for one day will be sad for forty days.

We are witnesses of the fact that peace, honest work, education and training have become the guarantee of development for our people who ate one almond divided into forty. We have always been a peace-loving people. Who did not invade our country? While we are proud of the bravery shown by our ancestors like Spitamen, Shirok, Jalaluddin Manguberdi, and Amir Temur during the Second World War, we are equally proud of the spiritual courage displayed by Najmuddin Kubra, Mirzo Ulugbek, and Zahiruddin Muhammad Babur, whose contributions to the development of world civilization fills our hearts with immense pride.

We have a rich national spiritual heritage that holds the value of peace in high esteem and completely condemns war. This noble purpose is the reason why we celebrate May 9th as a national holiday in the form of the Day of Remembrance and Appreciation [3].

It is a great value to include this day in the calendar as a holiday to honor the motherland. The lines "Motherland will never forget our heroic compatriots who sacrificed their dear lives for peace and freedom" are reflected in the monument dedicated to the memory of the heroes in Victory Park. It is a national and universal value that is accepted as infinite and eternal. 78 years have passed since the end of the Second World War. This is equal to the average life of a person. The opening of Memorial Squares in the center of every region gives pride and delight to the young generation. Uzbekistan has shown truly heroic assistance to the war-torn areas from behind the front lines, in addition to the bravery of young and old, including women, on the battlefield. The patriotism and humanitarianism of our people were demonstrated by the commissioning of the Fergana canal in forty-five days, and the tireless work of our workers at the relocated factories. "My grandfather, Abdurashid Muhitdinov, statesman and public figure, Professor Feruza, remembers that they were during the siege of Leningrad. They used to tell us about the hardest and most difficult days of the war. Their chests were decorated with military orders and medals. Every year, when the decree and decision of the head of our state is issued, tears come to my eyes, saying that the souls of my ancestors have rejoiced. I will tell my grandchildren about it and show them their pictures. But there are millions of my compatriots like me. So, this Memory will make our people more cohesive and united. There was no end to the love and humanity shown to those evacuated to our country. Because this also belongs to our household. My grandmother took and brought up Valentina Popochenko, who was three or four years old from Ukraine (her name and surname are written in her hand)."

Currently, her children live in the village of Sektare, Gijduvan district, Bukhara region. They also took another boy. During the war, this child was born and named Shukur. Shukur Sharapov lived well. He died in 2021 [4].

"Courage, perseverance, attention and honor are celebrated every year on May 9", and during the year, special care is given to the participants of the Second World War. Just one example: in accordance with the Decree "On encouraging participants of the Second World War" signed by the President of the Republic of Uzbekistan Shavkat Mirziyoyev, May 9 is widely celebrated as a national holiday in our country. Also, on the occasion of the 78th anniversary of the Victory over fascism, the tasks of financial



stimulation of war participants and disabled persons were determined. According to the decree, each participant of the Second World War and disabled persons were awarded 18 million soums on a festive occasion [5].

Muhabbat Hamidova, the editor of “Gulkhan” magazine, recalls: At the age of 18, he gave his son his name in memory of his brother Habibullah, who left for the war and did not return home. In the painful memories of Narimon Orifjanov, the editor-in-chief of our magazine, who never tired of searching for his brother’s name in hundreds of fraternal cemeteries in dozens of European cities. At the age of 18, he gave his son his name in memory of his brother Habibullah, who left for the war and did not return home. Painful memories of Narimon Orifjanov, the editor-in-chief of our magazine, who tirelessly searched for his brother’s name in hundreds of fraternal cemeteries in several European cities: while his mother was crying sadly saying “I couldn’t put a pinch of soil on my eyes”, 60,000 soldiers in Bratislava brought a pinch of soil from the cemetery, when they could not determine whether it was Sharifjanov or Orifjanov. With tears in my eyes, I listened to the memory of how happy his mother was when she felt her child. And I realized that the most terrible history of human life should never be forgotten, that it calls people to always be vigilant, to preserve peace as a precious blessing. Nearly eighty years have passed and it’s Memorial and Appreciation Day. As I sit down for breakfast with my family, surrounded by a bountiful spread prepared by the bride, I am struck by the peace and tranquility of our home. However, my thoughts are drawn to the brave villagers who lost their lives in defense of our way of life. One by one, their faces pass through my mind. Surprisingly, their faces showed happiness instead of the previous pain and dreams. O dear people, you may realize that our Uzbekistan will never forget its brave children, that human memory is sacred and valuable in this holy and free land. I plan to visit Khatira Square where hundreds of my fellow countrymen will gather. I wish to revisit the memory books where the names of my fellow village heroes are recorded. These names have been etched in the books for eternity, and reading them again will help me remember and honor their names [6].

Time is the judge. In the 80s, the name and memory of the boys who sacrificed their lives to protect the freedom and liberty of the Motherland and the peaceful life of our country remained forever in the memory of our people. Indeed, not forgetting and appreciating the sacrifices of the people is an aspect that shows the nationhood of the nation, taking an example from their heroic fathers and always being proud of them. This is an example for future generations. Therefore, it is our priority to honor our compatriots who have shown courage for the peaceful life of our country today. Information about participants of the Second World War and behind the front living in the Republic of Uzbekistan: 174 people as of May 7, in terms of regions: 3 people from the Republic of Karakalpakstan, 5 people from Khorezm region, 9 people from Navoi region, 7 people from Bukhara region, 10 people from Kashkadarya region, 8 people from Surhondarya region, 10 people from Samarkand region, 3 people from Syrdarya region, 6 people from Jizzakh region, Tashkent city 55 people, Tashkent region 26 people, Namangan region 7 people, Fergana region 19 people, Andijan region 6 people. Days, months, years pass, but the historical truth and historical events remain. Here are the numbers in front of us. I will give an example: there is a family house in Shodlik neighborhood of Tashlaq district of Fargona region. Odiljon Ota Zakirov, the owner of this family, a participant of the Second World War, recently turned 100 years old. If you talk to Odiljon Zakirov, you will sincerely admit that the way of life consisting of courage and perseverance deserves an example. The happy and sad stories of our hero, who have been painted for centuries, will captivate any person in an instant and make them think. During the Second World War, I served in the ranks of the artillery unit, - recalls the war veteran. - How many of our comrades-in-arms died prematurely in the battlefields. On the one hand, there were the horrors of war, and the loss of loved ones and homesickness were even more painful. But we were lucky to bravely overcome all difficulties and return to Uzbekistan with a bright face. 10 children grew up in the family. Currently, the hero of the war and labor front, who is the beloved grandfather of about 50 grandchildren and more than 100 great-grandchildren, lives happily. This house is busier than ever before the Memorial Day holiday. Yesterday, the governor of Fergana region visited the father and read the holiday greetings of the President to the war participants. He handed over a prize of 18 million soums. Also, souvenirs of the regional administration and daily necessary food products were presented. The war veteran continues our conversation by saying, “I am very grateful for the fact that I have reached these days at the age of one century.” God, let peaceful life continue in our country. We always pray that today’s youth will never see the hardships we saw. In fact, the Motherland is dear and holy, it is necessary to appreciate it and serve it tirelessly for its further development. God, may peace, love and goodness prevail on Earth, as in our country. Of course, great faith in building a new Uzbekistan of tomorrow will be strong in our hearts. The care of the Honorable President and peace and security will always be stable, that is, “Improving the financial support of the participants and veterans of the Second World War” and further supporting the system of support for the lonely elderly and persons with disabilities. in the Decision on improvement: Veterans of the war of 1941-1945 and former juvenile prisoners of Nazi concentration camps and citizens who worked during the siege of Leningrad, as well as to single elderly people who need the care of others and persons with disabilities instead of food products and hygiene products delivered free of charge, an additional fee is paid every month in the amount of one times the base calculation amount; Instead of the necessary clothes and shoes, which are delivered free of charge to the above-mentioned citizens, a compensation of 15 times the base calculation amount will be introduced for the purchase of clothes every year in August.



In this case, the surcharge is made on the basis of information provided by the medico-social services development agency to the organization responsible for the appointment of pensions and benefits about single elderly or persons with disabilities who need other people's care. We remind you that compensation and additional payments to the persons listed in this paragraph are paid according to the procedure for payment of pensions and allowances.

That is why Shavkat Miromonovich stated in his speech at the 78th session of the UN General Assembly: "Durable peace and prosperity can be achieved only with common aspirations and joint actions. We need mutual trust, solidarity and a spirit of cooperation more than ever." In this current historical turning point, it is necessary to leave the world whole and complete to future generations.

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## DECIPHERING THE NOVEL “THE SCARLET LETTER” USING SYMBOLIC ANALYSIS

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### ABSTRACT

*"The Scarlet Letter" is a novel written by Nathaniel Hawthorne. His works often focus on history, morality, and religion. Much of Hawthorne's writing centres on New England, with many works featuring moral metaphors with an anti-Puritan inspiration. His fiction works are considered part of the Romantic movement and, more specifically, dark romanticism. His themes often centre on the inherent evil and sin of humanity, and his works often have moral messages and deep psychological complexity. His published works include novels and short stories. The Scarlet Letter, set in Puritan New England during the 1600s, is a love story with its roots, but one filled with sin and punishment. It is also a critique of the hypocrisy of Puritan culture. It follows the story of Hester Prynne, who is ostracised for committing adultery and forced to wear a scarlet letter "A" on her chest as a symbol of her sin. As Hester grapples with societal judgement, she raises her daughter, Pearl, and refuses to reveal the identity of Pearl's father. The novel explores themes of sin, guilt, redemption, and the harsh judgmental nature of society at the time. The characters struggle with the consequences of their actions, and the narrative delves into the complexities of morality and forgiveness.*

**KEYWORDS:** *symbolism, puritan culture, scarlet Letter*

### SYMBOLISM

Symbolism refers to the use of representational imagery: the writer employs an image with a deeper, non-literal meaning, to convey complex ideas. In literature, symbolism is the use of a concrete image to represent an abstract idea. Symbolism is the use of a symbol, which can be a word or an image, to communicate a distinct idea. Symbolism is one of the many literary devices writers use to make their work more vivid. In a way, symbolism illustrates a piece of writing by creating pictures in the reader's mind.

### The Letter A

Though the scarlet letter is supposed to be a sign of shame, Hester interprets it as a potent marker of her identity. Over time, the letter's significance changes. The "A" ultimately comes to stand for "Able," even though it was originally meant to identify Hester as an adulterer. Ultimately, it becomes unclear because the Native Americans who attend the Election Day pageant believe it elevates her to a position of significance. The letter serves the same purpose as Pearl in serving as a tangible reminder of Hester's liaison with Dimmesdale. However, the letter appears little in comparison to a real kid, which serves to highlight the ultimate meaninglessness of the community's system of punishment and judgement.

### Puritan Society

The Puritans thought they were carrying out divine duties. Therefore, there wasn't much opportunity for negotiation. People who were thought to have strayed from God's word were subjected to severe punishment. There have been instances where people of different faiths were executed by hanging in.

A critical, if not contemptuous, perspective of Puritanism is presented in The Scarlet Letter. Hester is unjustly victimised by Puritan society, which the narrator describes as dull, constricting, unforgiving, and narrow-minded. The narrator characterises the local police officer as embodying the "whole dismal severity of the Puritanical code of law," which combined religion and law, at the scene where Hester is set free from prison.

### Hester and Dimmesdale

Hester and Dimmesdale represent Adam and Eve, as well as the repercussions of disobeying God's word or church doctrine. Hester is banished from the community, just like Adam and Eve, for her infidelity, while Dimmesdale is banished metaphorically because of her overwhelming guilt.



### **Pearl**

Despite being a multifaceted character, Pearl serves mostly as a symbol throughout the book. Pearl can be thought of as a living embodiment of her mother's scarlet letter. She is a sign of a transgression and the bodily result of sexual sin. But Pearl is more than just her mother's punishment—even though she serves as a reminder of Hester's "sin"—she is also a blessing. She is a symbol of "sin" as well as the ferocious force and passion that gave rise to it. As a result, Pearl gives her mother a cause to live and lifts her up when she feels like giving up. Pearl can't truly become "human" until Dimmesdale's identity as her father is made known. She operates in a symbolic manner up to then.

### **Chillingworth**

The fact that Chillingworth's name embodies the icy and unforgiving aspects of his character and heart is no coincidence. His heart has no space for anything but retaliation; he is an ice character. He ultimately becomes a symbol of evil and is shut out of humanity as a result.

### **The Color Red**

Red is a sign of Hester's strong passion and love in *The Scarlet Letter*, as well as her misdeeds. The crimson glow that appears on her cheeks shows that even after she takes off the "A" she has been ordered to wear, red is still a part of who she is.

### **The Rose Bush**

The rose bush represents Hester. Its red blossoms are not surprising. Like Hester, red roses are renowned for their exquisite beauty, but they can also be very difficult to manage. Roses are perennial plants that grow back the following year, and they are known to withstand even the most extreme circumstances. This resilience in the face of adversity is also evident in Hester's personality.

### **The Scaffold**

The scaffold represents both public confession and punishment. Those who have committed sins or crimes are required to come before the community for everyone to see and be judged for what they have done, rather than hiding away in shame. It serves as a deterrent to others to prevent them from sinning as well as a means of making individuals who have committed wrongdoing take responsibility for their acts. In this sense, the scaffold frequently represents balance.

### **The Prison Door**

The prison's massive, spiked wooden door is a representation of punishment. The door's bars and spikes represent the punitive and unforgiving system of justice prevalent in a culture steeped in Puritanism.

### **The Shadows**

Shadows are used in *The Scarlet Letter* to represent how the truth is hidden. Dimmesdale is frequently characterised as existing in the shadows since he won't acknowledge his sin with Hester or the fact that he is Pearl's father. He remains in the shadows or the dark throughout the narrative as long as he keeps hiding what he has done.

### **The Sunlight**

Sunlight symbolises both truth and the grace of God in *The Scarlet Letter*. Once the truth of Hester's sin is revealed in public, then she stands in the sunlight. Once Dimmesdale reveals his role, he too stands in the sunlight. Later, when Hester and Dimmesdale decide to flee together to England, they are in the forest. Once their decision has been made, sunlight breaks through and shines upon them, indicating that their decision has been made.

### **Nature vs. Society**

The novel explores the contrast between the harsh judgement of society and the natural world, often portraying nature as more forgiving and accepting.

### **Irony**

There is dramatic irony in the fact that Dimmesdale is Pearl's father, known to the reader but concealed from the characters until later in the novel.

### **Redemption**

The novel explores the possibility of redemption and forgiveness, particularly as characters confront their sins and attempt to find a path to moral renewal.

### **Historical Context**

Hawthorne provides a critical perspective on the rigid social and religious structures of 17th-century Puritan New England, commenting on the consequences of strict moral absolutism.



## CONCLUSION

Analysing these elements can provide a deeper understanding of the novel's themes and the complex characters within the Puritan society depicted by Hawthorne. A symbol is an object that stands for something else, such as an idea or a concept, or otherwise conveys a meaning. There are many symbols in *The Scarlet Letter*. Symbols are an important key to understanding and interpreting the meaning present in a work of literature, as are other literary devices.

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# LEVERAGING INFORMATION AND COMMUNICATION TECHNOLOGY FOR CONTINUOUS LEARNING AND SKILL DEVELOPMENT OF IN-SERVICE TEACHERS

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Article DOI: <https://doi.org/10.36713/epra16492>

DOI No: 10.36713/epra16492

## ABSTRACT

*The National Education Policy-2020 envisions an education system to transforming India into an equitable and vibrant knowledge society, by providing high-quality education as well as through Continuous professional development of teachers. The present study aimed to identify the innovations in Continuous professional development of teachers with reference to new National Education Policy 2020 as well as to explore the use of Information and Communication Technology (ICT) resources by in-service teachers for their continuous professional development. Descriptive survey design has been used by taking 30 in-service teachers from different schools of Odisha purposively. Data were collected via an online questionnaire and with a five point rating scale, open ended questionnaire and analyzed through percentage analysis, t' test and by using in-depth analysis. The study revealed the new discoveries for the CPD of teachers by the NEP-2020 as Multimodal workshops, Participation of 50 hours of CPD, Cover latest pedagogies, use of technology platforms and shorter post-B.Ed. certification. The result also revealed that teachers are using ICT resources for overall professional development and for classroom practices. The result also indicates use of ICT resources helping in-service teachers to stay up-to-date with the latest teaching practices, be involved in the world of information, find materials, select, modify, and add content that meets the specific needs of students, facilitate thinking abilities, remain interested in teaching, improve teaching skills, gain motivation and grow professionally.*

**KEYWORDS:** ICT, Professional development, In-service teachers, CPD

## 1.0. INTRODUCTION

In today's globalized world, teachers face increased difficulties and opportunities than before. In this experience, the professional development of teachers needs to be strengthened at all levels. Professional improvement refers to a range of activities, both formal and informal, that strengthen an individual's skills, knowledge, understanding, and different traits as a teacher. Professional development includes individual development, continuing education, and staff development. Additional knowledge and develop the pedagogical competencies needed for successful teaching and learning. Hence, to give a boost to the professional development of teachers, information and communication technology (ICT) has played an indispensable role. Improvements in technology have changed the usual way of teaching in schools (Ostendorf, Shriberg, & Stolcke, 2005). Currently, many ICT-associated educational devices are being used in classrooms, such as computers, smartphones, laptops, tablets, smart boards, projectors, and specific kinds of multimedia for more engaging and productive teaching and learning. Development, practices at the classroom level, and collaboration with colleagues (Eze, Adu & Ruramayi, 2013).

Keeping view, to the needs of continuous professional development of teachers the investigator was keenly interested to explore the use of ICT resources, especially the Internet, smart phones, forums, and social media for the continuous professional development of in-service teachers. The investigator has gone through several areas which needs to be explored such as i) Whether the teachers are using ICT resources for their professional development, ii) What kind of ICT resources do teachers use for their professional development, iii) How the ICT resources are helping the teachers for proper their overall professional development. The answers to the above questions are going to be potential to monitor and sustain the continuous professional development of in-service teachers and to provide an insight to policymakers, teacher training institutions, and governments for the progressive initiatives in the ICT integration and training of in-service teacher's professional standards looking to the 21st-century requirements. Therefore, the present study is entitled as "**Leveraging Information and Communication Technology for Continuous Learning and Skill Development of In-service Teachers**".



## 2.0. OBJECTIVES OF THE STUDY

- 1) To identify the new innovations in Continuous professional development of teachers with reference to National Education Policy 2020
- 2) To identify ICT mediated teaching and learning initiatives with reference to new National Education Policy 2020
- 3) To insight the use of ICT for the continuous professional development of in-service teachers with reference to the overall professional development and practices at classroom level
- 4) To highlight different type of ICT resources do In-service teachers use for their Continuous professional development

## 3.0. HYPOTHESIS OF THE STUDY

**Ho1:** There exists no significant difference between the male and female in-service teachers use of ICT for their continuous professional development.

## 4.0. METHOD OF THE STUDY

For the purpose of identifying the use of ICT for continuous professional development by in-service teachers, the descriptive survey method was used. The researcher has drawn 30 in-service teachers as samples from different schools in Odisha. Purposive sampling was used in this case. A self-designed five-point rating scale was used to collect the requisite data regarding ICT usage. The data were collected using a Google form and analyzed using descriptive statistics (Mean, SD, and percentage) and inferential statistics (t-test).

## 5.0 RESULT AND DISCUSSION

The results were presented and discussed in the order of objectives of the study.

### 5.1. Innovations in Continuous professional development of teachers with reference to new National Education Policy 2020

National Education Policy 2020 highlighted several innovative ideas in the field of teacher education for the continuous professional development of in-service teachers. Here, the innovative ideas are outlined by referring to the professional development of in-service teachers.

- Multiple modes of workshops, including in the form of local, regional, state, national, and international as well as online teacher development modules.
- Participation of 50 hours of CPD opportunities every year for their own professional development, driven by their own interests.
- Cover latest pedagogies regarding foundational literacy and numeracy, formative and adaptive assessment of learning outcomes, competency-based learning, and related pedagogies, such as experiential learning, arts-integrated, sports-integrated, and storytelling-based approaches, etc.
- School Principals and school complex leaders will also be expected to participate in 50 hours or more of CPD modules per year, covering leadership and management, as well as content and pedagogy with a focus on preparing and implementing pedagogical plans based on competency-based education.
- Shorter post-B.Ed. certification courses will also be made widely available, to teachers who may wish to move into more specialized areas of teaching, such as the teaching of students with disabilities, or into leadership and management positions in the schooling system, or to move from one stage to another.
- The use of technology platforms such as SWAYAM/DIKSHA for online training of teachers will be encouraged, so that standardized training programmes can be administered to large numbers of teachers within a short span of time.

### 5.2. ICT mediated teaching and learning with reference to new National Education Policy 2020

The recent rise in epidemics and pandemics necessitates that we are ready with alternative modes of quality education whenever and wherever traditional and in-person modes of education are not possible. In this regard, the National Education Policy 2020 recognizes the importance of leveraging the advantages of technology while acknowledging its potential risks and dangers. NEP 2020 recommends the following initiatives;

- Invest in creation of open, interoperable, evolvable, public digital infrastructure in the education sector that can be used by multiple platforms and point solutions, to solve for India's scale, diversity, complexity and device penetration.
- E-learning platforms such as SWAYAM, DIKSHA, will be extended to provide teachers with a structured, user-friendly, rich set of assistive tools for monitoring progress of learners.
- A digital repository of content including creation of coursework, Learning Games & Simulations, Augmented Reality and Virtual Reality will be developed.
- Student-appropriate tools like apps, gamification of Indian art and culture, in multiple languages, with clear operating instructions, will also be created for fun based learning
- E-learning platforms such as DIKSHA, SWAYAM and SWAYAMPBHA will also be leveraged for creating virtual labs so that all students have equal access to quality practical and hands-on experiment-based learning experiences





- Teachers will undergo rigorous training in learner-centric pedagogy and on how to become high-quality online content creators themselves using online teaching platforms and tools
- Proposed National Assessment Centre or PARAKH, School Boards, NTA, and other identified bodies will design and implement assessment frameworks encompassing design of competencies, portfolio, rubrics, standardized assessments, and assessment analytics

**5.3. Use of ICT for the continuous professional development of In-service teachers with reference to overall professional development and Practices at classroom level**

The present study aims to study the Use of ICT for the continuous professional development of In-service teachers with reference to overall professional development and Practices at classroom level. For this purpose, data have been collected from 30 in-service secondary teachers by using scale for use of ICT for professional development of teachers which is developed by the researchers. After scoring the responses of the participants, the collected data were organized and tabulated. The statement of the scale covers the following dimensions.

**a) Overall professional development:**

This research explored teachers' perceptions and self-reported use of diverse Information and Communication Technologies (ICT) resources in their ongoing professional development activities.

**b) Practices at classroom level:**

This researcher investigated the specific ICT resources teachers utilize within their classrooms and explored how these technologies are implemented to enhance the learning experience for students.

**Table No 1. Use of ICT for the continuous professional development of In-service teachers with reference to overall professional development.**

Sl. No	Statements	SA	A	UD	DA	SD
1	I use ICT resources to expand my experiences for career/promotion purposes	30	53.33	36.66	0	3.33
2	I use ICT resources to improve teaching skills	30	63.33	30	0	3.33
3	I use ICT resources to gain motivation	30	50	40	0	3.33
4	I use ICT resources to grow professionally	30	46.66	43.33	3.33	3.33
5	I use the ICT resources to learn new skills related to my subject	30	70	23.33	0	3.33
6	I use ICT resources to prepare myself for innovation	30	53.33	36.66	3.33	3.33
7	I use ICT resources to share ideas/views with other teachers	30	50	40	0	3.33
8	I use ICT resources to be aware of the latest developments in education	30	66.66	26.66	0	0
9	I use ICT resources to facilitate thinking abilities	30	43.33	43.33	3.33	3.33
10	I use ICT resources to remain interested in teaching	30	53.33	30	0	6.66

Note: the numbers in the table indicate percent.

The above table no-1 indicates use of ICT for the continuous professional development of In-service teachers with reference to overall professional development. As presented in above table the findings revealed that 83.33 percent (% of teachers responded SA +A) of in-service teachers perceived that *use of ICT resources to expand their experiences for career/promotion purposes*. While a high majority of the teachers (93.33% of teachers responded SA +A) stated that *they use the ICT resources to learn new skills related to their subject*. The results also indicated that cent per cent of teachers perceived they *use the ICT resources to learn new skills related to my subject* (100% of teachers responded SA +A); *use ICT resources to prepare themselves for innovation* (83.33% of teachers responded SA +A); *use ICT resources to share ideas/views with other teachers* (80% of teachers responded SA +A); a high majority of teachers(96.66% of teachers responded SA +A) stated that *they use ICT resources to be aware of the latest developments in education*; *they use ICT resources to remain interested in teaching innovation* (83.33% of teachers responded SA +A).

From the above discussion, it can be concluded that majority of teachers are using various ICT resources (e.g. internet, smart phone, social media, computer etc) to expand their experiences for career/promotion purposes, improve teaching skills, gain motivation, grow professionally, learn new skills related to subject, Prepare for innovation, share ideas/views with other teachers, be aware of the latest developments in education, facilitate thinking abilities, remain interested in teaching.



**Table No 2. Use of ICT for the continuous professional development of In-service teachers with reference to Practices at classroom level.**

Sl. No	Statements	SA	A	UD	DA	SD
1	I stay up-to-date with the latest teaching practices	53.33	33.33	3.33	3.33	6.66
2	I use ICT resources to be involved in the world of information	63.33	26.66	0	0	10
3	I use the ICT resources to find materials	63.33	26.66	3.33	3.33	3.33
4	I can select, modify, and add content that meets the specific needs of my students	53.33	30	3.33	10	3.33
5	I use ICT resources to learn about a variety of topics	63.33	23.33	6.66	3.33	3.33
6	I use ICT resources to read academic articles from online journals	53.33	36.66	3.33	3.33	3.33
7	I use ICT resources to search for information	66.66	33.33	0	0	0
8	I use ICT resources to find exercises	33.33	40	13.33	10	3.33

Note: the numbers in the table indicate percent.

The above table no-1 indicates use of ICT for the continuous professional development of In-service teachers with reference to practices at classroom level. It is evident from the above table, teachers are using ICT resources to be involved in the world of information (90% of teachers responded SA +A). Similarly, majority of the teachers are using the ICT resources to find materials (90% of teachers responded SA +A); while 83.33 % teachers believed that they can select, modify, and add content that meets the specific needs of their students; they use ICT resources to learn about a variety of topics(86.66% of teachers responded SA +A). The findings also reveals that majority of teachers are using ICT resources to read academic articles from online journals and to search for information (90% of teachers responded SA +A). In the other hand, 73.33% teachers are using ICT resources to find exercises.

Overall, it can be conclude that majority of teachers are using ICT resources in their classroom teaching learning situation. The findings indicates use of ICT resources helping them to stay up-to-date with the latest teaching practices, be involved in the world of information, find materials, select, modify, and add content that meets the specific needs of my students, learn about a variety of topics, read academic articles from online journals, search for information and to find exercises.

**5.4. Type of ICT resources do In-service teachers use for their Continuous professional development**

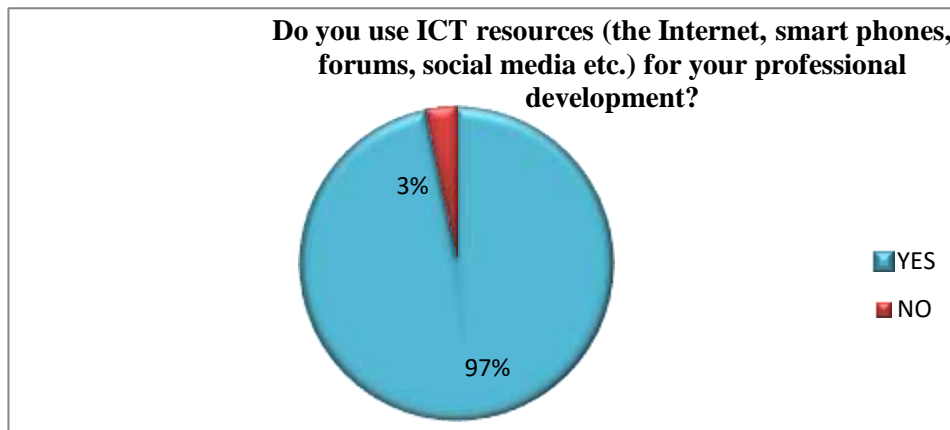
The present study aims to study find out the type of ICT resources do In-service teachers use for their Continuous professional development. For this purpose, data have been collected from 30 in-service secondary teachers by using self developed open handed questionnaire.

i) Questions were deal with the teachers’ opinion whether they are using ICT resources (the Internet, smart phones, forums, social media etc.) for their professional development. They were given two options such as “Yes” and “No”. They were asked to put a tick mark against the appropriate option. The Percentage of their responses has been provided in table no 3.

**Table No 3. Teachers’ opinion about the use of ICT resources. (N=30)**

Sl .No.	Item	Responses	
		Yes	No
1	Do you use ICT resources (the Internet, smart phones, forums, social media etc.) for your professional development?	29 (96.7%)	1 (3.3%)

Table no.3 reveals that majority of teachers (96.7%) are using ICT resources for their professional development. In the other hand only one teacher is not using any of the ICT resources for professional development.



**Figure No: 1 Teachers' opinion about the use of ICT resources.**

ii) Participants were again asked to mention the type of ICT resources/ platform and how they are using these for their professional development. According to the data, teachers are using various ICT resources for their professional development like YouTube, telegram, blogs, mobile phone, Computer, Projector, Google, OERs, online resources like articles, journals, NISTHA and DIKHYA, Wikis, Blog's, Slides, online assessment tools and Chalklit etc. Some of the teachers mentioned that they are using different ICT resources, for accessing different study materials and gaining additional information regarding teaching profession. While some other mentioned they are using online resources like articles, journals for some up-to-date information for the sake latest changes and innovations, research articles for research work knowledge and some online Govt. initiative web programme like NISTHA and DIKHYA for accomplishment of their in-service training.

Overall it can be said that the use of ICT assist definitely like a co-assistance in order to compete with the progressive society and develop the professional competencies.

**5.5. Difference between the male and female in-service teachers use of ICT for their continuous professional development.**

In order to find out the Difference between the male and female in-service teachers use of ICT for their continuous professional development, independent t-test has been used. The details of analysis and their interpretations are given below.

**Table No 4. Significant difference between the male and female in-service teachers' use of ICT for their continuous professional development.**

Gender	N	Mean	SD	SE	p-value	Level of significance
Male	16	79.19	14.59	3.64	.704	Not significant
Female	14	75.29	18.38	4.91		

Table 4 indicates that the value of p' (0.704) is greater than 0.05 and hence, not significant at 0.05 level. So, the null hypothesis, « There exists no significant difference between the male and female in-service teachers use of ICT for their continuous professional development » is retained. Result leads to infer that the use of ICT resources by male and female teachers is not differing significantly.

**6.0. MAJOR FINDINGS AND SUGGESTIONS**

- 1) The findings revealed that majority of in-service teachers (83.33%) are using ICT resources to expand their experiences for career/promotion purposes and (93.33%) using the ICT resources to learn new skills related to their subject.
- 2) It is found that cent per cent of in-service teachers are using the ICT resources to learn new skills related to their subject (100%).
- 3) Most of the in-service teachers (83.33%) are using ICT resources to prepare themselves for innovation use and (80%) using to share ideas/views with other teachers.
- 4) High majority of in-service teachers (96.66%) agreed that they use ICT resources to be aware of the latest developments in education and (83.33%) use ICT resources to remain interested in teaching innovation.
- 5) It is found that (90%) in-service teachers are using ICT resources to be involved in the world of information as well as to find materials.
- 6) Most of the in-service teachers (83.33%) believed that they can select, modify, and add content that meets the specific needs of their students where some (13.33) showed their inability.



- 7) The findings revealed that majority of in-service teachers (90%) are using ICT resources to read academic articles from online journals and to search for information
- 8) In-service teachers are leveraging a wide range of ICT resources for professional development. These include online platforms like YouTube, Telegram, and blogs, alongside mobile devices, computers, projectors, and Google. Additionally, teachers utilize Open Educational Resources (OERs), online articles and journals, government initiatives like NISTHA and DIKHYA, wikis, slides, online assessment tools, and Chalklit. Particularly valuable are online resources like articles, journals, and government training programs, which provide teachers with access to current information, research advancements, and professional development opportunities.
- 9) The use of ICT resources by male and female teachers is not differing significantly.
- 10) Due to the effect of COVID-19, our institution closed and brought an opportunity for us to connect from all over the world. Teachers are able to explore and widen knowledge by shifting to online classrooms from traditional classrooms. In this crucial time professional development of teachers is the top most requirements by integrating ICT resources.
- 11) Although, most of the teachers are using ICT resources for their professional development. But we need to make it efficient according to the classroom needs. Looking to the demand of in-service teachers, orientation and workshops are required to be organised for the development of technocratic skills among in-service teachers to use ICT resources in an effective way.

## 7.0. CONCLUSION

The National Education Policy 2020 (NEP 2020) prioritizes empowering teachers through self-improvement opportunities. These will encompass local, regional, state, national, and even international workshops, along with online modules for continuous professional development.

This focus is crucial in today's rapidly evolving knowledge landscape. Dramatic advancements in science and technology, including big data, machine learning, and artificial intelligence, necessitate a parallel evolution in teacher training. NEP 2020 acknowledges this by emphasizing the integration of demanding technologies alongside the development of multidisciplinary skills across various disciplines, particularly computer science and data science.

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# FORMULATION AND EVALUATION OF HERBAL COUGH LOZENGES

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## ABSTRACT

This research article presents the formulation and evaluation of herbal cough lozenges using a combination of natural ingredients known for their medicinal properties. The ingredients include ginger, honey, clove, tulsi (holy basil), cinnamon, cardamom, saffron, turmeric, menthol, sugar, amla (Indian gooseberry), lemon juice, peppermint oil, fennel, and distilled water. Each ingredient was selected based on its traditional use in alleviating cough and throat irritation. The formulation process involved blending the ingredients to create a cohesive mixture, followed by shaping and drying to produce lozenges. The evaluation of the lozenges included physical characteristics such as weight uniformity, hardness, and disintegration time, as well as sensory attributes such as taste and aroma. Additionally, the efficacy of the herbal cough lozenges in providing relief from cough symptoms was assessed through a clinical trial. The results demonstrate the potential of these herbal cough lozenges as a natural and effective remedy for cough and throat irritation, offering a safer alternative to conventional cough medications.

**KEYWORDS:** Cough, Throat Infection.

## INTRODUCTION

Cough is a common symptom of respiratory infections and various other respiratory conditions, often causing discomfort and distress to individuals. While conventional cough medications are widely available, there is a growing interest in herbal remedies due to their perceived safety and potential efficacy in alleviating cough symptoms. Herbal ingredients have long been used in traditional medicine systems for their therapeutic properties, including their ability to soothe throat irritation, suppress coughing, and promote respiratory health.

This research aims to formulate and evaluate herbal cough lozenges using a combination of natural ingredients known for their medicinal properties. The selected ingredients include ginger, honey, clove, tulsi (holy basil), cinnamon, cardamom, saffron, turmeric, menthol, sugar, amla (Indian gooseberry), lemon juice, peppermint oil, and fennel. Each ingredient was chosen based on its traditional use in treating cough and throat irritation, as well as its potential synergistic effects when combined.

The formulation of herbal cough lozenges offers a promising approach to providing relief from cough symptoms while minimizing the use of synthetic drugs and their associated side effects. Furthermore, the inclusion of natural ingredients with proven medicinal properties may enhance the therapeutic efficacy of the lozenges.

### Symptoms of cough

1. A runny or stuffy nose
2. A feeling of liquid running down the back of your throat (postnasal drip)
3. Frequent throat clearing and sore throat
4. Hoarseness



5. Wheezing and shortness of breath

#### **Benefits of Herbal lozenges**

1. Temporarily help to relieve symptoms such as sore throat, throat irritation.
2. It work by providing a cooling, feeling and increasing saliva in the mouth .
3. Used to medicate the mouth and throat for the slow administration in digestion or cough remedies.
4. Maintains oral hygien.
5. Reduces pain and inflammation<sup>[1]</sup>
6. Relieve cold and Running nose
7. Relief for cough

#### **Active Ingredients**

- 1.MENTHOL
- 2.EUCALYPTUS.
- 3.HONEY
- 4.LEMON

#### **Characteristics of Herbal Lozenges**

1. They contain one or more active ingredient and are flavoured and are sweetened so as to be pleasant tasting
2. Lozenges are various shaped solid dosage form, usually containing a medicinal agent and a flavouring substance, that are interested to be dissolved slowly in the oral cavity for localised or systemic effects.

**PROPERTIES OF HERBAL LOZENGES :** 1. These types of lozenges often contain natural ingredients such as herbs, vitamin and minerals are marketed for a variety of health benefits, such as immune support, respirators health, relaxation & improved sleep.  
2.They provide a pleasant dosage.

#### **OBJECTIVE**

1. It is used to medicate the mouth and throat for the slow administration in digestion or cough remedies
2. Lozenges may contain an anaesthetic, a demulcent or an antiseptic.
3. Lozenges provide a pleasant dosage form for patients who are unable to swallow other types of solid dosage forms.
4. This are OTC and prescription product.
5. They maximize the local activity of the drug.

#### **THE FORMULATION CONTENT OF VARIOUS DRUGS**

1. Ginger =10gm
2. Honey =10gm
3. Clove= 10gm
4. Black paper= 10gm
5. Tulsi= 5gm
6. Cinnamon=5gm
7. Cardamom=5gm
8. Saffron=5gm
9. Turmeric=7gm
10. Menthol=5gm
11. Sugar=33.3gm
12. Amla=3gm
13. Distilled water=66.7ml
14. Lemon juice=2 ml
15. Peppermint oil=2.5ml
16. Funnel=5gm



### Procedures

1. Add all drug 67.7ml of water. Then boiled and filter out the given solution
2. Then filter out solution add to 33.3 gm of sugar.
3. Boiled up to the gelly formed.
4. Then add binder ( Dry mango powder)

Sugar : as used for lozenges are gelly preparation

Saffron: as used in colouring agent and use mostly in asthma patients.

Dry mango powder: used as binder & Digestion

They are used in digation also

Tulsi: processed to dissolve slowly in the mouth to make use of its intrinsic cooling and freshening properties that provides relief to dry, irritated and sore throat.<sup>[2]</sup> In addition to being an anti-inflammatory agent, it also has anti-bacterial, anti-fungal and antioxidant properties.<sup>[3]</sup>

### Detailed Information

#### Ginger:



#### 1. **\*\*Taxonomical Information\*\***:

- Family: Zingiberaceae
- Genus: Zingiber
- Species: Zingiber officinale

#### 2. **\*\*Biological Source\*\***:

- Ginger is a flowering plant originating from Southeast Asia. The part used for its medicinal properties is the rhizome, which is the underground stem.

#### 3. **\*\*Synonyms\*\***:

- Some common synonyms for ginger include Zingiber officinale, ginger root, and simply ginger.

#### 4. **\*\*Organoleptic Characteristics\*\***:

- Ginger typically has a pungent aroma and a spicy, slightly sweet flavor. The rhizome is usually light brown in color with a rough outer texture.

#### 5. **\*\*Chemical Constituents\*\***:

- Ginger contains several bioactive compounds, including gingerol, shogaol, zingerone, and paradol, which contribute to its medicinal properties.

#### 6. **\*\*Uses\*\***:

- Ginger is widely used in traditional medicine for its anti-inflammatory, antioxidant, and digestive properties. It is commonly used to alleviate nausea, improve digestion, and reduce inflammation.

Ginger Boosts Immune System Ginger can soothe coughs and sore throats and improve your recovery time due to its compounds that can boost immunity. Most coughs caused by sore throats are caused by viruses. This includes the common cold, flu, and mononucleosis.<sup>[4]</sup> This are the carminative and Gastro-Intestinal Regulators



## Amla



### 1. **Taxonomical Information**:

- Family: Phyllanthaceae
- Genus: Phyllanthus
- Species: Phyllanthus emblica

### 2. **Biological Source**:

- Amla is a fruit-bearing tree native to the Indian subcontinent. It is commonly found in India, Pakistan, and other Southeast Asian countries.

### 3. **Synonyms**:

- Indian Gooseberry, Emblica officinalis, Amalaki

### 4. **Organoleptic Characteristics**:

- Amla fruits are round, greenish-yellow, and about the size of a small apple. They have a sour, tangy taste with a slightly bitter undertone. The fruit is juicy and often consumed raw, in pickles, or in various culinary preparations.

### 5. **Chemical Constituents**:

- Amla is rich in vitamin C and contains various other bioactive compounds such as polyphenols, flavonoids, tannins, and minerals like calcium and iron.

### 6. **Uses**:

- Amla is highly valued in Ayurvedic medicine for its numerous health benefits. It is known to boost immunity, improve digestion, promote hair health, enhance skin complexion, and provide antioxidant protection. In the context of cough lozenges, amla may contribute to the formulation's overall health-promoting and immune-boosting effects.

Amla is a great source for improving your immunity, and amla powder benefits your body during viral and bacterial infections as well as during the common cold. Amla Powder mixed with two teaspoons of honey provides relief from cough and cold when consumed about three to four times a day.<sup>[5]</sup>

## Black Pepper:



### 1. **Taxonomical Information**:

- Family: Piperaceae
- Genus: Piper
- Species: Piper nigrum





2. **Biological Source**:

- Black pepper is derived from the dried berries of the *Piper nigrum* vine, native to India and other parts of Southeast Asia.

3. **Synonyms**:

- Peppercorn, *Piper nigrum*

4. **Organoleptic Characteristics**:

- Black pepper is known for its pungent, spicy flavor and aroma. The dried berries are small, round, and dark brown to black in color.

5. **Chemical Constituents**:

- Black pepper contains several bioactive compounds, including piperine, which is responsible for its characteristic flavor and many of its health benefits. It also contains essential oils, alkaloids, and flavonoids.

6. **Uses**:

- Black pepper has been used for centuries in traditional medicine for its various health benefits. It is known to have antioxidant, anti-inflammatory, and antimicrobial properties. In the context of cough lozenges, black pepper may help soothe throat irritation, reduce coughing, and provide respiratory support.

Black pepper is the most important and most widely used spice in the world, cultivated in over 26 countries, together producing about 315–320 000 tons of pepper (black and white). Pepper is valued for its pungency contributed by the alkaloid piperine and flavor contributed by the volatile oil.<sup>[6]</sup> This chapter looks at production and international trade in pepper, cultivars, cultivation, post-harvest handling and grading. The chemical structure of pepper is presented, together with quality issues and techniques used in industrial processing. Finally, the functional properties of black pepper and its applications in medicine and in food are described.<sup>[7]</sup>

## Clove



1. **Taxonomical Information**:

- Family: Myrtaceae
- Genus: *Syzygium*
- Species: *Syzygium aromaticum*

2. **Biological Source**:

- Cloves are the aromatic flower buds of the clove tree, *Syzygium aromaticum*, which is native to the Maluku Islands in Indonesia.

3. **Synonyms**:

- Clove buds, *Eugenia caryophyllata*

4. **Organoleptic Characteristics**:

- Cloves have a strong, sweet, and spicy aroma. The dried buds are small, dark brown, and have a distinctive nail-like shape.

5. **Chemical Constituents**:



- Cloves contain several bioactive compounds, including eugenol, which is the primary component responsible for its aroma and medicinal properties. Other constituents include flavonoids, phenolic acids, and tannins.

6. **Uses**:

- Cloves have been used for centuries in traditional medicine and culinary applications. They are known for their analgesic, antibacterial, antifungal, and anti-inflammatory properties. In traditional medicine, cloves are used to alleviate toothaches, aid digestion, and relieve respiratory symptoms such as cough and sore throat.

## Turmeric



1. **Taxonomical Information**:

- Family: Zingiberaceae
- Genus: Curcuma
- Species: Curcuma longa

2. **Biological Source**:

- Turmeric is derived from the rhizomes of the Curcuma longa plant, which is native to South Asia, particularly India and Indonesia.

3. **Synonyms**:

- Indian saffron, Haldi

4. **Organoleptic Characteristics**:

- Turmeric has a distinct bright yellow-orange color. It has a warm, earthy aroma and a slightly bitter, peppery taste.

5. **Chemical Constituents**:

- The primary bioactive compound in turmeric is curcumin, which is responsible for its vibrant color and many of its health benefits. Other important constituents include volatile oils, such as turmerone and zingiberene, as well as various vitamins and minerals.

6. **Uses**:

- Turmeric has been used for centuries in traditional medicine, particularly in Ayurveda and traditional Chinese medicine (TCM). It is known for its anti-inflammatory, antioxidant, antimicrobial, and analgesic properties. Turmeric is used to treat a variety of conditions, including respiratory infections, digestive issues, and inflammatory conditions like arthritis.

In the formulation of herbal cough lozenges, turmeric may contribute its medicinal properties, including its anti-inflammatory and antimicrobial effects, which can help soothe throat irritation and support respiratory health. The curcumin content in turmeric may also provide antioxidant benefits and aid in reducing cough symptoms. Additionally, turmeric adds color and flavor to the lozenges, enhancing their overall appeal.

## Honey



1. **Taxonomical Information**:

- Honey does not have taxonomical information as it is a natural product rather than a plant or organism.



2. **Biological Source**:

- Honey is produced by bees from the nectar of flowers. It is a natural sweet substance that bees store in honeycombs within their hives.

3. **Synonyms**:

- Nectar, Bee honey

4. **Organoleptic Characteristics**:

- Honey varies in color and flavor depending on the flowers from which the bees collect nectar. It can range from light amber to dark brown and may have floral, fruity, or herbal notes. The texture can be thick and viscous or smooth and runny.

5. **Chemical Constituents**:

- Honey is primarily composed of sugars, mainly glucose and fructose, but it also contains trace amounts of vitamins, minerals, amino acids, and antioxidants. Its composition can vary depending on factors such as floral source and processing methods.

6. **Uses**:

- Honey has been used for centuries as a natural sweetener and for its medicinal properties. It is known for its antibacterial, anti-inflammatory, and wound-healing properties.<sup>[8]</sup> In the context of cough lozenges, honey may help soothe sore throats, suppress coughing, and provide a sweet flavor.

In the formulation of herbal cough lozenges, honey serves as a natural sweetener and may contribute its medicinal properties, including its ability to coat the throat, soothe irritation, and provide antimicrobial effects. Its sweet flavor also enhances the palatability of the lozenges.

**Cinnamon**



1. **Taxonomical Information**:

- Family: Lauraceae

- Genus: Cinnamomum

- Species: There are several species of Cinnamomum used for cinnamon, including Cinnamomum verum (true cinnamon) and Cinnamomum cassia (cassia cinnamon).

2. **Biological Source**:

- Cinnamon is obtained from the inner bark of trees belonging to the genus Cinnamomum. True cinnamon (Cinnamomum verum) is native to Sri Lanka, while cassia cinnamon (Cinnamomum cassia) is native to China and other parts of East Asia.

3. **Synonyms**:

- Cinnamomum zeylanicum (true cinnamon), Chinese cinnamon, cassia

4. **Organoleptic Characteristics**:

- Cinnamon has a warm, sweet, and woody aroma with a slightly spicy flavor. True cinnamon (Cinnamomum verum) is lighter in color and has a delicate, sweet taste, while cassia cinnamon (Cinnamomum cassia) is darker and has a stronger, more pungent flavor.

5. **Chemical Constituents**:

- The main bioactive compound in cinnamon is cinnamaldehyde, which is responsible for its characteristic flavor and aroma. Other constituents include eugenol, coumarin, and various essential oils.

6. **Uses**:

- Cinnamon has been used for centuries in traditional medicine and culinary applications. It is known for its antioxidant, anti-inflammatory, antimicrobial, and digestive properties. In traditional medicine, cinnamon is used to alleviate respiratory symptoms, improve circulation, and aid digestion.



In the formulation of herbal cough lozenges, cinnamon may contribute its medicinal properties, including its ability to soothe throat irritation, reduce coughing, and provide antimicrobial effects. The cinnamaldehyde content in cinnamon has been shown to have antiviral properties, which may help combat respiratory infections. Additionally, cinnamon adds a warm and comforting flavor to the lozenges.

## Fennel



### 1. **Taxonomical Information**:

- Family: Apiaceae (Umbelliferae)
- Genus: Foeniculum
- Species: Foeniculum vulgare

### 2. **Biological Source**:

- Fennel is a flowering plant native to the Mediterranean region but is also cultivated in other parts of the world. It is grown for its aromatic seeds and flavorful bulb-like stem.

### 3. **Synonyms**:

- Foeniculum officinale, Foeniculum dulce

### 4. **Organoleptic Characteristics**:

- Fennel seeds have a sweet, licorice-like aroma and a warm, slightly sweet flavor. The seeds are small, elongated, and ridged.

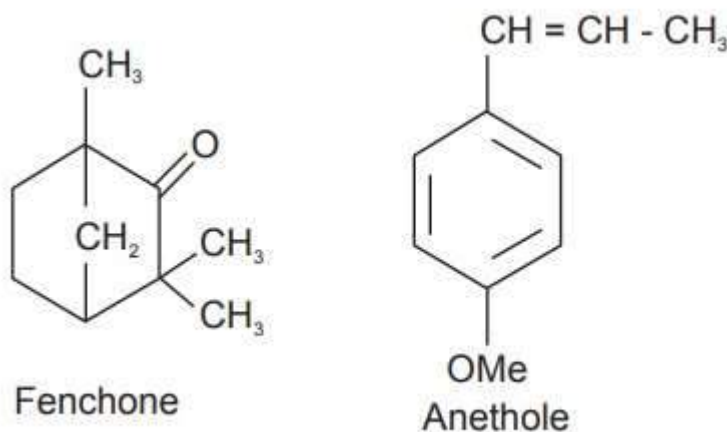
### 5. **Chemical Constituents**:

- Fennel seeds contain various bioactive compounds, including anethole, which is responsible for their characteristic flavor and aroma. Other constituents include flavonoids, phenolic compounds, and volatile oils.

### 6. **Uses**:

- Fennel has been used for centuries in traditional medicine and culinary applications. It is known for its carminative, digestive, and anti-inflammatory properties. Fennel seeds are commonly used to alleviate digestive issues such as bloating, gas, and indigestion. In traditional medicine, fennel is also used to relieve coughs and respiratory congestion.

In the formulation of herbal cough lozenges, fennel may contribute its medicinal properties, including its ability to soothe throat irritation, reduce coughing, and provide respiratory support. The anethole content in fennel seeds has been shown to have expectorant properties, which may help loosen mucus and facilitate its expulsion. Additionally, fennel adds a sweet and aromatic flavor to the lozenges.



### Cardamom



1. **Taxonomical Information**:

- Family: Zingiberaceae
- Genus: Elettaria (for true cardamom)
- Species: Elettaria cardamomum

2. **Biological Source**:

- Cardamom, also known as true cardamom or green cardamom, is a plant native to the Indian subcontinent and Southeast Asia. It is cultivated for its aromatic seeds, which are used as a spice.

3. **Synonyms**:

- Elettaria cardamomum, Elaichi (in Hindi), Cardamon

4. **Organoleptic Characteristics**:

- Cardamom seeds have a strong, sweet, and aromatic fragrance with a slightly spicy, minty flavor. The seeds are small, black, and found within papery pods.

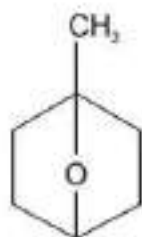
5. **Chemical Constituents**:

- Cardamom seeds contain various bioactive compounds, including essential oils such as cineole, terpinene, and limonene, as well as phenolic compounds like catechins and flavonoids.

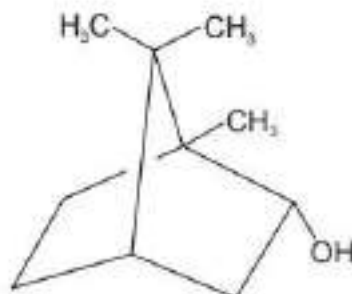
6. **Uses**:

- Cardamom has been used for centuries in traditional medicine and culinary applications. It is known for its carminative, digestive, and antimicrobial properties. Cardamom is commonly used to alleviate digestive issues such as indigestion, bloating, and gas. It is also used to freshen breath and relieve respiratory symptoms such as coughs and congestion.

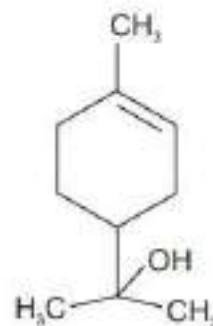
In the formulation of herbal cough lozenges, cardamom may contribute its medicinal properties, including its ability to soothe throat irritation, reduce coughing, and provide respiratory support. The aromatic compounds in cardamom may help clear nasal passages and promote easier breathing. Additionally, cardamom adds a pleasant flavor and aroma to the lozenges.



Cineole



Borneol

 $\alpha$ -Terpineol

### Peppermint Oil



#### 1. **\*\*Taxonomical Information\*\***:

- Family: Lamiaceae
- Genus: *Mentha*
- Species: *Mentha × piperita* (Peppermint)

#### 2. **\*\*Biological Source\*\***:

- Peppermint oil is derived from the leaves and stems of the peppermint plant, *Mentha × piperita*, which is a hybrid between watermint (*Mentha aquatica*) and spearmint (*Mentha spicata*). It is native to Europe and Asia but is now cultivated worldwide.

#### 3. **\*\*Synonyms\*\***:

- Mentha oil, *M. piperita* oil

#### 4. **\*\*Organoleptic Characteristics\*\***:

- Peppermint oil has a strong, refreshing aroma with a cooling sensation. It has a characteristic minty flavor with hints of sweetness.

#### 5. **\*\*Chemical Constituents\*\***:

- The main bioactive compound in peppermint oil is menthol, which is responsible for its characteristic cooling effect. Other important constituents include menthone, menthyl acetate, and various terpenes.

#### 6. **\*\*Uses\*\***:

- Peppermint oil has a wide range of uses in traditional medicine, aromatherapy, and culinary applications. It is known for its analgesic, anti-inflammatory, antimicrobial, and digestive properties. Peppermint oil is commonly used to alleviate headaches, soothe muscle pain, improve digestion, and relieve respiratory symptoms such as coughs and congestion.

In the formulation of herbal cough lozenges, peppermint oil may contribute its medicinal properties, including its ability to soothe throat irritation, reduce coughing, and provide a cooling sensation. The menthol content in peppermint oil acts as a mild anesthetic, numbing the throat and reducing the urge to cough. Additionally, peppermint oil adds a refreshing flavor and aroma to the lozenges.



## Lemon Juice



### 1. **Taxonomical Information**:

- Lemon juice does not have taxonomical information as it is a natural product obtained from citrus fruits.

### 2. **Biological Source**:

- Lemon juice is obtained from the citrus fruit *Citrus limon*, which belongs to the Rutaceae family. Lemon trees are native to South Asia but are cultivated in various parts of the world for their fruits.

### 3. **Synonyms**:

- Citrus limon juice

### 4. **Organoleptic Characteristics**:

- Lemon juice has a tart, tangy flavor with a refreshing citrus aroma. It is typically a pale yellow to bright yellow color and has a slightly acidic taste.

### 5. **Chemical Constituents**:

- Lemon juice contains various compounds, including citric acid, vitamin C (ascorbic acid), flavonoids, and other phytochemicals. It is also rich in minerals such as potassium and calcium.

### 6. **Uses**:

- Lemon juice is widely used in culinary applications for its flavor-enhancing properties and acidic tang. It is also used in traditional medicine and home remedies for its potential health benefits. Lemon juice is known for its vitamin C content, which boosts the immune system and provides antioxidant protection. It is also used to aid digestion, cleanse the body, and freshen breath.

In the formulation of herbal cough lozenges, lemon juice may contribute its acidic nature, which can help soothe throat irritation and provide a refreshing taste. Additionally, the vitamin C content in lemon juice may support immune function and help alleviate symptoms of coughs and colds. Lemon juice adds a tangy flavor and enhances the overall taste of the lozenges.

## Menthol



### 1. **Taxonomical Information**:

- Menthol does not have taxonomical information as it is a natural compound rather than a plant or organism.

### 2. **Biological Source**:

- Menthol is obtained from the essential oil of various mint species, particularly peppermint (*Mentha × piperita*) and cornmint (*Mentha arvensis*). It is a naturally occurring compound found in the leaves and stems of these plants.



3. **Synonyms**:

- No common synonyms; it's simply referred to as menthol.

4. **Organoleptic Characteristics**:

- Menthol has a characteristic minty aroma and flavor with a cooling sensation when applied to the skin or mucous membranes. It is typically a colorless or white crystalline solid at room temperature.

5. **Chemical Constituents**:

- Menthol is a cyclic terpene alcohol with the chemical formula C<sub>10</sub>H<sub>20</sub>O. It is the primary bioactive compound responsible for the minty flavor and cooling sensation of mint plants. Menthol is synthesized from menthone, which is another compound found in mint oils.

6. **Uses**:

- Menthol has a wide range of uses in pharmaceuticals, personal care products, and food and beverages. It is commonly used in cough drops, throat lozenges, and topical ointments for its cooling and soothing effects. Menthol is known for its analgesic, antipruritic, and decongestant properties. It is often used to relieve symptoms of coughs, sore throats, congestion, and minor skin irritations.

In the formulation of herbal cough lozenges, menthol may contribute its cooling and soothing effects, helping to relieve throat irritation and suppress coughing. It provides a refreshing sensation and may help alleviate congestion. Menthol is often included in cough lozenges for its ability to provide immediate relief from cough and throat discomfort.

### Evaluation Test

Hardness test- The Hardness testing was done by using Pfizer hardness tester for sampled lozenges and average hardness was determined and the results were indicated as kg/sq. cm <sup>[9]</sup>

Disintegration time- Ideally this test is not official for the formulation expected to be dissolved slowly in the mouth and hence the limits are not specific. Still the test was performed to find whether the lozenge dissolves in mouth and how much time it takes to dissolve completely so that the faster and localized onset of action can be obtained. The test was performed as per the procedure given in the monograph for uncoated tablets. The medium used was phosphate buffer pH 6.2 to simulate the pH of oral fluid. Sampled six lozenges revealed average disintegration time <sup>[10]</sup>

### CONCLUSION

Herbal lozenges are designed to provide various health benefits in the form of a small tablet that slowly dissolves in the mouth. The aim of herbal lozenges is to deliver the active herbal ingredients directly to the throat, mouth, and respiratory system to provide relief from various conditions.<sup>[11]</sup>

The cough lozenge is taken to relieve infections in the throat or sore throat caused by an infection or common cough and cold.<sup>[12]</sup> used to temporarily help relieve symptoms such as sore throat, throat irritation, or cough (due to a cold, for example). It works by providing a cooling feeling and increasing saliva in the mouth.<sup>[13]</sup>

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# A REVIEW ON POTENTIAL CONTAMINATION OF NON-ALCOHOLIC BEVERAGES WITH PESTICIDES

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Article DOI: <https://doi.org/10.36713/epra16532>

DOI No: 10.36713/epra16532

## ABSTRACT

Soft drinks are non-alcoholic water-based flavoured drinks that are optionally sweetened, acidulated and carbonated. Some carbonated soft drinks also contain caffeine; mainly the brown-coloured cola drinks. The contamination of soft drinks with pesticides presents a multifaceted issue with implications for public health, environmental sustainability, and regulatory oversight. This introduction will explore the sources of pesticide contamination in soft drinks, the potential health risks associated with pesticide residues, regulatory frameworks governing pesticide use, and strategies to mitigate the risks posed by pesticide contamination in soft drinks. Excessive consumption of carbonated soft drinks has been putatively linked to health effects including dental caries, obesity, and osteoporosis.

**KEYWORDS:** Soft Drinks, pesticides, Health effects, Chemical contaminants, Non-alcoholic

## INTRODUCTION

Chemical contaminants should not be present in beverages for human consumption, but could eventually be ingested by consumers as they may appear naturally from the environment or be produced by anthropogenic sources. These contaminants could belong to many different chemical sources, including heavy metals, amines, bisphenols, phthalates, pesticides, perfluorinated compounds, inks, ethyl carbamate, and others. It is well known that these hazardous chemicals in beverages can represent a severe threat by the potential risk of generating diseases to humans if no strict quality control is applied during beverages processing. This review compiles the most updated knowledge of the presence of potential contaminants in various types of beverages (both alcoholic and non-alcoholic), as well as in their containers, to prevent undesired migration. Special attention is given to the extraction and pre-concentration techniques applied to these samples, as well as to the analytical techniques necessary for the determination of chemicals with a potential contaminant effect. Finally, an overview of the current legislation is carried out, as well as future trends of research in this field.

Soft drinks have long been a popular choice for refreshment, enjoyed by people of all ages around the globe. However, recent concerns have emerged regarding the potential contamination of these beverages with pesticides. Pesticides, chemicals used to control pests and diseases in agriculture, have found their way into various food and drink products, including soft drinks, raising questions about the safety of these ubiquitous beverages. Soft drinks are typically made from a combination of water, sweeteners, flavorings, and preservatives. While these ingredients may seem innocuous, they can inadvertently introduce pesticide residues into the final product. Water, a primary component of soft drinks, can be a carrier for pesticide residues if it is sourced from contaminated water sources. Agricultural runoff, industrial pollution, and inadequate water treatment processes can all contribute to the presence of pesticides in drinking water, which may then be used in the production of soft drinks.

Furthermore, the ingredients used in soft drinks, such as fruits and sugars, may also contain pesticide residues. Fruits used for flavourings or extracts in soft drinks are often cultivated using pesticides to protect against pests and diseases. Similarly, sugar, a common ingredient in many soft drinks, is derived from sugar cane or sugar beets that may be treated with pesticides during cultivation. The contamination of soft drinks with pesticides can occur at various stages of the production process, including harvesting, processing, and bottling. Pesticide residues present in raw ingredients may persist through processing and manufacturing processes, ultimately ending up in the final product. Additionally, inadequate cleaning and sanitation practices in bottling facilities can lead to cross-contamination, further exacerbating the issue.

The presence of pesticide residues in soft drinks raises concerns about potential health risks for consumers. Pesticides are designed to be toxic to pests, and even at low concentrations, they can have adverse effects on human health. Chronic exposure to pesticide



residues has been linked to a range of health problems, including neurological disorders, reproductive issues, and certain types of cancer. Children, pregnant women, and individuals with compromised immune systems may be particularly vulnerable to the effects of pesticide exposure.

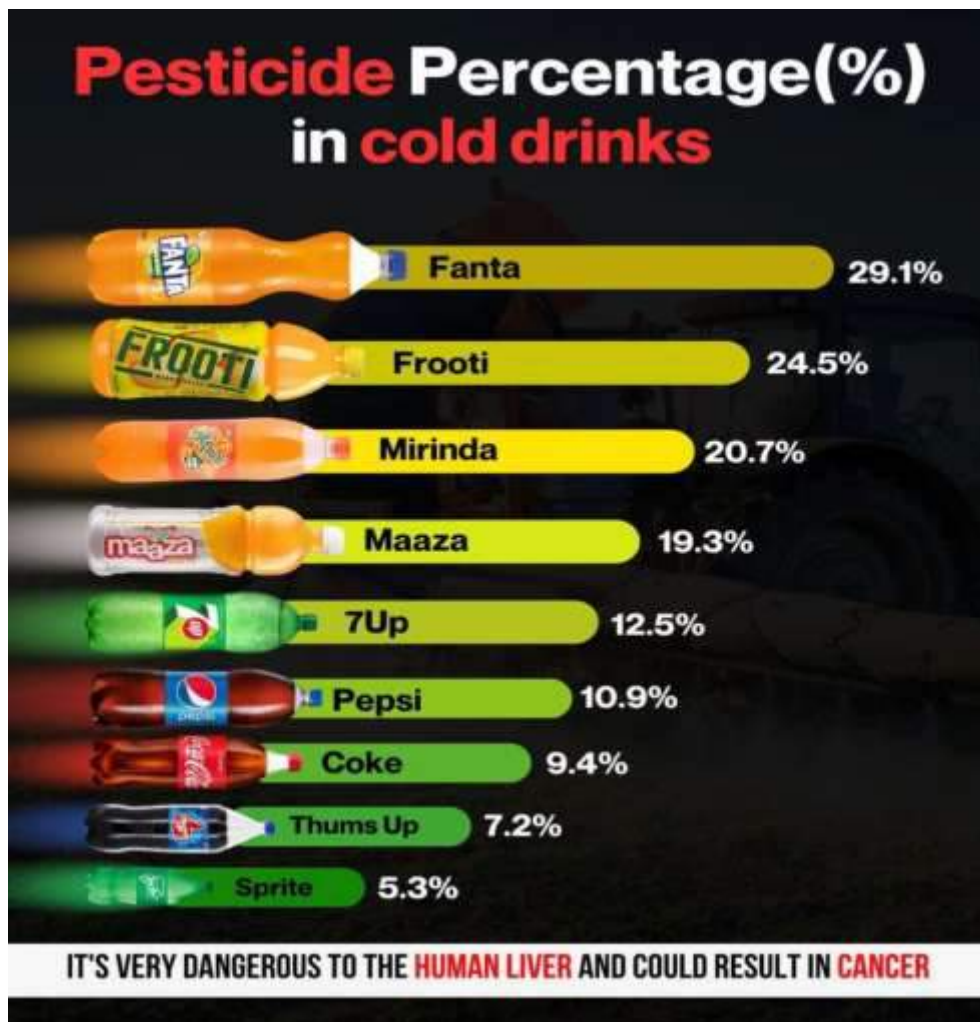
By definition, beverages are potable liquids for human consumption, which are essential for many physiological functions, such as giving energy and refreshing the body [1]. In general terms, “beverages” include many different products, such as milk, coffee, tea, juices, and alcoholic products, which humans commonly consume in their daily lives [2–7]. In agreement with recent literature [8–10], the most frequent drinks currently used in the human diet can be classified into two categories: Alcoholic and non-alcoholic beverages. A brief classification of beverages is shown in Figure 1. The vast majority of beverages, including alcoholic and non-alcoholic drinks, are based on large amounts of water. Nonetheless, water is not classified as a beverage, although in this review, bottled mineral water will be treated as a special kind of beverage, as suggested by some authors. The alcoholic group includes beverages, both distilled and non-distilled, mainly obtained from fruits or grains, with wine and beer having high rates of consumption worldwide, being typical examples of fruit-produced and cereal-produced beverages, respectively [11–13]

On the other hand, non-alcoholic beverages are subdivided into carbonated and non-carbonated drinks, including vegetable and fruit juices, prepared or embedded water-based beverages, such as coffee and tea, and dairy products. Carbonated soft drinks are those to which carbon dioxide has been lemon/lime, tonic, etc. added intentionally to produce a special kind of non-alcoholic liquor, including sodas, cola, lemonade.



**Figure 1: A Brief Classification of beverages**

Pesticides are defined as a broad spectrum of chemical and organic mixtures including insecticides, fungicides, plant growth regulators, etc. The primary source of pesticides in the ecosystem are agriculture and forestry. It is well known that the rapidly growing population needs enhanced global food production. Preferably, a pesticide must be fatal to the target organisms to control the effect of weeds species, instead of creating havoc on human beings and the environment. The disproportionate use of these lethal pesticidal compounds affects the plants and animals of the whole ecological structure. The widespread use of these hazardous chemical-based pesticides has a greater impact on human and other systems. The pesticidal applications in the forest, public health and industries have yielded enormous benefits. Pesticides mainly help the farmers to get higher food yield. Other benefits such as improved productivity of the crops, protect the damage of crops from weeds, vector disease controls, and food quality improvements pave the way for greater use of pesticides, despite having lethality [14]. Several new and powerful pesticides have been formulated in large quantity by researchers and manufacturers to combat the world’s population demands. This results in creating more pesticide resistance, healthy controls and a great food thirst [15].



The presence of pesticide residues in soft drinks raises concerns about potential health risks for consumers. Pesticides are designed to be toxic to pests, and even at low concentrations, they can have adverse effects on human health. Chronic exposure to pesticide residues has been linked to a range of health problems, including neurological disorders, reproductive issues, and certain types of cancer. Children, pregnant women, and individuals with compromised immune systems may be particularly vulnerable to the effects of pesticide exposure.

Regulatory agencies around the world have established maximum residue limits (MRLs) for pesticides in food and beverages, including soft drinks, to protect public health. These MRLs are based on scientific assessments of the potential risks associated with exposure to pesticide residues and are intended to ensure that consumers are not exposed to harmful levels of pesticides through their diet. However, enforcement of these regulations can vary widely between countries, and lapses in oversight can occur, allowing contaminated products to enter the market.

The term “contaminants” in beverages includes those compounds that are dangerous to health, whether chemical, physical, or microorganisms. Potential contamination is one of the main issues for consumers when selecting beverages for their use, as it could represent a risk for their health and well-being [16]. Although chemical and biological contaminants are strictly banned in beverages formulation, they can sometimes be unintentionally formed during processing, packaging, and distribution processes. In addition, physical contaminants such as foreign bodies that may be present in beverages must be taken into account (glass, wood, metal fragments, etc.). These may come from raw materials, but also from unintentional contamination from personnel or devices used during the processing and packing of the final product.

## SOFT DRINK INDUSTRY AND REGULATIONS

### Definition of soft drink

Soft drinks are non-alcoholic water-based flavoured drinks that are optionally sweetened, acidulated and carbonated. Some carbonated soft drinks also contain caffeine; mainly the brown-coloured cola drinks.



## The Market

### Global Scenario

Globally, carbonated soft drinks are third most consumed beverages. Per capita annual consumption of carbonated soft drinks is nearly four times the per capita consumption of fruit beverages (Source: Data from the Beverage marketing Corporation, as reported by the Canadian Soft drink Association). Soft drink consumption is growing by around 5% a year, according to the publication Global Soft drinks 2002, published by the Zenith International. Total volume reached 412,000 million litres in 2001, giving a global per capita consumption of around 67.5 litres per year.

The Centre for Science and Environment (CSE) announced that 12 soft drink brands collected for testing from in and around Delhi contained residues of four toxic pesticides and insecticides - lindane, DDT, malathion and chlorpyrifos. The multinational companies Coca-Cola and PepsiCo immediately challenged the report and indicated that they might consider legal action. In all the samples, the levels of pesticide residues far exceeded the maximum residue limit for pesticides in water used as "food" as set down by the European Economic Commission (EEC). Each sample had enough poison to cause long-term cancer, damage to the nervous and reproductive systems, birth defects and severe disruption of the immune system. The tested soft drinks include Pepsi, Coca-Cola, Mountain Dew, Diet Pepsi, Mirinda Orange, Mirinda Lemon, Pepsi Blue, 7Up, Fanta, Limca, Sprite and Thums Up. According to the findings, Coca-Cola and Pepsi had almost similar concentration of pesticide residues. While contaminants in Pepsi were 37 times higher than the EEC limit, Coca-Cola overstepped the norm having 45 times the prescribed limit of pesticide contamination. The worst results were of Mirinda Lemon (70 times the normal limit) followed by Coca-Cola, Pepsi, Fanta, Mirinda Orange, 7Up, Mountain Dew, Limca, Thums Up and Sprite. It was also found that pesticides in soft drinks were similar to bottled water. The CSE tests, conducted over the past six months, showed the amount of DDT in Pepsi was 16 times higher than EU norms and nine times higher in Coca-Cola. The Indian units of rival soft drink giants, Coca-Cola and PepsiCo, jointly denied the environmental group's report that their beverages contained high levels of pesticides. According to them the report is baseless and should be disregarded. They conform to the best international norms and are open to their product being tested anywhere in the world by an independent and accredited laboratory. However, CSE found no pesticides in tests of Coke and Pepsi soft drink brands sold in the United States. According to the centre, soft drinks in India had high pesticide residues because the soft drink and bottled water industry used an enormous amount of ground water as the basic raw material.

## CONCLUSION

In conclusion, the contamination of soft drinks with pesticides is a complex issue that requires attention from multiple stakeholders, including regulatory agencies, manufacturers, and consumers. By addressing the sources of contamination, strengthening regulatory oversight, and promoting consumer awareness, we can mitigate the risks posed by pesticide residues in soft drinks and ensure that these beverages remain safe and enjoyable for all

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# HAND SIGN LANGUAGE RECOGNITION USING AUGMENTED REALITY & MACHINE LEARNING

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Article DOI: <https://doi.org/10.36713/epra16515>

DOI No: 10.36713/epra16515

## ABSTRACT

Effective communication is a cornerstone of human interaction, fostering societal cohesion and development. Throughout history, communication has evolved from primitive drawings to complex languages, shaping our society's fabric. However, amidst this progression, individuals with speech and hearing impairments have often faced significant challenges in communication. Despite constituting a minority, their needs are paramount and must not be overlooked. Recognizing the diverse classification of languages into verbal and non-verbal forms, it becomes evident that non-verbal languages play a crucial role, especially for Individuals with Hearing and Speech Impairments (IWSHI). These individuals rely on non-verbal communication methods to interact with the world around them, yet they often face barriers due to the lack of understanding and accessibility. To address this challenge, the HSLR app serves as a transformative tool, enabling IWSHI to communicate confidently. Leveraging technologies such as Augmented Reality (AR) and Machine Learning (ML), our app facilitates real-time recognition of hand signs, providing instantaneous translations for seamless communication. Additionally, the integration of AR technology enhances the user experience, offering immersive and interactive sign-language communication platforms. The MediaPipe model used in real-time achieves high accuracy in recognizing sign language due to the ample dataset we provided.

**KEY WORDS:** Hand Sign Language Recognition (HSLR), Augmented Reality (AR), Machine Learning (ML), American Sign Language (ASL), Computer Vision, MediaPipe

## 1. INTRODUCTION

People with Speech and also Hearing Disabilities run into considerable interaction obstacles, especially those that do not recognize indication language or motions. This absence of understanding typically brings about obstacles to reliable communication, preventing social incorporation as well as engagement. Creating an option to help with smooth interaction in between IWSHI and also people without hearing problems positions a significant difficulty. In reaction to this immediate requirement the Hand Sign Language Recognition making use of AR-ML (HSLR) job arised as a groundbreaking effort to get over these interaction obstacles.

At the heart of the HSLR job exists a dedication to leveraging sophisticated innovations to deal with the distinct demands of the hearing-impaired neighbourhood. By using Hand Sign Language Recognition (HSLR) modern technology the job uses advanced computer system vision as well as artificial intelligence methods to spot together with acknowledge indicator motions in real-time. With meticulous assimilation of modern indicator discovery abilities, the system makes sure specific acknowledgment, introducing reliable interaction in between IWSHI plus their equivalents.

Additionally influenced by the symbiotic mix in between Augmented Reality (AR) as well as Machine Learning (ML) the HSLR job intends to revamp the landscape of indicator language interaction. Past plain acknowledgment, the system provides real-time comments empowering customers to refine their indication language abilities with self-confidence as well as performance. The smooth assimilation of AR innovation boosts the translation as well as finding out procedure, promoting an immersive coupled with appealing setting for reliable interaction. Fundamentally the HSLR job provides an appealing service to link the interaction void, fostering inclusivity, as well as encouraging individuals to interact with complete confidence via indication language.

## 2. LITERATURE SURVEY

The examination of Hand Sign Language Recognition through AR-ML (HSLR) in literary works commences with an exploration of gesture-based interactions crucial for individuals with speech and hearing impairments to communicate effectively in everyday life. These interactions predominantly rely on coordinated hand movements, facial expressions, and body language, collectively forming visual languages. Despite the existence of over 300 distinct sign languages globally, only a



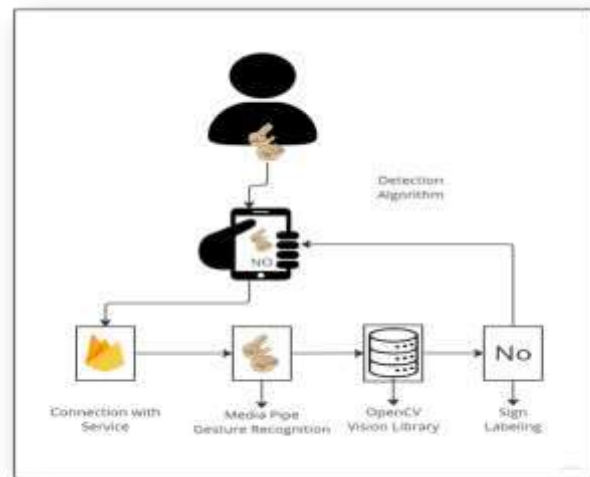
small fraction of individuals are proficient in any of them. This limited proficiency poses challenges for individuals with special needs to easily communicate with others. Hand Sign Language Recognition (HSLR) technology addresses this challenge by enabling communication without the necessity of knowledge of authorized languages, translating movements into spoken languages such as English. In 2022, a study on Sign Language Recognition and Response via Virtual Reality introduced an innovative approach using virtual reality with a Leap Motion controller. While it achieved success in cross-platform development and advanced graphics potential, complexity in establishing basic grammatical structures emerged as a limitation. In 2021, an Efficient Approach for Interpretation of Indian Sign Language utilizing Machine Learning focused on gesture-to-text conversion but fell short in real-time interaction. The same year witnessed the notable Sign Language Detection from Hand Gesture Images using Deep Multi-layered Convolution Neural Network, achieving a rigorous test accuracy of 99.89% despite lacking real-time capabilities. In 2020, SIGN LANGUAGE RECOGNITION USING TEMPLATE MATCHING TECHNIQUE presented a camera-based system but encountered sustainability challenges for real-time conversations. In 2019, A Sign Language Translator Application with Augmented Reality employing Text and Image Recognition and On the development of a web extension for text verification on Google Chrome explored practical applications. SignCol: Open-Source Software for Collecting Sign Language Gestures described an open-source software while Sign Languages to Speech Conversion Prototype using the SVM Classifier introduced a glove model distinguishing ASL and ISL. In 2017, Hand Gesture Recognition Using Machine Learning and the Myo Armband highlighted innovative techniques with the Myo armband along with Machine Learning Techniques for Indian Sign Language Recognition focused on classification. The proposed system in Proposed System for Sign Language Recognition emphasized responsiveness and robustness but faced limitations in response time and lack of ISL support. Overall, the literature survey underscores a rich array of research exploring diverse approaches, technologies, and applications within the realm of Hand Sign Language Recognition using AR-ML.

### 3. METHODOLOGY

Directory entails a thorough method to attending to the interaction obstacles dealt with by people with speech and also hearing problems with Hand Sign Language Recognition (HSLR). The initial step included putting together a varied dataset making up different words as well as alphanumeric personalities in American Sign Language (ASL). This dataset functioned as the structure for educating our version to acknowledge and also analyze indicator language motions properly. Furthermore, to make certain the efficiency of our version, we utilized a pre-trained design to recognize crucial things such as Fingers, Palm, Hand, and also Face important for exact hand motion acknowledgment. Ultimately, we set out on the version training stage making use of an Object Detection Algorithm customized especially for indicator language analysis.

Leveraging the set up dataset our version discovered to connect various hand motions with their equivalent linguistic significances. This training procedure targeted to improve the design's precision coupled with performance in acknowledging ASL motions in real-time situations.

Parallel with version growth, information purchase played an essential duty in making certain the system's efficiency. Utilizing Python plus OpenCV we recorded photos in real-time making use of a mobile phone's electronic camera, creating the basis of our indicator language dataset. Each alphabet in ASL was stood for by a collection of photos, recorded at normal periods to include a variety of hand motions. These photos were carefully arranged along with saved preparing the succeeding version training coupled with examination.



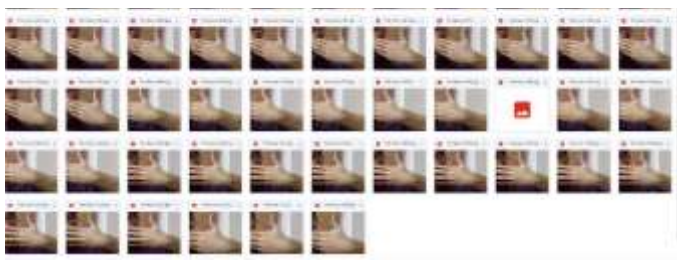
**Fig 1. Flowchart of HSLR AR-ML**

In the real-time application situation individuals start the Hand Sign Language Recognition utilizing our mobile application created in Kotlin. The system catches the individual's hand motions with the tool's electronic camera, using Pose Estimation to identify finger exposure, bends coupled with joints for exact acknowledgment. The design after that contrasts these real-time motions with the pre-labeled dataset, offering precise translations of the indicator language right into message. The suggested system's formula makes certain smooth assimilation of things discovery, hand motion acknowledgment plus translation supplying an user-friendly coupled with straightforward mobile application user interface that encourages people with speech as well as hearing disabilities to interact successfully in real-time. Extensive screening continuous customer comments devices as well as release with incorporated AR-ML innovation even more improvements the system's strength and also access adding to bridging the interaction void for people with speech along with hearing disabilities.





**AMERICAN SIGN LANGUAGE ALPHABET**



application that can check the hand motions done by IWSHI individuals so that offer translation of their motions. For this we made use of opencv for recognizing Hand and also Fingers.

Algorithm: In the beginning, we constructed a Dataset including numerous words and also alphanumeric personalities in Sign Language. After that we found an Mediapipe Algorithm is ideal to educate the design that can determine the items in this instance Fingers Palm Hand and also Face. Then we trained a Model based upon that Algorithm with a dataset ideal for determining items. After this was done, we trained the Model based upon comparable Object Detection Algorithm, that can recognize the indicator language. Examination the Model based upon various real-time Hand Gestures was performed. In real-time, feed the fractional hand includes right into the indicator language acknowledgment version. The version must forecast the indication being carried out and also equate it right into message outcome. Then, we established a user-friendly mobile application user interface that check or discover indicator from the tool's cam as well as shows the acknowledged indicator language outcome in real-time. We carefully evaluated the algorithm under different problems consisting of various hand alignments, signers, lights, etc.

Methods Used: SSD (Single Shot Detection) MOBILE INTERNET, CNN, MediaPipe.

**4.1 Execution Results**

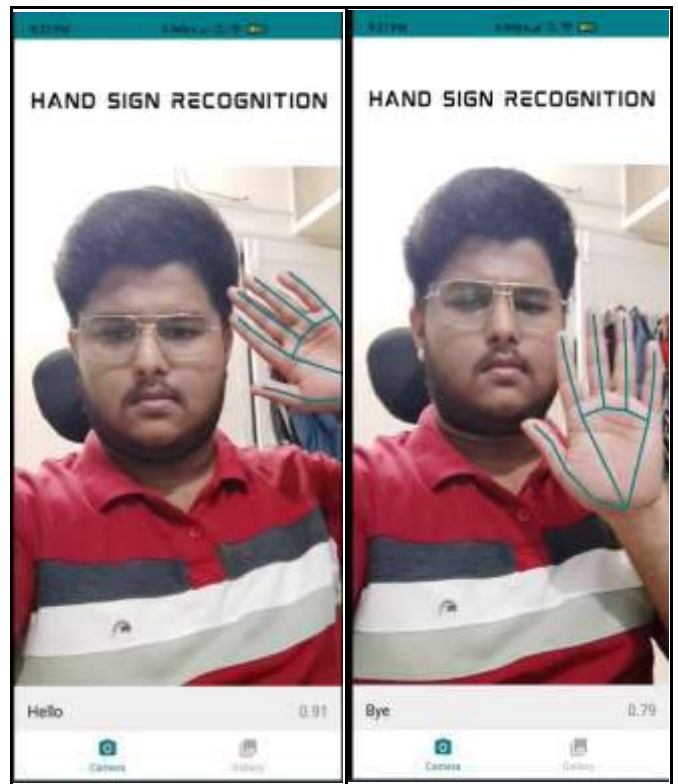


Fig 4.1- Execution (Hello Gesture) Fig 4.2- Execution (Bye)

**4. IMPLEMENTATION**

Our Job intends to link the interaction space in between normal individuals and the individuals with speech and hearing disabilities. To do this we are intended to produce a live

Fig 4.3- Execution (Thank-You)



Fig 4.4- Execution (Learn)

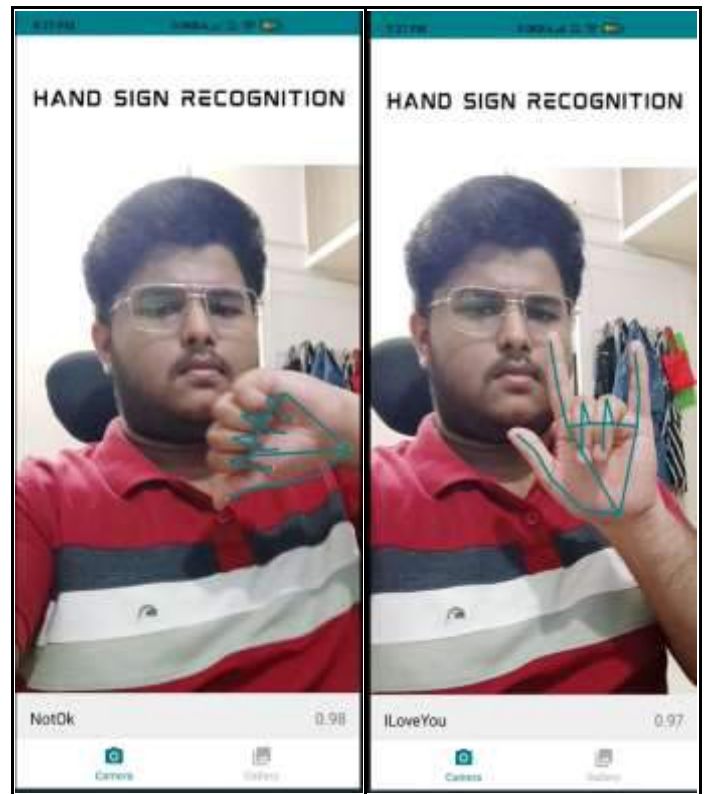


Fig 4.7- Execution (Not Ok)

Fig 4.8- Execution (Love you)

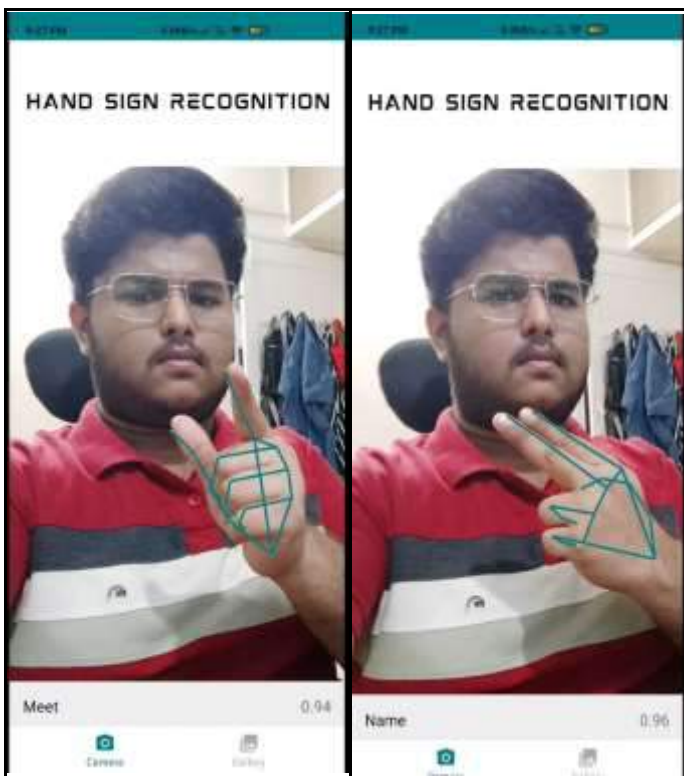


Fig 4.5- Execution (Meet)

Fig 4.6- Execution (Name)

## 5. CONCLUSION

The development of a real-time sign language detection system using AR-ML holds the promise of transforming communication for individuals with speech and hearing impairments. By seamlessly integrating object detection with real-time translation, this cutting-edge technology enables the immediate recognition and interpretation of sign language motions, promoting inclusivity and access. With a robust data collection, user-friendly mobile application, and ongoing optimization, it has the potential to revolutionize the lives of its users by providing a means for efficient and instant communication, ultimately fostering understanding and bridging communication barriers.

## 6. FUTURE SCOPE

In the future, Hand Sign Language Recognition using AR-ML can evolve and expand its impact by broadening its language recognition to include various sign languages, developing mobile applications for broader accessibility, enhancing features to cater to diverse user needs, integrating robust feedback systems, promoting educational use, compatibility with AR-VR equipment, fostering collaborations with relevant organizations, and advancing research for more accurate Hand Sign Language Recognition. This project's potential extends beyond addressing communication barriers, promising inclusivity, education, accessibility, and empowerment for individuals with speech and hearing disabilities.



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# TREATMENT OF LEUKOPLAKIA OF THE BLADDER AND RESULTS OF PATHOMORPHOLOGICAL STUDY

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## ANNOTATION

*This article discusses the treatment of bladder leukoplakia and the results of pathological examination. A study was conducted on 87 women with chronic cystitis. All women underwent cystoscopy. Conservative treatment, surgical treatment followed by pathological examination were performed. The use of transurethral resection of bladder leukoplakia as a treatment has shown to be more effective than treatment with a conservative method.*

**KEY WORDS:** *Leukoplakia of the bladder, treatment, cystoscopy, transurethral resection.*

## INTRODUCTION

Leukoplakia of the bladder (LMP) is a disease in which the transitional cell epithelium is replaced by squamous cell keratinizing epithelium against the background of dys hormonal disorders, chronic inflammation of the bladder and genital organs[1].

Chronic inflammatory diseases of the lower urinary tract in women are widespread[3]. Often, due to the ineffectiveness of conservative treatment, the patient is suspected of having interstitial cystitis. Risk factors include early onset of sexual activity, promiscuity, history of invasive interventions, including bladder catheterization, the presence of concomitant chronic gynecological diseases or vaginal dysbiosis [2,4]. Therefore, determining the risk factors for leukoplakia of the bladder, the frequency of occurrence by age groups, determining the duration and further determining the specific pathomorphological changes of each form is one of the most important problems of modern medicine [3].

In recent years, there has been a steady increase in the number of patients with various forms of dysuria. Persistent urinary disorders in women are common manifestations of chronic inflammatory processes of the lower urinary tract [1]. Of particular note is the increase in the number of patients with persistent urinary disorders, despite the normalization of urine tests and the cessation of bacteriuria (B.K. Komyakov et al ., 2004) [2].

Cystoscopy and biopsy of altered bladder mucosa in patients suffering from chronic cystitis, according to various authors, in 56-82% of cases reveals squamous metaplasia of the epithelium with varying degrees of keratinization, represented by foci of whitish plaque, clearly demarcated from the unchanged mucosa (A.M. Romanenko, 1985, I.A. Klimenko, 1986, A.F. Vozianov et al . , 1994, O.B. Laurent et al ., 2008) [1, 3, 4 ]. Clinicians combine all forms of squamous cell metaplasia of the

epithelium with the term “leukoplakia.” There are no exact statistics on the prevalence and incidence of bladder leukoplakia.

In the light of modern research, leukoplakia is a pathological process that is characterized by a violation of the basic functions of stratified squamous epithelium: the absence of glycogen formation and the occurrence of keratinization, which are normally absent [2]. Historically, defects in the embryonic development of the bladder mucosa, the role of a specific infection (tuberculosis, syphilis), and vitamin A hypovitaminosis were considered as the causes of the development of squamous metaplasia. Recently, the most probable theories of the origin of leukoplakia of the bladder are inflammatory, hormonal imbalance (the influence of estrogens) [5] , the result of thermal, chemical exposure; disruption of microcirculation in the wall of the bladder [6, 7], as well as destruction of the normal glycosaminoglycan layer of the urothelium under the influence of urogenital infection ( Ch . trachomatis , U. urealiticum , N. gonorrhoeae , M. genitalium , Tr . vaginalis , Herpes simplex I, II) [1, 5, 8].

The most controversial and fundamentally important question remains whether leukoplakia of the bladder mucosa is a precancer . Some authors believe that leukoplakia is not prone to malignancy (D.I. Golovin, 1982, I.A. Klimenko, 1986, V.N. Prilepskaya , 2003). Others believe that it can transform into cancer, so patients with leukoplakia need careful long-term observation (R. Benson et al ., 1982, A.M. Romanenko, 1985, I.A. Klimenko, 1986, A. Staack , 2006, N. Schlechte et al ., 2006).

Clinical manifestations of leukoplakia of the bladder are persistent dysuria, urinary urgency, pollakiuria and chronic urethral pain in combination or alone with chronic pelvic pain. It was revealed that cystoscopy in 63.6-100% of patients with persistent dysuria and chronic pelvic pain reveals squamous



metaplasia of the epithelium of the bladder mucosa, localized in the bladder neck and bladder triangle.

It should be noted that to date there is no generally accepted algorithm for diagnosing leukoplakia of the bladder, no unified treatment tactics have been developed depending on the stage of the pathological process, and there is no consensus on the tactics of surgical treatment of leukoplakia of the bladder. The applied conservative methods of treatment of chronic cystitis, including courses of antibacterial drugs, anti-inflammatory treatment, instillation of the bladder with antiseptic solutions, physiotherapeutic procedures on the bladder area, temporarily bringing clinical improvement in the patient's condition, have virtually no effect on the layer of the mucous membrane changed by the type of leukoplakia [2, 3]. The methods of surgical treatment of bladder leukoplakia (transurethral resection, electrocoagulation, vaporization) lead to the removal of the altered layer of mucosa, the formation of a zone of severe ischemia at the site of exposure, which causes a long period of recovery of the altered bladder wall (6 months or more), clinically accompanied by symptoms of persistent dysuria and possible relapse of the disease [6, 8].

The insufficient effectiveness of diagnostic and therapeutic measures in patients with leukoplakia of the bladder leads to the formation of neurosis-like conditions, which determines persistent physical, emotional and social maladaptation of this group of patients [6].

Improvement of endoscopic technologies and the use of new principles of coagulation of altered tissues make it possible to expand the options for treatment of bladder leukoplakia. The method of non-contact argon plasma coagulation (APC) has recently been increasingly used by surgeons of various specialties to devitalize superficial pathological processes and stop capillary bleeding. However, the use of this method in endourological interventions has not yet been studied [8].

According to foreign literature, cystoscopy in 70–100% of patients with persistent dysuria and chronic pelvic pain reveals leukoplakia localized in the bladder neck. At the present stage of development of medicine, reports have appeared on the use of transurethral resection (TUR) for leukoplakia of the bladder [5,7,8].

## PURPOSE OF THE STUDY

Evaluation of the effectiveness of transurethral resection of bladder leukoplakia.

## MATERIALS AND METHODS OF RESEARCH

87 women with chronic cystitis were examined. The patients' ages ranged from 20 to 82 years, with a mean age of 41.4 years. When studying the history of the disease, starting with the initial symptoms of the disease (discomfort in the bladder area, weakness, feeling of incomplete emptying of the bladder), the development of the disease was analyzed in detail. Patients experience a constant feeling of heaviness in the bladder area,

both when the bladder is full and in the absence of urine, pain and prolonged spasms after urination, discomfort or pain above the bladder, in the interstitium, in the pubic area and in the area of the entrance to the vagina, dysuria (eg, frequent urination). Such complaints served as a guide for the study. All women underwent cystoscopy. In 45 of them, changes in the mucous membrane of the bladder neck and Lieto's triangle, characteristic of leukoplakia are white, "velvet-like" flat plaques of irregular shape with distinct edges, slightly rising above the mucous membrane of the bladder.

To process and analyze the research materials, a patient examination card was developed, which, in addition to passport data, included anamnesis data, results of clinical and laboratory studies, data from morphological and immunohistochemical examination of biopsy and surgical materials.

We began treatment of patients with conservative measures. The complex of treatment measures included antibacterial therapy and bladder instillations.

## RESEARCH RESULTS

Thus, leukoplakia of the bladder is more often observed in women of childbearing age, progression of the disease occurs in middle-aged patients, i.e., in young people (39-49 years), with age the manifestations of metaplasia decrease. Metaplasia is characteristic of younger patients and is associated with frequent manifestations of chronic cystitis. There is essentially no consensus regarding treatment and management. Currently, antibiotics are the most common therapy used in medical practice. They have the ability to reduce symptoms of symptomatic remission, but their effectiveness is not constant.

The conservative treatment was effective in 10 patients. However, the long-term results of conservative treatment of this pathology were not so encouraging: out of 10 patients who received conservative therapy, 8 noted the resumption of urgency and pain in the lower abdomen within 3 to 9 weeks after treatment. Due to the ineffectiveness of the complex therapy, 35 patients underwent TUR of the areas of the bladder mucosa affected by leukoplakia. Based on the results of a pathomorphological study, the diagnosis of leukoplakia of the bladder mucosa was confirmed.

When examining biopsy material, the morphological specificity of leukoplakia in relation to sexually transmitted infections was studied, and the following was discovered. It was found that there were changes characteristic of all infections, and changes depending on the type of infection. General changes include the following general pathomorphological changes: hyperplasia, metaplasia and parakeratosis urothelium, inflammatory infiltrate of the private lamina. These general pathological changes help to understand the morphogenesis of normal and verrucous types of leukoplakia. Dystrophic changes in squamous and variable epithelium, metaplasia and dysplasia depended on the strong or weak level of the inflammatory process that developed under the influence of infection.



All patients, on days 4–5 after surgery, noted a significant improvement in their well-being, that is, a decrease or disappearance of pain in the bladder area, in the urethra when urinating, and the frequency of urination was significantly reduced. A re-examination was carried out after 3 months. A positive effect from the operation was noted in 38 patients. Mild dysuria remained in 7 patients.

Cystoscopy with biopsy (squamous metaplasia of the epithelium 64%, leukoplakia of the bladder 36%). The sizes of the areas are 0.7 - 3.0 cm. Surgical treatment was performed when conservative therapy was ineffective. Depending on the method of intervention performed, patients were divided into two groups. In group I, TUR of the bladder mucosa was performed using standard methods. In group II, monopolar vaporization of the altered mucosa ("Spray" mode, depth of coagulation necrosis up to 0.3 cm). In the postoperative period, conventional conservative therapy was carried out. Evaluation of the effectiveness of treatment in the immediate and long-term postoperative period was carried out according to the above scale. Relief of symptoms on the 1st day . in I gr. 68%, in II group. 86%. Control cystoscopy with biopsy was performed after 3 months. The picture of completely restored bladder mucosa was in 78% in group I and 100% in group II. Histological examination of the surgical area revealed no pathological foci. After 3 months satisfaction with treatment in 84 and 92%, and after 24 months. in 94 and 98%, respectively.

According to the severity of symptoms: mild degree (9-15 points) – 21%; moderate with maintaining sexual activity (16-20 points) 53% and severe without sexual activity (21-24 points) – 26%.

## CONCLUSIONS

The results of treatment using transurethral resection of bladder leukoplakia showed that the presented method of treating this pathology is effective. To relieve urinary symptoms in women with LV, transurethral resection of the bladder is performed. Improvements in quality of life have a success rate of 57.6%. Our study validates transurethral resection as an alternative treatment option for patients who have a very low complication rate.

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# THE CONCEPT OF HISTORICAL AND CULTURAL HERITAGE AND ITS PLACE IN THE DEVELOPMENT OF UZBEKISTAN

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## ABSTRACT

*This article provides a step-by-step analysis of the concept of historical and cultural heritage, types of historical and cultural heritage, the work being done in Uzbekistan in this area. The article shows the attitude to the historical and cultural heritage of Uzbekistan, the work of scientists who have studied historical monuments, the importance of historical and cultural heritage as a value.*

**KEY WORDS:** *material heritage, civilization, intangible heritage, cultural heritage, historical memory, manuscript sources, material and spiritual wealth, reforms, cultural-historical object, archeological monuments*

## INTRODUCTION

Uzbekistan has long been an important region in the development of not only Central Asia, but also world civilization. "From the oldest calligraphy and inscriptions created by the thinking and genius of our ancestors, to the samples of folklore, there are thousands of manuscripts in the treasury of our libraries today. Their great works of history, literature, art, politics, ethics, philosophy, medicine, mathematics, mineralogy, chemistry, astronomy, architecture, agriculture and other fields are our great spiritual wealth. A nation with such a rich heritage is rare in the world." Indeed, the existence of a developed culture in the life of the peoples of Central Asia is evidenced by the monuments written in ancient Bactrian, Sogdian, Orkhon, Khorezmian inscriptions, works of mural art and sculptures, architectural samples. Therefore, Uzbekistan the historical and cultural heritage fully reflects the gradual emergence and development of the ancient culture and civilization of the whole region. As we know, the historical and cultural heritage of our country is divided into the following three groups:

1. Monuments of material culture.
2. Scientific historical works, manuscript sources.
3. Intangible cultural heritage sites.

Monuments of material culture, in turn, can be divided into 3 types - archeological monuments, architectural monuments and artistic handicrafts. Archeological monuments, which are the treasures of our ancient past - the ruins of ancient cities, fortresses, settlements, the remains of defensive structures, carvings, rabots and cisterns, stone rings, stone inscriptions and paintings, artifacts, historical and cultural layers of settlements, etc. retain traces of ancient and medieval culture of the region. According to some estimates, the number of surviving monuments in the regions and districts of Uzbekistan, which are very uneven, is about 8.5 thousand. The territory of Uzbekistan is very rich in archeological monuments, which are a silent witness of our ancient history. Archeological monuments are material historical sources that play an important role in the study of the earliest period of human history to prewritten history. Archeological monuments are divided by scientists into the following types depending on the river: 1) Stone Age monuments; 2) Monuments of the Bronze Age; 3) Monuments of the Early Iron Age and Antiquity; 4) Medieval monuments. In turn, these monuments are divided into the following types in terms of use:

1. Archeological ancient defense structures;
2. Ancient hydraulic structures;
3. Ancient tombs;
4. Ruins of ancient architectural monuments;
5. Ancient inscriptions, rock paintings;
6. Jewelry and other treasures;
7. Ancient and medieval coins, various archeological finds.

Archaeological excavations in Uzbekistan began in the last quarter of the 19th century, after the Russian occupation of Turkestan. This work was originally started by Russian archeology enthusiasts and local historians. In 1895, the Turkestan Amateur Archaeological Circle was formed, and archeological excavations in the country were carried out under the supervision of this circle.



At that time the services of VL Vyatkin, NI Veselovsky and other Russian archaeologists were great. However, due to the fact that archeological monuments have not been studied in detail, the primitive and later periods were not covered at all at this time. However, archeological excavations in Turkestan in the late 19th and early 20th centuries played an important role in the history of Uzbekistan.

“The formation of archeology in Uzbekistan dates back to the 20s and 30s of the 20th century. During this period V.L.Vyatkin destroyed the ruins of Afrosiab (1925; 1929-30), B.P. Denike excavated the ancient Termez (1926-27), M.E. Masson excavated the Ahangaron Valley (1925-28), and the ruins of Ayritom (1932-33). . In the 30s of the last century, large-scale excavations were carried out by A.Yu. Yakubovsky in the Zarafshan valley (1934, 1939), M.E. Masson in ancient Termez (1936-38), V.A. Shishkin in Tali Barzu (1936 -39 years), in Varakhsha (1937-39 years), SP Tolstov, Ya.Gulamov in the ancient Khorezm oasis (1937-50 years), AP Okladnikov in Teshiktash and Machay caves (1938- 39 years). ), VV Grigorev in the ruins of Kovunchitepa (1934-37) carried out excavations. The collected archeological materials became an important source in the chronology of the history of Uzbekistan, new archeological cultures (Kaltaminor, Tozabogyop, Melon cultures, etc.) were studied and introduced into science. The discovery of a Neanderthal human skeleton in the Teshiktash cave in 1938 was a great discovery in the archeology of Uzbekistan and aroused great interest among scientists around the world. As a result of recent research, the study of the palaces and temples of Tuprakkala, Varakhsha, Bolaliktepa, Afrosiyob, Kuva, the discovery of ancient Sogdian inscriptions in Samarkand and Mug Mountains, Khorezm in Khorezm show that the culture of Uzbekistan has reached a high level. The establishment of the Institute of Archeology of the Academy of Sciences of Uzbekistan has allowed to further expand archaeological research in Uzbekistan. Founded in 1970 in Samarkand on the basis of the Institute of History and Archeology of the Academy of Sciences of Uzbekistan, the institute conducted extensive archeological observations and excavations in almost all regions of Uzbekistan in the 70s and 80s and found many rare monuments from the Stone Age to the late Middle Ages. For example, in Bukhara, Tashkent, Surkhandarya, Fergana, Samarkand regions Teshiktash, Amir Temur, Omonkutan, Obirahmat, Khojakent, Kapchigay, Obishir, Karatag (M. Kasimov, O. Islamov, N. Tashkentbaev, R. Sulaymonov, M. Khojanazarov) It is noteworthy that the study of ancient Stone Age caves, as well as new Stone (Neolithic) and Bronze Age sites in the Khorezm steppes. Especially in the southern districts of Uzbekistan, the discovery and study of many monuments of ancient agricultural culture (Sopollitepa, Jarkoton, Kuchuktepa, Mirshodi, Qiziltepa) (A.Askarov, T.Shirinov, A.Sagdullaev, Sh.Shaydullaev) are the genesis of ancient Bactrian culture where it was possible to observe the process of formation of the first urban culture. As a result of research, it was found that in the southern regions of Uzbekistan by the Bronze Age began to appear urban settlements. The monument to Sopollitepa, the first urban settlement in the country, is surrounded by a rectangular defensive wall made of cotton and raw bricks. Formed on the right bank of the Amudarya, Sopollitepa emerged as a stronghold fortifying the river crossing used in the Bronze Age. Another monument studied during this period is Jarqo'ton. This monument is the first city ruin in Uzbekistan. As a result of the study of Sopollitepa, Jarqoton fire temple, Jarqo'ton ruler's palace complexes, which are important in terms of architectural solutions in the ancient Eastern world, the archeological sites of Sopolli culture were recognized as the new center of Ancient Eastern civilization. As a result of this research, the formation of city-states on the southern borders of our country in the Bronze Age was proved.

An important part of the monuments of material culture are folk arts and crafts.

From the earliest times of history, works of art, handicrafts or folk arts and crafts have served to beautify human life, lifestyle, material environment, aesthetic enrichment. Handicrafts decorated with high aesthetic taste are valued as objects of artistic value, because their appearance, structure, decorative features have a positive effect on the mental state and mood of a person. Among the types of applied arts that produce handicrafts were ceramics, textiles, sewing, jewelry, wood carving, copper carving, metalworking, stone carving, and many other industries. Folk arts and crafts, which appeared in ancient times of our history, were also popular in neighboring regions. In particular, during the reign of Amir Temur and the Temurids, artistic handicrafts were further developed: elegant fabrics, floral embroidery, jewelry, artistically decorated weapons, horse equipment, utensils were produced. The famous Spanish ambassador, Clavijo, was amazed by the unique patterns and elegant decorations of the Oqsaroy in Shakhrisabz, and noted that even the masters of Paris should follow their example. The emergence of folk arts and crafts dates back to ancient times. The needs of society, the development of which serves as a key factor driving the development of artistic crafts.

In addition, the rich and colorful intangible cultural heritage of our people is an invaluable treasure left to us - the generations of a nation with great spirituality and enlightenment. Our national values, traditions, holidays and celebrations, weddings and celebrations, folklore - epics, fairy tales, proverbs and sayings, music and dance, singing, etc. are invaluable spiritual property of the Uzbek people, polished through the tests of antiquity and centuries. Intangible cultural heritage is generally divided into the following 6 areas: 1. Word art. 2. Traditional music. 3. The art of spectacle. 4. The art of dance. National crafts. 6. Cultural environment. Epic traditions have a special place in our intangible cultural heritage. The epics of the Uzbek people "Alpomish", "Gorogly", "Qirq qiz", "Ravshanoy" and others are a unique hymn to the spirituality, courage and aria of our people. The epic "Alpomish" has a special place among them. "If the ancient and glorious history of our people is an endless epic, it would be correct to say that Alpomish is the royal verse of this epic."





## CONCLUSION

In conclusion, the historical and cultural heritage is an important factor in uniting the people and educating young people in the spirit of loyalty to values, love for the motherland. During the years of independence, Uzbekistan has done a lot to preserve the historical and cultural heritage and show it to the world.

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# THE GOVERNMENT SYSTEM OF THE SELANGOR STATE UNDER THE BRITISH EMPIRE

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## ABSTRACT

*This article aims to shed light on the Malaysian states' rule under the British empire, highlighting the strong role of the appointed governor and the role of the local rulers. It also reveals the influence on the local judicial as well as tax matters.*

**KEYWORDS:** *British Empire, Malay states, Local Rulers, Selangor state, Colonial Office.*

In the late 19th century, the British Empire established residencies in Selangor, Perak, and Sungei Ujong (part of Negeri Sembilan). The intervention aimed at capitalizing on trade opportunities, expanding influence in the Malay states, and averting potential conflicts among Malayan clans. Moreover, the British sought to prevent future Siamese intervention in the region. At the end of the 19th century, the British administered and united the states of Selangor, Perak, Negeri Sembilan, and Pahang, establishing residency institutions to administer their matters and by 1884 these states formed Federated Malay States (FMS). The appointed residents who ruled over the states had real power over administrative matters and administered each state independently<sup>1</sup>. After the establishment of the Residents, all matters were governed directly by them, except religious ones, which were left with the Sultans of the respective states.

In Malaysia British took over gradually all states starting from Penang in 1786 and administration in Malaya began in 1874 with the Treaty of 'Pangkor'<sup>2</sup>. The signing of the Pangkor Treaty in 1874 marked a significant development. At the Pangkor meeting, two crucial agreements were reached: the Chinese Engagement, wherein leaders of the Ghee Hin and Hai San factions pledged to maintain peace under penalty of a substantial fine, and the Pangkor Engagement, which addressed the appointment of Residents. In March 1873, Tengku Zia'u'd-din granted Davidson and another party a ten-year concession to exploit untapped tin land in Selangor<sup>3</sup>. The Selangor Tin Mining Company was tasked with managing this concession, prompting their London representative, Seymour Clarke, to seek protection for the enterprise from the Colonial Office. Clarke referenced a letter from Tengku Zia'u'd-din, inquiring about security measures for the people and properties of traders and entrepreneurs.

Due to escalating warfare in the Peninsular Malaya, posing a potential threat to British dominance in the region, the Home Government opted for tighter control by instituting British Residents. Sadka notes that this policy shift was communicated to the Straits Government in a dispatch dated 20 September 1873. The Secretary of State highlighted the prevailing chaos in the Peninsula, the resultant harm to trade, and the imperative need for a solution. Consequently, Sir Andrew Clarke, a new Governor, assumed office in Singapore on 4 November 1873. Clarke's initial report to the Colonial Office indicated that he had resolved the Perak succession issue, persuaded the Sultan and chiefs to accept a Resident, and appointed an officer, Captain Speedy, as Assistant Resident in Perak to oversee affairs in Larut. Before leaving the Straits in May 1875, Clarke had also established Residents in Selangor and Sungei Ujong. However, Clarke was cautious about appointing Residents in Selangor and Sungei Ujong until he was certain of the success of the appointment in Perak. In September 1874, Clarke appointed Swettenham as Resident of Perak and J. G. Davidson as Resident of Selangor. By the end of 1874, British authorities were active in Larut, Lower Perak, Klang, Langat, and Sungei Ujong. Initially, appointed British Residents operated without clear regulations or guidelines. Their effectiveness depended largely on the support they received from the Straits Settlements office. Although the Pangkor Engagement defined the role of Residents, it was not robust enough to enable them to intervene extensively in Malay politics. Residents were prohibited from advising or interfering in Malay religion and customs, despite their pivotal role in

<sup>1</sup> Ganiyev, A. (2020). *Institution of zakat in colonial Malaysia. The Light of Islam*, 2020(1), 12

<sup>2</sup> Oybekovich, A. G., Shah, H. S., & Ayaz, M. (2017). *The Role of the Zakat System during the Colonial-period in Malaysia and Uzbekistan. Islamic Banking and Finance Review*, 4, 40-54.

<sup>3</sup> Sadka, E. (1968). *The Protected Malay States. The other press. Kuala Lumpur. Malaysia* see p. 344



Malay political and social life. Consequently, Residents had to navigate these challenges largely independently. Kennedy notes that early Residents were largely self-reliant; if they proposed advice, they were responsible for implementing it. Over time, the appointment of Residents expanded to other states<sup>4</sup>. In 1896, Pahang and the remaining part of Negeri Sembilan were incorporated into the British Residency system, forming the Federated Malay States along with Selangor, Perak, and Sungei Ujong, under the central administration of the British Empire.

After the establishment of the Residents, in 1874, in the States of Selangor, Perak and Sungei Ujong, the real control over the states started to move towards the Residents, after a few years of struggles by them to enforce their authority on the local leaders. From the British ruling side, as Rubin writes there were two ways to take over the control. "To ensure the compliance of the Malay Rulers with the British wishes there were two possibilities ... first, military force and second was to manipulate the facts to fit an acceptable legal framework that would justify British authority as a matter of right, not might." A good example of how the British Residents established their control over states under their residency determined with the actions of the Resident of Perak Hugh Low, who became Resident in 1877. Prior to coming to Perak, Hugh Low was a Governor of Labuan for 24 years. During his service, he travelled a lot in Borneo, made many expeditions as his interests were ranging from botany, the study of the local languages, customs and economy. Sadka observes that "Low came to Perak after he spent a lifetime among Malays, knowing their language and customs and something of the problem of adapting European administration to their needs and prejudices." Low had his ruling experience in Borneo, where James Brookes was ruling, he learned Brooke's style of dealing with the locals<sup>5</sup>. Sadka writes about Brookes following ... "Sarawak under Brookes was known throughout Malaysia as a government which identified itself with existing Malay authorities, enlisted them in the administration, deferred to their opinion, and introduced changes at a pace acceptable to them."<sup>6</sup> Low was a friend of Brookes and worked under him. For the European rulers, Low's approach to Malays was impressive; no matter what the designation of the person was, either he was the Sultan himself or small district chief, he dealt with each of them, in a respected manner and gained their trust easily. Kennedy indicates that "He worked on the principle that when dealing with members of another race, one should be at least as considerate as to members of one's own race, and infinitely more patient."<sup>7</sup> From all over the state, district chiefs and village penghulus came to him to seek his advice pertaining to the settlement of this or that issue that arose in their district. Low left everyone with satisfying decisions and gave them confidence that they came to him again. Sadka gives an example of the Low's approach towards the locals' issues, saying, "He reassured them, dealt with their difficulties, lent them money – everyone tugs at the Resident for this scarce article - and took the opportunity to accustom them to proposals for the land rent and poll tax." Low was successful in assuring the participation of the district chiefs and rajas in the rule of the state, however, he made sure that these people knew their place and felt a responsibility towards their position. In this way, he kept them involved somehow in the affairs of the state but at the same time, keeping them away from the executive positions. Under Low, many chiefs became government tax collectors; their income was based on the fixed amount of salaries from the collected amount of taxes. Low and Swettenham enforced the law where they appointed the penghulus of the mukims to keep order in the districts, instead of costlier police forces. Many Selangor and Perak third rank rajas were appointments as penghulu. This was one of the marked successes in the intentions of the Residents. Due to the diminishing role of the former district chiefs, the administrative matters pertaining to tax revenues and judicial rule came into the hands of the European District officers. The state Council was the most important body during the Residents time. As Kennedy writes, "All important acts of State stemmed from the Council. It dealt with the annual estimates of revenue and expenditure; the appointments and salaries and pensions of all Malay chiefs and headmen; the confirmation or modification of death sentences passed in the Courts."<sup>8</sup> The legislative body of the State, which was the State Council, was incorporated into the administration system of the new rule, dedicated to administering the state as a whole. It consisted of the chiefs, Chinese captains, Sultan and the Resident, the last being the main person in charge of the final decisions factually. The Resident was the person, who nominated the members and determined the agenda of the meeting as well as influenced its decisions. Describing the power of the Residents Sadka writes, "Despite the inadequate constitutional basis for their authority, the Residents by 1880 had become the effective rulers in states; in the years followed, their association with Malays developed smoothly on established principles, and the success of the Perak and Selangor administrations was reflected in phenomenal increases in revenues and populations." These developments ensured legally that the British Empire settled down in this region as an Imperial power and enjoyed the benefits of rich local natural resources for a long period.

Forming the local administration required careful allocation of salaries and pensions by the Colonial Office. Salaries and pensions were approved only for Residents and Assistant Residents of Perak and Selangor, recommended by the State Secretary and approved by the

<sup>4</sup> Kennedy, J. (1962) *A History of Malaya*. Macmillan and Co Ltd. London. UK. See p. 201

<sup>5</sup> Sadka, E. (1968). *The Protected Malay States*. The other press. Kuala Lumpur. Malaysia see p. 108

<sup>6</sup> *Ibid.* see p. 108

<sup>7</sup> Kennedy, J. (1962) *A History of Malaya*. Macmillan and Co Ltd. London. UK. See p. 179

<sup>8</sup> *Ibid.* See p. 181



Governor. Other subordinate appointments were made by the Governor without involving the State Secretariat, as these appointees represented the Ruler. However, the status of Residents and Assistant Residents regarding their salaries and pensions remained ambiguous. The Colonial Office attempted to incorporate Malay states' officers into the colony's establishment, but without committing to defining their actual status, leaving it to the Malay states' governments.

Although Residents like Maxwell, Low, and Swettenham were appointed by the Colonial Office and considered servants of the Crown, their pensions and salaries had to be funded from the revenues of the Malay states. Despite the uncertainty surrounding their legal status, administrative practice continued without interruption. The Colonial Office retained final decision-making authority over their appointments and salaries, and upon retirement, their pensions were paid through the Crown Agents on behalf of the states, following approval by the Governor and the Secretary of State.

Together with trade and mining opportunities, the British established a colonial office in order to take over the control of the Malaysian peninsula. Relations between Residents and the Colonial Office were crucial for the success of the Malay campaign<sup>9</sup>. The Colonial Office closely monitored affairs in the administered states, receiving updates through annual reports from state authorities. Based on these reports, the Secretary of State made decisions to prioritize development in key areas. For instance, the promotion of agriculture as a complement to mining through the introduction of Chinese and Indian peasant families was a recurring policy recommendation emphasized by the Colonial Office year after year.

Regarding judicial matters, various sources provided information to the Colonial Office. The issue of slavery drew attention, with the Residents in Selangor and Sungei Ujong liquidating the value of slave labor against original debts. In Perak, the death penalty for those involved in secret societies was initially widespread, but later restricted to cases involving murder, following objections from the Secretary of State.

The Colonial Office also objected to licensed public gambling in Malay states, which persisted despite being illegal in the Straits and Hong Kong. However, local opposition delayed abolition until 1912, with rampant illegal gambling contributing to increased crime levels.

## CONCLUSION

Residents and Governors aimed to improve local infrastructure to increase revenues for the British Empire, although they sometimes clashed with the Colonial Office. While both sides agreed on a Pan-Malayan railway system and uniform construction standards, the Colonial Office cautioned against extravagant railway concessions. In instances like the Sungei Ujong railway concession, where private interests clashed with state interests, the Colonial Office intervened to secure better terms for the state. This demonstrated the priority of state interests over private profits, even when pursued by Residents. A significant achievement was the construction of railway lines, facilitating tin trade and city infrastructure development. Initially tasked with advising the Sultan, Residents ended up administering all matters, while the Sultan retained ceremonial power as President of the State Council. The first Residents in Perak and Selangor served as a learning experience, with their successes and failures informing subsequent Residents in expanding British rule to other states.

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## REFLECTION OF LOCAL TRADITIONS IN XIX CENTURY FATWAS

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### ABSTRACT

*The article highlights a unique aspect of fatwas, which was used in the experience of Hanafi muftis of the 19th century, including Abdulhai ibn Abduhalim Laknavi (1847-1886) and fatwas collected in the "Collection of Fatwas", that is, the method of issuing fatwas based on local language and traditions. In addition to identifying the methodological basis of the mufti-ranking scholar's fatwa, who is the author of the quoted words he uses, his lineage, academic status, jurisprudential status, jurisprudential class he belongs to, the awareness level of the scholar, whose opinions are going to be used, of the language and cultural traditions of the people is found out to be crucial too.*

**KEY WORDS:** *Hanafi, Lakna, Ansari, Classes, Mahsi, wiping, ablution, tayammum, fatwa, moderation...*

### INTRODUCTION

The jurists of the Hanafi school have certain degrees according to their scientific potential. Among the scholars and scholars of fiqh who believe in other schools (madhabs), there is no division of scholars according to such levels. The matter of the degrees of Hanafi jurists is a large process that covers many centuries of information. Scholars who have analyzed this process have different approaches in classifying them as jurists of one or another level. Accordingly, there are some differences in the classification of scientists. Some scholars say that the jurists belong to a class according to their birth years and creative periods, while other scholars classify them based on the popularity and attention of their written works. Therefore, the ranking of jurists differs from one another. The matter of which class the Allama belongs to is considered to be crucial too.

Classification of jurists into ranks and classes reveals specific aspects for scientific approaches and they are:

First, such a classification allows to clearly understand the positions held by the jurists in the science of jurisprudence.

Secondly, it allows to determine the scholarly chain - status of the jurist.

Thirdly, it allows to determine the methodological basis of jurist research.

Fourthly, it allows to determine the jurisprudential capacity and peculiarities of the jurist.

Fifth, it allows us to talk about the scientific, social, and modern significance of his works and collections.

"An example of such a classification can be cited the class of Hanoi. In his work "Tabaqatul Hanafiyya" he divided the scholars into twenty one classes. These twenty-one castes are not described as distinguishing qualities or specific characteristics. Kafawi also classified Hanafi scholars into twenty-two categories in his book "Katoibu A'alamil Akhyar" and named each of them as "Kutayb" (booklet). Such classifications cannot fully describe the subject. Because they are not based on scientific standards and criteria. They follow the same chronological order as in the Muhaddis. The purpose of the authors of these works was to describe the life and work of scholars.

### DISCUSSION

It is emphasized in many fatwa books that the changes of times require changes in fatwas as well. Issuing fatwas and rulings, specific to the times, is a task that requires a lot of arduous and great responsibility. This issue remains relevant until now.

In Islamic legislation - shariat, while protecting the fundamentals that should remain stable, it is established that the part of life that changes with the change of conditions, time and space is updated based on certain rules.

In the part of Shari'ah called "Zonniyot" by expert scholars, meaning "non-firm judgments", matters of secondary things and means are dealt with. They are issues that can change depending on the time and situation, and ample conditions have been created for the ijthad of mujtahids to find a solution to these issues.

"Ibn Abidiin puts the condition of knowledge of people's customs in the mujtahid's conditions and states: "Many rulings change with the passage of time, because people's customs change with the passage of time, or some new need arises, or the people of that



period indulge in corruption(morally bad behaviour). If the judgement remains unchanged, firstly, it will cause various hardships and harm to people, and secondly, it will be contrary to the immutable rules of the Shariah, such as mitigation, hardship and harm removal.

After Umar ibn Abdulaziz came to power, he kept delaying the implementation of some Shariah rulings. His son urged his father to implement them as soon as possible. Umar ibn Abdulaziz replied to his son's request: "All the rulings I want to implement are correct, but I am afraid that implementing them all at once will burden people. People can turn away from all judgments. Even some sedition-mongers can be found among them."

Dr. Salah Muhammad Saleem Abul Hajj prepared the book "Al-Imamu Abu Hanifa.Tabaqotuhu wa tasviquhu"of Allama Abdulhai Laknavi's heritage research for publication, and carried out the scientific work "Al-manhajul fiqhiyyu lil imam Al-Laknavi" (the jurisprudence/way of Imam Laknavi). He also researched several works on scientific research, including "Ibrozul ghayyil waqe' fiy shifail 'ayyi lil Laknaviy" (in Laknaviy's work showing the mistakes in "The Healing of the Sick"), "Ahkamus Sivaki minas siyaati lil Laknavi" (judgements on miswaak in Laknaviy's work "as-Sioya"), "Ihkamul qantarati fiy ahkami "Basmala" (Strengthening the dome regarding the rulings of "Basmala" by Laknavi).

## RESULT

Allama Abdulhai ibn Abduhalim Laknavi (1847-1886), who lived and worked for a short time in the 19th century, is a scientist who left a great legacy.

Laknavi's work titled "Naf'ul Mufti" shows that he is a connoisseur of Islamic knowledge and an encyclopaedic scholar. The author took into account the local conditions of the peoples of Movarounahr, Khurasan, Pakistan and India in the fatwas collected in this work. The study of Laknavi fatwas shows that when answering the questions, the jurist, on the basis of his perfect knowledge of the fatwas and jurisprudential rulings of all the scholars before him, on each issue, supported that current question or the answer by corresponding to previous scholars and their work, with clear evidence.

This work of Abdulhay Laknavi, abbreviated as "Naf'ul-Mufti", in accordance with the order of traditional fiqh books, begins with the book "Ablution" "Issues related to Ablution (wuzu)". While answering the questions asked by Mustafti, fatwa seekers, Laknavi indicated in which books this answer was found, for example:

**Question:** In what cases is it makruh to gargle while performing ablution?

**Answer:** This is makruh for a fasting person. This is the case in Yusuf Chalabi's "Sharhul Viqaya Hoshiya".

**73rd FATWA.** A fasting person rinses his mouth without gargling his throat during ablution. Gargling is makruh because there is a risk of water getting into the throat. This is how it is mentioned in the works "Naf'ul-Mufti", "Sharhul Viqaya".

**Question:** What kind of beard is it necessary(wajib) to wash during ablution?

Answer: it is mentioned in Barjandi's "Sharhun Nikoya" regarding the sparse(not thick) beard.

But it is enough for a man with a thick beard to wash his beard. In "Bahrur Raiq" it is called wajib, in the sense of obligation. It is also explained in "Sirojul Vahhoj". The fatwa was issued on this. It's the same in "Zahiriya"...

In "Durrul Mukhtar" it is obligatory to wash the beard. In "Bado'i" this narration is addressed to the correct schools. The same is the case with An-Nahr.

In "Mawahibur Rahman" it is correct(necessary-wajib) to wash a thick beard and a fatwa has been issued. Washing or brushing one-third or one-fourth of the beard is forbidden.

**74th FATWA.** A person with a thick beard does not need to put water under his beard during ablution, but washes the surface of it. But a man with a sparse beard must pour water under his beard(skin). But it is obligatory to bring water under the thick beard in the ghusl. In the texts, the issue of washing a quarter of the beard has been changed to the obligation of washing fully. This is how it is mentioned in the works "Naf'ul-Mufti", "Sharh Niqaya", "Wadoe".

**Question:** Is it permissible to perform ablution with boiled water or zamzam water?



**Answer:** Yes; According to "Khizanatur Rivayat" in "Majma'ul Barakat" it comes like this.

**84th FATWA.** Ghusl with Zamzam water is permissible, but Istinja is makruh. This is how it is mentioned in the works "Naf'ul-Mufti", "Ad-Durrul-Mukhtar".

**Question:** Some of the "duda" (hemorrhoids) come out and then retract again, does this break ablution?

**Answer:** It won't break if it retracts by itself, but if it has to be inserted, it will break. It is said in "Durrul Mukhtar".

### Regarding TAYAMMUM

**Question:** How does a person who is paralyzed in both hands perform tayammum if he is unable to perform ablution and tayammum?

**Answer:** He rubs his face against the wall and rubs both his wrists with his elbows on the ground and performs salah. According to "Ghiyasiya" in "Sirojul Munir" it comes like this.

**61st FATWA.** If a person with paralyzed hands is unable to perform ablution and tayammum, he can perform tayammum by rubbing his wrists with his elbows onto the ground and his face against the wall and pray. This is how it is mentioned in the works "Qazi Khan" and "Naf'ul-Mufti".

"When it comes to the methods of issuing fatwas, it is certainly observed that they depend on changes in methodological formulas. If one mufti answered in a certain way, another person answered in a different way, and it depends on the nature of people." Valiullah Muhammad Abdulhay Laknavi said about his methods: "I feel such pleasure and joy in Hadith Sharif and its jurisprudence that I cannot feel such pleasure in other sciences and subjects. Allah has put me into a middle (moderate) path between excess and deficiency. If a problem arises, He inspires the path of moderation. I am not one of the pure followers who do not leave the word of the jurists even when it contradicts the Shariah arguments. I am not one of those who rejected the words of the jurists and deviated from fiqh. If there are issues that contradict the clear and authentic hadith, I have left it. In this matter, I consider the jurist to have received an apology, perhaps a reward. ...I don't say thoughts that worry the public. Instead, I'll only say things that people can understand."

"Majmuatul Fatawa" (Collection of Fatwas) is a work written by Abdulhai ibn Abduhalim Laknavi (1847-1886) which consists of answers he gave for questions while he was a mufti. If the question is in Arabic, the fatwa is given in Arabic, if it is in Urdu, in Urdu, if in Persian, then in Persian. The importance of this collection of fatwas is increased by the fact that reviews from other scholars and jurists have been obtained for the accuracy of certain fatwas. Fatwas are written based on the works of famous Hanafi scholars, and in most places, evidence from the Qur'an and hadiths is also provided for each of them. It was divided into three parts, separately and abridged and published in India under the framework of "Khulasatul Fatawa".

In general, it can be seen that there are several principles in the use of languages in issuing fatwas by the Muftis of India, which can be categorized as follows:

First, the questions are asked in traditional Arabic;

Second, a question asked in Arabic is traditionally answered in Arabic;

Thirdly, the names and terms used by the local population in their own language are explained with the help of synonyms found in the languages of the neighboring nations;

Fourthly, due to the sufficient level of knowledge of muftis, a clear explanation of the words and terms used in the text of the given question;

Fifth, the fact that the use of synonyms and expressions from the languages of the people living in Bakamti in the text of the question expressed in Arabic is of social importance;

Sixth, ensuring that the fatwa formulated in the form of an answer to a question is understandable not only to the inquirer, but also to people who speak other languages.

This expression type of Indian muftis is reflected in the following fatwa:

الاستفسار : خروج العرق البدني يقال له في الفارسية : رشتته، وفي الهندية : ناره، هل ينقض الوضوء؟  
الاستبشار : هو كالدودة لا ينقض الوضوء. كذا في "السراجية" عن "الملقط".

**Question:** Does the sweat coming from the human body, which is called "rishta" in Persian and "nora" in Hindi (Urdu), breaks ablution?





**Answer:** It does not break like the issue of "duda" (hemorrhoids). This is the case in the chapter "Multaqit" in the book "Sirojiyya".

## CONCLUSION

Based on the above points, the following can be said as a conclusion: The purpose of Sharia sciences and rulings is aimed at protecting the interests of Muslims and expressing their ability to fully practise their rights in society, and Sharia muftis and judges serve to achieve the goals of Sharia.

When issuing fatwas, muftis focus on the local, national traditions, psychological and mental values of the people and issue fatwas in accordance with them. In this way, Islamic jurisprudence, which has taken moderation as its motto, has been responding to the demands of Muslims throughout the ages and proves that it is suitable for all times and places."

Studies of collections of scientists, scholars and jurists from among Muslim nations show that these characteristics are reflected in fatwas.

The jurist Abdulhai Laknavi, who lived and worked in the 19th century, paid great attention to these local and linguistic features in his fatwas compiled during his life and work.

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# REVITALIZING BEAUTY: A COMPREHENSIVE STUDY ON FENUGREEK-INFUSED HERBAL PEEL OFF MASK ENHANCED WITH CHARCOAL, ORANGE PEEL, AND COCONUT OIL

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## ABSTRACT

This research article presents the formulation and evaluation of a novel herbal peel-off mask designed to rejuvenate and enhance skin health. The formulation integrates a blend of natural ingredients including Fenugreek, charcoal, orange peel powder, and coconut oil, along with additives such as cabopol, polyvinyl alcohol, glycerine, methyl paraben, propyl paraben, rose water, and triethanolamine. The study begins with the meticulous selection of each ingredient for its individual therapeutic properties and compatibility within the formulation.<sup>[1]</sup> Subsequently, various formulations are prepared and evaluated for their physical characteristics, such as consistency, spreadability, and homogeneity.<sup>[2]</sup>

**KEYWORDS:** Herbal peel-off mask, Fenugreek extract, Activated charcoal, Skin rejuvenation, Antioxidant properties, Moisturizing effects, Detoxification, Formulation optimization, Skin compatibility.

## INTRODUCTION

The pursuit of skincare products that harness the therapeutic potential of natural ingredients has gained significant momentum in recent years. Herbal formulations, in particular, have garnered attention for their perceived efficacy and safety in promoting skin health and rejuvenation. In line with this trend, the present study introduces a novel herbal peel-off mask formulated with a blend of potent botanical extracts, aimed at enhancing skin vitality and radiance.<sup>[3]</sup>

A peel-off gel in the formulation of a herbal peel-off mask typically refers to the base or vehicle that provides the gel-like consistency to the mask and allows it to be easily applied and peeled off the skin once it dries. In the context of a herbal peel-off mask made with fenugreek, charcoal, orange peel, and coconut oil, the peel-off gel serves as the carrier for these active ingredients.<sup>[4]</sup>

Here's a more detailed breakdown of each component and its role in the formulation:

- Peel-off Gel Base:** The base of the peel-off gel is usually a combination of water, glycerin, and a gelling agent such as carbomer or agar. This base provides the gel-like consistency and forms a film on the skin when applied. It allows the mask to adhere to the skin and facilitates easy peeling once it dries.
- Fenugreek:** Fenugreek is known for its anti-inflammatory and antioxidant properties. In the peel-off mask formulation, fenugreek may help soothe the skin, reduce redness, and provide a healthy glow.
- Charcoal:** Activated charcoal is a popular skincare ingredient known for its ability to draw out impurities and toxins from the skin. It helps in detoxifying the skin and absorbing excess oil, making it a valuable addition to a peel-off mask, especially for those with oily or acne-prone skin.<sup>[5]</sup>



4. **Orange Peel:** Orange peel is rich in vitamin C and antioxidants, which help brighten the skin, fade dark spots, and promote a more even skin tone. In the peel-off mask formulation, orange peel adds a refreshing scent and contributes to the overall rejuvenating effect on the skin.

5. **Coconut Oil:** Coconut oil is a nourishing ingredient that helps moisturize and soften the skin. It contains fatty acids that penetrate the skin to provide hydration and support the skin's natural barrier function. In the peel-off mask, coconut oil can help counteract any potential drying effects of the other ingredients and leave the skin feeling smooth and supple.

To formulate the peel-off gel for the herbal mask, these ingredients would be carefully combined with the gel base using a magnetic stirrer or other mixing equipment to ensure even dispersion. The resulting gel would then be applied to the skin, allowed to dry, and peeled off, leaving behind a refreshed and rejuvenated complexion.<sup>[6]</sup>

## Drug profile & Excipients profile

### 1. Fenugreek



- **Common Name:** Fenugreek

- **Scientific Name:** *Trigonella foenum-graecum*

- **Family:** Fabaceae (Leguminosae)

#### Taxonomical Information:

- **Kingdom:** Plantae

- **Order:** Fabales

- **Family:** Fabaceae

- **Genus:** *Trigonella*

- **Species:** *T. foenum-graecum*

#### Pharmacology

- **Active Constituents:** Fenugreek seeds contain various active compounds, including:

- **Alkaloids:** Trigonelline is a major alkaloid known for its potential hypoglycemic effects.

- **Saponins:** Diosgenin is a prominent saponin with potential pharmacological activities such as anti-inflammatory and antioxidant effects.

- **Flavonoids:** These compounds possess antioxidant properties and contribute to fenugreek's therapeutic effects.

- **Fiber:** Fenugreek seeds are rich in soluble fiber, which can help regulate blood sugar levels and promote digestive health.

- **Pharmacological Actions:** In the context of skincare:

- **Anti-inflammatory:** Fenugreek exhibits anti-inflammatory properties, which can help soothe and calm irritated skin.

- **Antioxidant:** Its antioxidant compounds help protect the skin from oxidative stress and environmental damage.

- **Moisturizing:** Fenugreek contains emollient properties that can help hydrate and nourish the skin.

- **Regenerative:** Some studies suggest fenugreek may aid in wound healing and tissue repair due to its potential to stimulate collagen production.<sup>[7]</sup>

#### Physiology

- **Skin Benefits:** Fenugreek's anti-inflammatory and antioxidant properties make it suitable for skincare formulations, where it can help improve the overall health and appearance of the skin.

- **Moisturization:** Fenugreek can help maintain skin hydration by forming a protective barrier and preventing moisture loss.

- **Skin Healing:** Its regenerative properties may promote wound healing and reduce the appearance of scars and blemishes.

- **Antimicrobial:** Fenugreek possesses antimicrobial activity, which can help prevent bacterial and fungal infections on the skin.



- Anti-aging: Some research suggests that fenugreek may have anti-aging effects due to its ability to protect against oxidative damage and support collagen production.<sup>[8]</sup>

## 2. Charcoal



- **Common Name:** Charcoal

- **Scientific Name:** Charcoal is a form of carbon produced by heating organic material in the absence of oxygen, such as wood, coconut shells, or peat.

- **Family:** Not applicable, as charcoal is a product rather than a living organism.

### **Pharmacology:**

- **Adsorption:** Charcoal has a porous structure that allows it to adsorb (not absorb) toxins, impurities, and excess oil from the skin's surface. This property makes it useful in skincare formulations for detoxifying and purifying the skin.

- **Neutralization:** Charcoal can help neutralize harmful substances and pollutants that may contribute to skin issues such as acne, blackheads, and blemishes.

- **Exfoliation:** In a peel-off mask, charcoal particles can act as a gentle exfoliant, helping to remove dead skin cells and unclog pores, resulting in smoother and clearer skin.

- **Antimicrobial:** While not a direct antimicrobial agent, charcoal's ability to absorb excess oil and impurities can create an environment less conducive to the growth of acne-causing bacteria and fungi.<sup>[9]</sup>

### **Physiology:**

- **Detoxification:** Charcoal works by binding to toxins and impurities on the skin's surface, effectively pulling them out of the pores and leaving the skin feeling clean and refreshed.

- **Pore Cleansing:** Its porous structure allows charcoal to penetrate deep into the pores, where it can absorb excess oil, dirt, and other impurities, helping to minimize the appearance of pores and prevent breakouts.

- **Oil Control:** Charcoal can help regulate sebum production by absorbing excess oil from the skin's surface, making it particularly beneficial for those with oily or acne-prone skin.

- **Skin Smoothing:** As a mild exfoliant, charcoal helps slough off dead skin cells, revealing smoother, more radiant skin underneath.

## 3. Orange Peel





- **Common Name:** Orange Peel
- **Scientific Name:** Citrus sinensis (Sweet Orange)
- **Family:** Rutaceae

**Taxonomical Information:**

- **Kingdom:** Plantae
- **Order:** Sapindales
- **Family:** Rutaceae
- **Genus:** Citrus
- **Species:** C. sinensis

**Pharmacology**

- **Active Constituents:** Orange peel contains various bioactive compounds, including:
  - **Citrus Essential Oils:** Rich in limonene, linalool, and other terpenes, which possess antioxidant and antimicrobial properties.
  - **Flavonoids:** Such as hesperidin and naringin, known for their antioxidant and anti-inflammatory effects.
  - **Vitamin C:** A potent antioxidant that helps brighten the skin and protect against oxidative damage.
- **Pharmacological Actions:**
  - **Antioxidant:** Orange peel is rich in antioxidants that help neutralize free radicals and protect the skin from oxidative stress, thereby reducing signs of aging.
  - **Antimicrobial:** The essential oils in orange peel have antimicrobial properties that can help inhibit the growth of acne-causing bacteria and fungi on the skin.
  - **Skin Brightening:** Vitamin C and flavonoids in orange peel contribute to skin brightening by reducing hyperpigmentation and promoting a more even skin tone.
  - **Anti-inflammatory:** Compounds like flavonoids may help reduce inflammation and soothe irritated skin.<sup>[10]</sup>

**Physiology**

- **Exfoliation:** Orange peel contains natural acids, such as citric acid, which can gently exfoliate the skin, removing dead skin cells and promoting cell turnover.
- **Oil Control:** The astringent properties of orange peel help regulate sebum production, making it beneficial for oily and acne-prone skin.
- **Skin Brightening:** Vitamin C in orange peel inhibits melanin production, reducing the appearance of dark spots and promoting a brighter complexion.
- **Antioxidant Protection:** Antioxidants in orange peel help protect the skin from damage caused by free radicals, UV radiation, and environmental pollutants.
- **Soothing:** Orange peel contains anti-inflammatory compounds that can soothe irritated skin and reduce redness and inflammation.<sup>[11]</sup>

**4. Coconut Oil**



- **Common Name:** Coconut Oil
- **Scientific Name:** Cocos nucifera
- **Family:** Arecaceae (Palm family)



**Taxonomical Information:**

- **Kingdom:** Plantae
- **Order:** Arecales
- **Family:** Arecaceae
- **Genus:** Cocos
- **Species:** C. nucifera

**Pharmacology**

- **Composition:** Coconut oil is rich in medium-chain fatty acids, particularly lauric acid, which possesses antimicrobial properties. It also contains other fatty acids such as caprylic acid and capric acid, as well as vitamin E, which contributes to its antioxidant properties.
- **Pharmacological Actions:**
  - **Moisturizing:** Coconut oil is an excellent emollient, meaning it helps to soften and hydrate the skin by forming a protective barrier that reduces moisture loss.
  - **Antimicrobial:** Lauric acid in coconut oil exhibits antimicrobial activity against bacteria, viruses, and fungi, making it beneficial for maintaining skin health and preventing infections.
  - **Anti-inflammatory:** Coconut oil contains compounds like polyphenols and vitamin E, which possess anti-inflammatory properties that can help soothe irritated or inflamed skin.
  - **Antioxidant:** Vitamin E in coconut oil acts as an antioxidant, protecting the skin from oxidative stress caused by free radicals and environmental factors.<sup>[12]</sup>

**Physiology**

- **Skin Hydration:** Coconut oil’s emollient properties help to lock in moisture, keeping the skin hydrated and preventing dryness and flakiness.
- **Barrier Function:** When applied topically, coconut oil forms a thin layer on the skin’s surface, which acts as a protective barrier against environmental aggressors and pollutants.
- **Wound Healing:** The antimicrobial and anti-inflammatory properties of coconut oil may aid in wound healing by preventing infection and reducing inflammation.
- **Skin Softening:** Regular use of coconut oil can help soften rough or dry patches of skin, leaving it feeling smooth and supple.
- **Soothing:** Coconut oil has a soothing effect on the skin, which can help relieve itching, redness, and irritation.

**Materials and Equipment**

1. **Mixing bowls:** For blending and mixing the ingredients to prepare the mask formulation.
2. **Measuring instruments:** Such as graduated cylinders, spoons, or weighing scales, for accurate measurement of ingredients.
3. **Blender or grinder:** To grind or blend ingredients such as fenugreek seeds or orange peels into powder form.
4. **Heating apparatus:** Such as a water bath or microwave, for melting and liquefying 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 mask formulation, ensuring optimal stability and skin compatibility.
7. **Sterile containers:** To store the prepared mask formulation, maintaining hygiene and preventing contamination.
8. **Packaging materials:** Such as jars or tubes, for packaging the final mask product for storage and distribution.
9. **Magnetic stirrer :** A magnetic stirrer is used in the formulation of a herbal peel-off mask to ensure thorough mixing of ingredients. It helps in achieving a homogeneous mixture, ensuring even distribution of ingredients for consistent results in the final product.

By utilizing these ingredients, materials, and equipment, the formulation and evaluation of the herbal peel-off mask can be conducted with precision and efficiency, ensuring the development of a high-quality skincare product with desirable properties and efficacy.<sup>[13]</sup>

**Formula:**

Sr. No	Ingredients	Category	Quantity Taken (gm)		
			F1	F2	F3
1)	Fenugreek	Antioxidant	1	1	1
2)	Charcoal	Deep cleanser and detoxifier	1	1	1
3)	Orange peel powder	Exfoliant	1	1	1
4)	Coconut oil	Moisturizer	1 ml	1 ml	1 ml
5)	Carbopol 934	Gelling agent	0.25	0.25	0.25
6)	Poly vinyl alcohol	Film forming agent	10	12	14



7)	Propyl paraben	Preservatives	0.20	0.20	0.20
8)	Methyl paraben	Preservative	0.20	0.20	0.20
9)	Glycerin	Humectant	5 ml	5 ml	5 ml
10)	Rose water	Perfuming agent	Q.S	Q.S	Q.S
11)	Triethanolamine	Neutralizer	Q.S	Q.S	Q.S
12)	Water	Solvent	Upto 100 ml	Upto 100 ml	Upto 100 ml



**Fig: Formulated Batches**

### Experimental Method

- 1) Firstly collect all the required ingredients and weigh it.
- 2) Then in one breaker dissolve 0.25gm of carbopol in 20ml of water by using magnetic stirrer.
- 3) In second beaker dissolve 12gm of poly vinyl alcohol in 40ml of water by using heat at 80degree.
- 4) Then in third breaker mix all other ingredients as per required quantity.
- 5) After this add dissolve ploy vinyl alcohol solution into carbopol solution containing beaker and mix it properly to obtained gel like consistency.
- 6) Add third beaker solution into carbopol and poly vinyl alcohol solution containing beaker and mix it properly.
- 7) In last add 2-3 drops of triethanolamine into this solution to neutralize it.
- 8) Pack and labelled it into air tight container.

### Evaluation Test

Evaluation Parameters for Peel off gel formulation:

1.Physical evaluation:

Physical parameters such as colour, appearance and consistency and feel were checked of the prepared formulation.

Colour:-The colour of the formulation was checked out against white background.

Consistency:-The consistency was checked by applying on skin.

Odour The odour of the gels was checked by mixing the gel in water and taking the smell.

2.Determination of pH:

The pH of formulation was determined using digital PH paper.





### 3. Spreadability:

For determination of Spreadability excess of sample gel was applied in between two glass slides and was compressed to uniform thickness by placing 50 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 -

$$S = m \times l/t, 20 \times 3.9/7 = 11.14$$

Where,

S - Spreadability

m - Weight tied to upper slide

l - Length moved on glass slide

t - Time taken

### 4. Status of the peel-off film

After drying film was able to remove from the applied site and it was soft to hard. Drying time took longer time ( 30-35min)

### 5. Film drying test :



### 6. Washability :

The prepared formulation were administered to the skin, and a thorough evaluation was conducted to assess both the extent and ease of water washing. This assessment involved a manual examination to determine how effectively and easily the formulations could be removed with water. The goal was to gauge the formulations' wash off characteristics, considering factors such as adherence to the skin and the simplicity of the removal process through water rinsing.<sup>[14]</sup>

### 7. Skin irritation study:

In the skin irritation study, twenty volunteers were subjected to gel masks with and without tea leaf extract and fenugreek powder, and no significant irritation, including burning, redness, or swelling, was observed. The gel mask formulations were consistent, except for the presence or absence of the mentioned extracts. Application was randomized, and participants were closely monitored for primary and secondary skin reactions.<sup>[15]</sup>

### 8. Peel Off Test:



The formulation film of 4x4mm was spread on backside of the hands skin. Leave it for 25-30 minutes to dry properly. After 25-30 minutes, peel off the dry film from the skin surface. Easy removal of peel without any complications was observed.<sup>[16]</sup>

9. Folding Endurance :

1)	Colour	Black	Black	Black
2)	Odour	Sweet	Sweet	Sweet
3)	Consistency	Semi solid gel	Semi solid gel	Semi solid gel
4)	Washability	Good	Good	Good
5)	PH	6.2	6.4	6.7
6)	Spreadability	10.15	11.14	11.76
7)	Skin irritation	No irritation	No irritation	No irritation
8)	Peeling time	40-45min	25-30 min	33-37min
9)	Homogeneity	Homo	Homo	Homo
10)	Status of peel of film	Peel not form perfectly	Peel formed (excellent)	Peel formed (Good)
11)	Folding Endurance	10	11	13

The formulation film was applied onto the skin. After drying, a portion of film (3x3cm) was cut and folded it at the same place until it was broken. Folding endurance can be defined as the value of number of times the film can be folded without breaking.<sup>[16]</sup>

All the formulations were light blackish in colour. The formulations are translucent. On application to the skin, all formulations producing smooth and cooling effect. The consistency and homogeneity of all prepared formulations were good. The results of this investigation showed formulation F1, F2 and F3 has semisolid consistency. All the formulations were found homogenous and easily washable. All the formulations had very slightly alkaline pH which was compatible with the normal skin physiology. The normal range of pH of skin is 4.5-7. Amongst all the formulations batches F1, F2 and F3, F2 batch is the effective one because it is having very optimum pH and spreadability than other batches and also the peeling time is less as compared to other prepared batches. All the evaluation parameters of F2 batch are within the normal range, so by considering this, F2 batch is more effective than other prepared batches.

## CONCLUSION AND INTERPRETATION

Topical peel-off gel formulation was prepared by using Fenugreek powder as the main drug, which was already known for its Anti-aging, Anti-acne, Anti-inflammatory activity and also having the property to treat oily skin and other skin related problems. There are 3 batches of topical peel-off gel formulation were prepared. Among all batches F1, F2 and F3, batch F2 was the best formulated gel. Thus, this peel-off gel formulation could be the safe and efficacious remedy for treating this skin related disorders and could be the safe alternative for synthetic anti-acne gels.

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16. Priyanka Shukla<sup>1</sup> Prof. Dr. Shashank Tiwari,<sup>2</sup> Sadhana Singh<sup>3</sup> Shada<sup>4</sup>& Aman Yadav<sup>5</sup> *formulation and evaluation of activated charcoal peel off face mask, Priyanka Shukla et al /J. Pharm. Sci. & Res. Vol. 15(2), 2023, 1020-1024, ISSN 0975 1459.*



## OCCUPATIONAL STRESS AND SELF-EFFICACY OF EARLY CHILDHOOD TEACHERS IN TAGUM CITY

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Article DOI: <https://doi.org/10.36713/epra16541>

DOI No: 10.36713/epra16541

### ABSTRACT

*This study focused primarily on the occupational stress and self-efficacy experienced by early childhood teachers, with a specific focus on Tagum City. A cohort of 100 early childhood educators participated in this research. Employing a descriptive-correlational methodology, the study aimed to assess the levels of occupational stress and self-efficacy among teachers and to uncover any significant associations between these variables. The findings revealed a moderate level of stress, with specific stressors including working conditions, curricular activities, and classroom management. However, teachers demonstrate high levels of self-efficacy, indicating a strong belief in their teaching abilities. The findings also highlighted a significant relationship between the self-efficacy and occupational stress of early childhood teachers in Tagum City, as evidenced by an R-value of 0.021. These results highlighted the importance of addressing stressors and promoting self-efficacy among educators to improve their well-being and effectiveness in the classroom. Future research and interventions should focus on supporting teachers in managing stress and enhancing self-efficacy to benefit the educational landscape.*

**KEYWORDS:** Occupational Stress, Self-efficacy; Early Childhood Teachers, Descriptive-correlational, Philippines

### INTRODUCTION

Early childhood teachers hold a pivotal position in facilitating children's learning and growth. However, they face various stressors that can detrimentally affect their self-efficacy (Lipscomb, et al., 2022). Similarly, the presence of stress in the school setting has a detrimental effect on teacher's self-efficacy, which can lead to unfavorable feelings (Skaalvik & Skaalvik, 2017; Barni, 2019). Besides, teachers with low self-efficacy may struggle more in the classroom and experience higher levels of occupational stress (Karabatak & Alanoglu, 2019).

In Indonesia, 59% of early childhood teachers reported experiencing low self-efficacy, which they attributed to challenges like feeling unprepared and stressed (Sibagariang & Pandia, 2021). Furthermore, in Ghana, a study conducted by Kuyini et al. (2022) revealed that primary teachers only have a moderate level of self-efficacy, especially regarding the implementation of inclusive education, showing concerns and demonstrate less positive attitudes. Additionally, self-efficacy is crucial for teachers in achieving their objectives, completing tasks, and navigating instructional challenges. Teachers with low self-efficacy tend to avoid challenging tasks, perceive creative activities and situations as daunting, interpret many situations negatively, and experience a loss of confidence in their abilities (Hussain et al., 2022).

Occupational stress commonly serves as an indicator of teachers' psychological condition and has been associated with aspects of teacher well-being, job performance, emotional fatigue, and levels of engagement (Han, et al., 2019). Moreover, teachers perceive their work as highly stressful due to various factors, including excessive workload, insufficient resources, negative feedback from students, lack of support from colleagues and superiors, inadequate wages, and challenging relationships with parents (De Stacio, et al., 2017). Additionally, they struggle with low self-esteem, limited control over their work, unclear work goals, and difficulties managing non-academic situations. The consequences of stress and burnout among teachers typically include increased rates of absenteeism, reliance on substitutes, early retirement, and a decline in their belief in their ability to effectively instruct (Girard et al., 2016).



Self-efficacy serves as a valuable asset for teachers in handling stressful circumstances (Rabaglietti, et al., 2021). Similarly, self-efficacy beliefs serve as personal assets that offer protection to teachers amidst occupational stressors. These beliefs also play a pivotal role in mitigating the impact of job-related stress on educators (İpek et al., 2018). Moreover, self-efficacy, a sense of autonomy in decision-making, and positive personal dispositions have been found to contribute to higher levels of teaching performance (Purwanto, 2022).

Occupational stress is significantly linked with self-efficacy, the belief in one's ability to accomplish tasks and handle challenges effectively within the workplace. When individuals possess high levels of self-efficacy, they tend to perceive stressful situations as more manageable and are better equipped to cope with them (Antoniou, et al., 2023). Likewise, stress perception being influenced by individual self-efficacy means that how stressed someone feels in a given situation depends on their belief in their ability to handle that situation effectively. Individuals with high self-efficacy tend to view stressful situations as challenges they can overcome, leading to lower levels of perceived stress (Lee et al., 2016). Added to that, high levels of occupational stress among teachers, coupled with inadequate coping mechanisms, correlate with unfavorable consequences including increased burnout, diminished teaching self-efficacy, less proficient classroom management techniques, decreased student learning achievements, and heightened depressive symptoms (Lauermaann & König, 2016).

Teachers who possess high self-efficacy and receive adequate professional support demonstrate increased work engagement. Providing early childhood educators with the resources they need to effectively perform their jobs and feel capable of making a meaningful impact on children's lives may enhance their work engagement, leading to greater passion, dedication, and positive energy in their work (Lipscomb et al., 2022). The cultivation of self-efficacy can be influenced by the work environment. Teachers in supportive school settings that are more adept at handling difficult situations and stress (Hadar, et al., 2020).

It is apparent that the efficacy of teachers strongly affects and significantly shapes their pedagogical development across various aspects (Barni et al., 2019; Alibakhshi et al., 2020) Consequently, as teachers' perceptions of their self-efficacy improve, their level of job satisfaction is likely to increase (Arslan, 2019; Kasalak & Dagyar, 2020).

## RESEARCH QUESTIONS

This study sought to bring new insights into the descriptive approach, to analyze and understand the relationship between occupational stress and self-efficacy. The following were the study's main objectives:

1. To identify the level of Occupational stress among Early Childhood teachers in Tagum City in terms of:

1.1 Curricular and Extracurricular Activity

1.2 Classroom management

1.3 Working conditions

2. To identify the level of Self- Efficacy of Early Childhood teachers in Tagum City in terms of:

2.1 Locus of control

2.2 Classroom Anxiety

2.3 Persistent Behavior

2.4 Professional mastery

3. To know if there is a relationship between Occupational Stress and Self- Efficacy of Early Childhood teachers in Tagum City.

At a significance level of 0.05, the study's hypothesis according to which there is no significant relationship between Occupational Stress and Self-Efficacy.

## METHOD

### *Research Design*

This quantitative study employed a descriptive research design to measure the occupational stress and self-efficacy of Early Childhood teachers in Tagum City. A descriptive study was conducted to determine and support this research. Descriptive research involves collecting data to test and answer questions in a subject study. It aims to comprehend how individuals interpret or derive significance from their experiences (Kahlke, 2014). The descriptive design is commonly utilized in both health and social science disciplines (Kim et al., 2017). Descriptive data are usually collected through a questionnaire survey, and pertinent data will be gathered through questionnaires and subjected to appropriate statistical treatment.

### *Research Participants*

This study involved early childhood teachers from Tagum City using a random sampling technique, resulting in a total of 100 respondents. Random sampling was deemed appropriate due to its wide applicability in diverse sampling environments (Rahman et al.,



2022). In selecting participants, specific inclusion and exclusion criteria were applied. The inclusion criteria encompassed teachers who had been engaged in teaching early childhood education (ECE) for a minimum of two years, were employed in public schools within Tagum City, and taught at the elementary level, ranging from Kinder to Grade 6. Additionally, willingness to participate in the study was a prerequisite. Conversely, individuals who did not meet these inclusion criteria, such as those with less than two years of teaching experience, those employed in private schools in Tagum City, or those teaching at the high school level, were excluded from participation. Moreover, individuals unwilling to participate were also excluded. These criteria were employed to ensure the selection of a homogeneous sample, thereby enhancing the study's internal validity and the generalizability of its findings within the specified context.

## RESULTS AND DISCUSSIONS

### Occupational Stress of Early Childhood Teachers

Table 1 shows the Occupational stress of early childhood teachers in Tagum City. With an overall mean of 2.783, described as moderate, and a standard deviation of 0.216. This means that the Occupational stress of early childhood teachers in Tagum City was moderately observed.

**Table 1. Level of Occupational Stress of Early Childhood Teachers in Tagum City**

Indicators	Mean	SD	Descriptive Equivalent
Working Condition	3.234	0.328	Moderate
Curricular and Extracurricular Activity	2.596	0.355	Low
Classroom Management	2.518	0.385	Low
<b>Overall</b>	<b>2.783</b>	<b>0.216</b>	<b>Moderate</b>

The working condition had the highest mean score of all the indicators, coming in at 3.234 with a variance of 0.328 and the descriptive equivalent of moderate. The curricular and extracurricular activities came in second with a mean score of 2.596 and an average deviation of 0.355 and a descriptive equivalent of low and the classroom management came in third with a mean score of 2.518 and standard deviation of 0.385 and a descriptive equivalent of low.

This result is aligned with the study findings of İpek et al. (2018) that teachers experienced moderate levels of stress, and the teaching environment influenced their stress levels. This result is also supported by the study of Rajendran et al. (2020) which highlighted that teachers experience only mild stress and this is due to student misbehavior. Additionally, disruptive behavior caused by a lack of student engagement can make it challenging for teachers to maintain classroom control (Shakespeare et al., 2018). Furthermore, teachers experiencing elevated occupational stress alongside ineffective coping mechanisms are linked to negative outcomes such as increased burnout, reduced teaching self-efficacy, and less effective classroom management (Lauermaun & König, 2016).

Early childhood Teachers' occupational stress at work stem from a lack of control over their jobs, limited collegial relationships within the program, and perceived challenging behaviors exhibited by children (Shaack, 2020). Moreover, challenging working conditions also impacts teacher well-being and student outcomes. Addressing the various aspects of working conditions are paramount for improving the overall quality of education (Viac & Fraser, 2020). In addition, encouraging creativity and fostering innovation proved beneficial for both school leaders and teachers in navigating and coping with changes and stress (Daffon, 2024).

### Self-Efficacy of Early Childhood Teachers

The level of self-efficacy is shown in Table 2 of early childhood teachers in Tagum City, with an overall mean of 4.523 described as very high with a standard deviation of 0.123. This means that the teaching self-efficacy of early childhood teachers in Tagum City was always observed.

Among all the indicators, professional mastery had the highest mean score 4.572 with a standard deviation of 0.262 with descriptive equivalent of very high. This was followed by classroom anxiety with a mean score of 4.566 with a standard deviation of 0.218 with a descriptive equivalent of very high. Next was the locus of control, with a mean of 4.514 with a descriptive level of 0.245, which is equivalent to very high. Lastly, the indicator persistent behavior obtained a mean score of 4.440 with a standard deviation of 0.436 with a descriptive equivalent of very high.



**Table 2. Level of Self-Efficacy of Early Childhood Teachers**

Indicators	Mean	SD	Descriptive Equivalent
Locus of Control	4.514	0.245	Very High
Persistent Behavior	4.440	0.436	Very High
Classroom Anxiety	4.566	0.218	Very High
Professional Mastery	4.572	0.262	Very High
<b>Overall</b>	<b>4.523</b>	<b>0.123</b>	<b>Very High</b>

The level of self-efficacy of early childhood teachers in Tagum City is very high. This could be interpreted as a positive sign for teachers. This result aligned with the study of Engin (2020) which cited that primary school teachers have high level of self-efficacy. Teachers possessing high self-efficacy also exhibit elevated levels of motivation. Similarly, a study conducted by Orakçı et al. (2023) revealed that teachers reported high levels of self-efficacy and felt confident in their teaching abilities. The high self-efficacy levels of teachers can also be linked to an improvement in the quality of education.

High self-efficacy among teachers is advantageous for the early literacy development of all young learners in early childhood education (Guo et al., 2021). Furthermore, Teachers' work engagement was positively associated with their self-efficacy and the level of professional support they received, while also considering factors such as job demands (Lipscomb, et al., 2022). Consequently, early childhood teachers' self-efficacy is flexible and can be strengthened through preparation, effective professional development, and support from leaders (Von Suchodoletz et al., 2018).

**Significant Relationship between Occupational Stress and Self-Efficacy of Early Childhood Teachers**

Presented in Table 3 the results of the correlation analysis between occupational stress and self-efficacy of early childhood teachers. The study's findings revealed a significant positive correlation between the levels of occupational stress and self-efficacy as indicated by an R-value of 0.221. This correlation was further supported by a p-value of 0.027, which fell below the predetermined significance level of 0.05, affirming the existence of a significant relationship between the two variables which led to the rejection of the null hypothesis. This indicates that as levels of occupational stress increase, so do levels of self-efficacy among early childhood educators.

**Table 3. Significance of the Relationship between Independent Variable and Dependent Variable**

Variables	R-value	R-square	P-value	Decision
Occupational Stress	0.221	0.0488	0.027	Reject Ho
Self- efficacy				

This result is corroborated by the study of Antoniou et al. (2023) which highlighted that when teachers demonstrate high levels of self-efficacy, they tend to perceive stressful situations as more manageable and are better equipped to cope with them. Similarly, teachers facing higher levels of stress due to workload tend to have greater confidence in their abilities to manage their classrooms effectively (Klassen & Chiu, 2010). Moreover, the study of Fathi & Derakhshan (2019) cited that self-efficacy is associated with stress. The level of confidence and belief that teachers have in their ability to perform their teaching duties effectively can significantly influence the amount of stress they experience in their role.

In addition, the study of Bolton (2018) showed that improving teacher self-efficacy is important for managing stress among teachers. This shows that if the teacher has the motivation and higher self-efficacy, they may not struggle to achieve teaching success or the quality of teaching that the students deserve. Also, self-efficacy can better prepare teachers to handle stressful situations effectively (Rabaglietti et al., 2021).

**CONCLUSION**

Based on the findings of this descriptive-correlational study among early childhood teachers in Tagum City, several key conclusions can be drawn.



Firstly, regarding occupational stress, the overall mean score of 2.783 suggests that teachers in Tagum City experience relatively moderate levels of stress in their profession. However, specific stressors such as working conditions, curricular and extracurricular activities, and classroom management still contribute to moderate to low levels of stress among educators.

In contrast, the level of self-efficacy among these teachers is notably high, with an overall mean score of 4.523. This indicates a strong belief in their capabilities to effectively perform their teaching roles. Indicators such as professional mastery, classroom anxiety, locus of control, and persistent behavior all demonstrate very high levels of self-efficacy among early childhood educators in Tagum City.

Furthermore, the calculated R-value of 0.221 indicates a positive correlation between occupational stress and self-efficacy. This suggests that as occupational stress increases, self-efficacy also tends to increase among early childhood teachers. Additionally, the obtained p-value of 0.027, falling below the significance level of 0.05, further confirms the significant relationship between these variables.

In conclusion, while early childhood teachers in Tagum City experience relatively moderate levels of occupational stress, there exists a significant and positive relationship between stress and self-efficacy. These findings emphasize the importance of addressing occupational stressors and fostering self-efficacy among educators to enhance their overall well-being and effectiveness in the classroom. Further research and interventions aimed at supporting teachers in managing stress and boosting self-efficacy could yield significant benefits for the educational landscape in Tagum City.

## RECOMMENDATIONS

Based on the findings from this descriptive-correlational study among early childhood teachers in Tagum City, the researcher proposes the following specific recommendations:

1. Early Childhood Teachers must proactively adopt stress management techniques such as mindfulness, time management, and seeking social support to effectively cope with occupational stressors.
2. Early Childhood Teachers may engage in professional development opportunities aimed at boosting self-efficacy, such as workshops, training programs, and peer support groups.
3. Early Childhood Teachers must strive to maintain a healthy work-life balance by setting boundaries, prioritizing self-care activities, and disconnecting from work during non-working hours.
4. School Administrators should ensure that teachers have access to resources and support systems to manage stress effectively, such as counseling services, wellness programs, and professional development opportunities.
5. School Administrator must foster a supportive and collaborative work environment where teachers feel valued, respected, and appreciated for their contributions and facilitate the establishment of peer support networks or mentorship programs among teachers to provide emotional support and share coping strategies.
6. School Administrators may organize workshops or training sessions on stress management techniques tailored to the specific needs of early childhood teachers.
7. Future Researchers may conduct further research to explore contextual factors that may influence occupational stress and self-efficacy among early childhood teachers, such as cultural differences, school policies, and community dynamics.
8. Future Researchers may design and implement intervention studies to evaluate the effectiveness of various interventions, such as mindfulness training, social support programs, or organizational changes, in reducing occupational stress and enhancing self-efficacy among early childhood teachers.

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# AN COMPLETE STUDY ON ANTIBACTERIAL, ANTICOAGULANT STUDY USING POMEGRANATE PEEL EXTRACT BY FORMULATING COLD CREAM

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## ABSTRACT

This study investigates the formulation of a cold cream enriched with pomegranate peel extract to assess its potential antibacterial and anticoagulant properties. Pomegranate peels, rich in bioactive compounds, were extracted using a solvent extraction method<sup>[1]</sup>. The obtained extract was incorporated into a cold cream base following standardized procedures. The formulated cream was then subjected to various analytical tests to evaluate its antibacterial efficacy against common pathogens and its ability to inhibit blood coagulation. Results demonstrated promising antibacterial activity against a spectrum of bacteria, including both Gram-positive and Gram-negative strains, suggesting its potential as a natural alternative to synthetic antimicrobials. Additionally, the cream exhibited significant anticoagulant properties, indicating its potential application in the management of thrombotic disorders<sup>[2]</sup>. This study underscores the feasibility of utilizing pomegranate peel extract in cold cream formulations for both therapeutic and cosmetic purposes, offering a natural and sustainable approach to skincare and healthcare. Further research is warranted to elucidate the mechanisms underlying these observed activities and optimize formulation parameters for enhanced efficacy and stability.

**KEYWORDS :** Pomogranate peel, extract, antibacterial, antioxidants .

## INTRODUCTION

Pomegranate peels of a specific variety called Ganesh were used for extracting compounds using various solvents like water, methanol, and ethanol, either alone or mixed with water. The researchers measured the amount of extracted compounds, tested the antioxidant properties using DPPH and ABTS assays, and determined the total phenolic content<sup>[3]</sup>

The researchers also checked if the peel extracts could fight bacteria, trying them against four types: Staphylococcus aureus, Enterobacter aerogenes, Salmonella typhi, and Klebsiella pneumoniae. Turns out, the extracts were really effective against all these bacteria. The mix of 70% ethanol and 30% water, as well as the pure water extract, showed strong antioxidant properties and had a lot of phenolic compounds. This suggests they could be useful in making health products.

Pomegranate peel extract is gaining attention for its potent antibacterial and antioxidant properties. Rich in polyphenols such as ellagic acid, punicalagins, and anthocyanins, it exhibits strong antimicrobial activity against various pathogens. Additionally, its high antioxidant content helps neutralize free radicals, protecting cells from oxidative damage. These properties make pomegranate peel extract a promising natural alternative for promoting health and combating bacterial infections<sup>[4]</sup>.

## Manufacturing and processing the cold cream for antibacterial and anticoagulant use

### Ingredients and Materials:

1. Pomegranate peels :

- Collect fresh pomogranate peel of specified ganesh variety.
- Wash thoroughly to remove contaminants<sup>[5]</sup>.
- Dry the peels using a suitable method (air drying, oven drying) and grind to a fine powder.



2. Ethanol :

- Choose pharmaceutical-grade ethanol.
- Measure the required quantity to help for the extraction process .

5. Water:

- Use distilled water for consistency and to avoid impurities.
- also use water for the extraction process<sup>[6]</sup>.

**Laboratory Equipment**

- mixing apparatus, pH meter, mortal pestle , UV Visible spectrophotometer. Whatmaan filter paper, maceration apparatus.etc.

**Formulation Process**

1. Extraction of Active Compounds from pomogranate peels :

- Use a suitable solvent (e.g. Ethanol, water) for extraction.

2. Preparation of pomegranate peel Extract:

Procedure:

1. Separate and washed the pomegranate peels it dried in vaccum oven at 50°C .
2. Dried peels ground with mortal and pestle make a course powder (1 mm size ) stored in a incubator at 4 °C.
3. 20 gm pomegranate peel powder separately soaked in 100 ml solution and extract prepared in six types solution i.e ethanol, methanol, water,30 ethanol:70 water, 50 ethanol: 50 water, 70 ethanol: 30 water.
4. Samples incubated at 37 °C for 24 hours in shaking incubator with 200 RPM .
5. Above solution are filtered with whatmaan no 1 filter paper and filtered stored in incubator at 4 °C .
6. Extraction process repeated three times and analysis of phenolic, antioxidants and antibacterial activity<sup>[7]</sup>.

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<sup>[8]</sup> .

**Formula**

Sr.No	Ingredients	Quantity Taken (For 100ml)	Category
1	Beeswax	15 gm	Base
2	Borax	0.50 gm	Emulsifying agent
3	Tween 80	Q.S	Emulsifying agent
4	Mint oil	20 ml	Perfumery
5	Pomogranate peel extract	4 ml	Antibacterial , anticoagulant

**Detailed Information**

Classification of pomegranate peel

Kingdom: plantae

Division: Magnoliophyta (also known as angiosperma)

Class: Magnoliopsida

Order: Myrtales

Family: Lythraceae

Genus: Punica

Species: Punica granatum

Health Benefits of Pomegranate peel offers several health benefits due to its rich content of bioactive compounds, including polyphenols, flavonoids, and tannins. Here are some of the potential health benefits associated with pomegranate peel<sup>[9]</sup>:



**Fig 1. Pomogranate peel**

**1.Antioxidant Properties:** Pomegranate peel is packed with antioxidants that help combat oxidative stress and free radical damage, reducing the risk of chronic diseases such as cardiovascular disease and cancer.

**2.Anti-inflammatory Effects:** The anti-inflammatory compounds in pomegranate peel may help reduce inflammation throughout the body, potentially alleviating symptoms of inflammatory conditions like arthritis and inflammatory bowel disease<sup>[10][11]</sup>.

**3.Antimicrobial Activity:** Pomegranate peel extract has demonstrated antimicrobial properties against various bacteria, fungi, and viruses, making it useful in fighting infections and supporting immune health.

**4.Skin Health:** The antioxidants in pomegranate peel can promote skin health by protecting against UV-induced damage, reducing signs of aging such as wrinkles and fine lines, and supporting wound healing.

**5.Cardiovascular Support:** Studies suggest that pomegranate peel may help lower blood pressure, reduce cholesterol levels, and improve overall heart health by reducing oxidative stress and inflammation in the arteries.

**6.Gastrointestinal Health:** Pomegranate peel contains compounds that may support digestive health by promoting the growth of beneficial gut bacteria, improving digestion, and reducing the risk of digestive disorders.

**7.Potential Anticancer Effects:** Some research indicates that the bioactive compounds in pomegranate peel may have anticancer properties, inhibiting the growth of cancer cells and reducing the risk of certain types of cancer, such as breast and prostate cancer.

**8.Oral Health :** Pomegranate peel extract has been studied for its potential to promote oral health by inhibiting the growth of oral bacteria, reducing plaque formation, and preventing gum disease.

**9.Weight Management :** Pomegranate peel contains compounds that may help regulate metabolism and reduce appetite, potentially supporting weight management efforts.

**10.Liver Health:** The antioxidant and anti-inflammatory properties of pomegranate peel may benefit liver health by protecting against oxidative damage and inflammation, reducing the risk of liver diseases.

While these potential health benefits are promising, more research is needed to fully understand the mechanisms of action and therapeutic potential of pomegranate peel. Incorporating pomegranate peel into your diet or using it as a supplement may provide additional health benefits alongside the consumption of pomegranate arils and juice.

#### **Uses of pomegranate peels :**

Pomegranate peel extract has garnered significant interest for its remarkable antibacterial and antioxidant properties, making it a valuable resource in both traditional medicine and modern scientific research.



### Antibacterial Activity

Pomegranate peel extract contains bioactive compounds like ellagic acid, punicalagins, and flavonoids, which exhibit potent antibacterial effects against a wide range of pathogens. These compounds interfere with bacterial cell membranes, disrupt cellular processes, and inhibit bacterial growth. Studies have demonstrated the efficacy of pomegranate peel extract against various bacteria, including *Staphylococcus aureus*, *Escherichia coli*, *Salmonella* spp., and *Pseudomonas aeruginosa*. Its ability to combat these pathogens makes it a promising natural alternative to synthetic antibiotics, especially amid concerns over antibiotic resistance<sup>[12]</sup>.

### Antioxidant Activity

The high antioxidant content of pomegranate peel extract plays a crucial role in scavenging free radicals and preventing oxidative stress-related damage to cells and tissues. Antioxidants such as polyphenols, flavonoids, and tannins found in the extract help neutralize reactive oxygen species (ROS) and inhibit lipid peroxidation, thus protecting against oxidative damage to DNA, proteins, and lipids. This antioxidant activity contributes to various health benefits, including anti-inflammatory effects, cardiovascular protection, and potential cancer prevention<sup>[13]</sup>.

### Mechanisms of Action

The antibacterial and antioxidant activities of pomegranate peel extract are attributed to its complex composition of phytochemicals. Ellagic acid, for example, exhibits antibacterial effects by disrupting bacterial cell membranes and inhibiting essential enzymes involved in bacterial metabolism. Punicalagins, prominent polyphenols in pomegranate peel, possess potent antioxidant properties, scavenging free radicals and enhancing the activity of antioxidant enzymes within cells.

### Applications

Due to its dual antimicrobial and antioxidant properties, pomegranate peel extract finds applications in various fields:

**Pharmaceuticals:** It can be incorporated into topical formulations for wound healing, acne treatment, and management of skin infections<sup>[14]</sup>.

**Food and Beverage Industry:** Pomegranate peel extract can be used as a natural preservative in food products to extend shelf life and inhibit microbial growth.

**Nutraceuticals:** Extracts or supplements derived from pomegranate peel are consumed for their health-promoting effects, including immune support and disease prevention<sup>[15]</sup>.

**Cosmetics:** Pomegranate peel extract is a common ingredient in skincare products, providing anti-aging benefits and protecting the skin against environmental damage.

In summary, pomegranate peel extract's antibacterial and antioxidant activities make it a versatile natural ingredient with significant potential for therapeutic and industrial applications, offering a promising avenue for further research and development.



Fig 2. Uses of pomegranate peels extract



## Chemical Constituents

Pomegranate peel contains a variety of chemical constituents, including bioactive compounds that contribute to its medicinal and nutritional properties. Here are some key chemical constituents found in pomegranate peel:

1. **Polyphenols:** Pomegranate peel is rich in polyphenolic compounds, including flavonoids (such as quercetin, kaempferol, and catechins) and phenolic acids (such as ellagic acid and gallic acid). These polyphenols are potent antioxidants with various health benefits, including anti-inflammatory, antimicrobial, and cardioprotective effects<sup>[16][17]</sup>.
2. **Tannins:** Pomegranate peel contains high levels of tannins, particularly hydrolysable tannins such as punicalagins and ellagitannins. Tannins contribute to the astringency of pomegranate peel and possess antioxidant, antimicrobial, and anti-inflammatory properties<sup>[18][19]</sup>.
3. **Anthocyanins:** Pomegranate peel contains anthocyanin pigments, which give the peel its characteristic red color. Anthocyanins are powerful antioxidants that may help protect against oxidative stress and inflammation.
4. **Phenolic Acids:** In addition to ellagic acid, pomegranate peel contains other phenolic acids such as caffeic acid, chlorogenic acid, and protocatechuic acid. These compounds contribute to the antioxidant and anti-inflammatory properties of the peel.
5. **Flavonols:** Pomegranate peel contains flavonols such as quercetin, kaempferol, and myricetin, which have antioxidant, anti-inflammatory, and anti-cancer properties<sup>[20]</sup>.
6. **Vitamins:** Pomegranate peel contains vitamins, including vitamin C, vitamin E, and various B vitamins. These vitamins contribute to the overall nutritional value of the peel and may have health benefits such as immune support and skin health.
7. **Minerals:** Pomegranate peel contains minerals such as potassium, calcium, magnesium, and phosphorus, which are essential for various physiological functions in the body.
8. **Organic Acids:** Pomegranate peel contains organic acids such as citric acid, malic acid, and tartaric acid, which contribute to the sour taste of the peel and may have health benefits such as promoting digestion.

These chemical constituents work synergistically to provide the health-promoting properties associated with pomegranate peel, including antioxidant, anti-inflammatory, antimicrobial, and cardioprotective effects.

## 1. Therapeutics

Research on the therapeutic potential of pomegranate peel has uncovered various health benefits and medical applications. Here are some therapeutic uses supported by scientific evidence –

- Antioxidants therapy
- Anti inflammatory treatment
- antimicrobial agent
- cancer prevention and treatment

These therapeutic uses highlights the potential of pomegranate peels as a natural remedy for various health conditions.

## 2. Taxonomic Information

- Provide detailed taxonomic classification of pomegranate peel, including family (Lythraceae), genus, and species, establishing its botanical identity.
- Examine any variations in the chemical composition of pomegranate peel among different geographical regions.

## 3. Physiological Aspects

- Explore the physiological interactions between the cold cream and penetration on body surface including absorption rates, tissue compatibility, and potential local effects.
- Assess the impact of water content in the formulation it's adsorption and penetration overall therapeutic outcome.

## 4. Pharmacological Information

Pomegranate peel extract's pharmacology encompasses its interactions with biological systems, mechanisms of action, and therapeutic effects. Here's a detailed overview:

### Interactions with Biological Systems

**Cellular Targets:** Pomegranate peel extract interacts with various cellular components, including cell membranes, enzymes, and DNA, exerting its pharmacological effects.

**Microbial Targets:** Its antibacterial activity involves interactions with bacterial cell membranes, enzymes, and metabolic pathways, leading to inhibition of bacterial growth and viability.

### Mechanisms of Action

**Antibacterial Activity:** Pomegranate peel extract disrupts bacterial cell membranes, inhibits essential enzymes involved in bacterial metabolism, and interferes with bacterial DNA replication, leading to bactericidal or bacteriostatic effects.

**Antioxidant Activity:** Its antioxidant properties involve scavenging of free radicals, inhibition of lipid peroxidation, enhancement of endogenous antioxidant enzyme activity, and protection against oxidative stress-induced cellular damage.



### Therapeutic Effects

**Antimicrobial:** Pomegranate peel extract exhibits broad-spectrum antimicrobial activity against Gram-positive and Gram-negative bacteria, fungi, and some viruses. It may be effective in treating bacterial infections, fungal skin conditions, and viral illnesses.

**Anti-inflammatory:** Its antioxidant properties contribute to anti-inflammatory effects by reducing oxidative stress, inhibiting pro-inflammatory cytokine production, and modulating inflammatory signaling pathways. This makes it potentially beneficial for conditions associated with chronic inflammation, such as arthritis and inflammatory bowel disease.

**Cardioprotective:** Pomegranate peel extract's antioxidant and anti-inflammatory effects contribute to cardiovascular health by reducing oxidative damage to blood vessels, lowering blood pressure, inhibiting cholesterol oxidation, and improving endothelial function.

**Skin Health:** Topical application of pomegranate peel extract may promote wound healing, alleviate skin inflammation, and protect against UV-induced damage, thanks to its antimicrobial and antioxidant properties.

**Anticancer:** Some studies suggest that pomegranate peel extract may possess anticancer properties, inhibiting cancer cell proliferation, inducing apoptosis (programmed cell death), and suppressing tumor growth through various mechanisms.

### Pharmacokinetics

**Absorption:** The bioavailability of pomegranate peel bioactive compounds varies depending on the formulation and mode of administration. Oral consumption allows for absorption of polyphenols and other phytochemicals in the gastrointestinal tract<sup>[21]</sup>.

**Distribution:** Once absorbed, bioactive compounds from pomegranate peel extract distribute throughout the body, exerting their pharmacological effects on target tissues and organs<sup>[22]</sup>.

**Metabolism and Elimination:** Metabolism of pomegranate peel compounds occurs primarily in the liver, where they undergo biotransformation before being excreted via urine and feces<sup>[23]</sup>.

In conclusion, pomegranate peel extract exhibits diverse pharmacological effects, including antimicrobial, antioxidant, anti-inflammatory, cardioprotective, and potential anticancer properties, making it a promising candidate for various therapeutic applications. Further research is warranted to elucidate its mechanisms of action and optimize its clinical utility.

## Future Trends And Traditional Knowledge

### 1. Future Trends

Future trends in skincare are likely to be driven by advancements in technology, shifts in consumer preferences, and emerging scientific research. Here are some potential future trends in skincare:

1. **Personalized Skincare :** The rise of personalized skincare solutions tailored to individual skin types, concerns, and genetic predispositions is expected to continue. Advances in technologies such as AI, DNA analysis, and skin diagnostics will enable the creation of customized skincare regimens and formulations to address specific needs.
2. **Clean Beauty:** consumers are increasingly seeking skincare products formulated with natural, organic, and sustainably sourced ingredients. Clean beauty, which emphasizes transparency, safety, and eco-consciousness, is likely to become more mainstream, driving demand for products free from harmful chemicals, synthetic fragrances, and harsh preservatives.
3. **Biotechnology and Bioactives :** Biotechnological innovations, including the use of stem cells, peptides, and microbiome-friendly ingredients, will play a significant role in skincare research and product development. Bioactive compounds derived from plants, algae, and marine sources will also be explored for their skin-rejuvenating properties.

Overall, the future of skincare will be characterized by innovation, sustainability, and a focus on holistic wellness. By staying ahead of these trends and embracing new technologies and formulations, skincare brands can meet the evolving needs and preferences of consumers while promoting skin health and beauty.

### 2. Traditional Knowledge

Traditional knowledge refers to the collective wisdom, practices, and skills passed down through generations within a community or culture. In the context of skincare and dermatology, traditional knowledge encompasses ancient remedies, herbal treatments, and indigenous practices that have been used for centuries to maintain skin health and address various skin concerns. Here are some examples of traditional knowledge in skincare:

1. **Herbal Remedies:** Many cultures have long relied on herbal remedies derived from plants, roots, flowers, and leaves to treat skin conditions. For example, aloe vera has been used for its soothing and healing properties, while neem has been valued for its antibacterial and antifungal effects.





- Natural Oils: Traditional knowledge often includes the use of natural oils, such as coconut oil, olive oil, and argan oil, for moisturizing and nourishing the skin. These oils are rich in fatty acids, vitamins, and antioxidants that help hydrate the skin and protect it from environmental damage.

### Quality Control

1. pH Measurement:

- Check the pH of the formulation to ensure it is suitable for oral use.

2. Stability Testing:

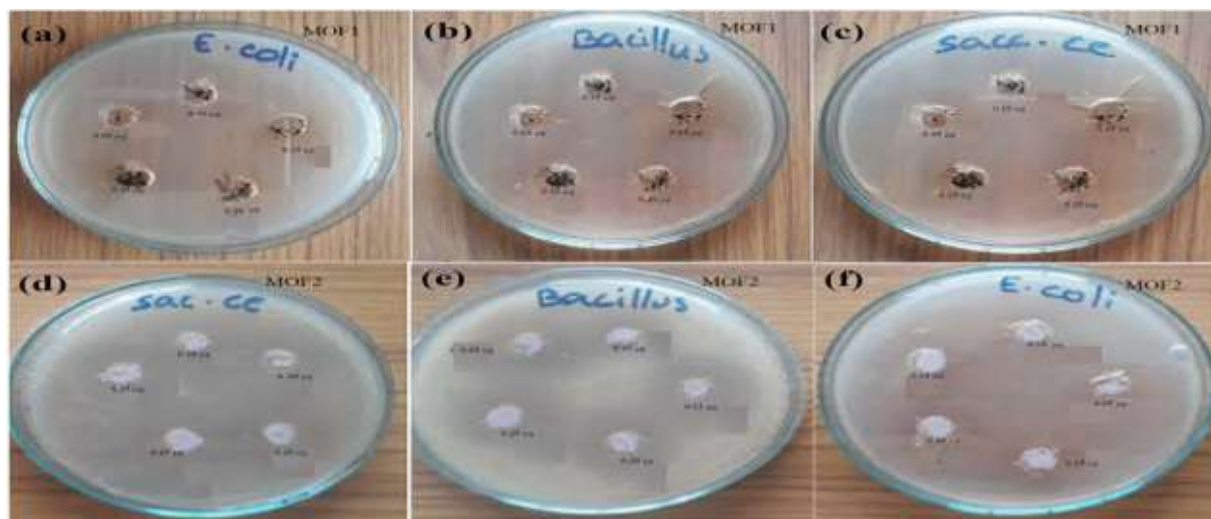
- Store samples in cool condition.

3. Texture and Consistency Testing:

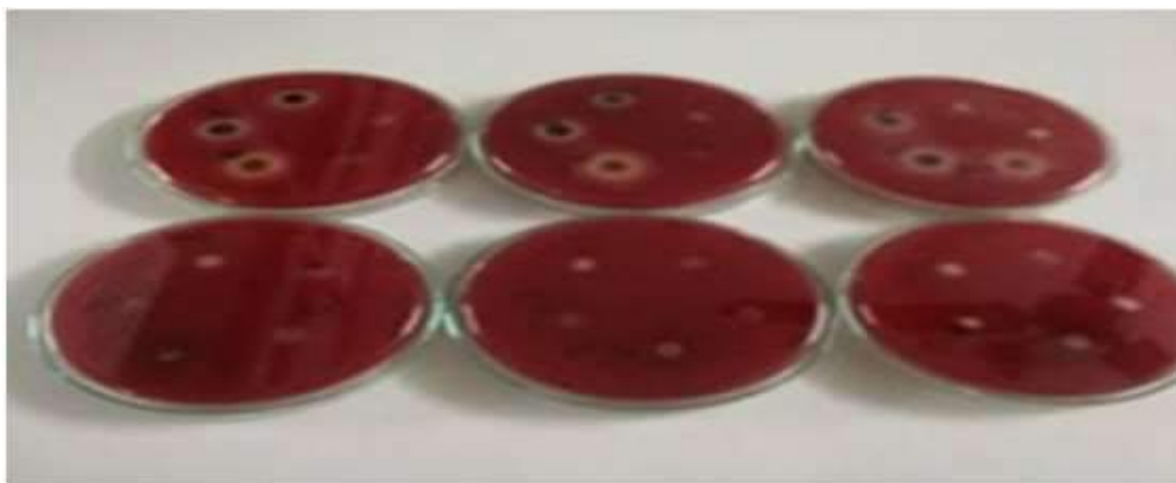
- Evaluate the texture and consistency of the cold cream to ensure a comfortable application.

4. Antibacterial and anticoagulant activity study:

In this study we check the antibacterial and anticoagulant activity using a agar medium and blood agar medium bacterial agar plate formation method we check the bacterial growth are increasing or decreasing. Also check the blood clotting property.



**Fig 3. To check the antibacterial activity using a different bacteria**



**Fig 4. To check the anticoagulant activity using blood agar medium different bacteria**

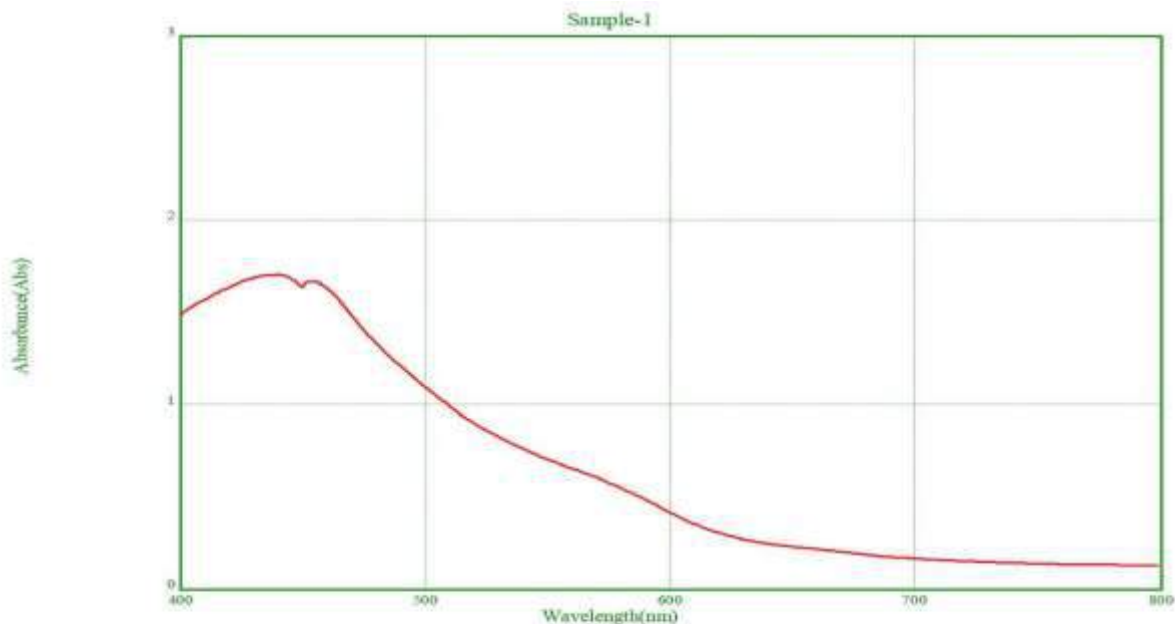


**Result, Observation, and Evaluative Steps**

Sr.no.	1] Physical Test	2] Sensory Test
1	Appearance – smooth texture	Odour – Refreshing odour Irritancy – No irritation and edema found
2	Colour – Brownish yellow	
3	Texture – Smooth	
4	Consistency – semi solid	
Sr.no.	3] Chemical Test	4] Stability Testing
1	PH – 4 to 6.7	Temperature – Room temperature (25°c) and below Light Exposure – Sensitive to prolonged exposure to direct sunlight. - Should be stored in opaque container or packaging. Storage Duration – Stable for upto 12 months when stored in cool & dry place.
2	Phenolic – present	
3	Flavonoids – Present	
4	Caffeic – Moderate	

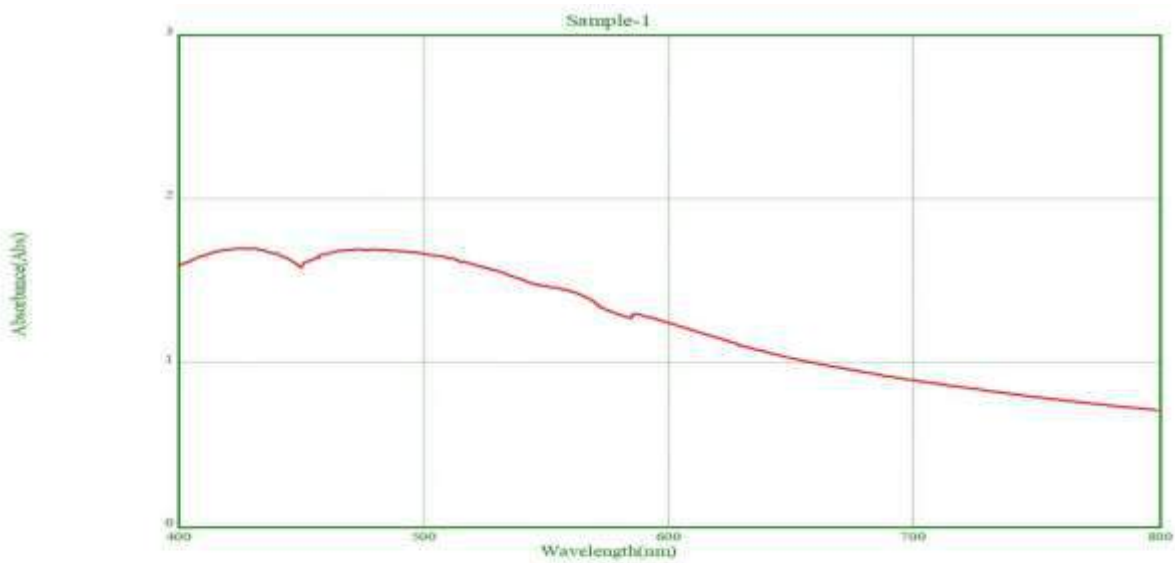
**I) UV Frequency  $\lambda_{max}$  ( Absorbance ) Absorbance Vs Wavelength :**

- Sample 1 (Ethanol 25 %)



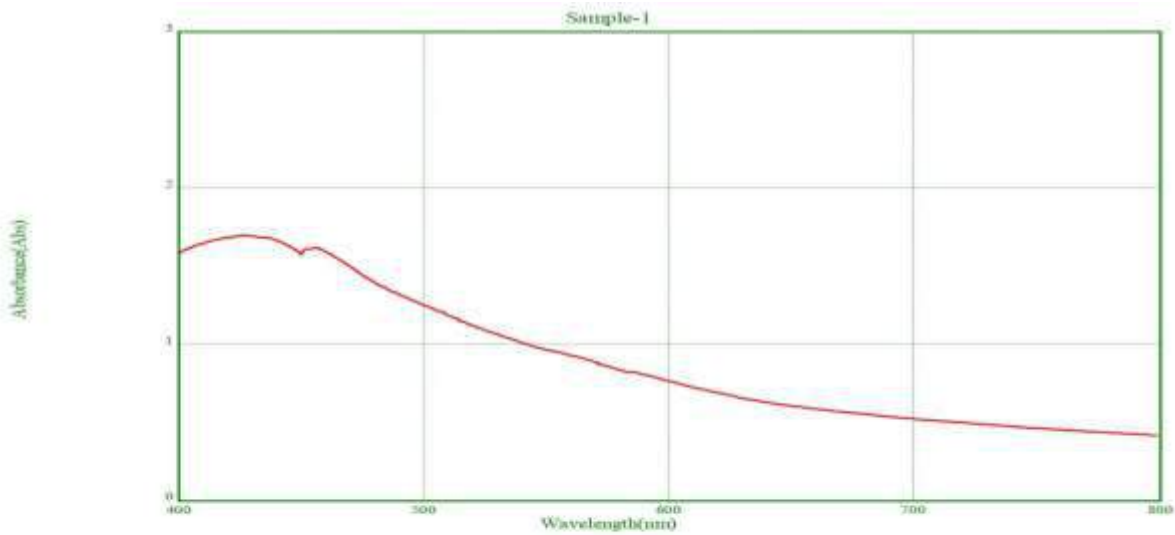
Scan Range: 400.0-1100.0nm  
 Scan Step: 1.0nm  
 Scan Filter: 49  
 Scan Time: March 27 15:54:47 2024

- sample 2 ( 50 ethanol : 50 water )



Scan Range: 400.0-800.0nm  
Scan Step: 1.0nm  
Scan Filter: 49  
Scan Time: April 01 14:20:40 2024

- sample 3 ( 70 ethanol : 30 water )



Scan Range: 400.0-800.0nm  
Scan Step: 1.0nm  
Scan Filter: 49  
Scan Time: April 01 14:11:55 2024

- Sample 4 ( 30 ethanol : 70 water )



### Conclusion on Cold Cream Formulation

In conclusion, our study provides compelling evidence supporting the efficacy of a cold cream formulation enriched with pomegranate peel extract for antibacterial and anticoagulant activity. The incorporation of pomegranate peel extract into the cold cream base resulted in a synergistic enhancement of its therapeutic effects, making it a promising candidate for skincare applications. The demonstrated antibacterial efficacy against a broad spectrum of bacteria, coupled with the anticoagulant activity observed in coagulation assays, highlights the multifaceted benefits of this formulation. These findings underscore the potential of pomegranate peel extract as a natural and effective ingredient in skincare products, offering both antimicrobial and circulatory benefits. Further research and clinical trials are recommended to validate these findings and assess the safety and efficacy of the formulated cold cream in real-world settings. Overall, our study contributes to the growing body of evidence supporting the integration of traditional botanical extracts into modern skincare formulations for enhanced therapeutic outcomes<sup>[24]</sup>.

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## THE CHANGES TO THE ACADEMIC PROCESS

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### ABSTRACT

*Covid-19 is the virus, which have killed uncountable people in the world. It was first identified in december 2019 in wuhan, Hubei province, China and then spread to the world and most of the countries affected by this Covid-19 virus. All world countries economies affected badly and major disruptions to daily life and the global economy. The outbreak was declared a public health emergency of international concern by the WHO on january 30,2020 and later a pandemic on March 11,2020. Government around the world implemented various measures such as lockdowns, travel restrictions, and social distancing to curb the spread of the virus. The pandemic has had far-reaching social,economic,and health crises. Efforts to combat COVID-19 continue,with ongoing research, vaccination drives, and international cooperation to mitigate its effects.*

**KEY WORDS:** Covid-19, Academic process, Changes

### INTRODUCTION

The COVID-19 pandemic, also known as the coronavirus pandemic, is an ongoing global health crisis caused by the spread of the SARS-CoV-2 virus. The outbreak was first identified in December 2019 in Wuhan, China and has since spread to almost every country in the world. The virus primarily spreads through respiratory droplets when an infected person coughs, sneezes, or talks. It can also spread by touching surfaces contaminated by the virus and then touching one's face. Symptoms of COVID-19 include fever, cough, and difficulty breathing, although some cases can be asymptomatic. Governments and health organizations across the world have implemented various measures to slow down the spread of the virus. These include social distancing, wearing face masks, hand hygiene, and lockdowns or quarantine measures. Travel restrictions have also been imposed to limit the spread across national borders.

The COVID-19 pandemic has had significant impacts on public health, economies, and societies. It has caused millions of confirmed cases and deaths worldwide, overwhelming healthcare systems in some areas. Many countries have experienced economic recessions and job losses due to lockdown measures and reduced economic activity. Efforts to combat the pandemic include the rapid development and distribution of vaccines. Multiple vaccines have been approved for emergency use and are being rolled out globally to immunize populations and control the spread of the virus. As the pandemic continues, it is important for individuals to follow public health guidelines and receive vaccinations to protect themselves and others from COVID-19.

**The COVID-19 pandemic has resulted in significant changes to the academic process at all levels, from elementary schools to universities. Some of the key changes include:**

**1. Shift to remote learning:** To maintain social distancing and prevent the spread of the virus, schools and universities have shifted to online learning platforms. Classes are now conducted through video conferencing tools, online learning management systems, and digital resources.

**2. Cancelled exams and assessments:** Many exams, especially large-scale standardized tests, have been canceled or postponed. Alternative assessments, such as online quizzes and projects, have been implemented to measure students' progress and knowledge.

**3. Altered academic calendars:** Educational institutions and teachers have had to adapt their teaching methods to online platforms. They have been utilizing different digital tools and techniques to engage students, such as prerecorded lessons, interactive quizzes, and virtual group discussions.

**4. Limited access to physical resources:** Libraries, computer laboratories, and other physical resources are either closed or have limited access. Students and researchers are encouraged to use digital resources, e-books, and online databases for their academic needs.

**5. Adaptation of teaching methods:** Teachers and professors have had to adapt their methods to online platforms. They have been utilizing different digital tools and techniques to engage students, interactive quizzes, and virtual group discussions.

**6. Reduced social interactions:** The pandemic has affected the social dynamics among students, as face-to-face interactions and group activities are limited. Students are facing challenges in terms of teamwork and collaboration, as well as the lack of socialization opportunities.



**7. Increased reliance on technology:** The pandemic has accelerated the integration of technology in education. Teachers and students are relying heavily on various digital tools, such as video conferencing software, online collaboration platforms, and learning management systems.

**8. Support for mental health:** educational institutions are prioritizing mental health support for students and staff who may be experiencing increased stress and anxiety due to the pandemic. Counselling services, online support groups and mental health resources are being provided.

**9. digital examinations and assessments:** with remote learning, traditional pen and paper exams have been replaced with alternatives. Online proctoring tools and anti-plagiarism software are being used to ensure academic integrity and monitor students during exams.

**10. Impacts on research and scientific conferences:** Many research projects and experiments have been postponed or disrupted, leading to delays in academic progress and publication. Scientific conferences have also moved to virtual formats, limiting the opportunities for networking and presenting research.

Overall, the changes brought about by COVID-19 have significantly altered the academic process, requiring both students and educators to adapt to new modes of learning and teaching.

### **Abstract changes of academic process due to Covid-19**

The academic process has undergone significant changes due to the COVID-19 pandemic. In order to maintain social distancing and reduce the risk of transmission, many educational institutions have shifted from traditional in-person classes to online or remote learning. This transition has brought about several abstract changes in the academic process.

**1. Online Learning Platforms:** Educational institutions have adopted online platforms, such as learning management systems (LMS) or video conferencing tools, to facilitate online classes and academic interactions. This shift enables students to access course materials, submit assignments, and engage with professors and peers remotely.

**2. Virtual Classrooms:** Virtual classrooms have become the new norm, allowing teachers and students to meet and interact virtually. These platforms offer features like live video lectures, real-time discussions, chat options, and collaborative tools. The academic process now relies heavily on these online platforms to deliver lectures, conduct discussions, and foster student-teacher interactions.

**3. Synchronous and Asynchronous Learning:** With online learning, the academic process has become more flexible. Institutions offer both synchronous and asynchronous learning options. Synchronous learning involves real-time interactions, like attending live lectures or participating in discussions. Asynchronous learning, on the other hand, allows students to access pre-recorded lectures or materials at their convenience and complete assignments within given timeframes.

**4. Remote Assessments:** Traditional in-person exams have been replaced or modified to fit remote learning environments. Institutions are opting for online assessments, including timed quizzes, online exams, and open-book assignments. These changes aim to ensure academic integrity while adapting to the limitations imposed by remote learning.

**5. Collaborative Digital Tools:** To promote collaborative learning and group projects, digital tools like cloud-based document sharing platforms, project management software, and virtual whiteboards have gained popularity. These tools facilitate seamless collaboration among students and enable them to work on academic projects remotely.

**6. Increased Self-directed Learning:** Online learning requires students to take more responsibility for their own learning. They need to manage their time effectively, set goals, and independently engage with the course material. This shift promotes self-directed learning and enhances skills like time management and self-motivation.

**7. Adaptation of Pedagogical Approaches:** The pandemic has challenged traditional teaching methods, prompting educators to adapt their pedagogical approaches to suit online environments. They have incorporated more interactive and engaging methods, such as multimedia presentations, online simulations, and gamification, to enhance student learning and maintain engagement.

**8. Focused Support Systems:** The shift to remote learning has necessitated the establishment of robust support systems. Institutions have reconfigured student support services, including academic advising, counseling, and technical assistance, to cater to the unique challenges faced by students in remote learning environments.

Overall, the COVID-19 pandemic has forced the academic process to adapt to remote learning models, utilizing technology and innovative approaches to ensure continuity in education. These abstract changes have transformed how students learn, engage, collaborate, and take assessments, and may continue to impact the future of education even after the pandemic wanes.

### **What is the difference between academic process before Covid-19 in relation to present scenario**

Before COVID-19, the academic process primarily revolved around traditional in-person classes, physical classrooms, and face-to-face interactions. Here are some key differences between the academic process before COVID-19 and the present scenario:

**1. In-person Classes:** In the pre-COVID era, students attended classes on campus, interacting directly with professors and classmates. Presently, online or remote learning has replaced the physical presence in classrooms, and students engage with course materials and peers through virtual platforms.



**2. Physical Campus:** Academic institutions were active and bustling with students, faculty, and staff. Students had access to campus facilities like libraries, laboratories, and sports facilities. In the present scenario, campuses may be closed or have restricted access, with limited physical interactions and activities taking place.

**3. Classroom Dynamics:** In-person classes allowed for real-time discussions, immediate clarifications, and physical demonstrations of concepts. Remote learning, however, often lacks the same level of immediate interaction and dynamic exchange due to technological limitations, time delays, or connectivity issues.

**4. Social Interactions:** Pre-COVID, students had ample opportunities for social interactions through extracurricular activities, clubs, student organizations, and events. With remote learning, social interactions have been limited, leading to reduced opportunities for socializing and networking among students.

**5. Time and Location Flexibility:** Before COVID-19, students typically had fixed class schedules and had to physically attend classes at specific times and locations. Presently, remote learning offers more flexibility in terms of scheduling, allowing students to access course materials and complete assignments at their convenience.

**6. Assessment Methods:** Traditional assessments before COVID-19 included in-person exams, quizzes, and presentations. The current scenario has seen a shift toward online assessments, including timed exams or open-book assignments, to adapt to remote learning environments and maintain academic integrity.

**7. Support Services:** Pre-COVID, students had access to on-campus support services such as academic advising, counseling centers, and study groups. These services have transitioned to remote delivery, with students receiving support through virtual platforms, emails, or video calls.

**8. Pedagogical Approaches:** In the traditional academic setting, educators relied on face-to-face teaching methods, such as lectures, discussions, and hands-on activities. Due to remote learning constraints, instructors have had to adopt more innovative pedagogical approaches, incorporating multimedia resources, interactive assignments, and virtual simulations to engage students and enhance learning outcomes.

These differences highlight the substantial changes in the academic process, from physical presence and interactions to virtual classrooms and remote learning. Institutions have had to rapidly adapt to ensure continuity in education while maintaining the quality of instruction and student engagement in the face of the COVID-19 pandemic.

### **Characteristics of academic process and its functions**

The academic process refers to the systematic and methodical approach followed in educational institutions to deliver knowledge, develop skills, and assess student learning. It encompasses various activities, systems, and interactions aimed at facilitating effective teaching and learning. The characteristics and functions of the academic process in student life are as follows:

**1. Structured Learning:** The academic process provides a structured framework for students, offering a well-defined curriculum and learning outcomes. It establishes a systematic progression of knowledge and skills, ensuring that students acquire a comprehensive understanding of their field of study.

**2. Continual Learning Journey:** The academic process is a continuous journey that spans various stages, from early childhood education to advanced levels of higher education. It provides students with a clear path for intellectual growth, development, and specialization, ensuring a progressive and comprehensive education.

**3. Knowledge Acquisition:** One of the primary functions of the academic process is to facilitate the acquisition of knowledge. Through lectures, readings, research papers, and assignments, students gain a deep understanding of various subjects, theories, concepts, and practical applications.

**4. Skill Development:** Along with knowledge, the academic process focuses on developing a range of skills in students. These can include critical thinking, problem-solving, communication, collaboration, analytical skills, research skills, and creativity, among others. These skills are essential for personal and professional success beyond academics.

**5. Personal Growth and Development:** The academic process promotes personal growth and development by encouraging students to explore their interests, passions, and talents. It allows them to discover their strengths, develop self-discipline, and cultivate intellectual curiosity, fostering a holistic development approach.

**6. Intellectual Engagement:** The academic process aims to engage students intellectually improvement.

**7. Personalized Learning:** The academic process recognizes the individuality of learners and provides opportunities for personalized learning. It offers a range of electives, specialization options, and co-curricular activities, allowing students to explore their interests and tailor their education to suit their career goals and aspirations.

**8. Academic Support Systems:** The academic process offers various support systems to assist students throughout their educational journey. These systems include academic advisors, guidance counselors, libraries, resource centers, and tutoring programs, providing guidance, mentorship, and additional resources to enhance student learning and success.

Overall, the academic process plays a vital role in student life by providing a structured framework, fostering knowledge acquisition and skill development, promoting personal growth, and preparing students for future academic and professional pursuits. It serves as the foundation for intellectual and personal development, ensuring that students gain a comprehensive and well-rounded education.





## CONCLUSION

The Covid-19 pandemic, profoundly impacted the academic process, forcing educational institutions to adapt swiftly and creatively. It highlighted the importance of addressing educational inequalities, ensuring technological access for all, and supporting the mental well-being of students and educators. The experiences of the pandemic are likely to influence the future of education, encouraging a more flexible and inclusive approach to learning.

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## **SELF-CONCEPT & EMOTIONAL COMPETENCY AMONG DAY SCHOLARS & HOSTELLERS**

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### **ABSTRACT**

*The aim of the study is to do a comparative study between day scholars and hostellers on the basis of self -Concept and emotional competency. The study was directed to aligning the self -Concept and emotional competency of students those live in home and hostels. A sample of 100 students of day scholars and hostellers in the B.P.M.S.V. was selected using stratified random sampling technique. The data is composed the self - Concept questionnaire and emotional competency questionnaire. The data is examined using descriptive statistics and correlation examine. The result showed that self -Concept significantly influenced the emotional competency of students. The difference between variables is found not significant.*

**KEYWORDS:** *self-concept, emotional competency, day scholars, hostellers*

Self-concept: Self concept strongest matches to the assembling of notion, perceptions and ideas that individuals hold about themselves. It encompasses various aspects such as personality traits, abilities, values, roles, and identities. Self-concept is shaped by experiences, interactions with others, societal influences, and introspection. It plays a crucial role in shaping behavior, attitudes, and decision-making processes. The characteristics of self-concept include:

- Complexity: Self-concept is multifaceted, consisting of various dimensions such as personality traits, abilities, roles, and identities.
- Stability and Change: While certain aspects of self-concept may remain relatively stable over time, others can be influenced by experiences and circumstances, leading to change.
- Clarity: Clarity refers to the degree of understanding and consistency individuals have about their self-concept. It can vary from clear and well-defined to ambiguous and uncertain.
- Consistency: Self-concept strives for coherence and consistency, aligning with one's behaviors, beliefs, and values.
- Flexibility: Despite its stability, self-concept can also be flexible, allowing individuals to adapt to new situations and experiences.
- Social Comparison: Individuals often evaluate their self-concept by comparing themselves to others, which can influence perceptions of self-worth and identity.

Emotional competency: Emotional competency refers to the ability to recognize, understand, and manage one's own emotions effectively, as well as to recognize, understand, and influence the emotions of others. It involves a set of skills related to emotional intelligence, such as self-awareness, self-regulation, empathy, social awareness, and relationship management. Emotional competency enables individuals to navigate their emotions in various situations, communicate effectively, build positive relationships, and make sound decisions based on emotional awareness and understanding.

The merits of emotional competency include:

**Improved Relationships:** Individuals with emotional competency can navigate interpersonal interactions more effectively, leading to better communication, conflict resolution, and stronger relationships.

**Enhanced Leadership:** Emotional competency is a crucial attribute for effective leadership. Leaders who understand and manage their emotions well can inspire and motivate others, build trust, and foster a positive work environment.

**Better Decision Making:** Emotional competency allows individuals to make more informed and rational decisions by considering both logical reasoning and emotional factors. This leads to better problem-solving and judgment in various contexts.



**Stress Management:** People with emotional competency are better equipped to handle stress and adversity. They can regulate their emotions, cope with challenges, and maintain resilience in the face of difficulties.

**Increased Empathy:** Emotional competency fosters empathy, the ability to understand and share the feelings of others. This leads to more compassionate and supportive interactions, both personally and professionally.

**Enhanced Mental Health:** Developing emotional competency can contribute to improved mental well-being by promoting self-awareness, self-acceptance, and effective coping strategies for managing emotions and stress.

## REVIEW OF RELATED LITERATURE:

S. Deshpande and Shobhana Abhyankar (2014), has studied self concept and emotional competency among day **students and boarders**: A comparative study. For this she collected information from 243 children To obtain the **information**, used self concept scale and emotional competency scale ( Sarasvati's and Sharma and Bhardwaj). The result obtained after collecting the information from day students and boarders is as follows ( $t=2.678, p<.01$ ); boys scored higher than girls.

Melinda Coetzee , N. Martins , Johan S. Bassoon and Helene M.(2004) work son the relationship between personality preferences , self-esteem and emotional competency the collected samples from 107 south African leaders to study their responses .The MBTI, CFSEI-AD, and the 360°ECP were published . A positive relationship was found between three products.

## JUSTIFICATION OF THE STUDY

The self-concept and emotional competency of day scholars and hostellers can be affected by different situation related to their living conditions. For day scholars, their self-concept possibly constructed by their experiences at home Interactions with family members and their social circle outside of school. Their sense of identity may be stronger based on personal relationships. On the other hand, hostellers may develop a different self-concept as they navigate independent living away from their families. They may have more opportunities for self-discovery and forming new relationships, which can impact their self-perception and emotional competency. In terms of emotional competency, day scholars may have different challenges and opportunities compared to hostellers. From this, it can be ascertained that self concept and emotional competitiveness among day scholars and hostellers.

## STATEMENT OF THE PROBLEM

“Self-concept & emotional competency among day scholars and hostellers”

## OBJECTIVES OF THE STUDY

1. To compare the self- concept of day scholars & hostellers in the B.P.M.S.V.
2. To compare the emotional competency of day scholars and hostellers in the B.P.S.M.V.
3. To compare emotional competency and self-concept of B.P.M.S.V. students.

## HYPOTHESIS OF THE STUDY

1. There will be no significant between the self-concept of day scholars and hostellers students.
2. There will be no significant between the emotional competency of day scholars and hostellers students.
3. There will be no significant between the emotional competency and self concept of B.P.M.S.V. students

## METHODOLOGY OF THE STUDY

The students of day scholars and hostellers completed a questionnaire that included questions about self- concept and emotional competency. There were some questions which are of negative nature and the scoring of those questions scored as 1,2,3,4,5. Rest of the questions were positive in nature hence the scoring of those questions scored as 5,4,3,2,1, depending upon the box selected by the students. The survey was conducted using data collected through day scholars and hostellers

## SAMPLE OF THE STUDY

This sample is collected from 100 students are day scholars and hostellers are students of B.P.M.S.V.  
100 Adolescents = 50 Day scholars + 50 Hostellers



**Tools of the study**

- ❖ Self -concept Questionnaire
- ❖ Emotional competency Questionnaire

**STATISTICAL TECHNIQUES USED**

The data were analyzed using the following number of techniques Mean ,Standard deviation T-Test

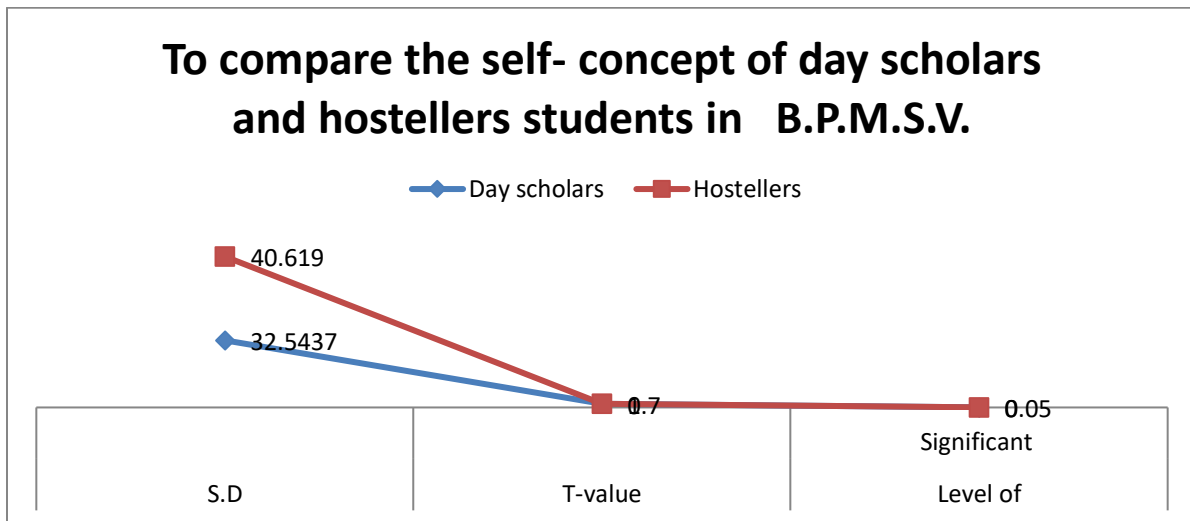
**VARIABLES IN THE STUDY**

- Self -Concept
- Emotional competency

**RESULTS**

Objective: To compare the self- concept of day scholars and hostellers students in B.P.M.S.V.

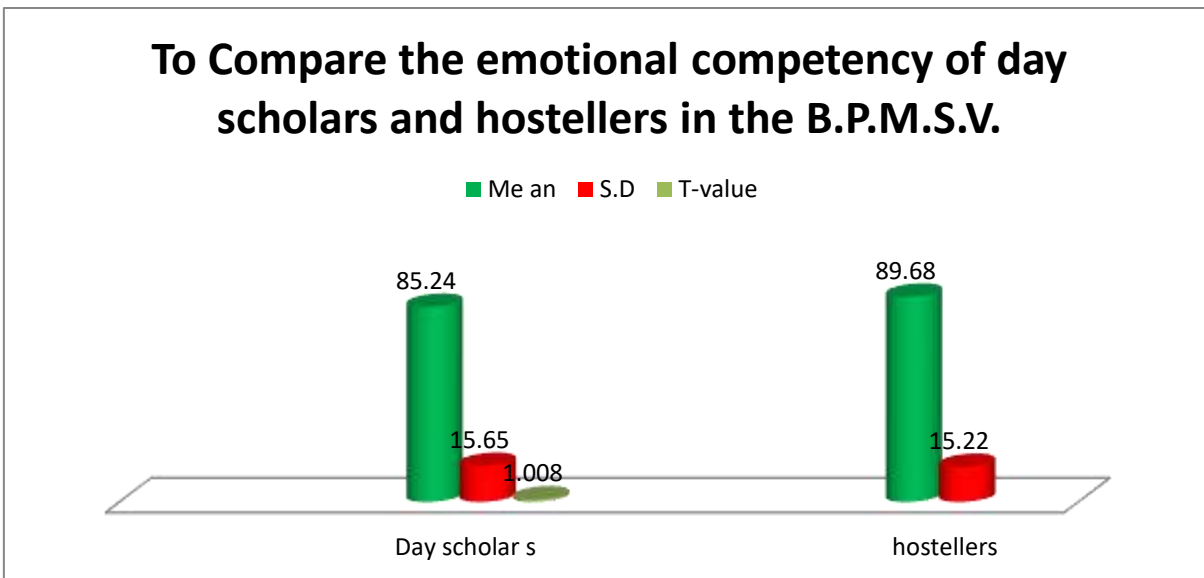
Groups	N	Mean	S.D	T-value	Level of Significant
Day scholars	25	214.68	32.5437	1.7	0.05
Hostellers	25	232.64	40.6190		



Discussion: The mean score of self- Concept of day scholars and hostellers students is 214.68 and 232.64. The t-value of 1.7253 and is significant at 0.05 level. For that season, the null hypothesis

Objective: To compare the emotional competency of day scholars and hostellers in the B.P.M.S.V.

Groups	N	Mean	S.D	T-value	Level significant of
Day scholars	25	85.24	15.65	1.008	0.05
hostellers	25	89.68	15.22		



Discussion: The mean score of emotional competency of day scholars and hostellers students is 85.24 and 89.68. The t- values of 1.0080 and is significant at 0.16 Level. For that season the null hypothesis.

Objective: To compare the self- concept and emotional competency of B.P.M.S.V. students

Variables	t-value
Self-Concept	0.1863
Emotional competency	

Discussion: The number of students in the case study is 100. The self-Concept and emotional competency is 0.1863. So the null hypothesis. Although technically a positive correlation, the relationship between our variables is weak.

### CONCLUSION

It be seen that self -Concept influence the emotional competency of students. I would prefer to suggest personally that educators must encourage positive self -Concept by providing emotional support, creating a positive learning environment. Parents also play a significant role in promoting Self concept by providing emotional support, love and encouragement.

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# THE ESSENCE OF FORENSIC ACCOUNTING IN DETECTION OF NPA IN INDIAN BANKING SECTOR

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## ABSTRACT

*Due to poor credit analysis of any project's requirements and inadequate banker oversight following loan disbursement to the company, bank loans end up being bad. They never check the final purpose of the money given to the company. As a result, the borrower takes advantage of banks' lenient policies. By using the borrowed money for personal gain, the borrower misuses the money. The firm's bank account statement is used by the forensic accountant to verify actual financial transactions. As a result, they stop banks from producing non-performing assets. The RBI (Reserve Bank) of India issued instructions for declaring the forensic accounting for accounts that are thought to be fraudulent.*

**KEY WORDS:** *Non performing asset, forensic accounting, bank, loans.*

## INTRODUCTION

A strong banking industry is necessary for an expanding economy. Other industries will suffer if the financial sector collapses as well. Non-performing assets (NPAs) are of special concern to Indian banks. The performance of a bank is gauged by its NPAs. A large number of NPAs have a negative impact on banks' profitability and net worth, which lowers asset value and raises sustainability risk. NPA growth affects the company's overall profit margin and the value to its shareholders because of the increased need for provisions.

Numerous changes in the banking system have been initiated as a result of the Narasimhan Committee Report-I on Non-Performing Assets in the Banking system from 1991. However, "exports decreased and the external sector ceased to offer any incentives for economic growth after the global financial crisis of 2008." Companies' stock remained unsold. They steadily decreased their production capacity as a result. Their revenue dropped sharply, as did their earnings. They failed to pay back loans to banks on time. Due to this, unmanageable bad loans, often known as NPAs, were created in banks. Due to severe provisions for their bad loans, this had an impact on bank profitability, which in turn led to a reduction in lending to the corporate sector.

Despite a rise in interest rates and a sharp decline in private investment after 2011–2012, credit growth from PSBs persisted. In India, this caused debt distress. This contributed to the significant growth of non-performing assets in Indian banks.

The growth of non-performing assets among Indian banks over the past few years has caused the Supreme Court to express grave worry. The Court has instructed the concerned Ministry/departments/banks to launch a forensic audit of specific companies to determine whether funds have been diverted by the promoters/directors for their own personal use during several hearings of numerous legal petitions and PILs filed against Big Corporate Houses.

To make sure that the lenders' funds are used appropriately and for the intended purpose, the Reserve Bank of India has requested that banks perform forensic accounting on all 28 NPA accounts that it has designated for resolution. As a result, forensic accounting and auditing are becoming increasingly important when dealing with NPAs and money laundering investigations.

A forensic accounting is one that examines financial records in a way that they can be used as evidence in court. A forensic auditor uncovers gaps in the organization's management control system and names those responsible for taking advantage of these conditions inside. This aids in reducing corporate fraud.

## OBJECTIVES

Due to misleading financial reporting, recent corporate frauds like Satyam Computers, Enron, WorldCom, and Madoff have shocked the globe. Therefore, the objective of my study is regarding the importance of conducting forensic accounting for prevention of NPA by studying the data regarding NPA and important cases regarding fraudulent activities which resulted in NPA.



## LITERATURE REVIEW

"Forensic accounting" is defined by Manning (2002) as "the combination of accounting, auditing, and investigation abilities in accordance with a degree that is required by a court of competence to handle matters in dispute in the framework of civil and criminal litigation. Investigation, dispute settlement, and litigation support are the three main facets of forensic accounting.

In the banking industry, fraud and irregularities can now be found via forensic audit, according to a study by Arvind Sharma and Anshul Garg (2018). The forensic audit technique, which the authors emphasised is more concentrated and specialised than a typical audit, aids in determining the existence of certain fraud and NPA areas.

P. Venkataraman (2019) addressed the application of forensic audit in the discovery of NPA in Indian banks in another study he performed. In order to aid in the recovery of bad loans, the author made the point that forensic audit could be utilised to pinpoint the primary cause of NPA. The study also emphasised the need of forensic audit in revealing the root causes of NPA, such as fraud or an absence of due diligence.

In one study, Sengupta, and Gupta (2019) looked at how forensic auditing affected the identification of non-performing assets in Indian banks. According to the report, forensic auditing is a useful tool for identifying NPAs and can assist banks in lowering their NPA levels. In addition, the study discovered that banks that implemented forensic auditing had lower NPA ratios than banks that did not.

Shah and Kansara (2020) looked at the function of forensic auditing in the identification and prevention of non-performing assets in Indian banks in another study. According to the study, forensic auditing can assist banks in preventing and detecting NPAs by spotting potential threats and flaws in their procedures and systems. The study also discovered that banks can lessen their exposure to NPAs and enhance their risk management procedures with the aid of forensic auditing.

The usefulness of forensic auditing in identifying and avoiding fraud in Indian banks was evaluated in research by Singh and Gupta (2021). According to the study, forensic auditing is a useful technique for identifying and stopping fraud and can assist banks in lowering their exposure to NPAs. The study also discovered that banks that implemented forensic auditing experienced less fraud than institutions that did not.

Mehta and Joshi (2021) conducted a study to determine how forensic auditing affected Indian banks' financial performance. According to the study, forensic audits can help banks become more financially successful by lowering their NPA levels and strengthening their risk management procedures. According to the study, institutions which utilised forensic auditing were more profitable and had lower credit risk than banks that did not.

The function of forensic audit in the Indian banking industry, particularly in the identification of NPA, was covered in research by Debasish Das (2021). The author emphasised that conducting a forensic audit can assist in identifying discrepancies in the credit appraisal process that may result in the accumulation of non-performing assets (NPAs). The study also made clear that forensic audit could be utilised to assess the efficiency of the banks' recovery mechanisms.

## RESEARCH METHODOLOGY

The research is based completely on secondary data collected from various journals, papers, magazine, case studies. Also, data collected from various true case regarding NPA in Indian Banks.

## PRESENT STATUS OF NPA IN INDIAN BANKS

The following table shows the present status of NPA in public and private sector banks. It is crucial to keep in mind the fact that the NPA situation in Indian banks may alter depending on a number of variables, including prevailing economic conditions, regulatory restrictions, and the efficacy of the recovery mechanisms put in place by banks.



**Table: Showing gross and NET NPA for public and private sector banks.**

YEARS	PUBLIC SECTOR BANKS		PRIVATE SECTOR BANKS	
	GROSS NPA (%)	NET NPA (%)	GROSS NPA (%)	NET NPA (%)
2010-2011	2.40	1.20	1.97	0.53
2011-2012	3.30	1.70	1.80	0.60
2012-2013	3.80	2.00	1.90	0.50
2013-2014	4.70	2.70	1.90	0.70
2014-2015	5.33	3.14	2.05	0.81
2015-2016	9.30	5.70	2.80	1.40
2016-2017	11.70	6.90	4.10	2.20
2017-2018	14.60	8.00	4.70	2.40
2018-2019	11.60	4.80	5.30	2.00
2019-2020	9.70	3.10	3.70	1.50
2020-2021	7.50	2.10	4.20	1.20
2021-2022	6.20	1.50	3.30	0.80

From the above table we can see that NPA is increasing for both the public and private sector banks of India, hence the need of forensic accounting is increasing.

### SOME LATEST CASES REGARDING NPA FRAUD

There have been numerous instances of fraud in relation to the Non-Performing Assets (NPA) problem that has long plagued Indian banks. Here are a few current instances:

**Punjab National Bank Scam:** In 2018, diamond sellers Nirav Modi and Mehul Choksi scammed the Punjab National Bank (PNB) of more than Rs. 13,000 crores. In order for Modi and Choksi's businesses to be able to secure loans from other banks, PNB personnel issued false letters of undertaking (LoUs) to them.

The Reserve Bank of India (RBI) issued a moratorium on Yes Bank in March 2020 as a result of the bank's poor financial situation. It was later discovered that Rana Kapoor, the bank's founder, had engaged in fraudulent actions, including financing to businesses with questionable financial standing and syphoning off funds.

Another example is the loan default involving Kingfisher Airlines, which cost a group of banks more than Rs. 9,000 crores. Vijay Mallya, the airline's owner, was accused of money laundering and fraud in 2016, and he left the country.

Other NPA fraud incidents in Indian banks include, among others, the Rotomac Pens scandal, the Bhushan Steel fraud, and the Winsome Diamonds fraud. To stop future scams like this, Indian banks' NPAs need to be better regulated and monitored, as shown by these incidents. These are only a few instances of the fraud cases which have recently troubled Indian institutions. The Insolvency and Bankruptcy Code (IBC) was implemented, and the regulatory framework was strengthened as part of the government's and regulatory agencies' efforts to resolve the NPA crisis.

### CONCLUSION

As we know in the scientific process known as forensic accounting, financial data is first acquired, then examined, and then presented in a suitable document that can stand the test of time in courtrooms. It is an effective tool to stop the growing frauds. Forensic accounting helps the banks in two ways:

Firstly, it covers the inquiry of criminal cases involving theft from employees, securities scams, insurance scams, etc. It also contains requirements and recommendations for possible further steps and secondly, it includes the investigation of criminal cases including theft from workers, securities fraud, insurance fraud, etc. It also includes specifications and advice for potential next steps.

Now, NPAs are an inherent component of the banking industry and will continue to be so as long as banks exist, but they must be strictly controlled. The amount of NPAs relies on how effectively bankers manage NPAs. The forensic study will assist the banks in determining the extent of non-performing assets (NPAs) in each industry, their causes, and potential corrective actions for actual income recognition, asset categorization, and provisioning. To determine the root causes and consequences of NPAs, the role played by different sectors in raising NPA levels, etc., the origins and impacts of NPAs must be microscopically investigated.

The development of non-performing assets in banks is attributed primarily to bankers' ineffectiveness in evaluating credit and credit monitoring, together with political intervention in loan approval, according to a review of secondary data gathered from a



variety of sources. This issue is lessened through forensic accounting, which also aids in keeping the amount of NPAs in banking under control.

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# ANALYSIS OF THE STATCOM DEVICE DURING MAINS VOLTAGE FLUCTUATIONS IN THE MATLAB/SIMULINK ENVIRONMENT

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## ABSTRACT

*The use of the «Static synchronous compensator (STATCOM)» device in electrical power systems for effective control of their operating modes is considered. An analysis of the STATCOM device with voltage fluctuations from the system is provided. STATCOM simulation was performed in the MATLAB/Simulink environment, and the results of simulations of its operation are presented.*

**KEY WORDS:** STATCOM, modeling, voltage stabilization, reactive power, voltage regulation

## I. INTRODUCTION

Over the last few years, power grids in United Power System of Central Asia (UPS CA) have been significantly strengthened and generating capacities have increased up to 18 GW. At the same time, the electrical regime in the association is carried out in conditions not always allowing to provide the necessary regime parameters. There are still problems with the capacity of several cross-sections between power systems, the output of individual power plants, and the provision of the necessary reserve capacity due to the large-scale introduction of Solar and wind power plants. To solve the problems arising in ensuring reliable and quality power supply, the UPS CA carries out works on improvement of methods and means of control of electric modes of the power system based on FACTS technology application. There is a large family of FACTS devices. TCSC, SSSC and UPFC devices are used for voltage maintenance, TCSC, SSSC devices are used for power system stability maintenance. In this article, the FACTS device of STATCOM type is considered for application in UPS CA.

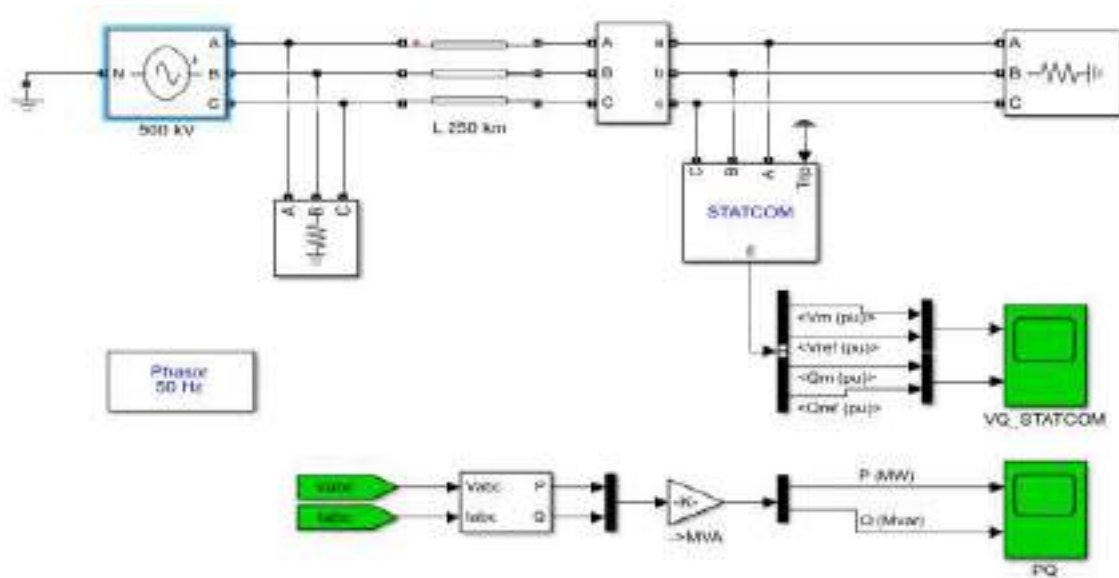
Disturbances in a network with nonlinear characteristics necessitate the use of special devices to ensure the normative values of electricity quality parameters, since reactive power consumed from the network, voltage fluctuations, voltage distortions, voltage imbalance, etc. have a negative impact on the network and the reliability of power supply to consumer equipment. One of the most common devices for solving this problem is a STATCOM – a device based on a static converter capable of statically compensating reactive power, the capacitive or inductive output current of which can vary regardless of the mains voltage. STATCOM regulates reactive power within wide limits ( $\pm 100\%$ ), is connected via a transformer parallel to the line in the network node, is used to regulate voltage; compensate for reactive power; consume active power from one phase and output it to another, smoothes fluctuations in energy systems at high speed. The physics of the processes occurring in STATCOM is demonstrated using vector diagrams in [1-5]. Advantages of using STATCOM: versatility; when the system is started, there is minimal impact on the network; reactive power compensation occurs in a large range; adjustable in the capacitive and inductive range; high response speed of the control system; minimal dimensions compared with analogues; high efficiency; high reliability with automatic shunting of a damaged serial module. The main disadvantage of the device is the high cost [5-9].

## II. RESEARCH METHODS AND THE RECEIVED RESULTS

The analysis of the operation of the STATCOM device was carried out on a model implemented in the Simulink application of the Simscape library of the MATLAB software package. The main condition is the impact on the network through a power source that simulates the high side of the voltage of the electrical system. The network in question consists of a power supply, power transmission lines, a measuring device, two loads and a STATCOM device (see Fig. 1).

Active elements of the model:

- The "Three-Phase Voltage Source" block, which changes the value of the output voltage amplitude at certain points in time;
- STATCOM unit, voltage regulation, reactive power compensation, smoothing of fluctuations in energy systems at high speed.



**Fig. 1. Model diagram in MATLAB/Simulink environment**

The main condition of the simulation is the analysis of the reactions of the STATCOM device during voltage fluctuations in the network through reactive power compensation in the interval of 1.5 seconds. The source sets the disturbance in time intervals [0 0.3 0.7 0.9] in seconds, the voltage fluctuation [1 1.1 0.9 1] in relative units of the voltage amplitude of 500 kV. Table 1 shows the main parameters of the blocks.

In case of voltage fluctuations in the network, STATCOM regulates the voltage at the connection point:

- When the mains voltage drops, STATCOM starts generating reactive power to maintain the voltage at the required level;
- If the mains voltage rises, STATCOM starts absorbing reactive power to reduce the voltage.

STATCOM constantly monitors the voltage at the connection point and adjusts the output reactive power to maintain the voltage at a set level. This allows you to smooth out voltage fluctuations in the network. In the settings of the STATCOM block, you can change its parameters, thereby setting reference values for its output signals [9-15].

**Table 1. Main parameters of the source and loads**

	Block name	Block type	Bus type	Bus ID	$V_{base}$ (kV)	$V_{ref}$ (pu)	$V_{angle}$ (deg)	P(MW)	Q(Mvar)
1	Three-Phase Series RLC Load1	RLC Load	Z	1	500	1	0	150	0
2	Three-Phase programmable Source (500kV)		swing	1	500	1	0	0	0
3	Three-Phase Series RLC Load2	RLC Load	Z	3	500	1	0	750	0

The main output signals of the STATCOM model, allowing you to evaluate the effectiveness of STATCOM in regulating voltage and reactive power in the electrical network:

$V_m$  (Output voltage module, the effective value of the phase voltage at the output of the STATCOM inverter). It reflects STATCOM's ability to regulate the voltage at the point of its connection to the network. By changing  $V_m$ , STATCOM can generate or consume reactive power by affecting the voltage level;

$V_{ref}$  (Reference voltage, the set value of the voltage module that STATCOM must support). The control system uses  $V_{ref}$  to generate control actions on the STATCOM inverter. A comparison of  $V_m$  and  $V_{ref}$  generates a control error used to generate control signals;

$Q_m$  (Measured reactive power, the current value of the reactive power generated or consumed by STATCOM). The  $Q_m$  signal is used by the control system to regulate the reactive power;



$Q_{ref}$  (Reference reactive power, the set value of the reactive power that STATCOM should generate or consume). The control system compares  $Q_m$  and  $Q_{ref}$ , forming control actions for the inverter.

After running the simulations of the model, the "Scope" block outputs an oscillogram of the main output signals in O.E., in the first window the values of output voltages, in the second the values of output reactive powers (Fig. 2). The values of the basic parameters are set through the "Measurements" block, where  $S_b=1000$  MVA,  $V_b=500$  kV.

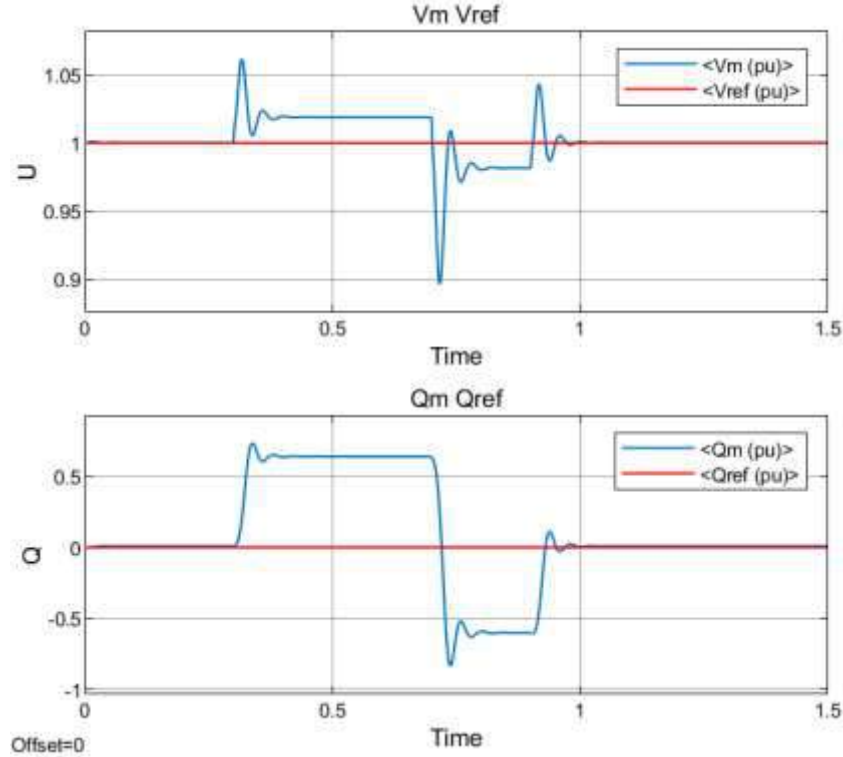


Fig. 2. Oscillogram of STATCOM output signals

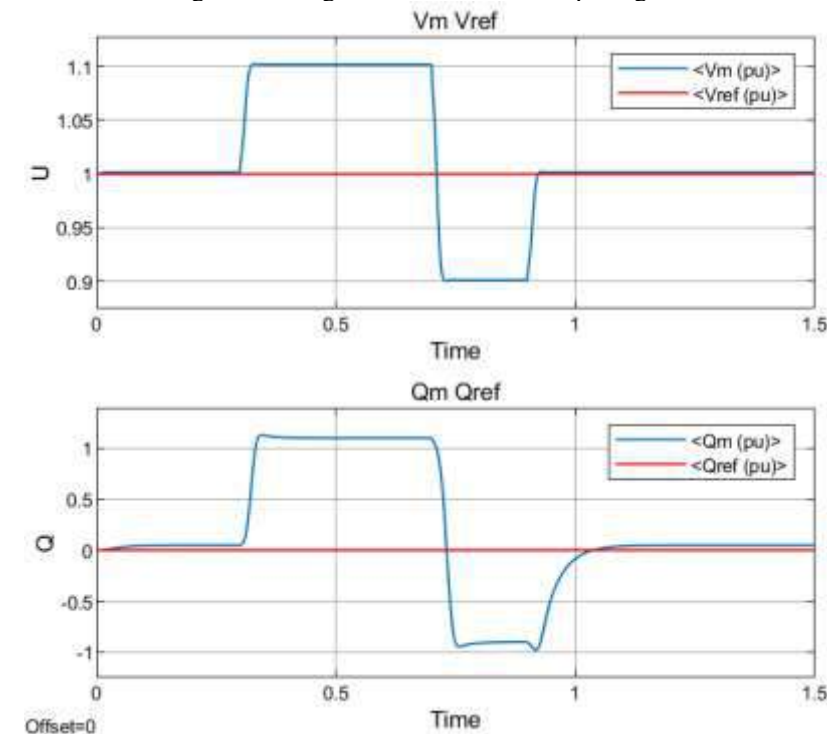


Fig. 3. Oscillogram of network parameters without a STATCOM device.



In the STATCOM block parameters window, you can change the value of the compensated reactive power. When entering a value closer to zero, there is a lack of compensation, which means that the STATCOM block can be neglected in the scheme. (Fig. 3) shows an oscillogram of network parameters without a STATCOM device.

Table 2 shows a comparison of peak values of voltage surges and reactive power.

**Table 2. Peak values of network parameters**

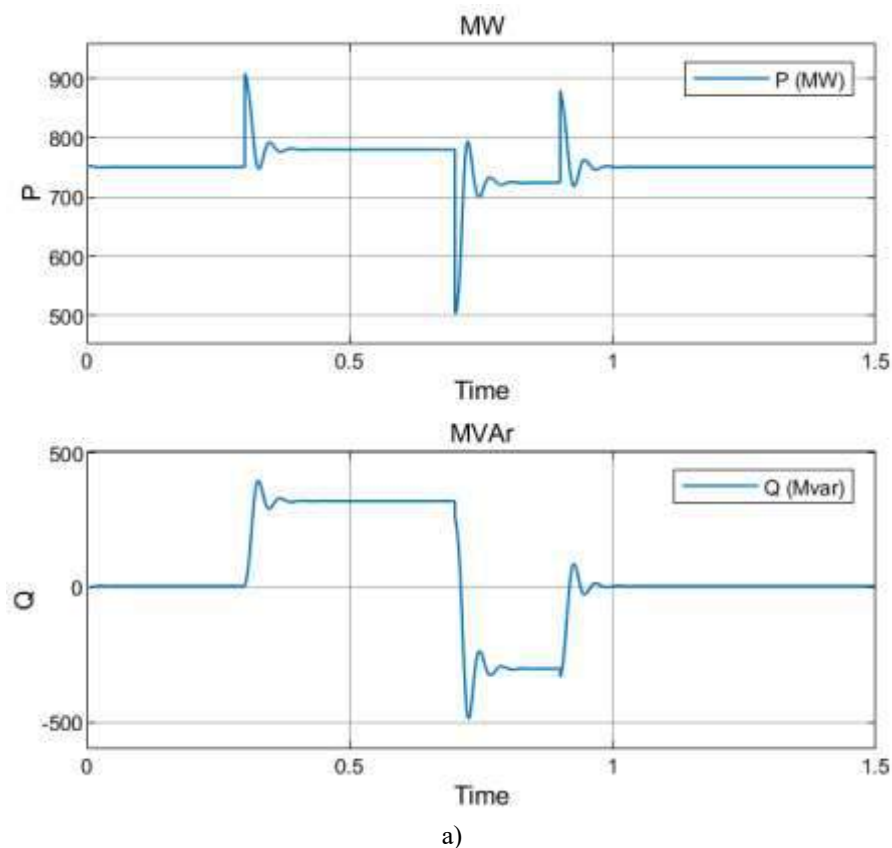
a) with a STATCOM device				
STATCOM	0-0.3 c.	0.3-0.7 c.	0.7-0.9 c.	0.9-1.5 c.
$V_m$ (o.e. / κB)	1 / 500kV	1.061 / 530,5kV	-(0.9 / 450kV)	1.043 / 521,5kV
$V_{ref}$ (o.e. / κB)	1 / 500kV	1 / 500kV	1 / 500kV	1 / 500kV
$Q_m$ (o.e. / MBA)	0 / 0 MVA	0.736 / 736 MVA	-(0.837 / 837 MVA)	-(0.6 / 600 MVA)
$Q_{ref}$ (o.e. / MBA)	0	0	0	0

b) without a STATCOM device				
	0-0.3 M	0.3-0.7 c.	0.7-0.9 c.	0.9-1.5 c.
$V_m$ (o.e. / κB)	1 / 500kV	1.093 / 546.5kV	-(0.9 / 450kV)	-( 0.914 / 457kV)
$V_{ref}$ (o.e. / κB)	1 / 500kV	1 / 500kV	1 / 500kV	1 / 500kV
$Q_m$ (o.e. / MBA)	0 / 0 MVA	1.12 / 1120 MVA	-(0.963 / 963 MVA)	-(0.986 / 986 MVA)
$Q_{ref}$ (o.e. / MBA)	0	0	0	0

The actual values of active and reactive network powers obtained from the “Measurements” block are shown in (Fig. 4). STATCOM contributes to the rapid attenuation of spikes. According to the obtained simulation data:

- the network with STATCOM stabilizes already at 0.93 seconds;
- a network without STATCOM stabilizes at 1.1 seconds (Fig. 3, 4).



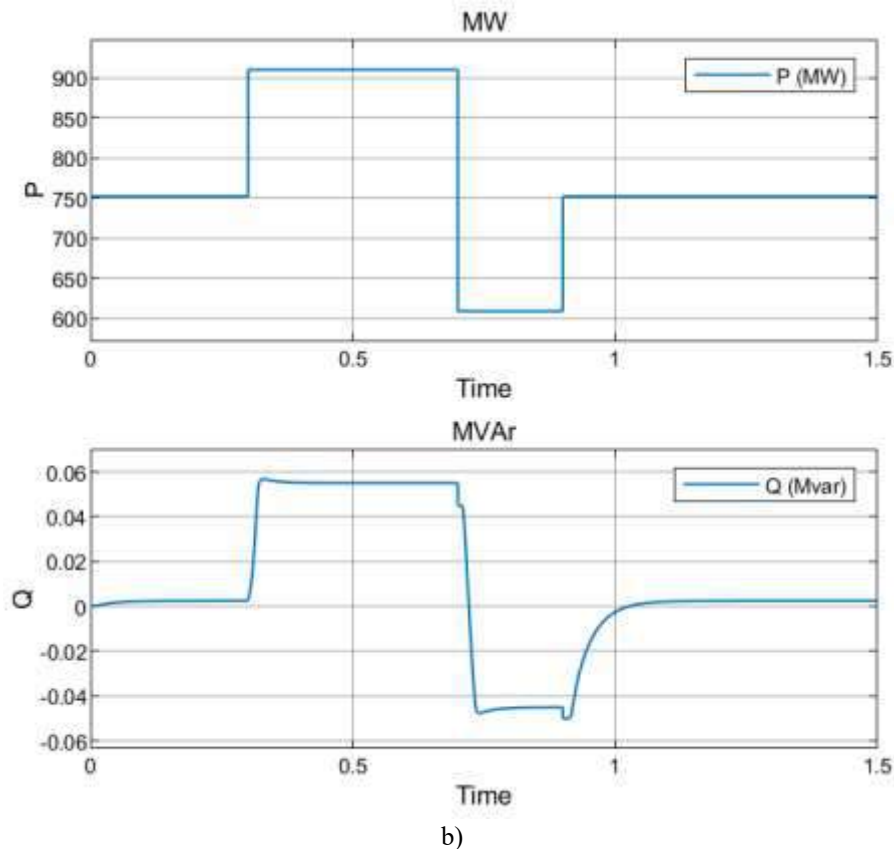


Fig. 4. Actual values of active and reactive power of the network: (a) - with STATCOM device, (b) - without STATCOM

### III. CONCLUSION

Modeling of the STATCOM device in the MATLAB/Simulink environment shows its effectiveness in voltage stabilization and reactive power compensation. The results obtained allow us to draw the following conclusions:

1. The STATCOM device successfully compensates for reactive power, ensuring voltage stability in the network and improving the quality of power supply.
2. When external factors change, the STATCOM device reacts quickly and adjusts the power, maintaining the set parameters. Based on the results of the simulation model, the STATCOM device is a reliable tool for maintaining the operating parameters of power systems, increasing energy efficiency and reliability of electrical installations.
3. The model makes it possible to complicate the scheme under consideration based on IEEE schemes [16, 17] and evaluate the possibilities of using STATCOM for the UES of Central Asia.

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# DEVELOPMENT AND EVALUATION OF PULP AND PAPER MADE UP FROM NON-WOOD FIBROUS MATERIAL LIKE LEAVES, GRASS AND FLOWERS

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## ABSTRACT

The conventional production of pulp and paper from wood fibers has long been associated with deforestation and environmental degradation. In response, researchers and industries are exploring alternative, sustainable sources for pulp and paper production. This paper presents an overview of the feasibility and potential benefits of utilizing leaves, grass, and flowers as alternative raw materials for pulp and paper production. [1] These plant materials offer numerous advantages, including rapid growth rates, abundant availability, and reduced environmental impact compared to synthetic sources. Furthermore, the utilization of forest resources can contribute to waste reduction and promote circular economy principles and discusses various processing techniques, such as mechanical and chemical pulping methods, suitable for extracting fibers from leaves, grass, and flowers. [2] Additionally, it highlights the importance of technological advancements and research efforts in optimizing the efficiency and quality of pulp and paper derived from these unconventional sources. Furthermore, the potential economic implications and market opportunities associated with the adoption of alternative raw materials are explored. also helps to emphasizes the importance of interdisciplinary collaboration between scientists, engineers, policymakers, and industry stakeholders to promote the widespread adoption of sustainable practices in the pulp and paper industry. Overall, the utilization of leaves, grass, and flowers for pulp and paper production represents a promising avenue towards achieving environmental sustainability and mitigating the adverse impacts of deforestation and resource depletion. [3]

**KEYWORDS:** Sustainable, Pulp, Paper, Leaves, Grass, Flowers, Environmental conservation, Deforestation, Circular economy, Interdisciplinary collaboration, Renewable resource, Abundant supply, Lower environmental impact, Diverse fiber sources, Biodiversity preservation, Fiber quality, Processing challenges, Variable quality, Land use competition, Seasonal availability, Raw materials, Synthetic paper, Organic materials, Environmental impact, Manufacturing process, Durability, Cost, Recyclability, Customizability, Petroleum-based polymers

## 1) INTRODUCTION

The consumption of paper worldwide has escalated by 400 percent in the last 4 decades and around 4 billion trees are cut across the globe for pulp and paper mills on every continent. This has caused global deforestation and forest degradation creating an ecological and climatic imbalance, in addition to making homeless 300 million people who consider forests their home around the globe. [4] Realizing such severe consequences, major pulp and paper producing companies worldwide have considered not to cut down natural forests any longer. In recent years, there has been a growing interest in developing sustainable alternatives to traditional papermaking processes, which heavily rely on wood pulp sourced from forests. This interest stems from environmental concerns regarding deforestation and the carbon footprint associated with paper production. As a response, researchers have been exploring the feasibility of using unconventional materials such as leaves, grass, and flowers to produce pulp and paper. [5]

This study focuses on utilizing leaves from *Annona squamosa*, grass from *Cynodont dactylon*, and various types of flowers in the papermaking process. These natural materials offer potential advantages such as abundance, renewability, and biodegradability, making them attractive candidates for sustainable paper production. Additionally, by incorporating environmentally friendly additives like baking soda (sodium bicarbonate), hydrogen peroxide, and starch, the aim is to optimize the papermaking process and enhance the quality of the final products. [6]

Through this research, we seek to explore the feasibility of producing pulp and paper from unconventional plant sources while evaluating the technical and environmental performance of the resulting materials. By reducing reliance on traditional wood-based pulp, this study aims to contribute to the development of eco-friendly papermaking practices and promote sustainability in the paper industry. [7]



## 2.HISTORY OF PAPER

The word “paper” is derived from plant papyrus. Papyrus is a thick material produced from the pith of the *Cyperus papyrus* plant. This plant was used in ancient Egypt long before the paper making in China.<sup>[8]</sup> Paper is said to be invented by Chinese Ts’ ai Lun in AD 105 from macerated vegetable fiber. In India; paper was invented independently in Buddhist times around 250 BC. Before the industrialization of paper production, recycled fibers of hemp and cotton (called rags) were common source for paper production. Rare Islamic papers were made from hemp or grass stems in Rajasthan (India) and colored with vegetable dyes.

The history of synthetic paper begins in the early 20th century with the development of durable and waterproof materials as alternatives to traditional paper. Over time, advancements in polymer chemistry led to the creation of synthetic polymers like polyethylene, polypropylene, and polyester, which served as the basis for synthetic paper production.<sup>[9]</sup>

## 3) INGREDIENTS AND MATERIALS

### a) Grass



Sr no	Attributes	Details
1	Biological source	<i>Cynodon dactylon</i> (commonly known as Bermuda grass or Dhurva grass)
2	Family	Poaceae (Grass family)
3	Chemical constituents	Flavonoids, Alkaloids, Saponins, Sterols, Tannins, Phenolic compounds
4	Chemical test	Thin-Layer Chromatography (TLC) High-Performance Liquid Chromatography(HPLC) Phytochemical Screening Bioassays

### b) Yellow Leaves



Sr no	Attributes	Details
1	Biological source	<i>Annona squamosa</i> (Sugar-apple or Sweetsop)
2	Family	Annonaceae
3	Chemical constituents	Acetogenins, Alkaloids, Flavonoids, Tannins
4	Chemical test	Thin-Layer Chromatography (TLC) High-Performance Liquid Chromatography(HPLC) Phytochemical Screening Bioassays



**c) Green Leaves**



Sr no	Attributes	Details
1	Biological source	It is a plant in the tribe Heliantheae of the family Asteraceae
2	Family	Asteraceae
3	Chemical constituents	pinoresinol-4-sulfate, pinoresinol-4-O-β-D-glucopyranoside, 1H-indole-3-carboxylic acid, 1H-indole-3-carbaldehyde
4	Chemical test	Dragendorff's reagent, Mayer's reagent Shinoda's test, ferric chloride test.

**d) Flowers**



Sr no	Attributes	Details
1	Biological source	Gaillardia pulchella
2	Family	Asteraceae
3	Chemical constituents	acid (26.90%), Phytol (7.58%) and Cyclopropaneoctanoic acid, 2-[[2-[(2-ethylcyclopropyl) methyl] cyclopropyl] methyl]-, methyl ester (6.73%).
4	Chemical test	gas chromatography-mass spectrometry (GC-MS)

**4) FORMULA**

Sr. No.	Ingredients	Quantity Taken
1	Non wood fibrous materials (leaves, grass, flowers)	About 250 gm
2	Baking Soda (Sodium bicarbonate)	About 5 gm
3	Hydrogen Peroxide	1gm
4	Starch	1gm
5	water	500 ml



## 5) METHODOLOGY

- 1) • Collect all material required for Pulp and paper making(leaves, grass and flowers)
- 2)) • Cut material into small pieces ( upto 1 cm)
- 3) • Boil in water with baking soda for about an hour
- 4) • Perform bleaching with hydrogen peroxide
- 5) • filter out
- 6) • liquid extract(Obtain after boiling)heat to concentrate and mix with starch while heating
- 7) • Material is triturate to form pulp
- 8) • Blend the pulp using blender
- 9) • Mix blended pulp with water into Vat(plastic tub)
- 10) • Add concentrated liquid and starch solution to water in Vat
- 11) • Mix well
- 12) • Prepare a paper using mould and Deckle

## 6) DIFFERENCE BETWEEN SYNTHETIC PAPER AND PAPER FROM NON-WOOD FIBROUS MATERIAL

Sr. No.	Characteristics	Synthetic Paper	Paper from Non-Wood Fibrous Material
1	Raw materials	Derived from petroleum-based polymers, such as polyethylene.	Made from natural and organic materials like leaves, grass, and flowers.
2	Environmental impacts	Often non-biodegradable and can contribute to pollution.	Biodegradable and eco-friendly, causing less harm to the environment.
3	Manufacturing process	Requires industrial processes and chemical treatments for production.	Can be made using simpler, more traditional methods without extensive chemical treatments.
4	Durability	Generally, more durable and resistant to tearing.	May be less durable and more prone to damage, especially when exposed to moisture.
5	Cost	Often more expensive due to the complex manufacturing processes involved.	Generally cheaper, especially if materials are locally sourced and the production process is simpler.



6	Recyclability	May not be easily recyclable due to the nature of the materials used.	Can be recycled or composted, contributing to a more sustainable waste management cycle.
7	Customizability	Can be easily customized for specific uses, offering a wide range of options for printing and coating.	Limited customization options compared to synthetic paper, but still suitable for various applications with some adaptations.

**7) ADVANTAGES AND DISADVANTAGES**

**a) Advantages**

1. Renewable Resource: Leaves, grass, and flowers are renewable resources, making them sustainable alternatives to wood pulp.
2. Abundant Supply: These materials are often abundant and readily available, reducing dependency on traditional wood sources.
3. Lower Environmental Impact: Processing plant matter into pulp and paper typically involves fewer chemicals and less energy compared to wood processing, resulting in a lower environmental impact.
4. Diverse Fiber Sources: Different types of leaves, grasses, and flowers offer a wide range of fiber characteristics, potentially allowing for the production of specialized papers.
5. Biodiversity Preservation: Utilizing plant matter other than trees can help preserve forest ecosystems and biodiversity.<sup>[10]</sup>

**b) Disadvantages**

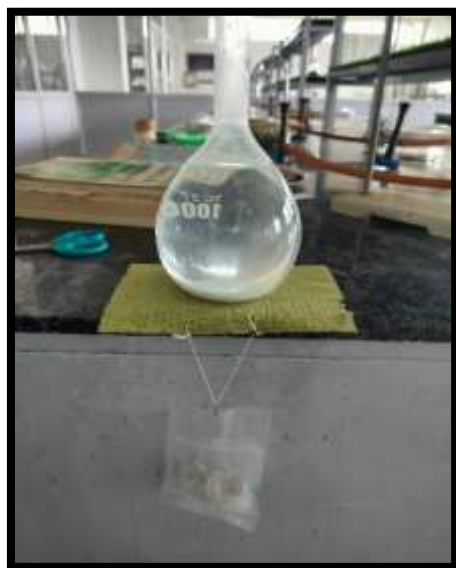
1. Lower Fiber Quality: Leaves, grass, and flowers generally have shorter fibers compared to wood, resulting in paper with inferior strength and durability.
2. Processing Challenges: Processing plant matter into pulp can be more challenging and require specialized equipment compared to wood pulping processes.
3. Variable Quality: The quality of paper produced from plant matter can vary significantly depending on the specific type of plant used, making consistency in product quality more difficult to achieve.
4. Land Use Competition: Depending on the scale of production, utilizing leaves, grass, and flowers for papermaking could compete with land use for food production or natural habitats.
5. Seasonal Availability: Availability of plant materials may be seasonal, leading to fluctuations in production and potentially higher costs.<sup>[11]</sup>

Overall, while there are potential benefits to using leaves, grass, and flowers for pulp and paper production, there are also significant challenges that need to be addressed to make it a viable alternative to traditional wood-based processes.<sup>[12]</sup>

**8) EVALUATION OF PAPERS**

**a) Tensile Strength**

Sr. no	Different types of paper		Tensile Strength (weight at which paper broke)
1)	Traditional paper	Filter Paper	175 gm
		Notebook Paper	525 gm
2)	Paper from Non-Wood Fibrous Material	Grass paper	125 gm
		Yellow leaves paper	175 gm
		Green leaves paper	325 gm
		Flower Paper	1200 (1.2 kg)



**b) Organoleptic Properties**

Sr. No	Types of paper	Color	Oduor	Texture
1	Filter paper	Greyish	Faint	Laid
2	Notebook Paper	White	Faint	Smooth
3	Grass paper	Dark green	Woody	Fibrous
4	Yellow leaves paper	Grey	Faint	Laid
5	Green leaves paper	Greenish	Woody	Rough
6	Flower paper	Yellowish Orange	Flowery	Rough

**c) Dissolution**

Sr. no.	Different types of paper	About 25% of paper dissolve (time in minutes)
1	Grass Paper	28
2	Yellow leaves paper	30
3	Green leaves paper	38
4	Flower paper	45
5	Filter paper	90
6	Notebook Paper	150





## 9) FUTURE PROSPECTIVES

1. Increased focus on sustainability could drive demand for paper made from renewable plant sources, reducing reliance on finite wood resources.
2. Utilizing these materials could lead to lower carbon emissions compared to traditional paper production methods, contributing to climate change mitigation efforts.<sup>[13]</sup>
3. Harvesting leaves, grass, and flowers for paper production may encourage the preservation of natural habitats and biodiversity.
4. Cultivating and processing these materials could create opportunities for local economies, especially in regions where traditional papermaking industries are not viable.<sup>[14]</sup>
5. Repurposing agricultural residues and plant waste for paper production could help alleviate waste management challenges and promote circular economy principles.
6. Ongoing research and development could lead to more efficient and cost-effective methods for extracting pulp from plant sources, driving technological advancements in the industry.<sup>[15]</sup>
7. Paper made from various plant sources may offer unique textures, colors, and properties, allowing for customization and differentiation in the market.
8. Companies adopting environmentally friendly papermaking practices may enhance their brand reputation and appeal to eco-conscious consumers.
9. Governments and regulatory bodies may incentivize or mandate the use of alternative pulp sources as part of broader sustainability initiatives.<sup>[16]</sup>
10. Collaboration between industries, academia, and research institutions could foster innovation and knowledge sharing, accelerating the adoption of plant-based papermaking technologies.<sup>[17]</sup>
11. These prospects highlight the potential for leaves, grass, and flowers to play a significant role in the future of sustainable paper production, offering environmental, social, and economic benefits.<sup>[18]</sup>

## 10) CONCLUSION

By utilizing leaves, grass, and flowers for pulp and paper making presents a promising avenue towards sustainable production practices. While there are challenges such as variable fiber quality and seasonal availability, the advantages of renewable resources, lower environmental impact, and potential biodiversity preservation outweigh these drawbacks. With advancements in processing techniques and interdisciplinary collaboration, the widespread adoption of this alternative raw material can contribute significantly to environmental conservation efforts and mitigate the adverse impacts of deforestation. Therefore, embracing the use of leaves, grass, and flowers in pulp and paper making represents a positive step towards achieving environmental sustainability in the industry.

## 11) RESULT

The result of exploring pulp and paper making from leaves, grass, and flowers reveals a promising opportunity for sustainable production practices. By tapping into renewable resources and reducing environmental impact, this alternative approach offers a viable solution to the challenges associated with traditional wood-based processes. While there are still obstacles to overcome, such as variable fiber quality and processing challenges, the potential benefits including biodiversity preservation and lower environmental impact make it a worthwhile endeavor. With further research, innovation, and collaboration, integrating leaves, grass, and flowers into pulp and paper making can lead to real advancements in environmental conservation and resource management.

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# HERBAL ALCHEMY: CRAFTING AN ORGANIC SYMPHONY OF SKIN CARE WITH NATURE'S REMEDIES

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## ABSTRACT

This research paper presents a comprehensive study on the formulation of an organic natural scrubber with body wash, utilizing a blend of herbal drugs renowned for their therapeutic properties. The formulation integrates a harmonious combination of Neem leaves powder, Arjuna bark powder, Sandalwood powder, Multani mitti, Wheat cover powder, Orange peel powder, Honey, Distilled water, Gelatin powder, Lemon juice, Tulsi leaves powder, Turmeric powder, and Shikakai powder.

The synergistic effects of these herbal ingredients are explored to create a holistic skincare solution that not only cleanses but also rejuvenates the skin. Through meticulous experimentation and formulation, this research paper presents a novel approach to skincare, leveraging the power of herbal remedies to create an organic, effective, and environmentally friendly scrubber with body wash. The findings of this study contribute to the growing body of knowledge<sup>[1]</sup> in natural skincare formulations, offering consumers a safer and more sustainable alternative to conventional products.

**KEYWORDS:** Scrub gel, softening, cleansing, moisturizing, fairness.

## 1. INTRODUCTION:<sup>[1,2]</sup>

In recent years, there has been a growing shift towards natural and organic skincare products, driven by consumer awareness of the potential risks associated with synthetic chemicals and a desire for more sustainable alternatives. Herbal remedies have long been valued for their therapeutic properties, offering a gentle and holistic approach to skincare. In line with this trend, this research paper explores the preparation and formulation of an organic natural scrubber with body wash, utilizing a blend of herbal drugs renowned for their beneficial effects on the skin.

The formulation of skincare products is a complex process that requires careful consideration of various factors, including the choice of ingredients, their compatibility, and their individual therapeutic properties. In this study, we focus on a selection of herbal ingredients known for their effectiveness in promoting skin health and vitality. These include Neem leaves powder, Arjuna bark powder, Sandalwood powder, Multani mitti, Wheat cover powder, Orange peel powder, Honey, Distilled water, Gelatin powder, Lemon juice, Tulsi leaves powder, Turmeric powder, and Shikakai powder.

Each of these ingredients has been chosen for its unique contribution to the formulation. Neem leaves powder, for example, is renowned for its antibacterial and anti-inflammatory properties, making it an ideal ingredient for cleansing and purifying the skin. Similarly, Arjuna bark powder offers antioxidant benefits, helping to protect the skin from environmental damage and premature aging.

Sandalwood powder and Multani mitti provide soothing and cooling effects, while Wheat cover powder and Orange peel powder act as natural exfoliants, gently removing dead skin cells and promoting cell renewal. Honey, with its humectant properties, helps to moisturize and hydrate the skin, while Distilled water serves as a solvent for the herbal ingredients, ensuring their proper dispersion within the formulation.



Gelatin powder plays a crucial role in binding the ingredients together, resulting in a smooth and consistent texture. Lemon juice contributes natural brightening effects, Tulsi leaves powder offers antibacterial and antifungal properties, and Turmeric powder enhances the skin's radiance and vitality. Finally, Shikakai powder adds cleansing and conditioning benefits, leaving the skin soft and supple. By combining these herbal ingredients in a carefully formulated blend, we aim to create a holistic skincare solution that not only cleanses and purifies the skin but also nourishes and rejuvenates it from within. This research contributes to the growing body of knowledge in natural skincare formulations, offering consumers a safer, more sustainable, and more effective alternative to conventional products.

### Objective

- They allow your skin to absorb moisturizer better. By doing dead skin cell buildup, any moisturizer applied afterward will soak into the skin more thoroughly.<sup>[2]</sup>
- They unclog pores and prevent ingrown hairs.<sup>[2]</sup>
- They leave your skin smoother and more even.

### Ingredient

1. Neem leaves powder
2. Arjuna bark powder
3. Sandalwood powder
4. Multani mitti
5. Wheat cover powder
6. Orange peel powder
7. Honey
8. Distilled water
9. Gelatin powder
10. Lemon juice
11. Tulsi leaves Powder
12. Turmeric powder
13. Shikakai Powder

### Procedure

1. Dissolve to the gelatin powder in to distilled water with the help of water bath
2. Then add the all ingredients into the gelatin powder solution.
3. Then add to the preservatives lemon juice at the end of formulation

### FORMULATION TABLE OF HERBAL SCRUB GEL<sup>[3,4]</sup>

Sr. No.	Crude Drug	Quantity	Category
1.	Wheat cover powder	1.5 gm	Provides Nourishment
2.	Neem leaves powder	1.5 gm	Antioxidant, Remove blackheads
3.	Tulsi leaves powder	1 gm	Antioxidant, Anti Inflammatory
4.	Turmeric powder	1.5 gm	Antioxidant, Glowing skin
5.	Orange powder	1.5 gm	Treat pimples
6.	Sandalwood powder	1.5 gm	Soothe sunburn
7.	Multani mitti	1.5 gm	Remove blackheads
8.	Honey	1 gm	Good for wrinkles and aging
9.	Arjuna bark powder	1.5 gm	Reducing tanning & pigmentation
10.	Gelatin	3 gm	Gelling agent
11.	Lemmon juice	1 gm	Preservative
12.	Shikakai Powder	Q.S	Foaming Agent
13.	Distilled water	Q.S	Vehicle



## Material & Ingredients Profile:<sup>[5]</sup>

### 1. Wheat cover powder



**Synonyms:** Wheat bran, Wheat husk, Wheat germ powder

**Biological Source:** Wheat cover powder is obtained from the outer layers of the wheat kernel, known as bran. Bran is the hard, outer shell of the wheat grain, which is removed during the milling process to produce refined flour. The bran is then ground into a fine powder to create wheat cover powder.

#### Organoleptic Characteristics

- Color: Light brown to medium brown
- Odor: Nutty or slightly earthy
- Taste: Mild, slightly nutty

#### Chemical Constituents

Wheat cover powder is rich in various nutrients and bioactive compounds, including:

- Dietary fiber (cellulose, hemicellulose)
- Protein
- Vitamins (especially B vitamins such as thiamine, riboflavin, niacin, and folate)
- Minerals (such as magnesium, phosphorus, zinc, and iron)
- Antioxidants (phenolic compounds, flavonoids)

**Uses:** Provides Nourishment, Protects Against Sun Damage, Fights Acne.

### 2. NEEM LEAVES POWDER



**Synonyms:** Azadirachta indica powder, Indian Lilac powder

**Biological Source:** Neem leaves powder is derived from the leaves of the neem tree, scientifically known as *Azadirachta indica*. The neem tree is native to the Indian subcontinent and is widely cultivated in tropical and subtropical regions around the world for its medicinal properties.

#### Organoleptic Characteristics

- Color: Dark green to brownish-green
- Odor: Strong, pungent, slightly bitter
- Taste: Bitter

#### Chemical Constituents

Neem leaves powder contains various bioactive compounds, including:

- Nimbin



- Nimbidin
- Azadirachtin
- Quercetin
- Beta-sitosterol
- Tannins
- Flavonoids
- Carotenoids
- Essential oils (such as limonene, citronellal)

**Uses:** Skin toner, Lightens skin blemishes, Remove blackheads

### 3. TULSI LEAVES POWDER



**Synonyms:** Holy Basil powder, Ocimum sanctum powder

**Biological Source:** Tulsi leaves powder is derived from the leaves of the holy basil plant, scientifically known as *Ocimum sanctum*. Tulsi, or holy basil, is an aromatic herb native to the Indian subcontinent and is revered for its medicinal properties in Ayurvedic medicine.

#### Organoleptic Characteristics

- Color: Dark green
- Odor: Aromatic, herbal
- Taste: Strong, slightly spicy, with hints of sweetness

#### Chemical Constituents

Tulsi leaves powder contains a variety of bioactive compounds, including:

- Eugenol
- Rosmarinic acid
- Ursolic acid
- Apigenin
- Luteolin
- Beta-sitosterol
- Vitamins (such as vitamin C, vitamin A, and vitamin K)
- Minerals (such as calcium, magnesium, and potassium)
- Essential oils (such as eugenol, eucalyptol, and limonene)

### 4. TURMERIC POWDER





**Synonyms:** Curcumin powder, Indian saffron powder

**Biological Source:** Turmeric powder is derived from the rhizomes of the turmeric plant, scientifically known as *Curcuma longa*. Turmeric is a flowering plant native to South Asia and is cultivated primarily for its rhizomes, which are used as a spice and medicinal herb.

**Organoleptic Characteristics**

- Color: Bright yellow to orange-yellow
- Odor: Earthy, aromatic
- Taste: Warm, slightly bitter

**Chemical Constituents**

Turmeric powder contains various bioactive compounds, the most notable of which is curcumin. Other constituents include:

- Curcuminoids (curcumin, demethoxycurcumin, bisdemethoxycurcumin)
- Turmerones
- Zingiberene
- Camphor
- Curcuminoids (curcumin, demethoxycurcumin, bisdemethoxycurcumin)
- Essential oils (such as turmerone, atlantone, and zingiberene)

**Uses:** Reduce acne, Glowing skin, Lightens skin.

**5. ORANGE PEEL POWDER**



**Synonyms:** Citrus sinensis peel powder, Orange zest powder

**Biological Source:** Orange peel powder is derived from the outer layer of the fruit of the orange tree, scientifically known as *Citrus sinensis*. Oranges are a citrus fruit native to Asia but are now cultivated in many parts of the world for their delicious fruit and aromatic peel.

**Organoleptic Characteristics:**

- Color: Light orange to deep orange
- Odor: Citrusy, fresh
- Taste: Bitter, slightly sweet

**Chemical Constituents:**

Orange peel powder contains a variety of bioactive compounds, including:

- Flavonoids (such as hesperidin, naringin, and quercetin)
- Limonene
- Citral
- Pectin
- Vitamin C



- Fiber
- Essential oils

**Uses:** Reduce skin marks, skin spots, Help to skin whitening, Treat pimples, acne

## 6. SANDALWOOD POWDER



**Synonyms:** Santalum album powder, Chandan powder

**Biological Source:** Sandalwood powder is derived from the heartwood of the sandalwood tree, known scientifically as *Santalum album*. Sandalwood trees are slow-growing evergreen trees native to the Indian subcontinent and are also found in parts of Australia and Indonesia.

### Organoleptic Characteristics

- Color: Pale yellow to deep brown
- Odor: Woody, sweet, exotic
- Taste: Typically not consumed orally; taste is not commonly described

### Chemical Constituents

Sandalwood powder contains several bioactive compounds, including:

- Santalols (alpha-santalol, beta-santalol)
- Santalenes
- Terpenes
- Flavonoids
- Tannins
- Aldehydes
- Ketones

**Uses:** Soothe sunburn, Remove suntan, Reduce signs of aging skin.

## 7. MULTANI MITTI



**Synonyms:** Fuller's Earth, Multani clay



**Biological Source:** Multani Mitti, also known as Fuller's Earth, is a type of clay that is formed from the decomposition of volcanic ash over thousands of years. It is found in various regions around the world, with significant deposits located in Multan, Pakistan, from which it derives its name.

#### **Organoleptic Characteristics**

- Color: Light beige to pale yellow when dry; turns darker when wet
- Odor: Earthy, slightly mineral-like
- Taste: Not applicable (not consumed orally)

#### **Chemical Constituents**

Multani Mitti mainly consists of various minerals and compounds, including:

- Aluminum silicate
- Bentonite
- Montmorillonite
- Kaolinite
- Quartz
- Magnesium
- Calcium
- Iron oxides

**Uses:** Good for wrinkles and aging, Prevent acne, Remove dirt from pores

## **8. HONEY**



**Synonyms:** Nectar, Bee honey

**Biological Source:** Honey is a natural sweet substance produced by honeybees from the nectar of flowers. It is primarily sourced from the honeycombs within beehives, where bees collect, transform, and store the nectar.

#### **Organoleptic Characteristics**

- Color: Honey's color can vary widely depending on the floral source, ranging from light golden to dark amber.
- Odor: Sweet, floral aroma
- Taste: Sweet, with varying degrees of floral, fruity, or herbal undertones depending on the floral source.

#### **Chemical Constituents**

Honey is composed mainly of sugars, primarily glucose and fructose, but also contains a variety of other compounds, including:

- Water
- Vitamins (such as B vitamins and vitamin C)
- Minerals (such as potassium, calcium, and magnesium)
- Enzymes (such as invertase, diastase, and glucose oxidase)
- Organic acids (such as gluconic acid and citric acid)



- Antioxidants (such as flavonoids and phenolic acids)

#### Uses

1. **Skincare:** Honey is valued for its moisturizing, antimicrobial, and antioxidant properties, making it a popular ingredient in skincare products. It helps to hydrate and soothe the skin, reduce inflammation, and promote healing. In the context of the organic natural scrubber with body wash, honey serves as a nourishing and revitalizing ingredient, leaving the skin soft, smooth, and radiant.
2. **Wound Healing:** Honey has been used for centuries as a natural remedy for wound healing.<sup>[6]</sup> Its antimicrobial properties help prevent infection, while its high sugar content creates a protective barrier that promotes healing. Honey can be applied topically to minor cuts, burns, and abrasions to accelerate the healing process.
3. **Haircare:** Honey can also benefit hair health. It helps to moisturize and condition the hair, improve scalp health, and add shine and softness. Honey can be incorporated into hair masks, conditioners, and hair rinses to nourish and strengthen the hair.
4. **Nutritional Supplement:** Honey is a natural sweetener that provides carbohydrates and energy. It is often used as a healthier alternative to refined sugar in cooking, baking, and beverages. Raw honey, in particular, retains more of its natural nutrients and enzymes.
5. **Immune Support:** Some studies suggest that honey may have immune-boosting properties due to its antioxidant content and antimicrobial activity. Consuming honey regularly may help support the immune system and promote overall health and well-being.

#### 9. ARJUNA BARK POWDER<sup>[7]</sup>



**Synonyms:** Terminalia arjuna powder

**Biological Source:** Arjuna bark powder is derived from the bark of the Arjuna tree, scientifically known as Terminalia arjuna. The Arjuna tree is a deciduous tree native to the Indian subcontinent and is commonly found in the forests of India.

#### Organoleptic Characteristics

- Color: Light to dark brown
- Odor: Woody, slightly astringent
- Taste: Bitter

#### Chemical Constituents

Arjuna bark powder contains various bioactive compounds, including:

- Triterpenoids (such as arjunic acid, arjunolic acid)
- Flavonoids (such as quercetin, kaempferol)
- Tannins
- Glycosides
- Saponins
- Minerals (such as calcium, magnesium, zinc)

**Uses:** Cardiovascular Health, Anti-oxidant, wound healing, anti-inflammatory.





## Discrimination process of Drugs

### 1. Collection of Orange peel powder

Fresh orange were collected from college botany garden. The orange were washed well using tap water.<sup>[8]</sup> The peel is separated, then the pulp of orange was separated and cutting them into small pieces then it was dried in shade for a period of 3-4 days. The dried samples were grinded properly grinder to obtain the powdered form. Pass through sieve no. 60.

### 2. Collection of Neem leaves powder

Fresh neem leaves were collected from college campus. Fresh neem leaves were dried in shade for 4-5 days. These leaves are grinded properly using mixture to obtain and pass through sieve no. 60.

### 3. Collection of Tulsi leaves powder

Fresh tulsi leaves were collected from college campus. They were dried in shade for 3-5 days. Then grinded properly to form powder. Pass through sieve no. 60.

### 4. Collection of Wheat cover powder

Wheat was soaked in the water for 3-4 days then crushed, squeezed and separated the covers and pass through sieve no. 60.

5. Other ingredients like turmeric, multani mitti, sandalwood, honey were collected from local market.

## Mechanism of Action and Pharmacology of the Formulation:

### Mechanism of Action:

1. Neem Leaves Powder : Neem contains compounds like nimbin and nimbidin, which exhibit antibacterial and antifungal properties. These compounds target and inhibit the growth of bacteria and fungi on the skin, helping to cleanse and purify it.<sup>[9]</sup>

2. Arjuna Bark Powder : Arjuna bark contains antioxidants like flavonoids and triterpenoids, which scavenge free radicals and reduce oxidative stress in the skin. This helps to prevent damage to skin cells and promotes skin health.<sup>[10]</sup>

3. Sandalwood Powder : Sandalwood contains santalols, which possess anti-inflammatory and astringent properties. These compounds soothe irritated skin and help to reduce redness and inflammation.

4. Multani Mitti : Multani mitti acts as an absorbent and exfoliant. It absorbs excess oil and impurities from the skin, unclogs pores, and removes dead skin cells, leaving the skin refreshed and rejuvenated.

5. Wheat Cover Powder : Wheat cover powder contains moisturizing agents like proteins and polysaccharides, which help to hydrate and soften the skin. It also supports the skin's natural barrier function, protecting it from environmental damage.

6. Orange Peel Powder : Orange peel contains vitamin C and citric acid, which brighten the skin and promote collagen production. It also acts as a gentle exfoliant, removing dead skin cells and promoting cell turnover.<sup>[11]</sup>

7. Honey : Honey is a natural humectant, meaning it attracts and retains moisture in the skin. It also has antimicrobial properties, which help to cleanse and soothe the skin.

8. Distilled Water : Distilled water serves as a solvent, helping to dissolve and disperse the other ingredients in the formulation. It also hydrates the skin and acts as a carrier for the active ingredients.

9. Gelatin Powder : Gelatin helps to thicken the formulation and improve its texture. It also forms a film on the skin, helping to lock in moisture and protect the skin from external aggressors.

10. Lemon Juice : Lemon juice contains citric acid, which acts as an astringent and helps to tone the skin. It also has antibacterial properties, which help to cleanse and purify the skin.

11. Tulsi Leaves Powder : Tulsi leaves contain eugenol and other volatile oils, which have antimicrobial and anti-inflammatory properties. They help to cleanse the skin and reduce inflammation.

12. Turmeric Powder : Turmeric contains curcumin, which has antioxidant and anti-inflammatory properties. It helps to protect the skin from free radical damage and reduce inflammation.

13. Shikakai Powder : Shikakai contains saponins, which have cleansing and foaming properties. It helps to cleanse the scalp and hair, removing dirt, oil, and impurities.

### Pharmacokinetics

- Topical Application : The active compounds in the formulation are absorbed through the skin, where they exert their effects locally. Minimal systemic absorption occurs, reducing the risk of systemic side effects.



- **Metabolism** : Metabolism of the active compounds may occur in the skin or liver, where they are broken down into metabolites that are eventually excreted from the body.

- **Excretion**: Metabolites of the active compounds are primarily excreted through urine and feces, although the exact excretion pathway may vary depending on the specific compounds and their metabolism.<sup>[12]</sup>

### Pathophysiology

- The formulation works by combining the pharmacological properties of each ingredient to address various skin concerns such as cleansing, moisturizing, soothing, and rejuvenating.

- Neem leaves powder and Arjuna bark powder target bacteria and free radicals, reducing inflammation and protecting the skin from oxidative damage.

- Sandalwood powder and Multani mitti cleanse and exfoliate the skin, removing impurities and dead skin cells, while also soothing and toning the skin.

- Wheat cover powder and Honey moisturize and hydrate the skin, supporting the skin's barrier function and preventing moisture loss.

- Orange peel powder, Lemon juice, Tulsi leaves powder, Turmeric powder, and Shikakai powder provide additional benefits such as brightening the skin, promoting collagen production, and cleansing the scalp and hair.

Overall, the formulation works synergistically to promote healthier, nourished, and rejuvenated skin, addressing various skin concerns with natural and herbal ingredients.<sup>[13]</sup>

### EVALUATION

To evaluate the quality of prepared formulation, several quality tests were performed.

Sr.no.	Evaluation parameter	Observation / Inference
1	Colour	Yellowish green
2	Odour	Pleasant
3	Consistency	Good
4	Ph	4.2 Ph
5	Washability	Easily removed by washing with water.
6	Sensitivity	No any irritation.
7	Spreadability	Easily spread through the body.

### RESULT

The research paper demonstrates the formulation of an organic natural scrubber for body wash using herbal ingredients, the combined use of these herbal ingredients in the organic natural scrubber with body wash formulation results in a holistic approach to skincare, addressing various skin concerns such as cleansing, exfoliating, moisturizing, and nourishing. The formulation is designed to promote healthier and radiant-looking skin, while also offering therapeutic benefits for overall well-being.

### COCLUSION

The scrub gel was prepared by using various crude drug powders and with the help of gelatin powder as polymer and then evaluated by various parameters which report prepared formulation have good consistency better result and does not have side effects. From the given study, it can be concluded that prepared herbal Formulation exhibited satisfactory result.

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# IMPORTANCE OF PHYTOTHERAPY IN CHRONIC NON-INFECTIOUS DISEASES OF THE LIVER

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Article DOI: <https://doi.org/10.36713/epra16591>

DOI No: 10.36713/epra16591

## ABSTRACT

*Currently, in the countries of Central Asia, as in most countries, 15-20% of the adult population suffers from acute and chronic liver pathology. Today, non-alcoholic fatty liver disease (NAFLD) is the most common non-communicable liver disease, accounting for approximately 70% of all chronic liver diseases. The complexity and versatility of the pathogenetic mechanisms of lipid metabolism disorders in the body requires effective pharmacological correction aimed at normalizing the composition, structure and ratio of various classes of lipoproteins. In this regard, the most harmless and therapeutically effective herbal remedies of natural origin, metabolic products of plant and animal cells, which have low toxicity and a wide spectrum of action, are of great importance. The advantage of phytotherapy is that it allows the use of plants for a long time without significant side effects, due to their compatibility with many drugs and with each other.*

**KEYWORDS:** *phytotherapy, herbal remedies, lipid metabolism.*

Currently, in Russia and Central Asian countries, as in most countries, 15-20% of the adult population suffers from acute and chronic liver pathology. In recent years, due to the increase in the incidence of viral hepatitis and its various forms, as a result of the effects of toxins, drugs and allergic injuries of the hepatobiliary system, due to the increase in the incidence of environmental pollution, the tension in the supply of drugs, and the World Health organization (WHO) defines the problem of combating with these diseases as an exception of important medical and social importance. Today, non-alcoholic fatty liver disease (NAFLD) is the most common non-infectious liver disease, accounting for approximately 70% of all liver diseases [1,5,28,33].

Non-alcoholic fatty liver disease (NAFLD) encompasses a wide range of liver damage, from steatosis to nonalcoholic steatohepatitis (NASG), fibrosis, and cirrhosis [1]. This pathology affects about 24% of the world's population. However, NAFLD is characterized by variable prevalence depending on geographic area, age, and the presence of other risk factors such as diabetes [3, 4]. For example, in the USA, its prevalence is 33.6% among adults and 10-20% among children, and 25% in Europe and Asia [5]. It should be noted that due to the prevalence of NAFLD and its association with obesity, insulin resistance, type II diabetes (D II), metabolic syndrome, and dyslipidemia, this disease is also a major risky factor for cardiovascular disease in the population [6]. In addition, NAFLD can also be found in non-obese individuals, and its prevalence in this group can vary from 3.5 to 27% [7, 8].

NAFLD also aggravates the severity and progression of other liver diseases such as hepatitis C and hemochromatosis. NAFLD incidence is thought to predominate among males, but females are also frequently affected [9]. Despite the different reasons that determine gender-specific responses to a high-fat diet (hormonal status, age, etc.), the gender factor in the development of NAFLD requires further study [10]. NAFLD is the most common chronic liver disease not only in adults, but also in children (from 8-17 to 38% among obese children) [6, 11]. If the simple steatosis (excess accumulation of fat in the form of triglycerides in the liver) observed in NAFLD is of good quality, the progression of the disease to NASG increases the risk of fibrosis, cirrhosis, liver failure, hepatocellular carcinoma and, accordingly, the development of death [2]. By 2030, NAFLD and its progressive form, NASG, are expected to be the main indication for liver transplantation [12]. NASG is known to be characterized by hepatocyte damage and inflammation in addition to steatosis, representing the most severe form of NAFLD [13].

There are a number of mechanisms that cause a violation of the metabolic function of the liver, which are primary (endogenous) factors, that is, secondary factors caused by the effect of gene mutations and exo- and endogenous xenobiotics. In their turn, they affect the function of hepatocytes and lead to disturbances in the metabolism of bilirubin, bile acids, protein and amino acids, carbohydrates and glycoproteins, lipoproteins and lipids, porphyrin, trace elements, mucopolysaccharides [1,2]. In particular, the liver regulates the distribution throughout the body of food components, in particular, fatty acids, brought from the small intestine through the portal vein. In the liver of a healthy person, lipids (mainly triglycerides, cholesterol, phospholipids) make up 0.8-1.5% of the liver mass. An increase in the amount of this type of lipids leads to the development of fatty liver disease [28,30].



In addition, dyslipidemia, regardless of their etiopathogenesis, is accompanied by dysfunction in the main organ of lipid homeostasis - the liver. The primary role of the liver is related to the processes of lipid regulation, mobilization and biosynthesis, as well as the processes of inactivation of potentially toxic metabolites and compounds for the body [2]. In this case, the liver, as a target organ for lipid metabolism disorders, actively participates in the further development of dyslipidemia with the development of a systemic pathological reaction of the whole organism [25,27].

The complexity and versatility of the pathogenetic mechanisms of lipid metabolism disorders in the body requires effective pharmacological correction aimed at normalizing the composition, structure and proportions of different classes of lipoproteins [19].

There is no doubt that rational pharmacotherapy is one of the effective ways to correct not only the morphofunctional state of the liver, but also the multifaceted pathogenetic mechanisms of dyslipidemia. Despite the wide arsenal of hepatoprotective and lipid-lowering drugs, they do not always have the desired effect and in some cases can even cause serious adverse reactions [12]. In this regard, the search for new, active and less toxic drugs for early adequate prevention and treatment of hepatobiliary system pathologies and lipid metabolism disorders is an important problem.

At the end of the third millennium, humanity made one of the conclusions in the field of biology and medicine. These are the most harmless and therapeutically effective phytochemicals of natural origin, which have low toxicity and broad-spectrum effects as a product of the metabolism of plant and animal cells [26,27].

Plants, as the leading component of human nutrition, are naturally metabolized, have a positive effect on all organs and their functional activity, are maximally absorbed due to a wide range of biologically active substances, and have a complex effect on the body [13,20].

The advantage of phytotherapy is that it allows long-term use of plants without significant side effects, due to their compatibility with many drugs and with each other. Phytotherapy is intended for use at home and does not require special equipment [34,36].

Another advantage of this method of treatment is the polyvalent effect of plants. As a rule, one medicinal plant has several effects.

The gastrointestinal tract and liver respond better to phytotherapeutic treatment than other body systems. This is very natural, because many medicinal properties of plants (antimicrobial, wound healing, epithelizing, hemostatic) directly affect the mucous membrane of the gastrointestinal tract, providing local protection. It fully reveals itself when used. In addition, with the help of certain effects of medicinal herbs (choleric, surgi, socogonal, etc.), by correcting the activity of the digestive system, heart, lung, joint and kidney pathologies and other diseases are treated. It is possible to improve the condition of sick patients [35,40].

Phytotherapy at different stages of the disease has its indications and properties, which include:

- In the initial stage of diseases, phytotherapy has a light effect on the body, and the therapeutic effect is used in limited quantities due to its development when used for a long time;
- In the acute phase of the disease, it can be used as a supportive treatment to increase the body's defenses, enhance the effect of important drugs and reduce their side effects;
- In the recovery phase, phytotherapy takes the leading place, especially in chronic diseases, because it can be used for a long time and gives good results in combination with synthetic drugs [18,22,23].

The potential of plants is huge, because plants have many medicinal properties: pain reliever, tonic and sedative, normalizes the work of the cardiovascular system, gastrointestinal tract, anti-inflammatory, diaphoretic, antimicrobial, etc. It should be noted that each medicinal herb has not one, but many properties that allow it to have a beneficial effect on the whole body. In addition, they normalize metabolic processes in the body, the hormonal background. Plants not only do not inhibit the body's defenses, but on the contrary, they are active against antibiotics that suppress many strains of microorganisms that are able to increase the human immunity, thus helping him to fight the disease. These properties - the effect on metabolism, hormonal and immune status - are used in the treatment of various chronic diseases [14,16,20].

However, it should be noted that all these would give an effective result only if they are used competently and correctly. The steps, sequence, continuity and duration of herbal medicinal use are very important [4,7]. Phytopreparations have their own characteristics - gradual development of the therapeutic effect, light, moderate effect.

Various infections, endogenous and exogenous intoxications (hepatotropic poisons, alcohol, food poisoning, etc.), blood circulation disorders, immune disorders, and side effects of drugs used in diseases of the hepatobiliary system lead to diseases.



Existing scientific studies on the lipid-lowering activity of herbal preparations are based on its biologically active substances in various parts of plants, such as polysaccharides, pectins, saponins, phenolic compounds, tocopherol, unsaturated fatty acids, retinol, ascorbic acid, inositol, states that it is related to biotin, plant fiber, choline, sitosterols, trace elements, allicin, etc. [5]. These data show the effectiveness of medicinal plants, which can implement almost all directions of modern lipid-lowering drug therapy.

Early and adequate phytotherapy as a type of additional metabolic therapy helps to correct and restore disturbed lipid metabolism and prevents the development of organic changes in target organs [18]. According to the effect on lipid metabolism and the mechanism of action, herbal preparations with hypolipidemic properties are divided into several groups. Thus, they reduce the absorption of cholesterol in the intestine and limit its penetration into the endothelium of plant vessels containing sitosterols, which are plant sorbents [2]. The mechanism of their lipid-lowering action is explained by inhibition of absorption of exogenous cholesterol and inhibition of enterohepatic recirculation of bile acids [13]. These properties include the flowers of mountain arnica (*arnica montana*), the fruits of carrot-like vizanga (*ammi visnaga*), the bark of horned elm (*ulmus laevis*), the fruits and leaves of common viburnum (*viburnum opulus*), and the roots of medicinal burnet (*sanguisorba officinalis*) and rhizomes [7].

This group of medicinal plants includes the roots of *Arctium lappa*, *Dioscorea Nipponica* rhizomes, *Tussilago farfara* leaves, *Hippophae rhamnoides* fruits and leaves, *Cydonia oblonga* seeds, *Aralia elata* roots, sorghum (*Avena sativa*), sorghum (*Avena sativa*) roots, sesame (*Sesamum*) seeds, wheat (*Triticum aestivum*) seeds, brown rice (*Oryza sativa*) bran, black beech (*Alnus glutinosa*) includes seedlings, flowers of chamomile (*Matricaria chamomilla*), and bulbs of marsh sedum (*Gnaphalium uliginosum*) [4;5]. Sitosterols contain the bioactive chemical compound allicin, the high content of which is found in the rhizomes of garlic onion (*Allium sativum*) and blue cypress (*Polemonium caeruleum*). Large amounts of sitosterol [3-sitosterol] are found in the following plants: pistachios (*Pistacia*) (300 mg), pumpkin (*Cucurbita*) seeds (265 mg), pine nuts (*Pinus sylvestris*) and almonds (*Prunus dulcis*) (200 mg) per 100 g weight [6].

Other plants that contain sitosterols and are rich in monounsaturated fats have the ability to inhibit the synthesis of cholesterol and triglycerides, as well as increase their use in the body. It has been studied that monounsaturated fats have a positive effect on lipid metabolism, selectively reduce the atherogenic part of low-density lipoproteins [2]. This effect is found in the ripe fruits of walnut (*Juglans regia*), leaves of plantain (*Plantago major*), medicinal yellow tea (*Agrimonia eupatoria*), hairy astragal (*astragalus dasyanthus*) grass and roots, and *tribulus terrestris* grass and roots [14].

The same properties are found in red hawthorn (*Crataegus sanguinea*) leaves, cranberry (*Vaccinium vitis-idaea*) fruits and fresh leaves, and hypericum grass [14]. The richest in monounsaturated fats are olive and corn oils from seeds, as well as nuts, avocados, canola oil and peanut oil [11].

Plants with a large amount of pectin substances - polysaccharides present in all land plants and some algae belong to the group of phytochemicals that accelerate metabolism and accelerate the removal of lipids from the body [8]. Pectins are water-soluble fiber that cannot be digested or absorbed in the stomach and intestines [6]. They bind harmful and toxic substances that enter with food and remove them from the body, contribute to the normal secretion of bile fluid, prevent its condensation in the liver and gall bladder, and effectively reduce the level of cholesterol in the blood. The plants of this group include common hazelnut (*Corylus avellana*), sea buckthorn (*Hippophae rhamnoides*) oil, rosehip (*Rosa cinnamomea*) fruit, common fennel (*Anethum graveolens*) seeds, red hawthorn (*Crataegus sanguinea*) fruits, chetan (*Sórbus aucupária*) fruits, Japanese kelp (*Saccharina japonica*) thallus, common raspberry (*Rúbus idáeus*) fruits [3,8]. Due to the high content of pectins, all legumes and fruits, especially citrus fruits, as well as apples, watermelons, currants, plums, apricots, peaches, radishes, wild garlic, algae and lichens have a lipid-lowering effect. There are several publications on the effectiveness of beets and cauliflower, which are rich in essential organic acids, minerals, pectins, vitamins, saponins, and plant fiber [6].

The next group that significantly affects lipid metabolism is medicinal plants that contribute to the normalization of dyslipoproteinemia by increasing the fraction of anti-atherogenic high-density lipoproteins. This pharmacological activity is primarily associated with polyphenolic compounds present in black currant, strawberry, chokeberry, raspberry, pomegranate, cranberry, red grape and unfiltered olive oil [6,12]. The antioxidant properties of catechins, which are abundant in yellow and green teas, have been studied [6].

It is known that one of the principles of phytotherapy is a systematic and comprehensive approach. This condition is implemented in pharmacotherapy by using multicomponent herbal preparations, which have a number of advantages over monopreparations. In particular, due to their complex chemical composition and a rational combination of biologically active substances, they have a multifaceted effect on the body: on the one hand, they directly affect damage, on the other hand, they provides pharmacological correction of the functions of various systems, as well as increases the resistance of the body in general [16]. In addition, synergism is manifested in the use of collections consisting of plants, which allows to increase the beneficial properties of the ingredients that make up their composition [1,14].



Taking into account the diversity of etiopathogenetic mechanisms in the disturbance of lipid homeostasis, it is clear that the selection and use of multi-component phytochemical preparations will be effective in the complex pharmacotherapy of diseases, where, in addition to the disturbance of lipid metabolism, other systems of the body are involved in the pathological process [19]. Thus, the hypolipidemic and angioprotective effect of wild mulberry (*Fragaria vesca*), horsetail (*Equisetum arvense*), *Hypericum perforatum* grass, seeds of anethum graveolens, birch (*Betula pendula*) leaves, peppermint (*Mentha piperita*) herb, carrot seeds, eleutherococcus spiny root, senna (*Senna alexandrina*) leaf and elderberry (*Arctium lappa*) roots collection is carried out by phytocollection.

In the modern folk medicine of Central Asian countries, jam and jelly are made from *Berberis vulgaris* fruits. Fruits are used as a choleric agent to increase appetite. A decoction of Zirk bark is drunk in liver, bladder, and rheumatism diseases. In Ayurvedic medicine, zirk is used to treat fever, liver diseases and diabetes. In Russian folk medicine, tincture of zirk leaves is used for liver and gall bladder diseases [13]. The plant is very popular in modern scientific herbal medicine. Its antibacterial, antioxidant, anti-inflammatory, antiarrhythmic, sedative, choleric, anti-leishmania and anti-malarial properties have been identified, which are attributed to the berberine alkaloid.

In studies, the use of zirk fruits significantly reduced the concentration of low-density lipoproteins and total cholesterol, and increased the concentration of high-density lipoproteins in patients with metabolic syndrome. 5% tincture of leaves is used for liver diseases, hepatitis, cirrhosis. Hepatoprotective properties of zirk have been experimentally determined [40]. Consumption of zirk extracts reduces the activity of ALT and AST in fatty liver and other liver diseases.

Saffron (*Crocus sativus*) extracts reduce appetite, induce rapid satiety, and are effective in the treatment of alimentary obesity. Its aqueous extracts inhibit histamine H1 receptors. Saffron consumption reduces blood triglycerides and inflammatory cytokines in metabolic syndrome [1].

Choleric agents play an important role in the treatment of diseases of the hepatobiliary system. There are 3 groups of herbal choleric agents: choleric, cholekinetic, cholelasmolytic [2,17,19].

True choleric stimulate the formation of bile and bile acids: zirk roots, mint, birch leaves, calendula, wormwood, coriander fruits, corn cobs (infusion and liquid extract) have this property [5,20].

Hydrocholeric increase bile secretion due to the water component: medicinal valerian, valerian preparations, mineral waters.

Cholekinetics increase the tone of the gallbladder, relax the bile ducts, the sphincter of Oddi, eliminate the condensation of bile in the gallbladder and enhance the process of its release: This property is vegetable oils (corn, olive, sunflower); found in calamus rhizome, zirk roots, dandelion, immortelle flowers, cornflowers, calendula, coriander and nematode [19].

Cholelasmolytics relax the smooth muscles of the gallbladder, bile ducts, that is, eliminate spasm: these are the flowers of arnica (*Arnica montana*) and calendula (*Calendula officinalis*), medicinal valerian (*Valeriana officinalis*) roots and rhizome, field spices, mint leaves [22].

The high efficiency of herbal preparations depends on the complex of biologically active substances. Choleric properties are associated with the presence of flavonoids, essential oils, resins and other substances. The mechanism of their action is complex and is related to the direct stimulation of the secretory function of hepatocytes; with an increase in the osmotic gradient between bile, blood and increased filtration of water and electrolytes into the bile ducts; by stimulating the receptors of the mucous membrane of the small intestine, it helps to activate the autocrine regulatory system and increase the production of bile [19]. Extracts from medicinal plants rich in magnesium ions can stimulate cholecystokinin secretion by duodenal epithelial cells. This effect may be due to the cholekinetic effect of preparations based on arnica and fennel. A reflex increase in the release of cholecystokinin causes bitterness. The combined use of plants with different mechanisms of cholekinetic action allows to achieve a very specific effect. In addition to the choleric effect, most plants have antimicrobial, anti-inflammatory and antihypoxic properties, some of which are effective hepatoprotectors [23].

Medicinal plants with a choleric effect, that is, to prevent the formation of stones in the liver and contribute to the elimination of stones: this is done through the roots of zirk, immortelle flowers, corn cobs and columns.

Thus, in the complex prevention and treatment of lipid metabolism disorders and hepatobiliary diseases, the use of a wide selection of available phytopreparations can be an important way to optimize the treatment and prevention process. Effective pharmacocorrection is possible if the basic principles of herbal treatment are followed, the main of which are the individual selection and dosage of herbal drugs, the adequate duration of use of herbal drugs, and a systematic and comprehensive approach based on science [13].

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## **CEREBRAL PALSY. RISK FACTORS, REHABILITATION FEATURES (LITERATURE REVIEW)**

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Article DOI: <https://doi.org/10.36713/epra16590>

DOI No: 10.36713/epra16590

### **ABSTRACT**

*The review presents current data on cerebral palsy, a disease that is quite common and characterized by multifactorial etiology, has a complex pathogenesis mechanism based on neuromotor disorders, resulting in impaired motor function, muscle tone and posture. Motor disorders most often characteristic of this pathology are accompanied by impaired sensitivity, perception and the development of secondary problems – disorders of the musculoskeletal system. Given the relevance and ongoing scientific research in this area, rehabilitation measures to restore functional activity among patients using modern physical methods, physical therapy, kinesiotaping are of great interest.*

**KEYWORDS:** *cerebral palsy, neuromotor disorders, childhood, kinesiotaping, rehabilitation, physical therapy, physical methods of exposure, muscle tone, spasticity, sensitivity.*

Cerebral palsy (CP) is a fairly a common movement disorder in children that is complicated by development disability due to multiple impairments.

By definition, cerebral palsy is a neurological, non-progressive disease that occurs due to damage to the brain (BM), its motor centers or pathways, that occur before, during or after childbirth. Cerebral palsy leads to lifelong disability with impaired motor functions caused by exposure to viral diseases (measles, influenza, parainfluenza) with subsequent development of meningoencephalitis; Sometimes may be associated with emerging hemorrhages in the brain during pathological, long, rapid labor [3, 7, 21].

The first description of cerebral palsy was historically carried out in 1880. English surgeon William Little, after whom the described form of cerebral palsy began to be called spastic diplegia, and Little's disease. The first mentions of the term "cerebral palsy" were introduced in 1897 famous Austrian psychiatrist Sigmund Freud, who introduced proposal for differences in forms of cerebral palsy based on topographic features, i.e. by number and the presence of affected limbs.

*Etiology and causal factors in the development* of cerebral palsy. The main etiological factors for the occurrence of cerebral palsy are considered to be many reasons, i.e. a polyetiological brain disease that begins in the intra- and perinatal periods [1, 11, 13]. There are many reasons: birth trauma with the development of hemorrhage in the brain, asphyxia of the fetus, anemia, the presence of endocrine diseases in the mother, intrauterine infection, immunological conflict due to incompatibility of mother and fetus, development and severe the course of toxicosis in pregnant women, hereditary predisposition, the presence of bad habits, difficult environmental conditions with the presence of radiation exposure or harmful industries that cause genetic mutations [2,16,29].

The following disorders are specific to cerebral palsy: decreased muscle tone, or lack thereof; coordination of movements and balance; rectifying reflexes (statokinetic); pathological tonic reflexes [4,21].

Currently, the most applicable among clinicians is the classification of K.A. Semenova, in which the following forms are distinguished: 1. Spastic diplegia - a form in which the predominant lesion is characteristic of the lower extremities; 2. Double hemiplegia – a form with the presence of spastic tetraparesis with a predominance of lesions upper limbs than lower; 3. Hemiplegia – the lesion is predominantly localized on one side of the body; 4. Hyperkinetic form – characterized by aggravated by hyperkinesia; 5. Atonic-astatic – this form is characterized the presence of decreased muscle tone; 6. Mixed form (Table 1).



**Table 1.**  
**Classification of cerebral palsy (according to K.A. Semenova 1976):**

Early age	Older age
Spastic forms: - hemiplegia - diplegia - bilateral hemiplegia Dystonic form Hypotonic form	Spastic forms: - hemiplegia - diplegia - bilateral hemiplegia Hyperkinetic form Ataxic form Atonic-astatic form Mixed forms: - spastic-ataxic - spastic-hyperkinetic - atactico-hyperkinetic

The following stages of development of cerebral palsy are distinguished:

- Early: up to 4-5 months;
- Initial residual stage: from 6 months to 3 years;
- Late Residual: older than 3 years.

Based on the location of movement disorders, they are distinguished:

- Monoplegic - motor disorders in this form are characteristic only in one limb;
- Hemiplegic - disorders of this form occur on one side of the body, within this case, symptoms appear partially or completely on two limbs;
- Diplegic – damage to motor disorders on both upper or lower limbs;
- Quadriplegic – severe motor impairment on all four limbs.

Characteristic of all forms of cerebral palsy are motor disturbances of the reflex type, i.e. there are movements, but they are not controlled by the patient, they are carried out compensatory with the formation of a motor stereotype, violation of coordinating movements, increased muscle tone.

All these manifestations are characterized by the following symptoms:

- Spasticity – occurs as a result of increased muscle tone;
- Tremor - the presence of trembling of the limbs, which is not voluntary;
- Athetosis - involuntary twitching with increasing range when moving limbs;
- Ataxia – imbalance in the patient;
- Rigidity – excessive muscle tension due to increased muscle tone.

Depending on the severity and time of occurrence of the pathology, diagnose cerebral palsy possible either during the mother’s pregnancy or during childbirth, or after birth of the child.

The symptom complex of patients with cerebral palsy is quite diverse and can manifest itself and change with the growth and development of the child. Initial signs appearing from birth are the following:

- Presence of hypo- and hypertonicity of muscles; delayed motor development;
- Preservation of the automaticity of spinal reflexes for a long time;
- Possible disturbances of external respiration; bowel problems associated with atony of intestines;
- Characteristic skin lesions with the development of neurodermatitis;
- Nutritional disorders, which in infants are characterized by impaired sucking reflexes, in older ages, chewing of food, difficulties in swallowing reflexes with the presence of coughing, choking during the act of eating, the possibility of taste disturbances; the occurrence of problems with urination, the presence of salivation, which is associated with a violation of muscle tone and motor activity of the muscles of the oropharyngeal zone;
- Characteristic low motor activity of the child, up to immobility;
- Frequent falls as a result of statokinetic disorders and inability maintaining the body in an upright position; the presence of strabismus, which is characteristic of all children with a spastic form caused by pathological hypertonicity of oculomotor muscles;
- Delayed development of auditory and speech reactions.

Many patients, due to hyper-/hypofunction of muscle tone, experience pathological synkinesis, the development of contractures and deformities, and involuntary movements various parts of the body due to hyperkinesis. Thus, the main manifestations of cerebral



palsy are pronounced motor disorders, changes in the locomotor apparatus causing spasms of the lower muscles limbs, development of contracture, high muscle tone, tendon reflexes, decreased muscle strength and performance, deformation of the musculoskeletal system (MSK) with impaired coordination of movements, correct standing and walking, active development of involuntary movements, synkinesis [5, 20].

Usually this pathology causes mental disorders with resulting in disorders of functional activity of cranial nerves (CN) and the development of clinical signs such as hearing impairment, vision impairment, strabismus with progression of bulbar and pseudobulbar disorders [12, 27].

According to the International Classification of Functioning Systems (CFS), the development of this pathology has a direct effect on the structures of the body (limbs), functional activity of the body (intelligence), types of activities (walking/standing), participation (sports). Emerging functional deficiencies caused by the disease, lead to impairment, limitation of functions and participation. Psychomotor disorders in cerebral palsy lead to the development of limited use of limbs, paralysis, difficulties in performing daily activities, dependence on others (relatives, friends), decreased quality of life (dQL). This necessitates carrying out therapeutic manipulations in the early stages of the onset of pathology.

Muscle tone disorders in patients with cerebral palsy from early childhood lead to limited functionality, which causes difficulty in self-care, learning the skills of movement, walking, which requires the use of any means to ensure movement, contributing to the formation motor deficit.

As it progresses, pathological reflexes arise, instability of the vertical position leads to the formation of contractures, subluxations and dislocations of the joints of the upper and lower extremities. These processes explain the formation of pathological attitudes and deformations. Cerebral palsy is characterized by the development of muscle tone disorders. The most characteristic type of spasticity, rigidity, hypo- and dystonia is the development of spasticity, caused by high muscle tone, the causative factors of which are lesions of the pyramidal system of the brain. Clinical manifestations of spasticity can range from painful muscle spasms to widespread lesions leading to the development of the main symptoms of hemi-, para- and tetraparesis.

With central paresis, patients with cerebral palsy experience pronounced spasticity, while a pronounced degree of paresis of muscle spasticity can make it easier to maintain the body in an upright position, and walking, which reduces it, contributes to impaired support function. Treatment of spasticity, in this regard, is indicated only in cases where it impairs motor functions, causing discomfort, making it difficult to care for the patient [1].

The presence of spasticity causes the development of secondary changes in the muscular-articular apparatus, which further enhances motor disorders. In this regard, the resulting muscle resistance during its stretching depends not only on the reflex tone and muscle tension, but also on the secondary changes that arise - the development of fibrosis, atrophy, contracture. Features of the development of spastic conditions in cerebral palsy are manifested by the presence of pathological tonic reflexes, which manifests itself when changing body position; the appearance of pathological synkinetic activity when performing voluntary movements; impaired coordination of the interaction of muscles of synergists and antagonists; increased reflex excitability.

Features of spasticity in cerebral palsy are that it is accompanied by inhibition of spinal stretch reflexes, with preservation of postural automatisms; muscle tone is directly proportional to the degree and speed of stretching of spasmodic muscles, in which postural reflexes, activated by changing the position of the body in space, play a big role in changing tone.

It should be noted that spasticity has a negative impact on the quality of life of patients with cerebral palsy, leading to severe complications from the musculoskeletal system, the occurrence of pain, disorders of energy metabolism with worsening disability. All this determines a difficult prognosis and also complicates the processes of rehabilitation of patients. Another of the complications associated with cerebral palsy are orthopedic ones caused by the growth and development of the child, progression and increase in loads on the musculoskeletal system, violations of adequate muscle function, the presence of spastic tone, impaired blood circulation, causing retardation of the growth of the affected limbs, the formation of pathological postures and skeletal deformities of the growing patient.

Spinal curvature, hip dislocations, and joint contractures are typical problems for patients with cerebral palsy. Often skeletal and joint deformities are accompanied by pain, which makes physical activity impossible. It is advisable to prevent orthopedic complications from the beginning by preventing them (by means of exercise therapy, orthopedics and physiotherapy), massages, physical exercise and orthotics; If skeletal deformities have formed, they are corrected surgically.

Monitoring the dynamics of the condition of the musculoskeletal system of a growing patient is carried out using annual x-ray monitoring of the condition of the joints and, first of all, the hip, as the most susceptible to dislocations and degenerative processes.



In the presence of secondary skeletal deformities, the rehabilitation treatment program is revised taking into account concomitant pathology, in particular, the load on the joints in the presence of dysplasia or dystrophic changes, on the bones in the presence of osteoporosis is limited (Novacheck, TF., 2007).

The most common spastic syndromes leading to the formation of deformities in the joints and spine in patients with cerebral palsy are:

Triceps syndrome or dynamic equinus. With the development of equinus, walking on toes is formed, the knee joint is in a state of flexion. Triceps syndrome is formed with the participation of the cervical symmetrical tonic reflex. Most often it occurs with increased tone in m. triceps surae. Increased tone in the gastrocnemius and soleus muscles, possible involvement of the plantar muscles. Plantar flexion of the foot occurs with the participation of m. Triceps surae, m. tibialis posterior, m. plantaris, m. fl exor hallucis longus, m. fl exor digitorum longus, m. peroneus longus and m. peroneus brevis.

Adductor spasm or adductor syndrome. This clinical syndrome, the second most common in cerebral palsy, is caused by spastic contracture of the adductor muscles of the thigh (m. adductor magnus, m. adductor longus, m. adductor brevis, m. gracilis - during internal rotation of the hip), it is also necessary to take into account the activity of the leg flexor muscles ( m. semimembranosus and m. semitendinosus), if the spasm is accompanied by flexion of the knee. Features of movement: the hips are tightly in contact, there is a cross at the level of the hips or knee joints, pronounced frontal instability, it is difficult to move the leg forward when walking, hyperlordosis in the lumbar region, there is always weakness of the outer thigh muscles, the gluteus medius and minimus muscles. As a rule, adductor syndrome is accompanied by hip dysplasia, sometimes with subluxation or dislocation of the femoral head, as well as a positive Trendelenburg sign. The most common is paresis of the gluteal muscles (antagonists of the adductor group).

Hamstring syndrome. This is the third most common syndrome in cerebral palsy, accompanied by an increase in the tone of the posteromedial group of thigh muscles (m. semimembranosus, m. semitendinosus, long head of m. biceps femoris), which extend the hip joint, flex the lower leg, and carry out internal rotation of the bent knee. Features of gait: the patient stands on legs bent at the knee joints, feet in the equinus position, support on the entire foot is possible, the pelvis is tilted forward or backward. Total kyphosis of the spine is possible.

Rectus syndrome. This syndrome is a common motor disorder in cerebral palsy. With a straightened fixed knee, the voltage in m. Rectus femoris causes the pelvis to tilt forward and downward. Rectus syndrome is formed when the cervical symmetrical tonic reflex and labyrinthine tonic reflex increase. There are two variants of rectus syndrome. With an increase in the cervical symmetrical tonic reflex, walking on straight legs, hyperlordosis in the lumbar region, and a pronounced forward tilt of the pelvis are characteristic. With an increase in the cervical symmetrical tonic reflex and labyrinthine tonic reflex, walking on bent legs is characteristic, lordosis in the lumbar region is smoothed or normal, and the forward tilt of the pelvis is less pronounced. There is also rectus rotation syndrome, which also has two development options.

With an increase in the cervical symmetrical tonic reflex, the patient stands and walks on straight, inwardly rotated legs, feet in equinovarus with pronounced internal rotation, hyperlordosis in the lumbar spine. With an increase in the cervical symmetrical tonic reflex and labyrinthine tonic reflex, he walks with legs bent and rotated inward, the feet in the equinus and equinovarus positions, the torso tilted forward, the lordosis is smoothed or normal. When contractures and deformities of the musculoskeletal system develop, orthopedic surgical treatment is used.

The goal of treatment is to eliminate the resulting deformities and restore normal range of motion in the joints. However, without adequate physical correction of spastic and hyperkinetic syndromes, contractures soon recur.

Spasticity is a movement disorder that is part of the upper motor neuron syndrome, characterized by a speed-dependent increase in muscle tone and accompanied by increased tendon reflexes as a result of hyperexcitability of stretch receptors.

Spasticity is detected during the study of passive movements in the limb as increased resistance (contraction) of the muscle when it is rapidly stretched. It is usually combined with increased tendon reflexes, clonus and pathological signs (for example, Babinski's sign) in paretic limbs.

An increase in muscle tone similar to spasticity can occur both due to increased excitability of a-motoneurons and due to an increase in the number of excitatory afferent impulses arising in response to muscle stretching.

Damage to the central motor neuron leads to a decrease in inhibitory effects on motor neurons, which increases their excitability, and on interneurons of the spinal cord, which leads to an increase in the number of impulses reaching a-motoneurons in response to muscle stretching. Other causes of spasticity are suggested to be structural changes at the level of the segmental apparatus of the



spinal cord, resulting from damage to the central motor neuron: shortening of the dendrites of motoneurons and collateral sprouting (proliferation) of afferent fibers that make up the dorsal roots.

For the treatment of cerebral palsy, many generally accepted therapeutic regimens are currently used, including botulinum toxin injections, orthopedic surgical correction, forced movement therapy, oral medications, occupational and physical therapy [11, 14, 17]. The main goal in the treatment of children with this pathology is to normalize muscle tone, reduce muscle-joint contractures, solve sensory and cognitive disorders, increase muscle strength, range of motion using dynamic methods and the inclusion of proprioceptive neuromuscular facilitation [15, 17, 19].

Physiotherapeutic methods of treatment for cerebral palsy are pathogenetically justified, since their use promotes the development of a neurohumoral reaction in the patient's body aimed at the emergence of unconditioned and conditioned reflexes, which in turn influence the course of basic processes in the central nervous system. As a result of the restoration of the relationship between excitation and inhibition, excitation decreases and inhibition increases, helping to reduce the rigidity of muscle spasticity and the intensity of hyperkinesis with the development of functional connections in the brain with the development of conditioned motor reflexes, contributing to compensatory adaptation mechanisms that improve and restore coordination of movement and posture.

One of the most promising and currently actively used injections are botulinum toxin injections [15].

Existing rehabilitation methods are numerous, but do not allow children with cerebral palsy to achieve complete and stable correction of motor disorders; often the achieved result is short-lived and requires additional correction methods [13, 23]. This problem especially presents certain difficulties when correcting motor activity in sick children with cerebral palsy with spastic diplegia, since methods and means of physical development of children with disabilities are based on the specifics of the disease and the initial state of the patient's body [3, 26].

There are literature data on the effectiveness of treatment of movement disorders using exercise therapy methods, using special simulators, kinesiotherapy and hydrokinesiotherapy techniques [28].

Due to the inability to maintain an upright body position in patients with cerebral palsy with Spastic diplegia disrupts the formation of natural statokinetic reflexes and the development of movements [16].

There are also ways to use special suits and simulators, it is also recommended to use various expanders, rollers, of various designs that contribute to the development and activation of dynamic strength and flexibility, mini trampolines are also very popular, which promote and improve coordination functions in patients with cerebral palsy, sometimes a group of exercise machines can be combined depending on the correct application and various influences, their main properties are aimed at activating and restoring motor functions [9, 10].

But due to the high cost and the need for specially equipped rooms, it is necessary to develop rehabilitation methods that are easier to use and economical to operate, one of which is various kinesiotherapy (KT) techniques. KT is a form of therapeutic physical culture in which the patient's voluntary conscious active movements correct impaired motor functions. Method KT is a relatively new technique used in rehabilitation programs for cerebral palsy.

Most consistent findings have shown that KT as part of a multimodal therapy program can be effective in the rehabilitation of children with cerebral palsy to improve motor function and dynamic activity.

Kinesiotaping (KT) is a new method that is included in the rehabilitation program for patients with cerebral palsy; it has also found application in sports, orthopedics and is approved as an additional method when functional disorders of the body occur, in particular musculoskeletal system [20,23].

Kinesio tape is an elastic tape made from latex-free cotton fiber, designed specifically to simulate the elasticity of muscles, skin and fascia [18, 23]. It is based on relaxation techniques, muscle stimulation, with the possibility of passive and passive-active movements. The main task when rehabilitation of these patients is the achievement of a return to normal reflex motor activity, tone of the muscular system with a decrease in reflex excitability of the motor system, stimulation of statokinetic reflexes, and normalization of movements in the joints of the limbs. Proper taping helps support weak muscles and creates a full response of the muscular system. There is a hypothesis that KT has a dose-stimulated effect on the skin receptors of the peripheral sensorimotor system, and the receptors have a direct connection with pain, proprioception and motor control. Taping has a direct effect on skin receptors, lymph and circulatory systems, fascial muscles and joints, increasing proprioception, with a gradual decrease in pain and lymphostasis, swelling, muscle spasms with strengthening and normalization of muscle tone [26, 27, 28, 29].



By supporting the joints, KT affects the musculoskeletal system by restoring proprioception, improving neuromuscular transmission with subsequent alignment of posture and stimulating skin receptors that provide feedback so necessary to maintain the body in complete balance [22, 23].

The use of KT should be included in rehabilitation programs for patients with cerebral palsy, as it has a positive effect on sensorimotor functions significantly improving the processes of control and coordination of motor and motor functions of the upper limbs [21].

This allows us to consider KT a new therapeutic approach, with which it is possible to solve most problems of central origin, leading to severe consequences that worsen the prognosis of neurorehabilitation for cerebral palsy.

A study of review literature sources [6, 24] showed the possibility of using KT in the rehabilitation of patients with cerebral palsy in combination with other methods: increasing strength, increasing endurance, improving and reducing muscle spasticity - this can be achieved when using KT on the upper extremities. This use primarily allows you to achieve: positioning of the wrist, palm and thumb in a functional position, which allows you to open the hand for sensory stimulation, improving the functions of the fingers [12, 18]; reduction of spasticity; supination of the forearm [12], maintaining the shoulder in a functional position [14]; stimulating active movement of the wrist and fingers [24, 26]. The authors' studies prove the possibility of using KT of the upper limb to improve motor function, synchronization, speed and smoothness of movements, activation, dexterity, reduction of spasticity, and protective stretching in children [12, 25].

Most reviews of the literature show the effectiveness of using KT on the upper extremities, thereby confirming the opinions of researchers in this direction. KT tape allows you to achieve an increase in the active range of motion (ROM) at the wrist, while their effectiveness can be variable and mainly associated with the beginning of active KT.

The use of KT in the torso and lower extremities, including the ankle joint, to reduce and reduce spasticity of the Achilles tendon with increased strength of the anterior tibia, knee, paraspinal, quadriceps muscles allows you to activate general motor skills and improve their functionality. This affects primarily the activation of dynamic function, control of vascular pressure with normalization and increase, where this is necessary, muscle balance to maintain sitting and standing positions [22, 23, 25].

It should be noted that there are conflicting opinions of researchers who, when studying the effect of KT, did not achieve a significant effect in patients with cerebral palsy in terms of static balance and postural control, which were assessed using the GMFM and GMFCs scales of various levels [18], which indicates a low effect of KT in severe lesions.

The results of KT exposure may be associated with the pressure exerted, the tension of the tape on the skin, thereby increasing cutaneous sensory stimulation with the implementation of proprioceptive improvement in the transmission of information to the central nervous system (CNS), another important effect is to provide protection and support to the joints, contributing to the increase and improvement functions of standing and walking [17].

An analysis of the available modern literature on the use of KT in patients with cerebral palsy showed the positive effect of this method on small and large joints, the possibility of improving motor abilities and functional activity, with control over balance and holding the body in a sitting/standing position. The use of this method in the rehabilitation of patients with cerebral palsy must be combined with both drug therapy and other methods of physiotherapy, but it should be noted that in severe degrees of cerebral palsy the use of KT is not effective. This method has a psychophysiological effect, which manifests itself on a subconscious level, encouraging children to fully use their capabilities. Considering the small number of publications and studies conducted on the use of KT in rehabilitation in patients with cerebral palsy, in order to expand and obtain the most accurate results, it is necessary to increase scientific developments in this direction with the search for possible mechanisms of its effect, which is provided for by the objectives of this study.

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# INFLUENCE OF FUNCTIONAL INTERVAL TRAINING ON PARTICULAR PHYSIOLOGICAL CHARACTERISTICS AMONG FEMALE VOLLEYBALL PLAYERS

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## ABSTRACT

The objective of this study was to find out the impact of functional interval training on physiological variables of female volleyball players. To achieve the purpose of this study, forty female volleyball players were selected SRM Institute of Science and Technology, Kattangulathur, Chengalpattu. Their age was ranged from 14 to 17 years. The selected subjects were randomly divided into two groups such as Group 'I' underwent functional interval training (n=20) and Group 'II' acted as control group (n=20). Group 'I' underwent functional interval training for three alternative days and one session per day and each session lasted for an hour for eight weeks period. Group 'II' was not exposed to any specific training but they were participated in regular activities. The data on and vo2 max was measured by cooper vo2 max test (ml/kg), breath holding time was measure by breath holding test (seconds) and resting pulse rate was measured by bio monitor (seconds). The pre and post tests data were collected on selected criterion variables prior to and immediately after the training programme. The pre and post tests scores were statistically examined by the dependent 't' test. The level of significance was fixed at 0.05 levels for all the cases in order to find out the significance. It was concluded that the functional interval training on vo2 max, breath holding time and resting pulse rate variables among female volleyball plyers. However the control group had not shown any significant improvement on selected variables such as vo2 max, breath holding time and resting pulse rate.

**KEYWORDS;** Functional Interval Training, Vo2 Max, Breath Holding Time, Resting Pulse Rate and Volleyball Players.

## INTRODUCTION

### Volleyball

Volleyball is a team sport in which two teams of six players are separated by a net. Each team tries to score points by grounding a ball on the other team's court under organized rules. It has been a part of the official program of the Summer Olympic Games since 1964. The complete rules are extensive. But simply, play proceeds as follows: a player on one of the teams begins a 'rally' by serving the ball (tossing or releasing it and then hitting it with a hand or arm), from behind the back boundary line of the court, over the net, and into the receiving team's court. The receiving team must not let the ball be grounded within their court. The team may touch the ball up to 3 times but individual players may not touch the ball twice consecutively. Typically, the first two touches are used to set up for an attack, an attempt to direct the ball back over the net in such a way that the serving team is unable to prevent it from being grounded in their court. The rally continues, with each team allowed as many as three consecutive touches, until either a team makes a kill, grounding the ball on the opponent's court or winning the rally; or a team commits a fault and loses the rally. The team that wins the rally is awarded a point, and serves the ball to start the next rally.

## FUNCTIONAL INTERVAL TRAINING

Functional training is becoming increasingly popular within the fitness industry and has been considered to be a better alternative than traditional resistance training for improving various measures of muscular fitness including strength, endurance, coordination and balance. Definitions describing what functional training is or what a functional exercise program should entail vary considerably in the literature. Furthermore, experimental research conducted to ascertain the muscular fitness benefits of functional training is limited and focused specifically on improving function in older adults (Milton et al. 2008; de Vreede et al. 2005; Whitehurst et al. 2005). Functional training ( FT) is becoming increasingly popular nowadays and was ranked among the top 10 most popular fitness trends. Interval training contributes expressively to physical training and has been gradually applied to the soccer field. This sport has received more attention in colleges and universities in the country. Football has become one of the most popular sports in the world, with a large number of spectators, fans, athletes, training teams and coaches. Under the background of



the country's vigorous development of football, football training in Colleges and universities has been paid attention to Colleges and universities have become an important training base for talent training and talent transportation of professional football players. Many colleges and universities have begun to implement various talent selection policies, so that students not only rely on cultural scores to enter colleges and universities, but also students with strong sports ability and high professional talent can enter colleges and universities through various sports assessment. In addition, during their study in Colleges and universities, they plan the career path for specially recruited students through professional teams. Since the development of football related industries, colleges and universities have become an important link in the preliminary selection of talents, and the talent training system has been gradually improved. The professional training methods of the team of professional physical education teachers in Colleges and universities can help college athletes improve their sports performance efficiently, and collect and sort out the data of training intensity, training methods (Minjie *et al.*, 2023).

**PURPOSE OF THE STUDY**

The purpose of the study was to find out the influence of functional interval training on selected physiological variables of female volleyball plyers.

**METHODOLOGY**

To achieve the purpose of this study, forty female volleyball players were selected SRM Institute of Science and Technology, Kattangulathur, Chengalpattu. Their age was ranged from 14 to 17 years. The selected subjects were randomly divided into two groups such as Group 'I' underwent functional interval training (n=20) and Group 'II' acted as control group (n=20). Group 'I' underwent functional interval training three alternative days and one session per day and each session lasted for an hour for eight weeks period. Group 'II' was not exposed to any specific training but they were participated in regular activities. The data on and vo2 max was measured by cooper vo2 max test (ml/kg), breath holding time was measure by breath holding test (seconds) and resting pulse rate was measured by bio monitor (seconds). The pre and post tests data were collected on selected criterion variables prior to and immediately after the training programme. The pre and post tests scores were statistically examined by the dependent 't' test for each and every selected variables separately.

**RESULT AND FINDINGS**

The influence of functional interval training on selected vo2 max, breath holding time and resting pulse rate were analyzed and presented below.

**1. Vo2 Max**

**Table-1**

**Computation of 't'-ratio between pre and post test means of experimental group and control group on Vo2 Max (MI/kg)**

Group	Test	Mean	Standard Deviation	t-ratio
Functional Interval training	Per test	42.52	1.20	13.40*
	Post test	45.64		
Control Group	Pre test	42.44	0.98	0.96
	Post test	42.04	0.56	

\* The table values required for significance at 0.05 level of confidence for df with 19

The table 1 shows that the pre-test mean value of functional interval training group and control group are 42.52 and 45.64 respectively and the post test means are 42.44 and 42.04 respectively. The obtained dependent t-ratio values between the pre and post test means of functional interval training group and control group are 13.40 and 0.96 respectively. The table value required for significant difference with df 19 at 0.05 level is 2.09. Since, the obtained 't' ratio value of functional interval training group was greater than the table value, it is understood that functional interval training group had significantly improved the vo2 max. However, the control group has not improved significantly. The 'obtained t' value is less than the table value, as they were not subjected to any specific training.



## 2. Breath Holding Time

**Table-2**

Computation of 't'-ratio between pre and post test means of experimental group and control group on Breath holding time (Seconds)

Group	Test	Mean	Standard Deviation	t-ratio
Functional Interval training	Pre test	35.56	1.95	7.90*
	Post test	39.65	0.54	
Control Group	Pre test	35.50	0.45	0.54
	Post test	35.65	0.32	

\* The table values required for significance at 0.05 level of confidence for df with 19

The table 1 shows that the pre-test mean value of functional interval training group and control group are 35.56 and 39.65 respectively and the post test means are 39.65 and 35.50 respectively. The obtained dependent t-ratio values between the pre and post test means of functional interval training group and control group are 7.90 and 0.54 respectively. The table value required for significant difference with df 19 at 0.05 level is 2.09. Since, the obtained 't' ratio value of functional interval training group was greater than the table value, it is understood that functional interval training group had significantly improved the breath holding time. However, the control group has not improved significantly. The 'obtained t' value is less than the table value, as they were not subjected to any specific training.

## 3. Resting Pulse Rate

**Table-1**

Computation of 't'-ratio between pre and post test means of experimental group and control group on Vo2 Max (MI/kg)

Group	Test	Mean	Standard Deviation	t-ratio
Functional Interval training	Pre test	72.10	1.12	6.40*
	Post test	70.88	1.20	
Control Group	Pre test	72.14	0.54	1.09
	Post test	72.08	0.26	

\* The table values required for significance at 0.05 level of confidence for df with 19

The table 1 shows that the pre-test mean value of functional interval training group and control group are 72.10 and 70.88 respectively and the post test means are 72.14 and 72.08 respectively. The obtained dependent t-ratio values between the pre and post test means of functional interval training group and control group are 6.40 and 1.09 respectively. The table value required for significant difference with df 19 at 0.05 level is 2.09. Since, the obtained 't' ratio value of functional interval training group was greater than the table value, it is understood that functional interval training group had significantly improved the resting pulse rate. However, the control group has not improved significantly. The 'obtained t' value is less than the table value, as they were not subjected to any specific training.



FIGURE-1 bar diagram showing the mean values of Vo2 Max pre and posttest for experimental group and control group.

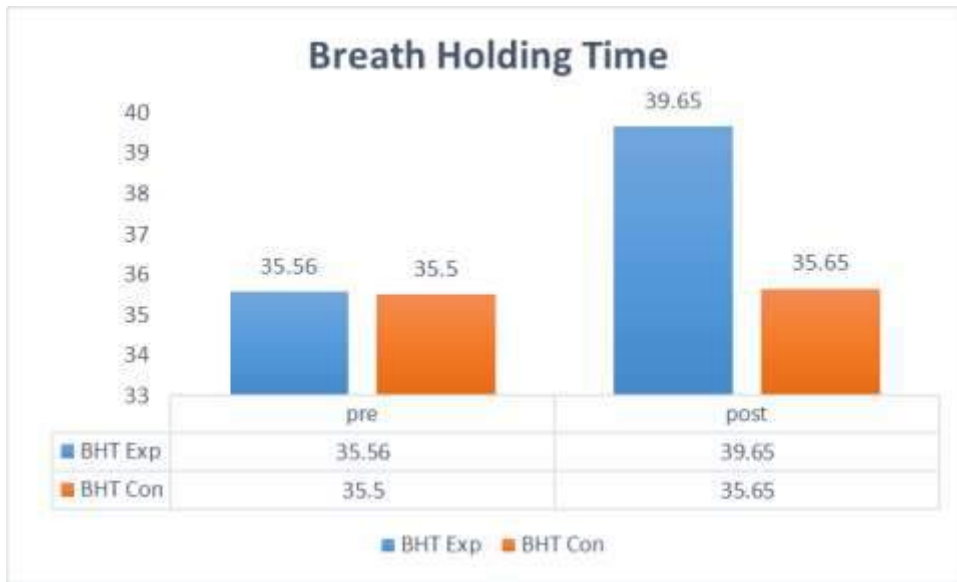


FIGURE-2 bar diagram showing the mean values of breath holding time pre and posttest for experimental group and control group.

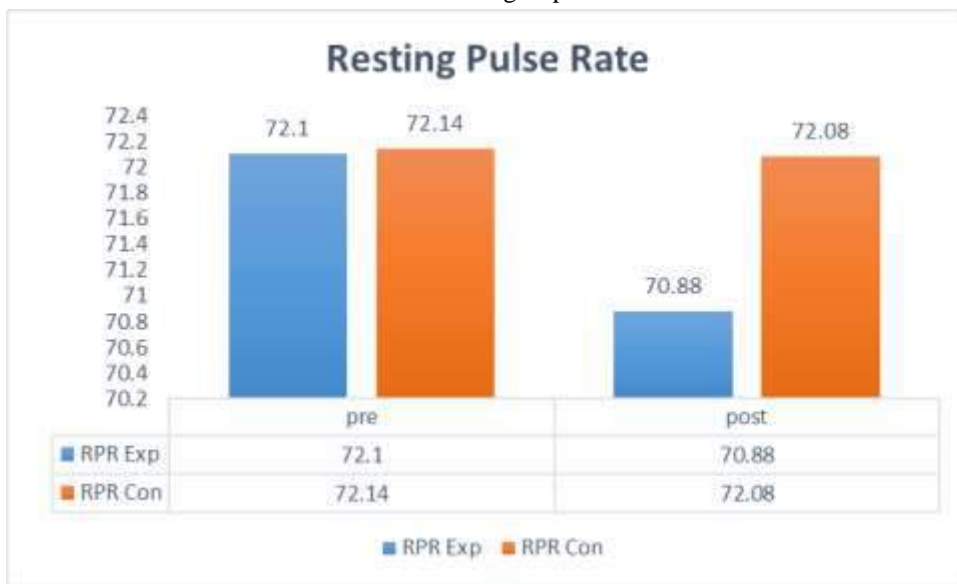


FIGURE-3 bar diagram showing the mean values of resting pulse rate pre and posttest for experimental group and control group.

### DISCUSSION ON FINDINGS

The present study experimented with the impact of eight weeks of functional interval training on vo2 max, breath holding time and resting pulse rate of female volleyball plyers. The results of this study indicated that functional interval training was more efficient to bring out desirable changes over the vo2 max, breath holding time and resting pulse rate of female volleyball plyers. Investigators have extended their interest to consider the vo2 max, breath holding time and resting pulse rate commencement from the way a selected variables of female volleyball players approaches the functional interval training. Pre and posttest vo2 max, breath holding time and resting pulse rate scores between the experimental and control group were examined, there was a significant difference in posteromedial and posterior directions.

The finding of the present study had similarity with the findings of the investigations referred in this study.

**Fardy et al., (1976) & Stegemann et al., (1987)** Physiological variables such as heart rate and blood lactate should be measured under field conditions so that coaches can be provided with relevant information on the physical demands of the volleyball game. Information on patterns of movements and actions performed by volleyball players during the game should be also collected and analyzed. These measurements refer to notational analysis or time-motion analysis, which are used to quantify the number and



types of movements performed by the players during a game. Unfortunately, we found no studies using time-motion analysis, but 2 studies examining on-court physiological variables were discovered.

**Usman et al., (2015)** concluded that lower body plyometric training twice a week, for 8 weeks showed significant improvement in vertical jump performance and pulmonary function in both male and female collegiate volleyball players.

**Manna et al., (2011)** assess the current status of an athlete and the degree of training adaptability and provide an opportunity to modify the training schedule accordingly to achieve the desired performance.

## CONCLUSION

Based on the results of the study following conclusion have been arrived that eight weeks functional interval training program was found to be most effective training protocol to bring out desirable change over vo2 max, breath holding time and resting pulse rate of female volleyball plyers.

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# ADVERSE CHILDHOOD EXPERIENCES (ACES) AND NURSING INTERVENTIONS: BREAKING THE CYCLE

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## ABSTRACT

*Adverse Childhood Experiences (ACEs) represent a significant public health concern, with profound implications for child health and development. This comprehensive review explores the prevalence, impact, and consequences of ACEs, emphasizing the critical role of nurses in identifying, preventing, and addressing ACEs through evidence-based interventions. By understanding the complex interplay between ACEs and health outcomes, nurses can play a pivotal role in breaking the cycle of adversity and promoting resilience in children and families.*

**KEYWORDS:** *Adverse Childhood Experiences (ACEs), nursing interventions, child health, trauma-informed care, resilience.*

## 1. INTRODUCTION

Adverse Childhood Experiences (ACEs) encompass a range of traumatic events that occur during childhood, including abuse, neglect, household dysfunction, and exposure to violence or substance abuse. The introduction provides an overview of ACEs and their significance in public health, highlighting the need for proactive intervention to mitigate their long-term effects. It introduces the role of nurses as frontline healthcare providers in addressing ACEs through preventive measures, early identification, and trauma-informed care.

Adverse Childhood Experiences (ACEs) are increasingly recognized as a significant public health concern with profound implications for individuals, families, and society at large. ACEs encompass a wide array of adverse events and circumstances that occur during childhood, including abuse, neglect, household dysfunction, and other traumatic experiences. The effects of ACEs can be enduring, influencing physical health, mental well-being, and social functioning throughout the lifespan. Understanding the prevalence, impact, and consequences of ACEs is essential for informing effective interventions aimed at breaking the cycle of adversity and promoting resilience in children and families.

The prevalence of ACEs is striking, with a substantial proportion of individuals reporting exposure to one or more adverse experiences during childhood. Research, such as the seminal Adverse Childhood Experiences Study (ACE Study) conducted by Felitti et al., has highlighted the widespread nature of ACEs across diverse populations and settings. These findings underscore the urgency of addressing ACEs as a public health priority.

The impact of ACEs on health and development is multifaceted and far-reaching. Individuals who experience ACEs are at increased risk for a range of negative outcomes, including chronic diseases, mental health disorders, substance abuse, and interpersonal difficulties. Furthermore, ACEs can disrupt neurodevelopmental processes, alter stress response systems, and compromise immune function, leading to long-term health consequences.

Moreover, ACEs can have intergenerational effects, perpetuating cycles of adversity within families and communities. Children who experience ACEs are more likely to encounter similar challenges in adulthood, further exacerbating the transmission of trauma across generations. Understanding the mechanisms underlying the intergenerational transmission of ACEs is crucial for designing effective interventions that break this cycle and promote positive outcomes for future generations.

Nurses are uniquely positioned to address ACEs and mitigate their impact through a variety of interventions. As frontline healthcare providers, nurses interact with children and families across various settings, allowing them to identify individuals at risk for ACEs and provide support and resources. By adopting trauma-informed approaches, nurses can create safe and nurturing environments that promote healing and resilience for those affected by ACEs.

This review aims to explore the prevalence, impact, and consequences of ACEs on child health and development, while also examining the role of nurses in addressing ACEs through evidence-based interventions. By raising awareness of ACEs and



highlighting the importance of nursing interventions in mitigating their effects, this review seeks to contribute to efforts aimed at breaking the cycle of adversity and fostering healthier, more resilient communities.

## 2. PREVALENCE AND IMPACT OF ACEs

This section explores the prevalence rates of ACEs globally and their association with various health outcomes. It delves into epidemiological studies, such as the Adverse Childhood Experiences (ACE) Study, to elucidate the link between ACEs and chronic diseases, mental health disorders, substance abuse, and interpersonal violence. The section also examines the mechanisms through which ACEs influence health outcomes, including the concept of toxic stress and its impact on biological systems.

The prevalence of Adverse Childhood Experiences (ACEs) is staggering, with studies indicating a significant portion of individuals worldwide reporting exposure to one or more ACEs during childhood. The original ACE Study conducted by Felitti et al. found that approximately two-thirds of participants reported at least one ACE, while more than one in five reported three or more ACEs. Subsequent research has corroborated these findings, revealing high rates of ACEs across diverse demographic groups and geographical regions.

ACEs have a profound impact on individuals' health and well-being, influencing various aspects of physical, emotional, and social functioning throughout the lifespan. Research has consistently shown that individuals with a history of ACEs are at increased risk for a wide range of adverse health outcomes, including chronic diseases, mental health disorders, substance abuse, and interpersonal difficulties. The cumulative impact of ACEs on health outcomes is particularly concerning, as individuals who experience multiple ACEs exhibit a dose-response relationship with worse health outcomes.

One of the most striking findings from research on ACEs is the strong association between childhood adversity and the development of chronic diseases later in life. Individuals with a history of ACEs are more likely to experience conditions such as heart disease, diabetes, cancer, respiratory diseases, and autoimmune disorders. Moreover, the impact of ACEs on physical health extends beyond specific diseases, affecting overall health status, quality of life, and mortality risk.

In addition to physical health outcomes, ACEs have profound implications for mental health and well-being. Individuals who experience ACEs are at increased risk for a wide range of mental health disorders, including depression, anxiety, post-traumatic stress disorder (PTSD), and substance use disorders. Furthermore, ACEs can contribute to the development of maladaptive coping strategies, such as substance abuse, self-harm, and risky behaviors, which can further exacerbate mental health problems and impair overall functioning.

ACEs also have significant social consequences, impacting individuals' relationships, educational attainment, and socioeconomic status. Children who experience ACEs are more likely to have difficulties in school, including academic underachievement, absenteeism, and behavioral problems. Moreover, ACEs can undermine social functioning and interpersonal relationships, leading to challenges in forming and maintaining healthy relationships with peers, family members, and authority figures.

Furthermore, ACEs have intergenerational effects, perpetuating cycles of adversity within families and communities. Research has shown that individuals who experience ACEs are more likely to repeat similar patterns of behavior and experience similar outcomes in adulthood, passing on the legacy of trauma to future generations. Understanding the intergenerational transmission of ACEs is crucial for breaking the cycle of adversity and promoting positive outcomes for future generations.

In summary, the prevalence and impact of ACEs on individuals' health and well-being are significant and far-reaching. Addressing ACEs requires a multifaceted approach that acknowledges the complex interplay of biological, psychological, social, and environmental factors underlying childhood adversity. By raising awareness of the prevalence and consequences of ACEs, we can better understand the magnitude of the problem and develop targeted interventions aimed at preventing ACEs, mitigating their impact, and promoting resilience in children and families.

## 3. CONSEQUENCES OF ACEs ON CHILD HEALTH AND DEVELOPMENT

Here, we provide a detailed analysis of the specific consequences of ACEs on child health and development. We explore the adverse neurodevelopmental outcomes, impaired social functioning, and academic difficulties associated with ACEs. Additionally, we examine how ACEs contribute to the intergenerational transmission of trauma and perpetuate cycles of adversity within families and communities.

The consequences of Adverse Childhood Experiences (ACEs) on child health and development are profound and multifaceted, exerting a lasting impact that extends well beyond the immediate trauma. ACEs encompass a range of adverse events and circumstances, including abuse, neglect, household dysfunction, and exposure to violence or substance abuse. These experiences



can disrupt the normal trajectory of development and compromise various aspects of physical, emotional, cognitive, and social functioning.

One of the most significant consequences of ACEs is the disruption of neurodevelopmental processes. Early experiences of trauma can alter brain structure and function, particularly in regions associated with emotion regulation, stress response, and executive functioning. Children who experience ACEs may exhibit changes in neural connectivity, neurotransmitter systems, and neuroendocrine pathways, leading to difficulties in emotional regulation, impulse control, and decision-making.

Moreover, ACEs can have detrimental effects on cognitive development and academic achievement. Children who experience ACEs are more likely to exhibit developmental delays, learning disabilities, and academic underachievement compared to their peers. These cognitive impairments may manifest as difficulties in attention, memory, processing speed, and executive functioning, impacting academic performance and long-term educational outcomes.

ACEs also have profound implications for emotional well-being and mental health. Children who experience ACEs are at increased risk for a wide range of mental health problems, including depression, anxiety, post-traumatic stress disorder (PTSD), and behavioral disorders. These emotional difficulties may manifest as symptoms of emotional dysregulation, hypervigilance, avoidance behaviors, and difficulties in forming secure attachments with caregivers.

Furthermore, ACEs can undermine the development of social competence and interpersonal skills. Children who experience ACEs may struggle with forming and maintaining healthy relationships with peers and adults, leading to difficulties in social interactions, communication, and empathy. These social difficulties may persist into adolescence and adulthood, contributing to challenges in establishing and maintaining meaningful relationships, both personally and professionally.

In addition to the direct effects on child health and development, ACEs can have long-term consequences that extend into adulthood. Research has shown that individuals who experience ACEs are at increased risk for a wide range of negative outcomes in adulthood, including chronic physical and mental health problems, substance abuse, interpersonal difficulties, and socioeconomic disadvantage. Furthermore, ACEs have been linked to a shortened lifespan, with individuals who experience multiple ACEs exhibiting a dose-response relationship with premature mortality.

It is important to recognize that the consequences of ACEs are not deterministic, and individuals' responses to trauma can vary widely based on a variety of factors, including genetic predisposition, resilience, social support, and access to resources. Moreover, early intervention and support can mitigate the impact of ACEs and promote positive outcomes for children and families affected by trauma.

#### **4. NURSING INTERVENTIONS FOR ACEs**

This section focuses on the pivotal role of nurses in addressing ACEs through evidence-based interventions. It discusses the principles of trauma-informed care and emphasizes the importance of creating safe, supportive, and empowering environments for children and families affected by ACEs. We delve into various nursing strategies, including screening protocols, psychoeducation, therapeutic interventions, and referrals to specialized services.

Nurses play a pivotal role in addressing Adverse Childhood Experiences (ACEs) through a variety of interventions aimed at mitigating the impact of trauma and promoting resilience in children and families. As frontline healthcare providers, nurses are uniquely positioned to identify individuals at risk for ACEs, provide support and resources, and intervene early to prevent further harm. By adopting trauma-informed approaches, nurses can create safe and nurturing environments that promote healing and recovery for those affected by ACEs.

One key nursing intervention for ACEs is screening and assessment. Nurses can systematically identify children and families who may be at risk for ACEs using validated screening tools, such as the Adverse Childhood Experiences Questionnaire (ACE-Q) or the Pediatric ACEs and Related Life-events Screener (PEARLS). Screening allows nurses to identify individuals who have experienced ACEs and initiate appropriate interventions to address their needs.

In addition to screening, nurses provide supportive care and interventions to children and families affected by ACEs. This may include psychoeducation about the effects of trauma, coping strategies, and referrals to specialized services such as mental health counseling, social work, or child advocacy centers. Nurses can also facilitate access to community resources, such as housing assistance, food banks, or parenting support groups, to address the social determinants of health that contribute to ACEs.





Furthermore, nurses play a crucial role in creating trauma-informed healthcare environments that prioritize safety, trust, choice, collaboration, and empowerment for individuals affected by ACEs. By integrating trauma-informed care principles into nursing practice, nurses can create a supportive and healing environment that promotes recovery and resilience.

Another important nursing intervention for ACEs is therapeutic communication and relationship-building. Nurses develop trusting relationships with children and families affected by ACEs, providing a compassionate and nonjudgmental space for individuals to share their experiences and access support. Through active listening, empathy, and validation, nurses help individuals process their trauma and develop coping strategies to navigate their healing journey.

Moreover, nurses advocate for policy and system-level changes to prevent ACEs and support children and families affected by trauma. This may involve advocating for legislation to strengthen child welfare systems, increase access to mental health services, or improve social support networks for families at risk for ACEs. Nurses can also participate in interdisciplinary collaborations with other healthcare providers, educators, policymakers, and community organizations to develop comprehensive strategies for preventing and addressing ACEs at the individual, family, community, and societal levels.

## **5. PROMOTING RESILIENCE AND PROTECTIVE FACTORS**

In this part, we explore strategies for promoting resilience and protective factors that can mitigate the impact of ACEs and foster positive outcomes. Nurses play a crucial role in building protective factors within individuals, families, and communities through strengths-based approaches, social support networks, and access to community resources.

In the face of Adverse Childhood Experiences (ACEs), promoting resilience and protective factors is essential for mitigating the impact of trauma and fostering positive outcomes in children and families. Resilience refers to the ability to adapt and thrive in the face of adversity, and it can be cultivated through a combination of individual, family, and community-level factors. Nurses play a critical role in promoting resilience and protective factors, empowering individuals and families to overcome adversity and build a brighter future.

One key protective factor is the presence of supportive relationships with caring and consistent adults. Nurses can facilitate the development of nurturing relationships between children and caregivers, providing a secure base from which children can explore and navigate their environment. By fostering strong attachments and bonds, nurses help children develop a sense of trust, security, and belonging, which serves as a buffer against the negative effects of ACEs.

Moreover, nurses promote resilience by strengthening family cohesion and communication. By providing education and support to families, nurses help parents develop positive parenting skills, communication strategies, and conflict resolution techniques. By fostering a positive family environment characterized by open communication, mutual respect, and support, nurses empower families to navigate challenges and build resilience together.

In addition to supporting families, nurses promote resilience by fostering social connections and community support networks. By connecting individuals and families with community resources, such as support groups, counseling services, and recreational activities, nurses help build social support networks that provide emotional, practical, and instrumental support in times of need. By fostering a sense of belonging and connectedness, nurses empower individuals to draw upon their social support networks for strength and resilience.

Furthermore, nurses promote resilience by fostering a strengths-based approach to care. By recognizing and building upon individuals' strengths, talents, and resources, nurses help instill a sense of competence, mastery, and self-efficacy. By highlighting individuals' strengths and successes, nurses bolster self-esteem and confidence, empowering individuals to overcome adversity and achieve their goals.

Another key protective factor is the promotion of healthy coping strategies and stress management techniques. Nurses provide education and support to individuals and families, teaching them effective coping skills such as mindfulness, relaxation techniques, and problem-solving strategies. By empowering individuals with adaptive coping mechanisms, nurses help build resilience and promote emotional well-being in the face of adversity.

Moreover, nurses advocate for policies and practices that create supportive and empowering environments for children and families affected by ACEs. By promoting trauma-informed policies and practices in healthcare, education, and social service settings, nurses help create environments that prioritize safety, trust, and empowerment. By advocating for systemic changes that address the root causes of ACEs, such as poverty, inequality, and social injustice, nurses contribute to the creation of a more equitable and resilient society.



## 6. CHALLENGES AND OPPORTUNITIES

Here, we discuss the challenges faced by nurses in addressing ACEs, including limited resources, stigma, and systemic barriers. Additionally, we explore opportunities for interdisciplinary collaboration, policy advocacy, and research initiatives aimed at preventing and mitigating the effects of ACEs. This section highlights the importance of a holistic approach to addressing ACEs and the need for sustained efforts at the individual, community, and policy levels.

## 7. CONCLUSION

In conclusion, this review underscores the significant impact of ACEs on child health and development and emphasizes the critical role of nurses in addressing ACEs and breaking the cycle of adversity. By adopting a trauma-informed approach and implementing evidence-based interventions, nurses can promote resilience, facilitate healing, and empower individuals and families affected by ACEs to thrive despite adversity.

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# PERFORMANCE EVALUATION OF A LOCALLY MADE 3KVA SINGLE PHASE INVERTER

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## ABSTRACT

This study presents performance evaluation of 3KVA 24/220V 50Hz single Phase inverter. The two 12 Volts 200AH batteries were connected in series to produce 24V, 400AH which is fed into the input terminals of the inverter connecting resistive and inductive loads in the output terminals to determine different measured. It was observed that when the inverter system was working on No-load, the battery voltage kept decreasing, which is an indication that for optimum performance the battery must be charged continuously irrespective of whether load is connected or not. It was observed that as resistive load increases, the terminal voltage of the battery decreases, while the current drawn increases, as the terminal voltage of the battery decrease. It was observed that the higher the load, the more the current drawn, hence the extent of continuity of supply depends on the ampere-hour rating of the battery and the amount of current drawn by the load. Also the resistive load consumes less energy compared with inductive load. Therefore, for highly inductive loads such as electric motors and transformers, there is need for higher capacity inverters for smooth operations. The output waveform analyzed using the Hantek DSO5202B, shows that the inverter that was analyzed has pure sine wave. The prototype design took care of the various lapses in previous designs which included the final output (pure sine wave), cut off voltage to save battery life and very reduced cost of the final product as products were assembled locally.

**KEYWORDS:** Battery, environmental sustainability, inverter, power distribution, resistive and inductive load

## 1.INTRODUCTION

Electricity generation, transmission, and distribution entities have struggled to provide consistent power to consumers, prompting consumers to seek alternative sources of power for residential, commercial, and industrial needs (Obukoeroro and Uguru 2021; Adoghe *et al.*, 2023). Various methods are available for power generation, including generators, wind power, and solar energy. Much of this energy is stored in batteries using inverters, which are power electronic devices that convert direct current (DC) energy, typically found in batteries, into alternating current (AC) energy (Phutane and Suraj, 2013). Man relies on power supply for almost every phase of their daily activities as in houses, offices, computer, security, telecommunication system, farming etc., but with the erratic power supply it is quite evident that there is need for alternative source of supply, as such the need for stand-by power supply is essential which brought into existence the alternative means called the inverter (Govindaraju and Baskaran, 2010).

Between the late nineteenth and mid-twentieth centuries, the conversion of DC to AC power was achieved using rotary converters or motor-generator sets (M-G sets). During the early twentieth century, vacuum tubes and gas-filled tubes emerged as switches in inverter circuits (Sudipta *et al.*, 2013; Ezeagwu *et al.*, 2019). The origin of electromechanical inverters explains the source of the term inverter, early AC to DC converters used an induction or synchronous AC motor direct-connected to a generator (dynamo) so that the generator's commutator reversed its connections at exactly the right moments to produce DC. A latter development is the synchronous converter in which the motor and generator windings are combined into one armature, with slip rings at one end and a commutator at the other and only one filed frame. The result with either is AC-in, DC-out. Using an M-G set, the DC component can be regarded as being generated independently of the AC component. With a synchronous converter, it can be viewed as a form of "mechanically rectified AC". Moreover, with suitable auxiliary and control apparatus, an M-G set or rotary converter can be operated in reverse, converting DC to AC. Therefore, an inverter can be conceptualized as an inverted converter (Sudipta *et al.* 2013).

When utilizing an M-G set, the DC portion can be seen as generated autonomously from the AC section. Through a synchronous converter, it can be perceived as a type of "mechanically rectified AC". Additionally, with appropriate auxiliary and control equipment, both an M-G set and a rotary converter can be employed in reverse, transforming DC into AC. Thus, an inverter can be understood as a reverse converter (von Jouanne *et al.*, 199). SCRs do not turn off or commute automatically when the gate control signal is shut off. These only turn off when the forward current is reduced to below the minimum holding current, which varies with each kind of SCR, through some external process. For SCRs connected to an AC power source, commutation occurs naturally every time the polarity of the source voltage reverses. In SCR circuits connected to a DC power source, forced commutation



methods are typically necessary to ensure that the current is forced to zero when commutation is needed. However, simpler SCR circuits often utilize natural commutation rather than forced commutation (Sudipta *et al.*, 2013; Tsai *et al.*, 2028).

Although inverters provide clean and reliable energy, these are not cost-efficient for high power demands but only on the long run. It is an expensive technology and for years researchers and developer have tried to make the technology more cost-efficient. The idea is that in the future, household electricity could be provided by means of inverters powered by fuel cells and batteries or other alternative energy sources that can help reduce cost of household's energy demands (Phutane and Suraj, 2013). The inverter has become very important in modern technology because of the need to produce continuous electric power supply to critical loads such as computers, surgical equipment, security doors, automated teller machines (ATMS), telecommunication system, broadcast equipment, public address system, lighting system etc. The inverter is a major segment of an uninterrupted supply unit (UPS) (Phutane and Suraj, 2013; Anas and Pratibha, 2014). In applications where inverters transfer power from a DC power source to an AC power source, it is possible to use AC to DC controlled rectifier circuits operating in the inversion mode. In the inversion mode, a controlled circuit operates as a line commutated inverter. This type of operation can be used in HVDC power transmission systems and in regenerative braking operation of motor control systems. Another type of SCR inverter circuit is the Current Source Input (CSI) inverter. A CSI inverter is the dual of a six step voltage source inverter. With a current source inverter, the DC power supply is configured as a current source rather than a voltage source. The inverter SCRs is switched in a six-step sequence to direct the current to a three-phase AC load as a stepped current waveform (Jyoti *et al.*, 2013). SCI inverter commutation methods include load commutation and parallel capacitor commutation. With both methods, the input current regulation assists the commutation. With load commutation, the load is a synchronous motor operated at a leading power factor. As these have become available in higher voltage and current ratings, semiconductors such as transistors or IGBTs that can be turned by means of control signals have become the preferred switching components form used in inverter circuits (Jyoti *et al.*, 2013).

The square wave output with high harmonic content, is not suitable for certain AC loads such as motors or transformers. Square wave units were the pioneers of inverter development (Jyoti *et al.*, 2013). The output of a modified square wave, quasi square or modified sine wave inverter is similar to a square wave output except that the output goes to zero volts from time before switching positive or negative (Osahenvenwen *et al.*, 2016). A multilevel inverter synthesizes a desired voltage from several levels of direct current voltage as inputs. The advantages of using multilevel topology include reduction of power ratings of power devices and lower cost. There are three topologies-diode clamp inverters, flying capacitor and cascaded inverter (Jyoti *et al.*, 2013). A pure sine wave inverter produces a nearly perfect sine wave output (less than 3% total harmonic distortion) that is essentially the same as utility-supplied grid power. Thus, it is compatible with all AC electronic devices. This is the type used in grid-tie inverters. Its design is more complex, and costs more per unit power (Alaskan, 2006). In achieving a better output voltage waveform (sine wave approximation) lower the harmonic content of the final output which is a problem in most locally assembled inverters. The study will focus on the performance evaluation of a 3KVA locally made inverter carried out with 2x12V/200AH batteries connected in series to give a 24V input supply; it is expected to have an output of 200VAC, 50Hz.

## 2.MATERIALS AND METHOD

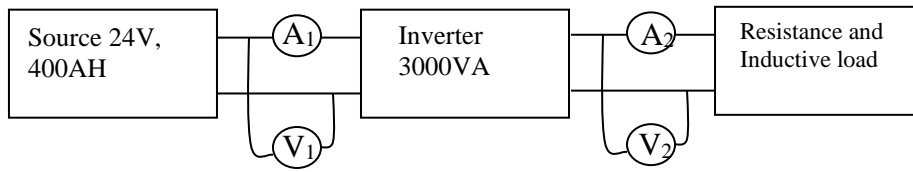
The materials and apparatus used in this study include the following.

- i. 3KVA single phase, 50Hz, 24/220volts inverter designed and constructed locally and assembled.
- ii. 2-12 volts 200AH mercury deep cycle batteries.
- iii. 10-200watts Philip filament lamps
- iv. 3-Digital multimeters
- v. Wattmeter
- vi. Load bank
- vii. Hantek DSO 5202B oscilloscope
- viii. 125 Watts inductive load

### 2.1. Experimental Procedures

The two 12 Volts 200AH batteries are connected in series to produce 24V, 400AH which is fed into the input terminals of the inverter as shown in figure 1. The variable resistive and inductive loads were connected to the output terminals of the inverter via the ammeter to measure the load current, while the voltmeter is connected across the load to determine the terminal voltage of the inverter. At the commencement of the experiment, the terminal voltage of the battery bank was measured and battery voltage against time for No load at the output terminals of the inverter was also recorded. First the load was varied in steps of 200Watts by addition of 200Watts filament step up to 400 Watts and more with an inductive load of 125 Watts ratings, readings taken which included  $V_{dc}$ ,  $V_{ac}$ ,  $I_L$  and  $V_{ac}$ .

The experimental data was used to determine the battery voltage, load current and load voltage for both resistive and inductive load test.



**Figure 1: Experimental Diagram**

### 2.2. Digital Multimeter

Digital multimeter was used for measuring and taking reading for both current and voltage. The photograph is shown in plate 1



**Plate 1: Photograph of Digital Multimeter Used.**

### 2.3. Digital Oscilloscope

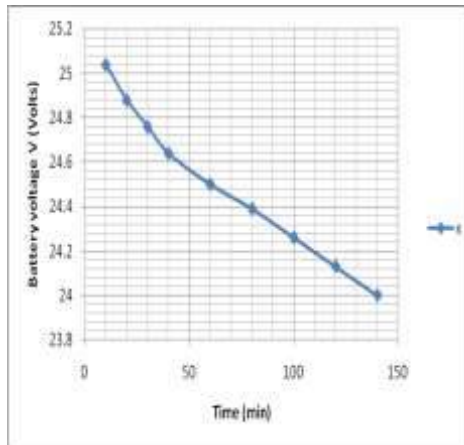
The Hantek DSO5202D 2 channel storage oscilloscope was used to get output waveform to determine if his complete sine wave. The Hantek oscilloscope photograph is shown in plate 2.



**Plate 2 Photograph of Hantek DSO5202B Oscilloscope used.**

## 3. RESULTS AND DISCUSSION

The test was done to ensure that the inverter circuit is working as expected. The test would help to ascertain its behavior under no load with respect to the output voltage stability. The inverter performance was determined by the measurement of voltages, current and time duration for different loads to the inverter at different periods. The inverter was used to power various resistive and inductive loads under strict supervision in the laboratory. Figure 2 shows battery voltage against time for no load

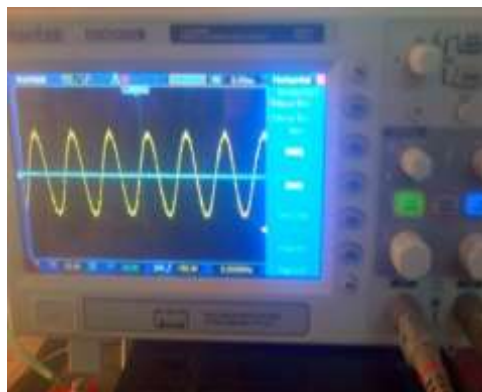


**Figure 2: Battery Voltage against Time for Inverter No Load**

It is shown in Figure 2 that at no load even when the inverter was working the battery voltage kept dropping which indicates that for optimum performance of a battery it must be charged continuously irrespective of whether load is connected or not. The current drawn recorded for the no load test was very minimal; this current was as a result of the internal impedance of the battery and was constant for the period. The photograph for this experiment and waveform are captured in plate 3 and plate 4 respectively

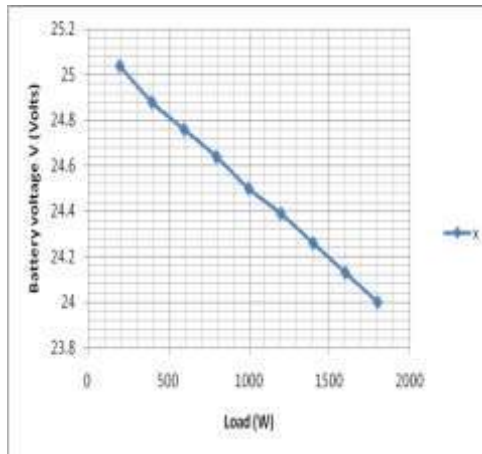


**Plate 3 Experimental Set with No Load and Display**



**Plate 4: Waveform from Oscilloscope with No Load on Inverter Resistive Load Test**

Varied resistive load test was carried out the plot is shown in figure 3, for resistive load (varied) against battery voltage



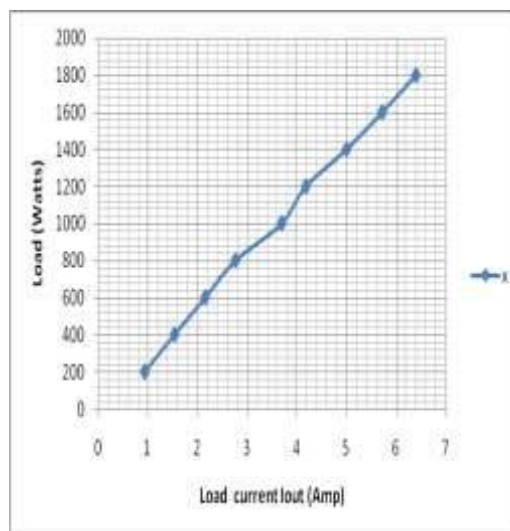
**Figure 3: Inverter Resistive Load Test**

For battery voltage against resistive load, shows that as the resistive load increases the terminal voltage gradually decrease. The relationship is not linear but decreases exponentially as resistive load increases. The photograph of the experimental waveform (pure sine wave) is recorded in plate 5.



**Plate 5: Photograph of Waveform Recorded For Resistive Load**

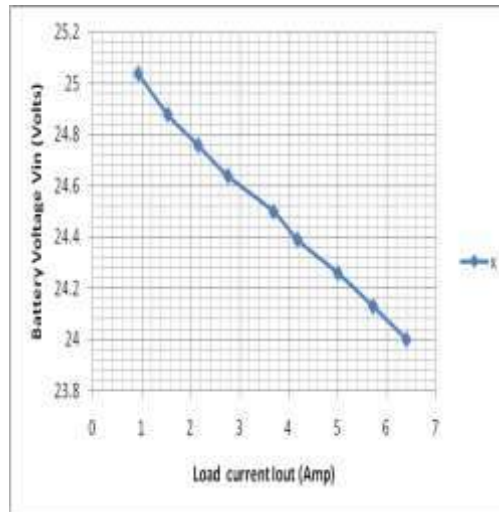
The figure plotted for load versus current show current drawn is proportional to the load as load increases current drawn increases. This is shown in figure 4.



**Figure 4: Load Current Characterization**

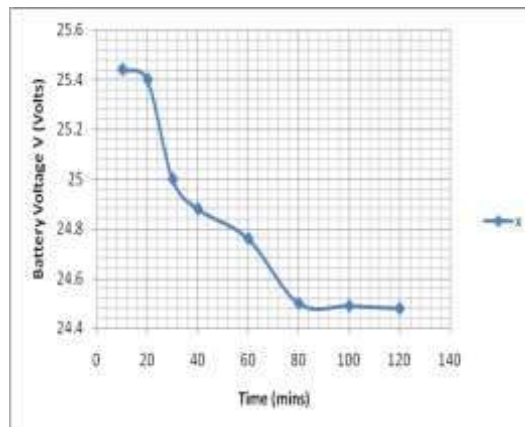
Also the relationship between load current and battery voltage is shown in figure 5 as current drawn increases the terminal voltage of the battery decreases





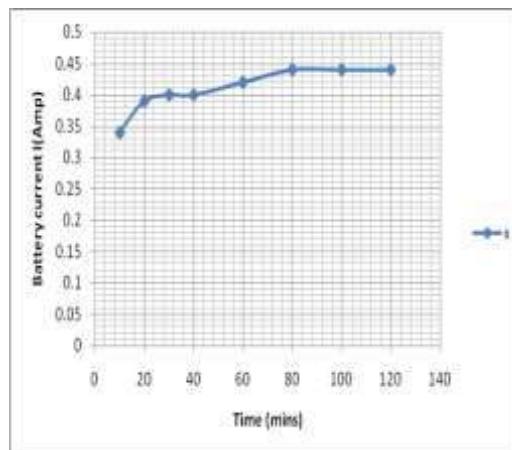
**Figure 5: Effect of load current on the terminal voltage of the battery Inductive Load Test**

The inverter was used to power inductive load, the results shown in figure 6 (battery voltage against time) and figure 7 (battery current against time).



**Figure 6: Battery voltage against time with inductive load**

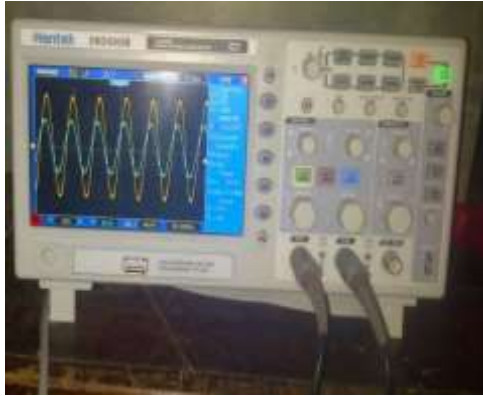
Figure 5 and 6 illustrate that the system encounters a sudden voltage drop initially due to the starting current drawn from the battery, particularly attributed to the inductive load. This voltage drop is followed by a gradual increase. It was noted that the inverter depletes its charge more rapidly under an inductive load due to the higher initial inductive load, contrasting with the behavior observed under a resistive load.



**Figure 7: Battery current against time with inductive load**



In Figure 7 it was observed that the battery drops between 0-10 minutes was significant and it then remains almost constant for 10 – 20 minutes this is as a result of high initial starting current of an inductive load, the waveform (pure sine wave) shown in plate 6.



**Plate 6: Photograph of waveform recorded for inductive load**

#### **Resistive and Inductive Load Test**

After readings were taken for resistive and inductive loads separately the load were combined and readings taken, plate 7 shows the waveform (pure sine wave) captured.



**Plate 7: photograph of combined load for the experiment (Resistive and Inductive)**

#### **4.CONCLUSION**

The goal for this study was to analyse the performance of a locally made 3KVA, 220V, 50Hz, single phase inverter in line with the local content policy of the Federal Government of Nigeria to produce appropriate sine wave. The goal, to produce a 220 Volts sine wave with the capability of providing 3000 VA of power was tested with various types of loads (inductive and resistive) and waveform captured which was very close to a pure sine wave, was made possible by the SG3524 oscillator (Featuring inbuilt pulse width modulator) it fires the power MOSFETS ON and OFF in pull push mode i.e. one OFF the other ON for example when the upper FET conducts, The lower one is closed or vice versa at a frequency of 50 HZ. The PWM is a source of oscillation of the power inverter. The circuit converts a DC voltage into a series of pulses, such that the pulses duration is directly proportional to the value of D.C voltage. The greater advantage of such circuits is that there is almost no power loss in the control circuit.

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# GENDER INEQUALITY AND HEALTH: A STUDY OF ELDERLY IN ALIGARH CITY

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Article DOI: <https://doi.org/10.36713/epra16632>

DOI No: 10.36713/epra16632

## ABSTRACT

Women are more susceptible to unjust treatment, discrimination, and denial of fundamental human rights such as survival, education, health, inheritance, etc. due to social factors such as male domination and their subordinate status. Women experience two distinct disadvantages in the aging population due to gender-based roles and stereotypes. As a result, they are treated poorly in society. While aging is unavoidable, its gendered inequalities are not. Gender greatly impacts both men's and women's health in India. This in turn affects a person's susceptibility to illness and likelihood of experiencing health problems. The present study is both primary and secondary in nature. This paper tried to analyse the social and health issues faced by the elderly and examine gender-based inequalities in healthcare among the elderly in a selected area of Aligarh City in India and suggest ways to promote gender equality among the elderly by challenging the established pattern of inequality in health.

**KEYWORDS:** Elderly, Gender, Health, Aging

## INTRODUCTION

This paper is based on gender inequality in healthcare among elderly in Aligarh City. There are several domains in which men and women have encountered unequal opportunities. These domains include mortality, natality, basic facilities, special opportunities, professional, ownership, and household (Sen, 2001, pp. 466-468). In the 2011 census, the senior population in India accounted for 103 million individuals, which represents 8.6% of the total population (LASI Wave I, 2017-2018, p.2). India is positioned at 135th rank among 146 nations with respect to the Global Gender Gap 2022. It can be inferred that gender refers to the socially constructed characteristics that are associated with males, females. It exhibits variation across cultures and is susceptible to transformation over time according to World Health Organisation. Gender inequality is unequal and biased treatment between male and female (Tiwari, 2013, p.24). Gender norms, socialisation, power relations, and access to resources are among the factors that influence differences in vulnerability and susceptibility to illness, the experience of illness, health behaviours, access to and use of health services, treatment responses, and health outcomes (WHO, 2023).

Elderly (Old) age is a stage of life marked by substantial shifts for both genders, including changes in societal responsibilities and gender-related expectations and status within the family (Caramel, 2019, p.2). The perpetuation of gender discriminatory practices across generations results in the violation of the rights of girls and impedes their growth. This gap is attributed to their increased longevity, the loss of a partner, and the resulting socio-psychological and financial instability (Giridhar et.al, p. 21). It is not uncommon for elderly women to experience financial hardship and social isolation subsequent to extended periods of providing uncompensated care to their loved ones. Some of the factors that contribute to vulnerability among the elderly population include poverty or the likelihood of experiencing poverty, exposure to violence, and instances of elder abuse. The elderly women may face financial difficulties in their later years due to a history of discrimination, resulting in a reduced amount of financial resources and assets, thereby posing a challenge to their ability to sustain a satisfactory standard of living. Women in the majority of countries exhibit a lower probability of receiving pensions in comparison to their male counterparts, and even when they do, their benefits are typically considerably reduced. As a consequence of this, elderly women exhibit a higher vulnerability towards exploitation and mistreatment (Nair et. al. 2019, pp.1-5). The present study is supported with the intersectionality theory proposed by Kimberley Crenshaw. Intersectionality is a conceptualization framework for how various forms of prejudice and discrimination affect one individual, a group of individuals, or a society issue. It considers how people's multiple identities and life experiences intersect in order to comprehend the complexity of prejudices they encounter. ([www.ywboston.org/2017/03/what-is-intersectionality-and-what-does-it-have-to-do-with-me/](http://www.ywboston.org/2017/03/what-is-intersectionality-and-what-does-it-have-to-do-with-me/)). As per the 2011 Census, 104 million Indians are above 60 years of age, making up 8.6% of the country's overall population. Ages 60 and older make up 12% of the population. The states of Tamil Nadu (16%), Puducherry (16%), Kerala (20%), Himachal Pradesh (17%), and Goa (15%) have larger percentages of senior people (60 and above) (WHO). So the



concern of this paper is to investigate gender biases in healthcare among elderly in selected wards of Aligarh City. Aligarh district is a district in Uttar Pradesh, and Aligarh City serves as the district's administrative center (BIPDA, 2021, p.3).

### OBJECTIVES OF THE STUDY

This paper tried to analyses the social and health issues faced by the elderly and examine their gender-based inequalities in healthcare expenditure in family.

### RESEARCH QUESTIONS

Q1. What are the socio-economic circumstances of the elderly?

Q2. What health issues do elderly have?

Q3. Are there any gender biases in healthcare expenditure encountered by the elderly in the family?

### REVIEW OF LITERATURE

**Nagaraju Kilari (2020)** posits in his scholarly article titled "Gender Inequality in India" that in India, gender inequality is a complex problem with many facets, including labor engagement, traditional lineal systems, tendency for sons to provide for their elders, employment inequality, loan access, occupational inequities, and social and cultural factors. The problem is exacerbated by son preference, forced financing practices, restricted access to higher-paying jobs, and traditional male lineage inheritance. The problem is further compounded by cultural and social factors, such as the dowry system and health inequities.

**Giridhar et.al.** reported that gender inequality exists at all ages, but as women get older, the effects of socially constructed roles become more obvious. Widowhood is more prevalent among elder women, who live alone, have no income, have fewer assets, and be completely dependent on family for support, which makes poverty in old age inherently gendered. The study found that homes with older women as the head are poorer than those with older men as the head.

**According to Ghosh's (2009)** article, 'Women face significant challenges in the ageing process due to deeply ingrained institutionalized gender hierarchies within their society'. It has been observed that globally, older women constitute the demographic that is most vulnerable to poverty, thereby rendering the ageing process for women even more arduous. It is imperative for women to initiate the planning process early on in their lives, particularly with regards to the ageing process. The apprehensions regarding ageing women in India are intricately linked to anxieties surrounding feticide, dowry deaths, and the custom of dowry, domestic violence, and sati, among other institutionalized and oppressive cultural practices that are indicative of the position of women in the nation.

**E. Harnois'** article titled "Age and Gender Discrimination: Intersecting Inequalities across the life course" (2015), it is evident that women across all age groups, including the young, middle-aged, and elderly, " are subjected to various forms of sexism throughout their lifetime, as observed in previous research on gender discrimination and sexual harassment. The authors explicitly acknowledge that the elderly population encounters various forms of prejudice, such as those rooted in gender, race, ethnicity, and physical impairment.

**Nair et.al. (2021)** conducted a narrative review entitled "Gender Problems in the Care of Elderly" and discovered that age-related physiological, anatomical, emotional, and cognitive changes were influenced by gender. The research indicates that advanced age in women is associated with a higher likelihood of experiencing mental health issues, elder abuse, and less gratifying sexual encounters. Notwithstanding this, they are provided with inadequate long-term care and are afforded limited opportunities to avail medical interventions. The investigation of gender-related concerns in geriatric healthcare, particularly in the domains of frailty, mental health, and sexual health, among others, holds significant significance.

**According to Kaur & Kaur (2019)** reported that women over 65 years of age had considerably greater rates of chronic morbidity, poor vision, cataracts, blood pressure, back pain/slipped discs, malnutrition, depression, reduced physical performance, and elder abuse than older males did. Age-related prejudice and neglect are pervasive, often exacerbated by widowhood, total reliance on others are experienced by older women.

**Tama et.al. (2020)** in their study analysed that the healthcare expenditures for elderly females were comparatively lower than those for elderly males. The expense of healthcare is impacted by multiple variables, such as the prevalence of chronic ailments, the gravity of said ailments, and the nature of medical establishments and provisions. Despite the higher frequency of medical facility visits among older women compared to older men, there is a possibility that they may exhibit a preference for public healthcare institutions over private hospitals. For patients to use their insurance, those medical facilities collaborate with the Healthcare and Social Security Agency (BPJS Kesehatan). The medical costs will be covered by the Healthcare and Social Security Agency, clinics, or health centers. The study did note that the prevalence of non-communicable diseases is rising with age and that they are a common health issue for the elderly. Furthermore, it was shown that women are more likely to be exposed to risk factors that compromise



their functional health and have a higher incidence of diseases as they age. These risk factors, which could all contribute to the health issues faced by older women, could include poverty, being divorced or widowed, unemployed, having a lower level of education, and having less decision-making authority.

**Roy & Chaudhri (2016)** have posited that disparities in health and healthcare utilisation among older individuals based on gender are impacted by factors such as socioeconomic status, financial resources, and empowerment. The results of the study indicated that elderly females exhibited comparatively lower levels of self-reported health in contrast to elderly males, along with higher incidences of disability, fewer occurrences of chronic illnesses, and reduced healthcare utilisation. The study comprised a representative sample of 34,086 elderly individuals who participated in the survey.

**Tomar (2021)** looks at the connections between the lockdown and risks to the health of senior Indian women. For older women in India, there are still health inequities. The physical and psychological well-being of the population has been impacted by the legal lockdown in India. Due to the limits on mobility during the lockdown, older individuals confront challenges such as limited access to healthcare services, a lack of attendants, and prolonged social isolation. These issues may cause gender and age-based disparities to become much more obvious. Because they are more prone to illnesses than males, older women may be particularly vulnerable to health problems. However, this is related to long-term chronic health problems, economic reliance, gender-based discrimination, and elder abuse. Women typically live longer than men.

**Carol Estes (2009)** posits that a key aim of feminist political economics of ageing is to examine the ways in which existing social institutions contribute to the perpetuation of dependence and vulnerability among elderly women across their life spans. The proposed strategy is founded upon four fundamental assumptions: The circumstances and encounters of women are socially constructed over the course of their lifetimes. The second premise posits that the experiences and challenges faced by older women cannot be solely or predominantly attributed to their individual actions and decisions. Women and other socially disadvantaged groups often face significant limitations in their preferences and options, which may be perceived as illusory. As per the third principle, concept of cumulative advantage posits that individuals are allocated and selected on the basis of their status and achievements, thereby suggesting that the elderly population will exhibit greater levels of social stratification compared to earlier life stages, the fourth assumption posits that the marginalization of elderly women is impacted by the interrelated and complex oppressions of ethnicity and race, socioeconomic status, sexual orientation, and financial hardship.

## AREA AND METHODS OF STUDY

This study was carried out in Aligarh city of Uttar Pradesh. Aligarh district is a district in Uttar Pradesh, and Aligarh City serves as the district's administrative center. Since there are numerous lock factories in the area, it is known as *Tala Nagri*, which means "City of Locks". Prior to the 18th century, Aligarh was commonly referred to by its previous name, Kol or Koil. The district is divided into 5 tehsils. Moreover, it comprises 24 towns and 1199 villages. Hinduism and Islam account for 79.05% and 19.85% of the district's population, respectively, as well as 19, 51,996 males and 17, 21,893 females. In the district, there are 882 females for every 1000 males. The city is divided into 70 wards (BIPDA, 2021, p.3). This area is selected because no prior research has been done in this area on the given topic secondly comparative study is possible between retired working and non working elderly in terms of health disparities. The study is carried out in selected four wards of Aligarh City including NaiBasti, Nai Abadi, Doharra, and Usmanpara. This article investigates the impact of gender inequality on the health of elderly women through the utilisation of primary and secondary data sources. The research has been conducted on a population of elderly male and female who were 60 years and above, residing in a specific region of Aligarh city. This area is selected because no prior research has been done in this area on this topic. Owing to limited time and resources, a sizable cohort could not be chosen. A purposive sampling technique was employed to select a total of (50) fifty participants, consisting of (20) twenty males and (30) thirty females through personal contacts. Purposive sampling is thought to not accurately reflect the population however for the purposes of this study there was no other method for finding participants. This approach seemed to be the most suitable one to employ since there was no official data bank on the elderly population in Aligarh. This study is descriptive in nature. Interview schedule and observation have been employed as tools of gathering data. The case study approach has been utilized to gain a comprehensive understanding of the participant's individual experiences. This paper comprises of four case studies, (1) one male and (3) three females including pseudonyms (name changed of participants) out of these above fifty participants.

## PRIMARY DATA

### CASE STUDIES

**Case study 1:** Noor Jahan (name changed) is a 70-year-old illiterate Muslim widow from Malda. She is a beggar who lives on the roadside near Lal Diggi. Her husband passed away 30 years ago who used to work as an agricultural laborer in the fields there. She has two children. At the time of the death of her husband, her daughter was 15 years old and her son was 13 years old. Her son was also involved in working in the agricultural field for daily wages there. After her husband's death, her family suffered from financial crises and she started to beg for money and food from people. As she said, "*When my husband was alive, at least I used to get food*



*two times, but later there was a lot of problems*". She came to Aligarh after four years when her daughter got married to a son of her village neighbors. With her daughter, she also started living in Aligarh. Earlier they live on rent in a small room but due to pending charges of rent, the owner asked to leave the room. Therefore, she started to live in a slum area separately and her daughter lived with her husband at some other place. But after one year, her daughter's husband died due to a severe heart attack while sleeping. She has two children who also knock on doors begging for money. Noor Jahan lives alone. When the researcher asked why she does not live with her son in Malda, she explained that her son also works as a laborer, earns a little money and since she didn't receive two meals a day there and daughter in law treats her badly, abuses her and sometimes asked to leave the house as they didn't have much to feed her also. Therefore, she came to Aligarh, she begs for money from strangers in places near the AMU (Aligarh Muslim University) campus, Amir Nisha and sometimes Dodhpur because she got tired to walk far places due to lack of energy in body due to continuous standing for the whole day and sometimes takes medicine from the medical store to get relief from the pain in legs. In the morning she comes from her area to these places after eight o'clock and returned back after sunset. Noor Jahan is unable to lift heavy objects like flour etc. due to weakness in her bones, therefore she asked for simple money and meals at a place. She barely receives about 100-200 rupees a day wandering here and she stated, *"If I beg while sitting at one place, I will not get it properly"*. About her food habits she stated that within that amount she purchases food from shops or asks people to give food

*"What can I do, no one gives me food, if I get 10-20 rupees from someone, I eat from that"* she said. She takes meal whatever is available at that place in shops at that time therefore she doesn't maintain a balanced diet however in the morning she takes tea with rusks or biscuits. She neither takes milk nor fruits. And occasionally she went to sleep without taking a meal at night while she was starving because neither food nor money was left to buy anything as she stated when she has a fever or any other problem she didn't go outside. When the researcher asked about her health status, she don't know her weight and never measured whenever she suffers from any kind of acute disease she just goes to the medical store for medicines as she doesn't have much money to pay doctors' fees. When she lives in Malda she went to a government hospital there for any kind of suffering. When she was asked here in Aligarh why she doesn't visit government hospitals if needed, she stated that *"I've been there once, but often I don't go; instead, I get my medications at the pharmacy because no one is available to take me there"*. She occasionally fell in places due to weakness and pain in her joints. She stated that she has the problem of *Gathiya* (Arthritis). Her eyesight is also weak but never went for checkups as she said, *"If I get food two times that is enough for me, as there is no one to look after in the life ahead"*. She said that life is very difficult for her neither she has any financial support from her family members, nor she gets love from them. Even she doesn't want to go back to his son because of the unforgettable and unfair treatment done by her daughter-in-law. She has nobody to share her problems and feelings which lead to loneliness.

**Case study 2:** Fatima (name changed) is a 65 years old woman. She is a widow and has studied till the fifth standard. She lives in *NaiBasti*. Due to a lack of a source of money, she worked on the press to produce locks keys before she became sixty. Her spouse, who also worked as a mechanic in a car repair shop, passed away six months ago from cancer. There are seven family members in her family, two married sons with their wives and two grandchildren. Both her sons are illiterate. They both work as auto part repairers in various locations. She lives in a small room in her home. She relies on her elder son because her younger son doesn't give her a monthly payment. She assists to her daughter-in-law with housework. After asking the general questions on socio-economic background, then turned to the questions about her food habits and daily diet she stated that she takes a meal twice a day and said *"It is enough to obtain roti (bread) from children"* mostly vegetables and pulses are taken and do not get milk and fruits. She has no idea of her present weight. Whenever she fell ill she visits 'Malkhan Singh Hospital', a government hospital for her treatment and sometimes avoid to go because of long-distance walking due to a lack of energy in her body. At the time of interview, she was suffering from a fever and took one dose after consulting a doctor who takes charge of Rs. 50 and didn't visit the doctor the second day as she said, *"from where a lot of money will be brought in each day"*. She said her younger son and his wife do not take her to the hospital but he takes care of his wife and takes her to the hospital while her elder daughter-in-law takes her to the doctor. Coming to his present health status, she has problems with cataracts, osteoporosis, arthritis, gas, and fever all the time. In her opinion old age is a curse without her husband as she doesn't have a partner now with whom she can share her feelings and problems said crying... *"don't know how life will go ahead"*.

**Case study 3:** Azmat Ali (name changed) is a married 64-year-old man. He has done post-graduation and lives in a nuclear family. He has four children two daughters and two sons. He earned 50,000 rupees a month as a university employee before he turned 60 and he is receiving half of it after retirement. His wife is a homemaker. Regarding his health, he is dealing with high blood pressure, diabetes, physical weakness, and memory loss. Every day, he takes medicines. He visits the doctor every month and goes to medical for his treatment. In terms of eating habits, he takes three meals each day. He consumes milk on a regular basis but does not consume fruit. He serves as the family's head and makes all decisions. He said *"Due to the half pay, the fact that all three of my children are in school, and the lack of any extra income, my financial situation has changed after retirement"*. He made the decision to conduct some business after retiring, but he took no action because of covid. As he said he spends the same amount on food and health for girls and sons. In terms of the treatment of their children, he says all children love him and her wife also takes care of her, she gives



them food on time and they take lunch together. He sometimes feels lonely after retirement due to a lack of social contacts and does not have any work to do. He is quite introverted so do not share much with his children, he used to go market to buy home-related things and used to watch television and according to him he wants to make his children successful in their careers both daughters and sons.

**Case study 4:** Bhoori (name changed), a 61-year-old woman, resides with her sister’s husband. She has been divorced for 40 years. She exclusively resides in Aligarh with her older sister's husband because when her mother passed away, her sister raised her there as she was childless. There are only two people in the family. Her sister died 10 years ago due to some illness. She has one daughter who was married to a man who works in a factory eight years ago. When it was enquired as to the cause of her divorce, she said that *"My husband didn't talk to me properly, my in-laws mistreated me due to dowry demands, and my husband also hit me, so my sister brought me home, and I soon got divorced"*. Along with it, she said, *"My sister used to look after me like a mother, yet she never let anything go wrong because of her love"*. Nonetheless, she claimed that initially, everything went smoothly but that over time issues developed and people began to wonder why she made this choice. Her relatives taunt her that because of some of her own faults, her spouse had to divorce her. Along with her husband, her sister made incense sticks boxes. Nevertheless, her sister passed away 8 years ago. Also, his brother-in-law does not treat him properly. Provide no financial assistance. She, therefore, does her own work on a piece of fabric like embroidery work. She received 100 rupees for one outfit in exchange for it, but the amount of time and observation required to do so weaken her eyesight. She visited her neighbours since she was feeling lonely. She is unaware of her weight. *"Physically, maybe I look healthy, but mentally, I'm not,"* she said, because her son-in-law does not allow her daughter to meet her mother. And they continually make demands for money or other materials, saying *"your mother has a lot of money"*. She claimed that because no one is around in her life to share sentiments or sufferings, her health is deteriorating day by day. She eats anything she could prepare and fit into her diet three times a day, depending on how much she has. Despite having a little income, she has never had a food crisis. Also, her brother-in-law resides on the ground floor and consumes prepared food from the market and sometimes takes from her.

**TABLES**

**Table 1**  
*Social Status of Elderly (Total number of respondents: 50)*

Attributes	Frequency	Percentage
<b>Age in years</b>		
(60 -70)	35	70
70 & above	15	30
<b>Gender</b>		
Male	20	40
Female	30	60
<b>Educational Status</b>		
Literate	14	28
Illiterate	36	72
<b>Marital Status</b>		
Married	18	36
Unmarried	0	0
Widowed	31	62
Divorced	01	2
<b>Religion</b>		
Hindus	10	20
Muslims	40	80

Source: Field Study

Data from Table 1 shows that 70% of respondents are in the 60–70 age group, and 30% are in the 70 above age group. The findings show that out of 50 respondents, 36 % were married, none of them was single, 62% were widowed, and just 2% were divorced. The results showed that 20% of the respondents were Hindus, whereas 80% of the respondents were Muslims. Therefore, Muslim respondents made up the bulk of the study's elderly participants in this study.





**Table 2**  
*Economic Status of Elderly*

Attribute	Frequency	Percentage
<b>Occupational status before turned out 60 years</b>		
Employed	22	44
Unemployed	28	56
Total	50	100
<b>Occupation</b>		
Government worker	4	8
Business	6	12
Unorganised sector	12	24
Homemaker	28	56
Total	50	100
<b>Present occupational status after 60 years</b>		
Working	6	12
Not working	44	88
Total	50	100
<b>Total salary per month before retirement or 60 years of age</b>		
0 - 5000	28	56
5000-20000	18	36
20000- 50000	4	8
50000 & above	0	0
Total	50	100

Source: Field study

According to the data shown in Table 2, 56% of the respondents were unemployed before they turned out 60 and 44% were employed. It is also shown that majority of the respondents worked in the unorganized sector i.e. 24% followed by business i.e.12% and government workers i.e. 8%. As per their current occupational status after 60 years of age, only 12% are working whereas 88% are not working. Data also reveals their total salary per month before retirement or 60 years of age 18% got 5000-20000, 4% got 20000-50000, and 0% in 50000 & above.

**Table 3**  
*Head of Household*

Attribute	Frequency	Percentage
Elderly Male	16	32
Elderly Female	10	20
Son	24	48
Daughter in law	0	0
Total	50	100

Source: Field study

According to Table 3, the data shows that 32% of the respondents who are heads of the household are elderly males, followed by elderly females i.e. 20%, 48% by the son of their families and 0% by daughters-in-law.

**Table 4**  
*Meal taking in a day*

Attribute	Frequency	Percentage
<b>Meal twice a day</b>		
Males	10	20
Females	10	20
<b>Meal thrice a day</b>		
Males	12	24
Females	18	36



**Total**

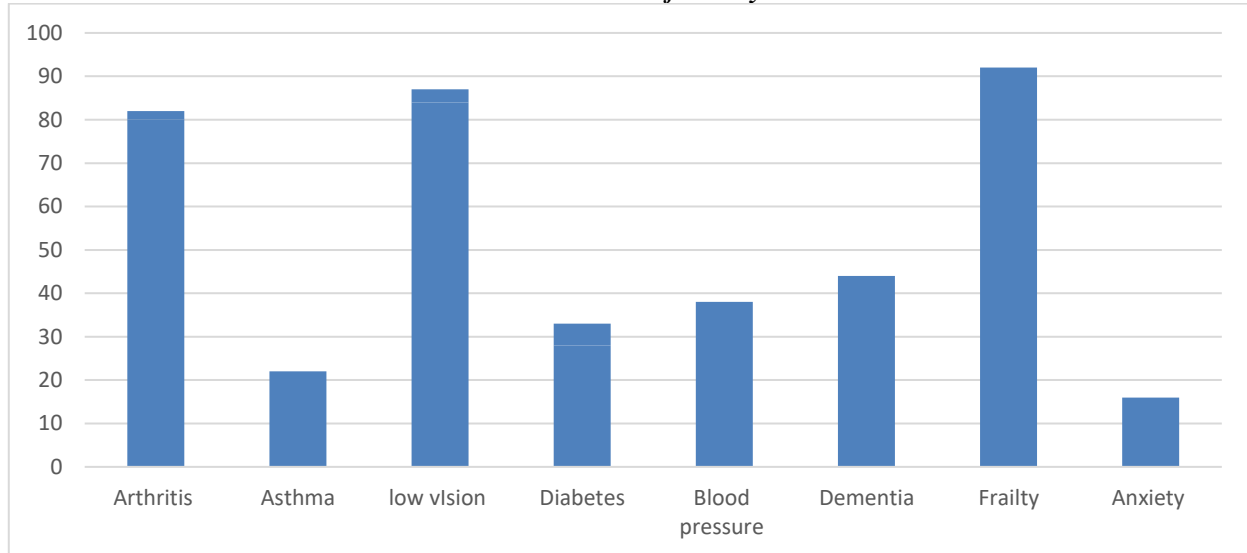
50

100

Source: Field Study

The data in Table 4 shows that meal taking twice a day is equal in both men and women i.e. 20% both elderly males and females and 36% of males and 24% of females took a meal thrice a day.

**Graph 1**  
*Health Issues of Elderly*



Source: Field study

According to the data presented in the graph, out of 50 respondents, 92% have the problem of frailty in their bodies. After that, 80% of the respondents have the problem of arthritis disease, 22% of the respondents suffered from Asthma, 84% of the respondents suffered from loss of vision, 32% of the respondents suffered from diabetes, 38% of the respondents suffered from blood pressure issues, 44% of respondents from dementia and a small number of respondents suffered from the problem of anxiety i.e.18%.

## FINDINGS AND DISCUSSION

Above study reveals that, number of obstacles such as gender inequality, socio-economic status, financial dependence hinders the elderly population's ability to avail healthcare services. The experience of diminished self-esteem can arise as a consequence of reduced financial resources and a decline in social status. The shift from a salaried income to a pension or unemployment benefit can result in an economic deficit, necessitating reliance on family members or offspring for financial support as stated by Dey et.al.(2012). In this context the following analysis has been categorized on the basis of research questions of the study.

1. Socio-Economic Circumstances of the Elderly
2. Health Issues faced by Elderly
3. Gender biases in healthcare expenditure encountered by the elderly

### 1. Socio-Economic Circumstances of the Elderly

Income insecurity is a significant factor contributing to vulnerability among elderly women. Approximately 10% of elderly women who are employed as a result of financial hardship predominantly work within the unorganised sector, where remuneration is meager and retirement and other benefits are not provided. It has been observed that elderly women who have lost their spouses are at a higher risk of economic vulnerability and poverty.

Findings have shown that elderly women tend to exhibit a high degree of dependency and have relatively low levels of personal income. Furthermore, income insecurity has been found to significantly impact the precariousness of elderly women.

The majority of the elderly participants who were interviewed exhibited a lack of literacy skills and was dependent on their offspring for financial support. Among the total respondents, it was found that 72% were illiterate. It was suggested by the respondent that the individual's dependency issues could potentially be mitigated through the acquisition of skills or education. The participant reported that their spouse did not leave any financial assets or other resources, leaving them to manage their livelihood with the resources available to them. They expressed a sense of reliance on a higher power to sustain them through this period. Elderly women are frequently denied dominance in their families, even in instances that are entirely normal, even after the death of her husband.



Findings show that elderly women have reported enduring abuse of some kind. The most common type of violence experienced by women is verbal, whereas physical abuse is the least common. The son seems to be the main perpetrator of the abuse. Notably, elderly women report being abused by their daughters-in-law also.

## 2. Health Issues faced by Elderly

Findings of the study show that around 80% of elderly women have self-reported their health status as poor. The incidence of acute morbidity is observed to be significantly higher in women when compared to men. Prevalent ailments observed among the elderly population include asthma, auditory impairment, cataract formation, cervical and back pain, arthralgia, hypertension, frailty and arthritis, cardiovascular disorders, anxiousness, diabetes, dementia affective disorders and cognitive decline. The prevalence of osteoporosis, arthritis, high blood pressure, and eye problems is higher among women. Additionally, hypertension is more prevalent among the female population. Patients commonly opt for medical care at state-run healthcare facilities and resort to self-administered remedies.

## 3. Gender Biases in Healthcare Expenditure Encountered by the Elderly

The denial of the supremacy of elderly women can be attributed to gender bias. Elderly women may encounter instances of disrespect in emotional matters. The financial dependence of elderly women is significantly elevated. It is reported that the elderly women following their marriage, they have consistently adhered to their spouse's directives and allowed them to make all decisions. This behaviour has persisted even in their current stage of life, where they seek their spouse's approval prior to engaging in certain activities or meeting with others.

Women experience higher levels of loneliness and isolation within the home environment when compared to men. Women who experience the loss of a spouse due to death undergo a challenging period of bereavement, often characterised by intense feelings of loneliness, preoccupation with the deceased, sleep disturbances, physical complaints. This can lead to a decline in mental well-being. The results of the study indicate that loneliness is a significant concern among elderly widows, who exhibit higher rates of mortality, illness, and misery compared to their married counterparts.

Notwithstanding the longevity advantage that elderly women typically enjoy over elderly men, their healthcare needs and requirements are often disregarded by their family members. It reveals that elderly women receive comparatively lesser attention from their children with respect to their healthcare needs. The inadequate allocation of financial resources results in a lack of appropriate nutrition for individuals of varying ages and genders. However, in matters of familial preference, priority is typically granted to male members. In one of the case, the elderly woman expressed their preference to offer their spouse priority access to any desirable meals available. Any remaining portions would then be consumed by her. Furthermore, gender disparities exist in the expenditures made by elderly towards diverse health-related commodities, including pharmaceuticals, medical practitioner and surgical fees, hospital and long-term care facility charges, and other healthcare outlays.

## CONCLUSION

The findings suggest that various factors such as illnesses, family conflicts, and dependency significantly impact the ageing population, regardless of gender. Women are at a risk of experiencing adverse health outcomes, financial instability, poverty, and gender-based discrimination due to their longer lifespan compared to men especially the elderly widows appear to experience the most pronounced systemic disadvantage.

Conversely, it appears that women who are financially secure do not experience significant disparities in healthcare provision. The study suggests that elderly males with higher levels of education and those who reside with their spouses and children demonstrate more appropriate health-seeking behaviour. Our study revealed that individuals, who were elderly, lived alone, had low levels of literacy, and came from lower socio-economic backgrounds exhibited inadequate health-seeking behaviour. The study suggests that a higher proportion of elderly males tend to seek medical attention, while a larger proportion of elderly females tend to rely on home remedies. A shift from a salary-based income to a pension-based income or a state of unemployment leading to financial dependence on family members can result in significant financial loss. The decline in economic potential and social standing may lead to a sense of poor self-worth.

The subject under consideration pertains to the examination of interrelated systems of oppression, domination, or discrimination, as well as the convergence or intersection of social identities. The present study is underpinned by the theoretical framework of intersectionality. The adoption of an intersectional perspective reveals the manner in which individuals' social identities can intersect, leading to the experience of compounded forms of discrimination. As a result, in later life, the elderly confront elder abuse and discrimination, while elderly women face both elder abuse and gender inequality. The concept of age can be considered as a self-contained structure of inequity, as it represents a form of disparity that is not contingent upon bodily transformations or the compounded impacts of other forms of injustice experienced throughout an individual's lifespan. The autonomy and authority of



elderly individuals may be restricted due to the societal tendency to associate ageing with decline and physical weakness. Therefore, it is imperative to incorporate mental health and psychological healing into the treatment plan for the elderly. The incorporation of gender-responsive care is imperative for achieving universal health coverage and enhancing the overall health status of the elderly population.

## LIMITATION

It is plausible that the outcomes of these qualitative interviews may not be generalizable to all elderly populations. As a result of the low representation of elderly males in the designated regions, the researcher was unable to obtain a balanced distribution of male and female participants within the households due to feminization of ageing. The number of respondents is fifty therefore only the above issues have come out and with large sample more concerns will come out. More research on this topic with a bigger sample size is advised in light of the elderly population to comprehend better and offer more information about additional problems that India's elderly citizens face.

## STATEMENTS AND DECLARATION

### Competing interests

#### Funding

- The authors did not receive support from any organization for the submitted work.
- No funding was received to assist with the preparation of this manuscript.
- No funding was received for conducting this study.
- No funds, grants, or other support was received

**Financial interests:** The authors declare they have no financial interests.

- The authors have no relevant financial or non-financial interests to disclose.
- The authors have no competing interests to declare that are relevant to the content of this article.
- All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.
- The authors have no financial or proprietary interests in any material discussed in this article.

### Conflicts of Interest

The author declares no conflicts of interest

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# IMPACT OF CREDIT, INTEREST RATE AND INFLATION ON SMALL AND MEDIUM ENTERPRISES PRODUCTIVITY IN NIGERIA

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Article DOI: <https://doi.org/10.36713/epra16607>

DOI No: 10.36713/epra16607

## ABSTRACT

*This study sought to evaluate the impact of credit, interest rate and inflation on Small and Medium Enterprises Productivity in Nigeria, using annual time series data from 1986-2023. The data for the study was sourced from the World Development Indicator (WDI) and the Central Bank of Nigeria (CBN) statistical bulletin. The data collected were gross domestic product (GDP) which is the dependent variable while commercial bank total credit to private sector (CPS), small and medium enterprises contribution to GDP (SMEC), inflation rate (INFL) and interest rate (INT) are the independent variables. Descriptive, inferential statistics and Error Correction Model (ECM) were used to test the long run relationship of the variables. The results of the regression show that credit to private sector and small and medium enterprises contribution to gross domestic product is positive and significant to economic growth. The results further revealed that inflation rate and interest rate have a negative and insignificant effect on gross domestic product. The study recommends that government should put more efforts to curb inflation to give more confident to investors and should implement measures (low interest rates) that would broaden the borrowing base to improve financial capacity of SMEs, thus lead to an increase in the contribution of SMEs to nation's GDP.*

**KEYWORD:** *SME, Interest rate, Inflation, GDP.*

## 1. INTRODUCTION

Small and medium scale enterprises (SMEs) are pivotal to the growth of national and regional economies. Hence, they are acknowledged as the engine of economic growth that promote economic well-being particularly in developing and emerging market economic through employment generation and poverty alleviation. SMEs contributes to GDP, increases revenue from taxes, develops human capacity, fosters entrepreneurship culture, generates income, and improves the quality of life of members a society (Adeyemi, 2011). Ateke and Nwiele (2017) add that SMEs fundamental components of the economic fabric of developed and emerging economies that stimulate economic growth, promote innovation and enhance prosperity. The word 'small and medium scale enterprises' has as many interpretations as they have applications. It has been used inter-changeably by the researchers, policy makers, and business advisors. They are informal sector, small business, small firms, small-scale industries (SSI), small scale enterprise (SSE), small and medium enterprise (SME), medium and small-scale industry (MSSI), micro, small and medium enterprise (MSME) and micro enterprise (ME). Variants of expressions are used among and within different countries.

The entrepreneur plays a central role in capitalist economies (Schumpeter, 1934, 1939; Vaz-Curado and Mueller, 2019). therefore, the question regarding the factors that explain the expansion or contraction of entrepreneurship in economies is of vital importance (see, e.g., Gnyawali and Fogel, 1994; Keilbach, et al., 2008). The role of credit and finance in enhancing entrepreneurship has been ignored or underweighted in conventional wisdom (Hodgson, 2021). The conventional wisdom some economic historians (e.g., Postan, 1935; Pollard, 1964) have adopted theorizes that entrepreneurs finance their businesses with their own savings and by reinvesting their profits or borrowing from their family and friends. In this framework, financial institutions play a minor role in financing entrepreneurial activities (Heaton, 1937; Trew, 2010). In sharp contrast, many international studies violate this view and emphasize that financial institutions play a key role in economic development (e.g., Hodgson, 2021; Trew, 2010).



Furthermore, the attainment of a prosperous economy will remain elusive in the midst of high interest rate because it stagnates economic growth and hinders expansion of businesses. Developing nations have maintained a double-digit interest rate which makes cost of borrowing from banks relatively high compared to a single digit in many developed countries. In developed economies 98% of all enterprises are SMEs, employing 80% of labour in Japan, 50% in Germany, 46% in USA and contributing 39% of national income to the USA economy (Udechukwu, 2003), and 60% to the Chinese GDP in 2014 (Lam & Liu, 2020). These statistics suggests that lending to SMEs makes meaningful impact to when they are long-term oriented. However, lenders always preferred the opposite because of the volatile, high mortality rate and high risk involved in lending to SMEs. In addition, economic theory has always pointed to the harmful effects of inflation on the growth of economies, whether through expectations, the costs of investing, the difficulty of predicting relative prices in the future or even the political aspects associated with austerity measures of macroeconomic policy (Dressler, 2016). In general, it is understood that macroeconomic policy is clearly important for economic growth because of its role in reducing uncertainty and encouraging investment by economic agents (Barro & Sala-I-Martin, 2004; Aghion & Howitt, 2009; Acemoglu, 2009; Ramzi & Viem, 2016).

Therefore, with the individual effect of credit, interest rate and inflation on small and medium enterprise productivity in Nigeria, the survival rate of SMEs has been a contending issue in Nigeria. Obiwuru et al. (2012) and Basil (2005) reveals that about 80% of SMEs die within their first five years of establishment, a smaller percentage survive the first five years but goes into extinction in the sixth to tenth year while five to ten per cent survive, thrive and goes into maturity. Access to credit facility has been a major constraint limiting the growth of SMEs in relation to its contribution to gross domestic product (Lam & Liu, 2020; Opara, 2011; Onyenebo, 2018; Basil, 2005; Ayuba & Zubairu, 2015). It is no doubt that apart from funds sourced internally by operators of SMEs in the country, the external source of funds comes from the banking sector (Aremu & Adeyemi, 2011). High interest rate discourages operators of SMEs from accessing these loans to finance their businesses; low interest rate attracts investment and causes expansion of economic output (Ojega & Odejimi, 2014).

There is indeed no controversy about the importance of SMEs to the wellbeing of nations; and their funding has attracted the attention of scholars and policy-makers. Previous studies focused on explaining drivers of growth of SMEs less on credit, interest rate, inflation, and more on internal competences and sundry environmental variables. With a view to joining the discourse on growth of SMEs and contribute to the growing body of knowledge on the topic therefore, this paper examines the impact of credit, interest rate and inflation on SMEs productivity in Nigeria.

### Statement of the Problem

This study was informed by the perceived paradox of growth in Nigeria. As the GDP grows, it is expected that it trickles down to other sectors of the economy by ways of greater utilisation of local raw materials, employment generation, encouragement of rural development, development of entrepreneurship, mobilisation of local savings, linkages with bigger industries, provision of regional balance by spreading investments more evenly, provision of avenue for self-employment and provision of opportunity for training managers and semi-skilled workers. Unfortunately, the reverse is the case. The country's citizens continued to record a dwindling economic situation, low levels of purchasing power, inability to access capital for business expansion and low level of standard of living, increase in unemployment and underemployment, and low level of absorption capacity of the informal sector enterprise. In spite of the fact that SMEs have been regarded as the backbone of most economies for employment generation and technological development, its impact on Nigeria economic growth and development has been low, thus warranting an empirical probing to various SMEs drivers and inhibitors that impact on the growth in Nigeria. In recent times, however, economic growth and development and their drivers have been examined by researchers from various standpoint and with varying literary perspectives. The impact of Small and Medium Enterprises on the growth and development of the Nigerian economy have also been investigated (Eze and Okpala, 2015; Muritala *et al.*, 2012; Offor, 2012; Opafunso and Adepoju, 2014). For example, Offor (2012) carried out similar research but the study regress only Small-Scale Industries Output and real interest rate on GDP. Eze and Okpala (2015) included Output of Small and Medium Scale Enterprises, Bank Credit to SMEs, Interest rate, and Government Expenditure among others.

This study is important and it fills a gap by expanding models of previous researchers to include other variables that either propel or inhibit SMEs from impacting positively on economic growth in Nigeria, Thus the inclusion of small and medium enterprises contribution to GDP, inflation, interest and credit to private sector. Furthermore, if SMEs in Nigeria are restructured to impact heavily on GDP in Nigeria, arguably it will help to address the challenges of unemployment, poverty, and a host of other human miseries.

The main objective of this study is to investigate the impact of credit, interest rate and inflation on SMEs productivity in Nigeria. But the specific objectives are; (i) Examine the contribution of Small and Medium Enterprises on Economic growth in Nigeria; (ii)



investigate the impact of Inflation on the growth of SMEs in Nigeria and (iii) to determine the impact of Credit to SMEs on economic growth in Nigeria.

## 2.LITERATURE REVIEW

The role of SMEs in the creation of employment opportunities and poverty alleviation in the economy has very strong empirical support, for instance while giving an insight into the contribution of SMEs in the economic growth, carpenter (2012) in his book opined that, about 70 percent of SMEs industries account for development in developed countries. SMEs today account for the bulk of output in most countries. They have also proven beyond doubt to be employment creators in China where they employed more than 50 percent of the work force. While in Nigeria, SMEs in both the formal and informal sectors employs over 60 percent of the workforce (Ashamu, 2014). Therefore, the argument on the role of small and medium scale enterprises in ameliorating the menace of unemployment in the national economy has been in the front burner for years and this has geared many scholars on the subject to conduct researches that could beam light on the issue. It is in the same spirit that reviewing past research studies on the subject becomes imperative (Omadjohwoefe, 2011).

Adeyemi and Lanrewaju (2014) assessed the impact of Small and medium business entrepreneurship on poverty reduction in Ibadan metropolis, South Western Nigeria. The study population was drawn from a register of relevant trade associations and published government documents, which yielded a total of 383 enterprises. The study used simple percentage and logit regression as a tool of analysis. The empirical results indicated that individuals in and small business entrepreneurship in Ibadan metropolis earnings increased by 39%. The study found that the impact could have been more pronounced but for some socio-economic, infrastructural and management challenges. The study recommends strengthening of entrepreneurship, increased publicity of government Business Development and Support Services, liberalization of access to and usage of business premises, reduction in cost of production, improvement of infrastructural facilities among others.

Emerole and Edeoga (2015) conducted a study on employment creation and income generation potential of small and medium scale enterprise in Abia state, Nigeria. With reference on poultry and bakery, beyond the broad objective, the study sought specifically to assess the income generating capacity of these firms, and assess their employment capacity and its determinants. Sixty samples were randomly selected from each of these SMEs; Income statement account and multiple regression analysis were used to analyze the data collected. The Income Statement Account reveal that an average poultry in Abia state metropolis has an income generating capacity of ₦2,534,200 and average bakery ₦3,151,056 annually. The regression coefficient revealed that Size of the firms (0.638) at 1% level of significant, Number of department (0.611) at 5% level of significant is positively related to the employment capacity of these firms, Availability of labour (-0.636) and profitability of the organization (-3.138) has a negative relationship with the employment capacity of these firms. Each of these firms has a minimum of two employees and maximum of five persons, while one hundred and twenty (120) firms studied has a total number of three hundred and eighteen (318) employees. The researcher concluded that the employment creation and income generation potential of small and medium scale enterprises are indispensable for economic development of Abia state in particular and Nigeria as a whole. Thus he recommended that government should encourage more entrepreneurs through the creation of social amenities and reviewing of tax policies which have a negative influence on their income generating capacity.

James (2015) examined the role of small-scale enterprises in the achievement of economic growth in Nigeria. The problems hindering the small-scale enterprises from achieving their full potentials as the agents of growth and development were highlighted. Suggestions and recommendations were made with a view to solving the identified problems. One essential function of small-scale enterprises is that they provide employment to large number of Nigerians residing in both the rural areas and the urban centres thereby helping to solve the nagging problem of unemployment in the country. When unemployed people are given gainful employment, it reduced the spate of social ills, such as, robbery, prostitution, advance fee fraud (419) and kidnapping in the society. The operation of numerous small-scale enterprises also boosts trading activities because the employed people are earning money which they can spend in obtaining good and services. Descriptive research method was adopted in this article. The study population used consists of 50 small-scale enterprises chosen through simple random sampling from businesses operating in two states (Lagos and Anambra States). A total of 250 questionnaires were administered (that is five questionnaires for each of the 50 enterprises). Tables and percentages were subsequently used to analyze the data extracted from the completed questionnaires. Apart from other supportive facts and figures, more than 77.7% of the respondents strongly believed that small-scale enterprises in Nigeria serve as veritable instrument for achieving economic growth. Ilegbinosa and Jumbo (2015) empirically examined the impact of Small and Medium Scale Enterprises on Nigeria's economic growth from 1970 to 2012. The study collected both primary data for 84 SMEs and secondary data for the statistical analysis. The ordinary least square (OLS), co-integration and error correction model were employed as statistical tools to estimate the data collected during the period of this study. The variables used include Gross Domestic Product as the dependent variable and Finance Available to Small and





Medium Enterprises, Interest rate and Inflation rate as the independent variables. The result of the analysis revealed that finance available to SMEs was positively related to economic growth while interest rate and inflation rate showed a negative and positive influence on economic growth respectively.

Chinweuba and Sunday (2015) conducted a quantitative analysis of the impact of Small and medium scale enterprises (SMEs) on Nigeria's economic growth performance for the sample period 1993 to 2011. The econometric technique adopted for the study was multiple regression method based on ordinary least squares technique. The study adopted the Augmented Dickey Fuller (ADF) unit root test to check for the order of stationarity of the variables employed. The Johansen cointegration test conducted to show evidence of long run equilibrium relationship between small and medium scale enterprises and economic growth. The result of the regression reveals that output of the small scale enterprises does not make any significant contribution to Nigeria's economic growth performance. The study concludes that poor government policies, on tariffs and incentives, bribery and corruption, non-existent.

Mashimba and Khul (2015) examined the performance of Micro and Small-Scale Enterprises (MSEs) in Tanzania; a growth hazards of fruit and vegetables processing vendors. The study locations were selected as sample using simple random sampling procedure and the survey method was used to collect data from the respective small enterprises. Panel data were used given the large size of the sample. The study employs the Cox proportional (Cox PH) analytical tool to investigate growth of studied MSEs over time. The analysis evolves interaction manager-owner's intrinsic knowledge, resources, and geographical proximity of sampled enterprises. The results show a low growth rate of studied enterprises, i.e. at 0.25 and 0.16 per year for revenue and capital investment respectively. The main factors associated to studied MSEs growth are MSE's operational capital; number of owners; staff-size; profit; annual production of products; access to basic market information; linkage to supportive bodies; business improvement services; distances to inputs sources and marketplaces; and manager-owner's age as well as experience in business activities.

Brown, Earle and Lup (2016), employed panel data techniques to analyze a survey of 297 new small enterprises in Romania containing detailed information from the start-up date through 2016. They found strong evidence that access to external credit increases the growth of both employment and sales, while taxes appears as constrain to growth. The data suggest that entrepreneurial skills have little independent effect on growth, once demand conditions are taken into account. The evidence for the effectiveness of technical assistance is weak: only assistance provided by foreign partners yields a positive effect. A wide variety of alternative measures of the business environment (contract enforcement, property rights, and corruption) are tested, but none are found to have any clear association with firm growth.

Niskanen and Niskanen (2017) investigated the determinants of growth in a sample of small and micro Finnish firms. Firm growth is examined on a number of firm specific and relationship lending characteristics. The data set provides an excellent opportunity for investigating the effects that firm specific factors have on firm growth. The study investigated the relationship between firm growth and relationship lending variables. They are also able to provide new information on the role that legal form has on firm growth by using more detailed ownership variables. The results on relationship lending effects suggest that an increase in the number of lending banks decreases growth rates in the larger firms and that an increase in the number of banks operating in the county where the firm is located enhances growth of the larger firms and decreases growth rates of the smaller firms. It could, therefore, be argued that close lending relationships enhance growth for all firms, but that only the larger firms in the sample benefit from more competitive banking markets.

Ogbe (2017) conducted a study on the effects of small business on the reduction of poverty in Nigeria; a case study of some selected small businesses in Benue state. The research uses desk top research and interviewed some entrepreneur in Benue State and concluded that small business actually contributed maximally to the reduction of poverty levels in the area as they serve as sources of livelihood to their proud owners and beneficiaries. The researchers, however, recommend that government at all levels should create an enabling environment for small business to strive most especially in the areas of finance, Security, policies, technical advice and infrastructure (examples roads, electricity and water)

Jeremiah and Emmanuel (2015) investigated the nature of relationship between inflation rate and economic growth rate. The study made use of secondary data sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin and the National Bureau of Statistics (NBS). The Ordinary Least Square (OLS) logged multiple regression was employed with Gross Domestic Product (GDP) as the dependent variable and Inflation Rate (INFR), Exchange Rate (EXCHR), Input of Labour and Input of Capital served as the explanatory variables. Our results showed that inflation rate in line with apriori expectations had a positive relationship but non-significant with the economic growth rate. And recommended that for sustainable economic growth to be achieved in Nigeria, the level of inflation should be stabilized by the monetary authorities.



Ahmed and Mortaza (2015) empirically established a statistically significant negative relationship between inflation and economic growth using CPI and real GDP as proxy variables for Bangladesh for the period between 1980 and 2016. This reconciles with the work of Saeed (2007) for Kuwait between 1985 and 2005 which indicates long run and strong inverse relationship between CPI and real GDP. Okwuchukwu et al (2015) examines the significance of bank credit in stimulating output within the real sector and the factors that prompt financial intermediation within the economy: Nigeria experience. The variables used are real GDP and real private sector credit growth. It was observed that there exists a reserved causation between real output and financial development. It is therefore recommended for the government to ensure proper integration of the financial sector to be capable of substantially intermediating in the financial processes for the real sector of the economy.

### 3.METHODOLOGY

The application of appropriate method in economic research is very important if useful policy recommendation is to be made from a particular study. The work will adopt econometric method since the research is a time series analysis involving more than two independent variables. Accordingly, this section deals with the source of data, theoretical framework, model specification and method of data analysis and evaluation techniques.

#### Model Specification

The model for this study will be based on the insight gain from Nwoga (2007) and modifications made. In line with this, the study will adopt Nwoga style of model and make GDP as the dependent variable in the model. In line with this, this study will adopt Nwoga style of model and make GDP as the dependent variable while SMEC, inflation, interest and credit to private sector are the explanatory variables of the study. Thus, the model equation for this study is stated as follow:

The model is implicitly specified as follows;

$$GDP = f(SMEC, CPS, INT \text{ and } INFL) \dots \dots \dots (1)$$

The model is explicitly specified thus:

$$GDP_t = a_0 + \alpha_1 SMEC + \alpha_2 CPS + \alpha_3 INFL + a_4 INT + \epsilon_t \dots \dots \dots (2)$$

Where:

GDP = Gross Domestic Product

SMEC = Small and Medium Enterprises Contribution to GDP

CPS = Credit to Private Sector

INT = Interest Rate

INFL = Inflation Rate

$a_0$  = the intercept,  $\alpha_1 - \alpha_4$  = the coefficient or slope of the independent variables

$\epsilon_t$  = stochastic error term.

The 'a priori' expectations are determined by the principles of economic theory and refer to the expected relationship between the explained variable and the explanatory variable(s). It is expected that  $\alpha_1 - \alpha_2, > 0$ ,  $\alpha_3 - \alpha_4 < 0$

There has been several arguments that the log form of a model produces a more reliable result than the non-log form due to the capacity of the log form to smoothen the data and on this ground a log form of the model is thus specified with a view to smoothen the data and to avoid the error of Heteroscedasticity.

$$(GDP) = a_0 + \alpha_1(SMEC) + \alpha_2L(CPS) + \alpha_3INFL + a_4INT + \epsilon_t \dots \dots \dots (3)$$

#### Estimation Technique

The first step in this analysis is to test for the properties of the time series data with a view to determining whether or not the variables are non-stationary, stationary at level or first differencing. Having established the stationarity of the variables and they were all integrated of the same order one I(1), we proceed to Johansen co-integration test which will enable us to establish if there is any co-integrating equation in the model which will suggest the existence of long run relationship among the variables under examination. Meanwhile having established that there are co-integrating equations in the model the next thing is to estimate an Error Correction Model (ECM) which will help us to determine the speed of adjustment from the short-run disequilibrium to long run equilibrium. In other words, ECM represents the short-run dynamic model in the work.

### 4.DATA PRESENTATION AND ANALYSIS

#### 4.1 Summary of Descriptive Statistics

Table 1 presents a descriptive statistics of time series data variables used for the study. The essence of this is to show the level of disparity among the variables.



**Table 1: Summary of Descriptive Statistic**

	LNGDP	LNCPS	LNSMEC	LNINFL	LNINT
Mean	8.893784	6.506070	4.337935	2.368192	2.847956
Median	9.169617	6.737767	3.970830	2.321955	2.897807
Maximum	11.52771	12.26000	11.02241	2.856470	3.394508
Minimum	5.310443	0.000000	1.735189	1.629241	2.208274
Std. Dev.	2.026810	2.900023	2.579561	0.268257	0.263526
Skewness	-0.329916	-0.409742	0.466128	-0.105688	-0.613076
Kurtosis	1.774561	2.871312	2.250314	3.558097	3.468396
Jarque-Bera	2.421349	0.860142	1.788912	0.445189	2.153556
Probability	0.297996	0.650463	0.408830	0.800439	0.340692
Sum	266.8135	195.1821	130.1380	71.04575	85.43868
Sum Sq. Dev.	119.1308	243.8938	192.9699	2.086898	2.013925
Observations	30	30	30	30	30

**Source:** Researcher’s computation (2024) using E-views 10.0

Table 1 shows the descriptive statistics of the variables used in the study. It shows that 1986-2016, the average Gross Domestic Product (GDP), Credit to Private Sector (CPS), Small and Medium Enterprises Contribution to GDP (SMEC), Inflation (INFL), and Interest Rate (INT) variables are 8.893784, 6.506070, 4.337935, 2.368192 and 2.847956 respectively. This indicates that the variables exhibit significant variation in terms of magnitude, suggesting that estimation at levels may introduce some bias in the result.

#### 4.1.1 Correlation Analysis

In an attempt to explore the relationship between dependent variable GDP and explanatory variables used in the study, the study carried out correlation analysis using Pearson Product Moment Correlation (PPMC). Whereas the descriptive output tells us about each set of data (that is, the mean, standard deviation, Jarque-Bera, probability, and number of values for each variable). The correlation matrix output tells us how the variables are related. This is necessary because the independent and dependent variables need to be tested for multicollinearity.

**Table 2: Correlation Matrix**

Variable	LNGDP	LNCPS	LNSMEC	LNINFL	LNINT
LNGDP	1.000000	0.967264	0.844573	-0.360334	-0.044162
LNCPS	0.967264	1.000000	0.802031	-0.256393	0.016231
LNSMEC	0.844573	0.802031	1.000000	-0.349959	-0.106429
LNINFL	-0.360334	-0.256393	-0.349959	1.000000	0.129318
LNINT	-0.044162	0.016231	-0.106429	0.129318	1.000000

**Source:** Researcher’s computation (2024) using E-views 10.0

Table 2 shows how the variables relate to one another in the sample data from 1986-2023. The table shows that the coefficient of correlation of a variable with respect to itself is 1.0000. This indicates that there exists a perfect relationship between a variable with respect to itself. The matrix result showed that there exists a positive relationship between CPS, SMEC and GDP with a coefficient of 0.967264, 0.844573 and 1.00 respectively. The implication of a positive relationship between two variables is that both of them move in the same direction. This means when one of the variables moves upwards, the other also would be found to move upward. This means that Credit to Private Sector and Small and Medium Enterprises Contribution to GDP affect Gross Domestic Product positively. The implication is that, as CPS and SMEC increase, GDP increases by one unit. On the other hand, negative relationships exist between Interest Rate (INT) and Inflation Rate (INFL) and Gross Domestic Product. It means that INT, INFL and GDP move in oppose direction. Conclusively, the result showed that the variables are independent of each other and can be included and used in the regression analysis as independent variables without getting spurious results.

#### 4.2 Unit Root Test

In time series analysis, stationarity of the series is examined by unit root test. This is to avoid producing spurious regression results that would make estimates biased and inconsistent, the time series data for all the principal variables in the model (GDP, CPS, SMEC, INT, and INFL) were tested for the period 1986-2024 to ensure their stationarity. There are several standard tests that are normally employed for unit root testing. The study made use of Augmented Dickey-Fuller (ADF) unit test to establish the stationarity of the data and order of integration. To determine if the time series is stationary, the ADF test statistic value must be greater than Mackinnon critical value at 5% level of significance, with the comparison done at absolute term.



**Table 3: Stationarity Test of Variables ADF Test**

Variable	ADF Stat	Critical levels (5%)	Order of integration	Stationarity Status
GDP	-3.311524 (0.0233)	-2.963972	1(1)	Stationary
CPS	-5.274161 (0.0002)	-2.967767	1(1)	Stationary
SMEC	-7.662767 (0.0000)	-2.967767	1(1)	Stationary
INT	-8.172489 (0.0000)	-2.967767	1(1)	Stationary
INFL	-7.202540 (0.0001)	-3.144920	1(1)	Stationary

**Source:** Researcher’s computation (2024) using E-views 10.0

The result of the ADF test at first difference as shown in table 4.3 above reveals that the ADF test statistics is higher than the critical value at both 1%, 5% and 10% levels of significance, this however implies that all the variables included in the model are integrated of the same order one I(1) except GDP. In other words, the result shows that all the variables are stationary at 1%, 5% and 10% level of significant respectively. Having established stationarity among the variables, the implication is that there could be a long run relationship among the variables that are integrated of the same order, and so we proceeded to test for co-integration so as to determine the number of co-integrating equations in the model.

#### 4.3 Tests for Cointegration

If variables possess relationship that allows them to converge in the long- run, cointegration test helps to facilitate policy formulation and implementation. It helps to determine if this long-run relationship exists among the variables. The study utilized Johansen (1991) cointegration test. The choice of this method is based on the fact that, it is easy to use and possess some unique capabilities. It has generalized testing procedure for more than one cointegration relationships. The decision rule is that the trace statistic must be greater than the 5% critical value at none hypothesized.

**Table 4: Summary of Cointegration Results**

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.871800	111.1357	69.81889	0.0000
At most 1 *	0.664064	57.72754	47.85613	0.0045
At most 2	0.435435	29.36586	29.79707	0.0560
At most 3	0.370261	14.50165	15.49471	0.0702
At most 4	0.090906	2.477974	3.841466	0.1154

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.871800	53.40816	33.87687	0.0001
At most 1 *	0.664064	28.36168	27.58434	0.0397
At most 2	0.435435	14.86421	21.13162	0.2985
At most 3	0.370261	12.02368	14.26460	0.1098
At most 4	0.090906	2.477974	3.841466	0.1154



Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b\*S11\*b=I):

**Source:** Researcher’s computation (2024) using E-views 10.0

Engel Granger cointegration test results reveal that the residuals from the regression results are stationary at 5% level of significance. This implies that Credit to Private Sector (CPS), Small and Medium Enterprises Contribution to GDP (SMEC), Interest Rate (INT) and Inflation Rate (INFL) are co integrated with Gross Domestic Product (GDP) from 1986 to 2024. In other words, there exists a long run and stable relationship between the dependent and independent variables. This finding also reveals that any short run deviation in this relationship would return to equilibrium in the long run.

#### 4.4 Long Run Regression Model

**Table 5: Result of the Long Run Regression Model**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.969589	1.197972	5.817822	0.0000
LNCPS	0.578354	0.048765	11.85991	0.0000
LNINT	-0.231280	0.323644	-0.714613	0.4815
LNINFL	-0.706836	0.332809	-2.123850	0.0438
LNSMEC	0.113875	0.056616	2.011363	0.0552
R-squared	0.957880			
Adjusted R-squared	0.951141			
F-statistic	142.1363			
Prob(F-statistic)	0.000000			
Durbin-Watson	1.031960			

**Source:** Researcher’s computation (2024) using E-views 10.0

Table 5 above shows the result of the long run model which reveals the coefficient of CPS is 0.578354 with a probability value of 0.0000 indicating that CPS has a positive and significant impact on the growth of the Nigerian economy in the long run. It was also shown in the result above that INT has a coefficient of -0.231280 with a probability value of 0.4815 indicating that there is a negative and non-significant relationship between INT and economic growth in Nigeria in the long run. The result of the long run model also shows that inflation has a negative and significant relationship with economic growth in Nigeria in the long run. The result in the table also reveals that Small and Medium Enterprises Contribution has positive and significant relationship with economic growth of Nigeria within the period of investigation as shown by the coefficient of 0.113875 and a probability of 0.0552. The result of R<sup>2</sup> and that of the adjusted R<sup>2</sup> with a value of 0.957880 and 0.951141 respectively shows that the line of best fit is highly fitted. In other words, the result also implies that in the long run, about 96% of the variation in the dependent variables was attributed to the variation in the independent variables included in the model. The result for F-statistics as shown in table 5 above also reveals that the overall regression is statistically significant at 5% level of significance. The test for autocorrelation represented by the Durbin-Watson statistics indicates that there is likely presence of autocorrelation in the model.

#### 4.5 Error Correction Model

The error correction model measures the speed of adjustment to equilibrium. The error correction model (ECM) is significant if it has a negative sign in either over parameterized or Parsimonious ECM. This implies that the present value of the dependent variable adjusts rapidly to changes in the independent variable. A higher percentage of ECM indicates a feedback of that value or an adjustment of that value from the previous period disequilibrium of the present level of dependent variable and the present and past level of the independent variables. The over parameterized ECM is being made by leading and lagging each variable while the parsimonious ECM consider the variables that adjust rapidly to equilibrium between the leading and the lagged variables. The table 5 below shows the result of parsimonious ECM conducted on the explanatory variables.



**Table 6: Parsimonious Error Correction Model**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.758292	0.378458	2.003636	0.0588
LNGDP(-1)	1.004976	0.042325	23.74404	0.0000
LNINT	-0.191138	0.086725	-2.203951	0.0394
LNCPS	0.014808	0.033468	0.442451	0.6629
LNSMEC	0.002184	0.010998	0.198558	0.8446
LNINFL	-0.196354	0.064708	-3.034439	0.0065
ECM(-1)	-0.491639	0.193390	-0.473855	0.0407
R-squared	0.998600			
Adjusted R-squared	0.998180			
F-statistic	23.78127			
Prob(F-statistic)	0.000000			
Durbin-Watson	2.600115			

**Source:** Researcher’s computation (2024) using E-views 10.0

The coefficient of the ECM term which measures the speed of the adjustment of the dependent variables at which equilibrium is restored, (-0.491639) is significant and correctly signed (negative) at 5 percent level, and therefore confirms our earlier proposition that the variables are co-integrated. The speed suggests that economic growth in Nigeria adjusts rapidly to the long-run equilibrium changes in the explanatory variables and it gives the proportion of the disequilibrium error accumulated in the previous period that is corrected in the current period. The speed implies that 49 per cent of any disequilibrium in the economic growth process is corrected within a lag (one year in this study). This result is in agreement with Chan and Elston (2013), Adenyeji and Lenrewaju (2014) and Akhuemonkhan and Rose (2012)

The coefficient of multiple determinations ( $R^2$ ) shows that about 99 percent of the total variation in the dependent variable (GDP) is explained by the changes in the explanatory variables (CPS, SMEC, INT and INFL) of the estimated model. This implies that the estimated model has a good fit in the long -run. The adjusted coefficient of determinations (adj.  $R^2$ ) also shows that the regressors explain over 99 percent of the systematic variation in the dependent variable. The F statistic of 23.78127 indicates that the parameters of the estimated model are jointly or simultaneously statistically significant. Hence, inference from the estimated results could be taken as valid for policy sake.

Durbin-Watson statistic ratio of 2.600115 indicates absence of serial correlation. This indicates that the unit root test has effectively screened the time series variables to achieve stationarity.

Interest rate reduces gross domestic product as shown by the coefficient of -0.191138 and probability of 0.0394, which is significant to explain gross domestic product within the period of the study. The negative relationship between interest rate and economic growth in the long run implies that increase in interest rate by the financial bodies in the country fails to transform into increase in the level of economic growth. This is due to the fact that high interest rate discourages investors from borrowing as it lengthens the gestation period of investment. It means that a one percent increase in interest rate in the country, Gross Domestic Product will decrease by 19 percent. As a result of this, study does not accept the null hypothesis. The result is in line with the study conducted by Chan and Elston (2013) which states that a relationship exists between interest rate and gross domestic product in Nigeria.

The empirical findings of the study also revealed that, credit to private sector (CPS) is positively related to gross domestic product in the long-run meaning that increasing trend in credit to private sector makes firms to generate more funds to finance for output expansion as shown by the coefficient of 0.140808. This implies that for every one percent increase in CPS, gross domestic product increase by 0.014808 units. This signifies that credit to private sector helps to improve GDP in the Country. This makes the study to reject the null hypothesis that states credit to private sector has no significant impact on gross domestic product in Nigeria. This study agrees with the study conducted by Lawal (2011), Glos (1976), Isemin (1998), Ndedi (2013) and but contrary to that of Makinde (2013).



Small and Medium Enterprises Contribution within the period of the study shows that there is a positive but not significant relationship between SMEC and gross domestic product as the coefficient is 0.002184 and P value of 0.8446. This indicates that a unit change on the value, on the average increased GDP by 0.002184 units. This shows that there is positive relationship between SMEC and economic growth in Nigeria for the period of time considered in this study. The result was in line with the findings of Kanitar (1994), Okpara (2011), Miltra and Abubakar (2011), Misango and Ongiti (2013) and Kodithuwakku and Rosa (2002), but contradict the result of Osoimehen (2012).

The parsimonious result in table 6 shows that, inflation rate has negative and significant relationship with gross domestic product within the period of the study as indicated by the coefficient of -0.196354 and the P-Value of 0.0065. The implication of this result is that, a unit increase in inflation rate in the State, GDP decreases by about 20 percent. But however, some economic theorists believed that inflation relates positively to economic growth/GDP. The economic effect of this situation may be increase in the cost of input as well as reducing the purchasing powers of the households thereby leading to a decline in the demand of firms' products.

## 5.CONCLUSION AND RECOMMENDATION

The main objective of this study is to examine the impact of small and medium enterprises on economic growth in Nigeria. Augmented Dickey-Fuller (ADF) Unit Root Test, Johansen Cointegration test and Error Correction Mechanism (ECM) were used for the empirical examinations.

The result of the ADF unit root test shows that the stationarity of all the variables has been established which a pre-requisite for the cointegration test. Johansen cointegration test indicates that the residual is stationary at 5% significance level, implying that a long-run relationship exists among the variables. The coefficient of multiple determinations  $R^2$  and Adj  $R^2$  in the parsimonious model and the coefficient of the lagged error correction term suggest that the explanatory variables have a significant impact on the Nigerian economic growth. The explanatory variables in the study explain a greater proportion in changes in gross domestic product, however, it was realized that Credit to private sector (CPS) and Small and medium enterprises contribution (SMEC) were insignificant thereby presaging that CPS and SMEC have not adequately impacted on GDP in Nigeria. On the other hand, inflation (INFL) and interest rate significantly influenced GDP, although rates have significant inverse relationship with GDP implying that it is a constraint to economic growth in the long run in Nigeria. The study therefore concludes that SMEs contribute to economic growth in Nigeria.

### Recommendations

Based on the findings of the research, the study recommends the following policy measures to help government achieve the desired GDP growth in Nigeria.

- i. This study recommends that government should implement measures (low interest rates) that would broaden the borrowing base rather than increasing rate. This involves measures that would eliminate variations in the cost of borrowing between and among money deposit banks in the Country.
- ii. Nigerian government should intensify efforts in reducing the barriers to ease of business to enable smaller firms to stand up in competition with other bigger businesses in the Country.
- iii. Government should also put more effort to curb inflation to give more confident to investors.

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# A STUDY ON IMPACT OF CRUDE OIL ON INDIAN ECONOMY WITH REFERENCE TO AUTOMOBILE SECTOR

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## ABSTRACT

Consumers' opinions and choices about the car sector are greatly affected by petrol prices, according to research on consumer behavior. Our analysis of production expenses and supply chain dynamics sheds light on the ways in which fluctuations in oil prices impact company operations. This study examines the multi-faceted relationship between crude oil prices and the Indian economy by way of the intricate dynamics of the automobile sector. Looking at elements like previous trends, macroeconomic indicators, consumer behavior, production costs, and policy considerations, this study employs a detailed research technique to evaluate the complicated implications of changes in crude oil prices on India's economy. Several major Indian automakers have shown financial resilience, according to a report from the stock market.

## I – INTRODUCTION

The economic activity of refining petroleum into various chemical products is known as the petrochemical industry. These days, the typical citizen in a developed country consumes around 3.5 gallons of oil daily for petrochemical production. So, let's not forget about fuel oil; the typical individual in an industrialized country needs about 1,200 gallons of oil each year just for modern life.

### Production of food

One of petroleum's most significant uses is as a nitrogen source in agricultural fertilizers, which is ammonia. The use of pesticides in farming is also crucial for maintaining consistent and healthy crop yields. The main ingredient in most insecticides is crude oil. Farm machinery and fertilizer factories are only two examples of the many ways in which agricultural activities depend on petroleum-based products.

### Fabricated from polyethylene

Plastic is an essential component of modern life. Plastics like computer screens, nylon, and Styrofoam are essential to many produced items. Polystyrene is the main ingredient of Styrofoam and polyvinyl chloride (PVC), two industrial waste products that emerged after World War II. Nylon, the most ubiquitous petroleum-based material to date, finds use in everything from apparel to mechanical gears and car engines. Most plastics are derived from olefins, which include propylene and ethylene.

Mineral oil and petrolatum are petroleum by-products that are present in many topical lotions and treatments. Also derived from petroleum is tar, which is used topically to alleviate dandruff and psoriasis. The building blocks of most drugs, complex organic compounds, start as smaller, simpler chemical

molecules. Most of these precursors are petroleum by-products. Petroleum distillates, including benzene, toluene, xylene, and

others, are the primary components of dye, synthetic detergent, and fabric goods. Polyurethanes are derived from benzene and toluene; these chemicals are used to make surfactants, oils, and wood varnish. Even sulphuric acid originates from sulfur that is produced from petroleum.

### Petroleum Chemistry

Petroleum chemistry involves a combination of many hydrocarbons. Carbon and hydrogen are the building blocks of hydrocarbons, an organic material. A large part of petroleum consists of hydrocarbons of different lengths. Even the tiniest hydrocarbons include hydrogen atoms and one carbon atom, like methane.

Contrarily, hydrocarbons may contain hundreds of thousands of atoms linked in a variety of complex structures, such as rings, chains, and more.

The majority of hydrocarbons in petroleum chemistry are alkanes, which are also known as branching or linear hydrocarbons. The remaining chemical component is mostly composed of aromatic hydrocarbons and cycloalkanes. There are a lot of more complex hydrocarbons in petroleum chemistry as well, including asphaltene.

### Those Hydrocarbons

The primary classes of hydrocarbons studied in petroleum chemistry are alkanes, sometimes known as paraffins. The



proportion of these saturated hydrocarbons in crude oil might range from fifteen percent to sixty percent. They may be generally described as  $C_nH_{2n+2}$ . Alkanes are what make petroleum combustible, whereas paraffins are highly aromatic hydrocarbons made up of just carbon and hydrogen. The many alkanes found in raw petroleum chemistry determine its potential use. For fuel exclusively, you may use the following types of alkanes: Refined gasoline, kerosene, diesel, and fuel oil are all byproducts of this process. The refined products of this process are pentane, octane, hexadecane, nonane, and heating oil, respectively. An exception to this rule is natural petroleum gas, which is composed of molecules with less than five carbon atoms. These molecules may be burned off or captured and sold under pressure as LPG.

## II – RESEARCH GAP

There are a number of potential directions to take research on the effect of crude oil price fluctuations on the Indian economy, especially as they pertain to the automotive industry. Examine how changes in the price of crude oil affect the price elasticity of demand for autos. Examine the ways in which customers react to changes in gasoline prices by modifying their buying habits, favouring more fuel-efficient automobiles, and altering their use patterns (such as mileage and vehicle size). Analyse how the unpredictable price of crude oil has affected the Indian automobile supply chain. Analysis of the automotive industry's cost structure, its use of petroleum-based materials (e.g., plastics, rubber, and lubricants), and the methods used to control input costs and minimize supply chain interruptions might be part of this.

## III – OBJECTIVES OF THE STUDY

- To know about the economy growth of the country
- To identify the factors influencing the crude Oil Prices
- To analyze the impact of Crude Oil Prices on Consumer Buying Behavior

## Research Methodology

The impact of rising crude oil prices on India's economy, and the automotive industry in particular, is examined using a methodical approach that combines quantitative and qualitative research methods.

Data is gathered from Primary Source and Secondary Source of Data

Primary Data: Data which is collected through the Structured Questionnaire and Observations

Research Design: Descriptive Research Design

Sampling Design: Convenience Sampling

Sampling Procedure: Systematic Sampling

Sample size: 147

Tool for analysis: Structured Questionnaire

Secondary Data: The Data is collected from the secondary source which is already available like Textbooks, Journals, Websites etc.

## IV – LIMITATIONS OF THE STUDY

- The data is only available based on responses from participants in the survey.
- The study's analysis may not provide reliable findings for decision-making.
- The data obtained from participants might not be acquired at the optimal time for analysis.

## V – LITERATURE REVIEW

**A Study on Impact of Crude Oil Prices Fluctuation on Indian Economy by Mr. Kali Charan Mdak, Ms. Pallabi Mukherjee, (2013):** Crude oil prices have a large impact on the growth of national GDP. Crude oil for India is imported to a large extent. Gross domestic product, coefficient of production, and wholesale price index are only a few of the many variables used in this essay. Using time series data from 2000–2014, this study examines the impact of fluctuating oil prices on India's economic growth. The data is analyzed using several linear regression models. India's dependence on imported crude oil is increasing at a rapid pace. Crude oil prices reached \$148/bbl, a massive rise. It was July 2008 on a worldwide scale. A barrel of crude oil cost \$84 in 2014, a record low. Imports of crude oil are increasing in price, contributing to a worsening trade deficit in India. The primary purpose of this article is to analyze the impact of crude oil price changes on India's GDP growth. This research examined the impact of oil prices on the Indian economy using time series data that extended from 2000–2001 to 2012–2013.... India is growing its reliance on imported oil. Imports account for 80% of our current revenue, and that number is only going to grow.

## Impact of Crude Oil on Indian Economy by Firdoos Ahmad Wani, Mudasir Kirmani, Syed Mohsin Andrabi, (Nov 2015):

India relies on crude oil imports to fulfill its energy demands, which are increasing at a fast pace. The basic price of crude oil is quite inexpensive, but the typical customer pays more because of import tariffs. In response to a rise in the cost of gasoline and related items, the typical consumer's expenditure rises. This research has made an effort to explain the present state of crude oil imports and why it is critical to lower these imports in order to raise the living standards of the common man. Any shift in the cost of crude oil has the potential to have a significant impact on economies all around the globe. However, as the price of crude oil rises, almost every good—consumer and otherwise—sees a corresponding increase in price. Whenever the price of crude oil goes up, it has a negative impact on a country's GDP growth. Changes in the price of crude oil may impact the economy of any



nation, including India. The skyrocketing demand for petroleum products in India has led to a rise in crude oil imports.

**Impact of Oil Price on Economic Growth: A study of BRIC nations by Pushpa Negi (June 2015):** This empirical research examined data from 1987 to 2014 to determine the impact of the oil price on GDP in the BRIC nations, which stand for China, Russia, India, and Brazil, the four fastest-growing emerging economies. The first step of the empirical investigation was to determine whether the time series were normally distributed. Then, we used the Ordinary Least Square (OLS), Fixed Effect Model (FEM), and Random Effect Model (REM) to find out how oil prices affected GDP. We used the Hausman test, which has an asymptotic chi-square distribution, to pick between the Fixed Effect Model and the Random Effect Model. The results of the Hausman test indicated that the Fixed Effect Model, which was estimated using dummy variables, was the most appropriate model for the inquiry, therefore that was the last step. All things considered, the results show that GDP and oil price go hand in hand.

**Declining Crude Oil Prices and its Implications on the Indian Economy by Manvi Mehta, Ruchi Mamania, Manasvi Mehta, (2019):** This research study primarily aims to examine the consequences of fluctuating oil prices on the Indian economy. Oil price fluctuations have a significant effect on the economies of developing countries like India's. When it comes to global energy and oil consumption, India ranks third, behind only China and the US. Expansion and modernization of every economy are dependent on the supply of oil. The focus of this study paper is on the production and supply of oil. Our goal in this study has been to attempt to forecast the impact of various market and economic factors on oil prices using a variety of methodologies. In order to have a sense of how a decline in oil prices may impact various economic leading and trailing indicators, this article takes a look at their impacts. This study looks at a variety of economic factors, including inflation, GDP, impacts on foreign reserves, and more. Due to its large dependence on oil imports, India needs comprehensive research to understand the implications of changes in oil prices. The need for oil in India is constantly rising, and the country is highly dependent on supplies from Iraq and Saudi Arabia. From what we can see, the relationship between oil prices and stock prices is inverse, so when oil prices go down, stock prices and the economy benefit.

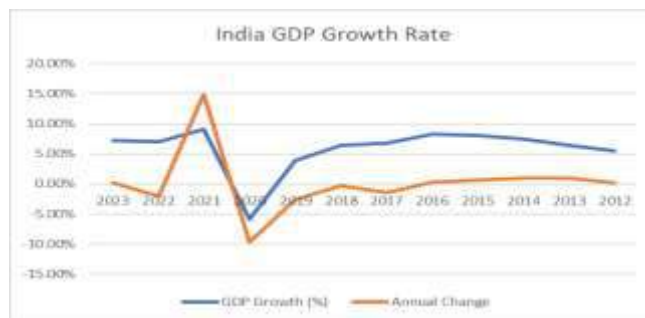
**The Effects of Crude Oil Price Surprises on National Income: Evidence from India by Chinnadurai Kathiravan, Murugesan Selvam, Balasundaram Manian, (Jan 2023):** The major purpose of this research is to analyze the changes in GDP per capita and exchange rates as a result of changes in the price of crude oil. It analyzes the effects on national income and currency exchange rates of abrupt rises in the price of crude oil. With the

use of annual time series data, this research monitored crude oil prices, the US dollar/Indian rupee exchange rate, and GDP per capita from 1990 to 2020. Various mathematical methods were employed: Multiple regression analysis, including ordinary least squares (OLS), descriptive statistics, and a unit root test. Based on the results of the present study, there is a two-way Granger causality impact between the price of crude oil in Dubai and currency rates, and between exchange rates and the price of crude oil in WTI. All of the diagnostic tests were passed by the computed models. The exchange rate and GDP per capita were both impacted by the price of WTI crude oil throughout the study period, but according to the OLS model, the exchange rate was solely driven by the price of Dubai crude oil.

## VI – DATA ANALYSIS & INTERPRETATION

### GDP Growth Rate

India GDP Growth Rate - Historical Data		
Year	GDP Growth (%)	Annual Change
2023	7.20%	0.20%
2022	7.00%	-2.05%
2021	9.05%	14.88%
2020	-5.83%	-9.70%
2019	3.87%	-2.58%
2018	6.45%	-0.34%
2017	6.80%	-1.46%
2016	8.26%	0.26%
2015	8.00%	0.59%
2014	7.41%	1.02%
2013	6.39%	0.93%
2012	5.46%	0.22%



### Interpretation

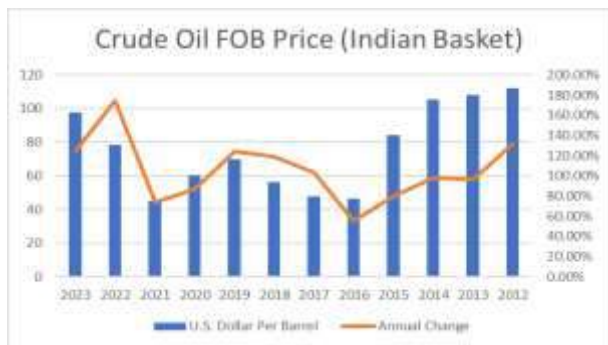
From the above table and graph we can state that, the highest GDP rate is in the year 2021 i.e. 9.05% and lowest GDP rate is in the year 2020 i.e. -5.83%. The data represents the last 10 years of



GDP Percentage which shows 2012 to 2016 in increasing rate and in the year 2017 there was the decrease in the GDP Percentage. In the year 2021 the GDP as increased to 9.05% and later on decreased to 7.20% in the 2023 year

Crude Oil FOB Price (Indian Basket)

Year	US Dollar Per Barrel	Annual Change
2023	97.67	124.91%
2022	78.19	174.45%
2021	44.82	74.12%
2020	60.47	86.53%
2019	69.88	123.83%
2018	56.43	118.65%
2017	47.56	103.01%
2016	46.17	54.86%
2015	84.16	79.76%
2014	105.52	97.73%
2013	107.97	96.50%
2012	111.89	131.50%



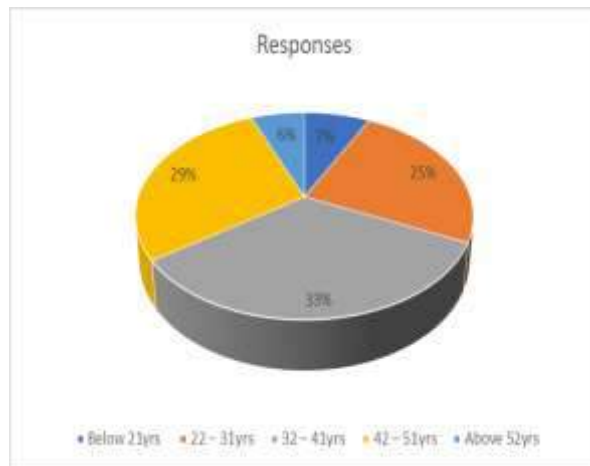
**Interpretation**

From the above data we can state that, the highest Crude Oil FOB Price in Indian Basket is in the year 2012 i.e. 111.89 U.S. Dollar per Barrel and lowest in the year 2016 i.e. 46.17.

1. Age:

- a. Below 21yrs      b. 22 – 31yrs      c. 32 – 41yrs      d. 42 -51yrs
- e. above 52yrs

Age	Responses	Percentage
Below 21yrs	11	7
22 – 31yrs	36	25
32 – 41yrs	49	33
42 – 51yrs	42	29
Above 52yrs	9	6
Total	147	100



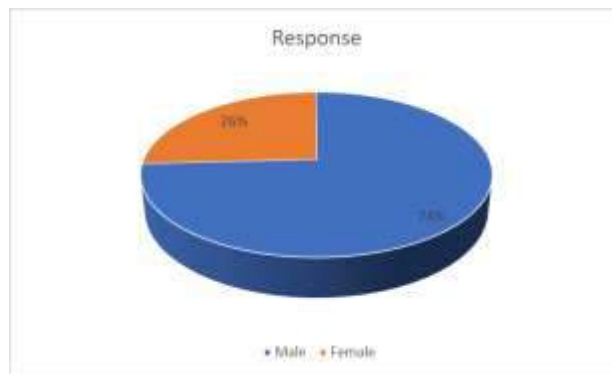
**Interpretation**

From the above table and graph we can state that, 7% of the respondents age is below 21yrs, 25% of the respondents age group is 22-31yrs, 33% of the respondents age group is 32-41yrs, 29% of the respondents age group is 42-51yrs, 6% of the respondents age is above 52yrs.

2. Gender

- a. Male
- b. Female

Gender	Response	Percentage
Male	109	74
Female	38	26
Total	147	100



**Interpretation**

From the above data we can state that, 74% of the respondents are Male, 26% of the respondents are Female

Occupation

- a. Student
- b. Pvt. Employee
- c. Govt Employee
- d. Self Employed



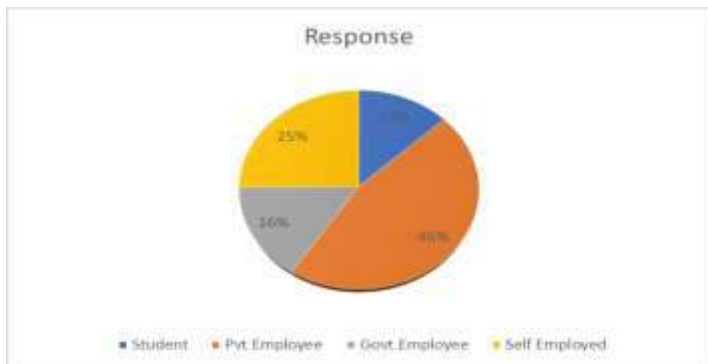
Occupation	Response	Percentage
Student	19	13
Pvt Employee	68	46
Govt Employee	23	16
Self Employed	37	25
Total	147	100

240001-360000, 36% of the respondents income is 360001-480000, 17% of the respondents income is 480001-600000, 6% of the respondents income is above 600001

4. Educational Qualification

a. SSC b. 10+2 c. Degree d. PG e. Ph.D

Educational Qualification	Response	Percentage
SSC	5	3
10+2	14	10
Degree	52	35
PG	68	46
Ph.D	8	6
Total	147	100



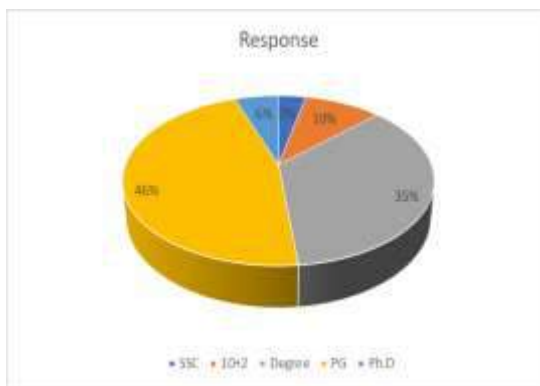
**Interpretation**

From the above data we can state that, 13% of the respondents are Students, 46% of the respondents are Pvt. Employees, 16% of the respondents are Govt Employees, 25% of the respondents are Self Employed

3. Income

a. Below 240000 b. 240001-360000 c. 360001-480000 d. 480001-600000 e. above 600001

Income	Response	Percentage
Below 240000	12	8
240001 – 360000	49	33
360001 – 480000	53	36
480001 – 600000	25	17
Above 600001	8	6
Total	147	100



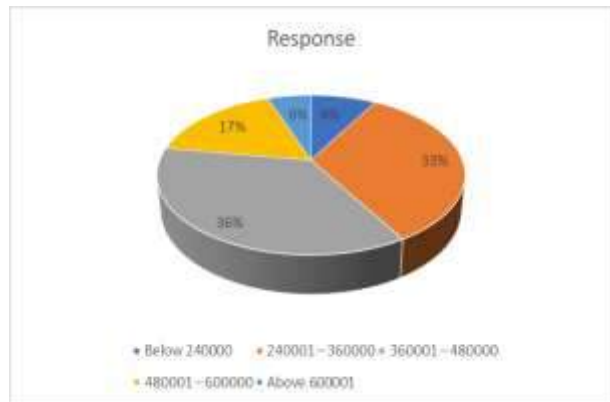
**Interpretation**

From the above table and graph we can state that, 3% of the respondents educational qualification is SSC, 10% of the respondents are 10+2, 35% of the respondents are Degree holders, 46% of the respondents are PG, 6% of the respondents are Ph.D.

5. How closely do you follow News related to Crude Oil Prices?

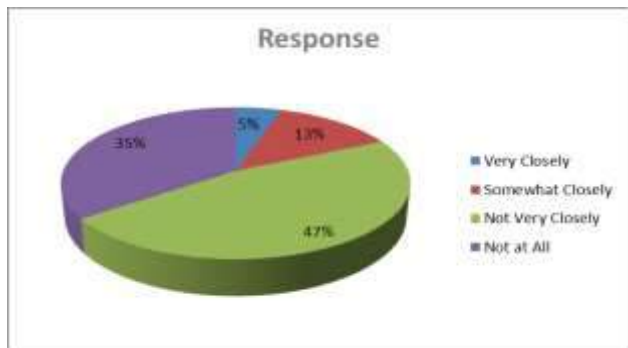
a. Very Closely b. Somewhat Closely c. Not Very Closely d. Not at all

Particulars	Response	Percentage
Very Closely	8	5
Somewhat Closely	19	13
Not Very Closely	69	47
Not at All	51	35
Total	147	100



**Interpretation**

From the above data we can state that, 8% of the respondents income is below 240000, 33% of the respondents income is



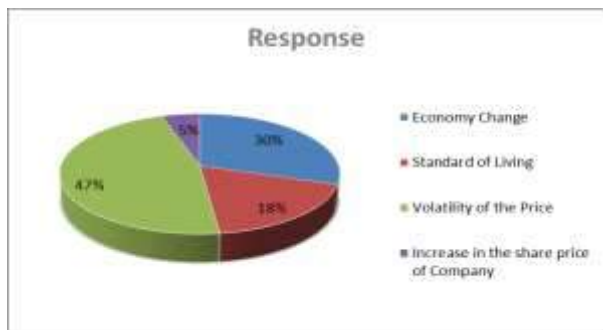
**Interpretation**

From the above table and graph we can state that, 5% of the respondents watch Crude oil Prices Very Closely, 13% of the respondents somewhat closely watch, 47% of the respondents Not Very Closely watch, 35% of the respondents doesn't watch at all.

6. What changes may occur when there is a price change in the crude Oil

- a. Economy Change
- b. Standard of Living
- c. Volatility of the price
- d. Increase in the share price of Company

Particulars	Response	Percentage
Economy Change	44	30
Standard of Living	27	18
Volatility of the Price	69	47
Increase in the share price of Company	7	5
Total	147	100



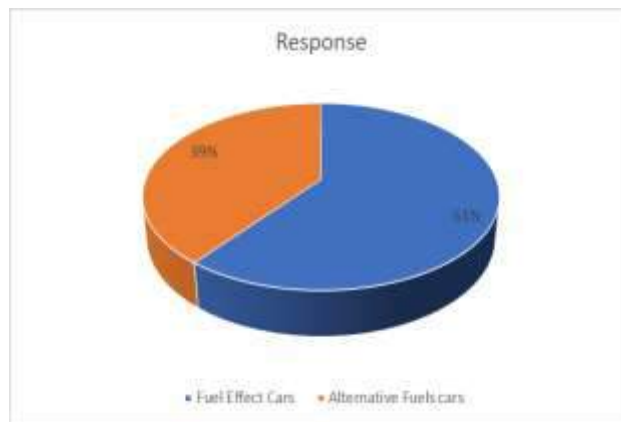
**Interpretation**

From the above table and graph we can state that, 30% of the respondents says there is an Economy Change when the Crude Oil Price Changes, 18% respondents says Standard of Living, 47% of the respondents says volatility of the price. 5% of the respondents says Increase in the share price of company.

7. When the price of crude oil is High, do you prefer fuel efficient cars or ones that use alternative fuels?

a. Fuel Efficient Cars b. Alternative Fuels Cars

Particulars	Response	Percentage
Fuel Efficient Cars	89	61
Alternative Fuels Cars	58	39
Total	147	100



**Interpretation**

From the above table and graph we can state that, 61% of the respondents will prefer Fuel Efficient Cars when crude oil Prices are high. 39% of the respondents will prefer Alternative Fuel Efficiency Cars

**VII – FINDINGS**

- The highest GDP rate is in the year 2021 i.e. 9.05% and lowest GDP rate is in the year 2020 i.e. -5.83%. The data represents the last 10 years of GDP Percentage which shows 2012 to 2016 in increasing rate and in the year 2017 there was the decrease in the GDP Percentage. In the year 2021 the GDP as increased to 9.05% and later on decreased to 7.20% in the 2023 year
- The highest Crude Oil FOB Price in Indian Basket is in the year 2012 i.e. 111.89 U.S.Dollar per Barrel and lowest in the year 2016 i.e. 46.17.
- According to the analysis, 7% of the respondents age is below 21yrs, 25% of the respondents age group is 22-31yrs, 33% of the respondents age group is 32-41yrs, 29% of the respondents age group is 42-51yrs, 6% of the respondents age is above 52yrs.
- According to the analysis, 74% of the respondents are Male, 26% of the respondents are Female
- According to the analysis, 13% of the respondents are Students, 46% of the respondents are Pvt Employees, 16% of the respondents are Govt Employees, 25% of the respondents are Self Employed
- According to the analysis, 8% of the respondents income is below 240000, 33% of the respondents income is 240001-360000, 36% of the respondents income is 360001-480000, 17% of the respondents income is



480001-600000, 6% of the respondents income is above 600001

- According to the analysis, 3% of the respondents educational qualification is SSC, 10% of the respondents are 10+2, 35% of the respondents are Degree holders, 46% of the respondents are PG, 6% of the respondents are Ph.D
- According to the analysis, 5% of the respondents watch Crude oil Prices Very Closely, 13% of the respondents somewhat closely watch, 47% of the respondents Not Very Closely watch, 35% of the respondents doesn't watch at all.
- According to the analysis, 30% of the respondents says there is an Economy Change when the crude Oil Price Changes, 18% respondents says Standard of Living, 47% of the respondents says volatility of the price. 5% of the respondents says Increase in the share price of company.
- According to the analysis, 61% of the respondents will prefer Fuel Efficient Cars when crude oil Prices are high. 39% of the respondents will prefer Alternative Fuel Efficiency Cars
- According to the analysis, 11% of the respondents strongly Influence of buying car when there are changes in the price of Crude Oil, 33% of the respondents Somewhat Influence, 36% of the respondents influence, 7% of the respondents are Neutral, 13% of the respondents do not influence.
- According to the analysis, 40% of the respondents says Yes they are well informed on the present patterns and volatility in the price of crude oil and 60% of the respondents says No
- According to the analysis, 27% of the respondents as seen the changes in the people buying cars when price of the crude oil is high, 73% of the respondents as no seen anyone.
- According to the analysis, 47% of the respondents says Yes the Automobile Industry respond sufficiently to fluctuations in price of crude Oil, 29% says Maybe, 24% of the respondents says No.
- According to the analysis, 28% of the respondents says Industry adjust the changes in the price of crude oil in Introduction Stage, 39% of the respondents says Growth stage, 20% of the respondents says Maturity stage, 13% of the respondents says Decline Stage.
- According to the analysis, 50% of the respondents says yes govt actions have in reducing the effects of changes in the price of crude oil on the automotive Industry, 30% of the respondents says Maybe, 20% of the respondents says No.
- According to the analysis, 21% of the respondents says Tax Policies could be used to tackle this problem, 33% of the respondents says Strategic Reserves could be

used to tackle this problem, 35% of the respondents says Diversification of Energy Sources, 11% of the respondents says Educational Awareness.

- According to the analysis, 52% of the respondents says during times of High Cost in Crude Oil then automobile industry will be positively impacted by developments in electric and hybrid Vehicles, 20% respondents says No Impact, 28% of the respondents says Negative Impact.
- According to the analysis, 60% of the respondents says Yes they are interested in buying a hybrid or electric car soon, 40% says No

### VIII – SUGGESTIONS

- The economy should be able to withstand the ongoing changes in oil prices induced by geopolitical events on a global scale if enough safeguards are put in place to prevent such catastrophes.
- People shouldn't have to bear the brunt of such price increases, and the government should try to do something about it.
- The country should be able to increase its own production of crude oil and not rely on other countries that produce oil. Building reserves gives the country a chance to become self-sufficient and stop losing valuable foreign cash.
- An focus on more fuel-efficient vehicles has been shifted in car production in India as a result of fuel price rises. Introduce compressed natural gas (CNG) automobiles as a solution to the ever-increasing price of gasoline.
- One way to lessen the blow of gas price swings is to use public transit.
- Establishing diplomatic ties with favourable states is a must if the government intends to pursue international oil exploration seriously.
- To enhance its oil refining potential, the country needs additional refineries.

### IX – CONCLUSION

It elucidates the complex interplay between changes in the price of crude oil and many macroeconomic indicators in India, such as GDP growth, trade balances, unemployment, and inflation. Understanding the car industry's inner workings revealed how oil price fluctuations affect manufacturing costs, consumer preferences, and the market overall. The need for the auto industry to adapt to changing consumer attitudes is underscored by evidence from studies of consumer behavior showing that petrol prices substantially influence purchasing choices. To remain effective in the face of fluctuating oil prices, which greatly affect production costs and supply chain dynamics, it is crucial to plan ahead. Information on the financial health of major organizations in the Indian automobile industry was uncovered



by the stock market study, highlighting the sector's susceptibility to changes in oil prices and the need of adaptable approaches. The policy evaluations emphasized the need of being subtle and flexible when formulating regulations, due to the fact that crude oil prices are quite unpredictable.

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# NATURAL RELIEF: DEVELOPING AND ASSESSING A POLYHERBAL CREAM FOR DYSMENORRHEA MANAGEMENT WITH NATURAL RESOURCES

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## ABSTRACT

Dysmenorrhea, characterized by painful menstrual cramps, affects millions of women worldwide, impacting their quality of life and productivity. This study aimed to develop and evaluate a polyherbal cream for dysmenorrhea relief using natural herbal ingredients known for their analgesic and anti-inflammatory properties. The formulation consisted of ginger extract, cinnamon, fennel, borax, tween 80, mentha, and white beeswax. Each ingredient was selected based on its traditional use and scientific evidence supporting its efficacy in alleviating menstrual pain. The cream was prepared using a standardized method and evaluated for various parameters, including physical appearance, pH, viscosity, spreadability, and stability. Results showed that the polyherbal cream exhibited excellent physical characteristics, with a smooth texture, suitable pH, and optimal spreadability. In studies demonstrated significant anti-inflammatory activity, attributed to the synergistic effects of the herbal ingredients. Overall, the polyherbal cream showed promising potential as a natural remedy for dysmenorrhea, providing safe and effective relief from menstrual discomfort.<sup>[1]</sup>

**KEYWORDS:** Dysmenorrhea; ; Diagnosis; Therapeutics; Non-Steroidal Anti-Inflammatory Agents;

## INTRODUCTION

Dysmenorrhea is a prevalent gynecological condition characterized by painful menstrual periods, often accompanied by cramping in the lower abdomen. It affects women of reproductive age and can significantly impact their quality of life, leading to absenteeism from work or school and decreased productivity. Dysmenorrhea can be categorized as primary or secondary, depending on its underlying cause.<sup>[2]</sup>

Primary dysmenorrhea occurs in the absence of any underlying pelvic pathology and is primarily due to increased prostaglandin production, leading to uterine contractions and ischemia. These contractions result in the characteristic cramping pain experienced during menstruation. Secondary dysmenorrhea, on the other hand, is caused by underlying pelvic conditions such as endometriosis, adenomyosis, or pelvic inflammatory disease (PID). Secondary dysmenorrhea typically presents with more severe and prolonged symptoms compared to primary dysmenorrhea.

The symptoms of dysmenorrhea can vary in severity, with some women experiencing mild discomfort while others endure debilitating pain. Common symptoms include lower abdominal cramps, back pain, nausea, vomiting, diarrhea, and headaches. The pain usually begins just before or at the onset of menstruation and may last for several days.<sup>[3]</sup>

Management of dysmenorrhea often involves a combination of pharmacological and non-pharmacological approaches. Nonsteroidal anti-inflammatory drugs (NSAIDs) are commonly used to alleviate pain and reduce inflammation by inhibiting prostaglandin synthesis. Hormonal contraceptives, such as oral contraceptives or intrauterine devices (IUDs), may also be prescribed to regulate menstrual cycles and decrease menstrual flow, thereby reducing pain.<sup>[4]</sup>

In recent years, there has been growing interest in alternative and complementary therapies, including herbal remedies, acupuncture, and dietary supplements, for the management of dysmenorrhea. These approaches offer potential benefits with fewer adverse effects compared to broad categories:



### **What is dysmenorrhea disease?**

Dysmenorrhea is a medical term that refers to painful menstrual periods or menstrual cramps. It is a common condition experienced by many menstruating individuals and can vary in severity from mild discomfort to debilitating pain. Dysmenorrhea is classified into two main types:

**Primary Dysmenorrhea:** This type of dysmenorrhea occurs in the absence of any underlying medical condition. It is typically caused by the release of prostaglandins, hormone-like substances that stimulate uterine contractions. Prostaglandins cause the uterus to contract more forcefully, leading to increased pain and discomfort during menstruation. Primary dysmenorrhea usually starts shortly after menarche (the onset of menstruation) and may improve with age or after childbirth.<sup>[2]</sup>

**Secondary Dysmenorrhea:** Secondary dysmenorrhea is associated with an underlying medical condition, such as endometriosis, adenomyosis, uterine fibroids, pelvic inflammatory disease (PID), or ovarian cysts. These conditions can cause inflammation, scarring, or structural abnormalities in the reproductive organs, leading to more severe and persistent menstrual pain. Secondary dysmenorrhea typically develops later in life and may worsen over time if left untreated. Symptoms of dysmenorrhea may include: Cramping pain in the lower abdomen or pelvis Back pain Thigh or leg pain Nausea Vomiting Diarrhea Headaches Fatigue Treatment for dysmenorrhea depends on the underlying cause and severity of symptoms. For primary dysmenorrhea, over-the-counter pain relievers such as nonsteroidal anti-inflammatory drugs (NSAIDs) or hormonal contraceptives (birth control pills) may help alleviate symptoms. Lifestyle changes such as regular exercise, dietary modifications, and stress management techniques may also be beneficial. For secondary dysmenorrhea, treatment focuses on addressing the underlying medical condition. This may involve medications to manage inflammation or hormonal imbalances, surgical interventions to remove fibroids or treat endometriosis, or other specialized treatment.<sup>[2]</sup>

## Symptoms of Dysmenorrhea Disease



Dysmenorrhea, or painful menstrual periods, can manifest with a range of symptoms, which may vary in severity from person to person. The primary symptom of dysmenorrhea is pelvic or abdominal pain that occurs before or during menstruation. However, individuals may also experience additional symptoms, including:

**Cramping Pain:** The most common symptom of dysmenorrhea is cramping pain in the lower abdomen or pelvis. The pain may range from mild to severe and may radiate to the lower back or thighs.

**Menstrual Pain:** Pain associated with dysmenorrhea typically occurs just before or during menstruation and may last for several hours to several days.

**Back Pain:** Some individuals may experience lower back pain or discomfort in addition to pelvic pain during menstruation.

**Nausea:** Nausea or a feeling of queasiness may accompany dysmenorrhea, particularly during the more severe episodes of pain.

**Vomiting:** In some cases, dysmenorrhea can be accompanied by vomiting, especially if the pain is severe.

**Diarrhea:** Dysmenorrhea may cause changes in bowel habits, such as diarrhea, due to the release of prostaglandins, which can affect the muscles in the intestines.

**Headaches:** Some individuals may experience headaches or migraines in association with dysmenorrhea.

**Fatigue:** Dysmenorrhea can be physically and emotionally draining, leading to feelings of fatigue or exhaustion.

**Mood Changes:** Hormonal fluctuations associated with menstruation and menstrual pain can contribute to mood changes, such as irritability, anxiety, or depression.



**Concentrating:** The pain and discomfort of dysmenorrhea may interfere with daily activities and make it challenging to concentrate or focus.

### Ingredients, Equipment, & Steps

#### Ingredients

1. Ginger extract<sup>[5]</sup>
2. Cinnamon powder
3. Fennel seeds
4. Borax
5. Tween 80 (surfactant)
6. Mentha oil
7. White beeswax

#### Equipment

1. Weighing balance
2. Glass beakers or containers
3. Hot plate or burners
4. Stirring rod or glass rod
5. Thermometer
6. pH meter
7. Homogenizer or blender
8. Containers for storage

#### Steps

1. Weigh and measure the required quantities of ginger extract, cinnamon powder, fennel seeds, borax, tween 80, mentha oil, and white beeswax using a weighing scale and glass beakers.
2. Heat a suitable quantity of water in a glass beaker on a hot plate or burner until it reaches a temperature of about 70-80°C.
3. Add the measured quantities of white beeswax and borax to the hot water and stir continuously until completely melted and homogenized.
4. In a separate glass beaker, combine the ginger extract, cinnamon powder, fennel seeds, tween 80, and mentha oil. Mix thoroughly to ensure uniform dispersion.
5. Slowly add the herbal mixture to the melted wax and borax solution while stirring continuously to achieve proper emulsification.
6. Continue stirring the mixture until it cools down to room temperature and starts to thicken.
7. Once the cream has cooled and thickened, adjust the pH using a pH meter to ensure it falls within the desired range for skin compatibility.
8. Transfer the polyherbal cream into suitable containers for storage, ensuring they are tightly sealed to prevent contamination.

#### Formula

Sr.No.	Ingredients	Quantity Taken			Category
		F1	F2	F3	
1	Ginger Extract	3 ml	3 ml	3 ml	Antioxidant, antimicrobial, neuro- protective, analgesic, gastrointestinal, anti-inflammatory
2	Cinnamon	3 ml	3 ml	3 ml	Antioxidant, antimicrobial, anti-inflammatory
3	Fennel seeds	3 ml	3 ml	3 ml	Antioxidant, antimicrobial, anti-inflammatory
4	Borax	1 gm	1.5gm	0.50 gm	Stabilizer
5	Mentha	10 ml	20 ml	15 ml	Provide relief from muscle aches, joint pain, and headaches.
6	White bees wax	2.5gm	7 gm	5 gm	emulsifying agent, stabilize
7	Tween80	Q.S	Q.S	Q.S	Non ionic , Surfactant & Emulsifiers



### Procedure of the Ointment

a) Initially ointment base was prepared by weighing accurately grated Bees wax and liquid paraffin and borax which was placed in evaporating dish on water bath. After melting of Bees wax remaining ingredients were added and stirred gently to aid melting and mixing homogeneously followed by cooling of ointment base.

b) Herbal ointment was prepared by mixing accurately weigh Ginger extract and cinnamon, fennel extract to the ointment base by levigation method to prepare a smooth paste with two or three times its weight of base, gradually incorporating more base until to form homogeneous ointment, finally transferred in a suitable container.<sup>[6]</sup>

### Drug Profile & Ingredients Profile

#### 1) Ginger

Sr.No.	Attributes	Details
1	Taxonomical information	Kingdom Plantae Clade Monocots Order Zingiberales Family Zingiberaceae Genus Zingiber Species Z.officinale
2	Vernicular Name	Hindi name: Adrak English name: Ginger Common name: Ginger
3	Part use	Rhizome, ginger root or whole ginger used



Ginger is a versatile ingredient that is used in various forms in ointments and other topical preparations for its potential therapeutic properties. Here are some ways ginger can be used in ointments:

**Ginger Extract:** Ginger extract, obtained from the root of the ginger plant, contains bioactive compounds such as gingerol and zingerone, which have antioxidant and anti-inflammatory properties. Ginger extract can be incorporated into ointments to provide soothing relief for sore muscles, arthritis, or other inflammatory conditions.



**Essential Oil:** Ginger essential oil is derived from the steam distillation of ginger root. It has a warm, spicy aroma and is believed to have analgesic and circulatory-stimulating properties. Ginger essential oil can be added to ointments to impart its fragrance and potential therapeutic benefits for muscle pain, joint stiffness, or poor circulation.

**Infused Oil:** Ginger can be infused into carrier oils such as olive oil or coconut oil to extract its medicinal properties. Ginger-infused oil can be used as a base ingredient in ointments to provide both the fragrance and therapeutic effects of ginger.

**Powder:** Ground ginger powder, made from dried ginger root, can be added directly to ointment formulations for its warming and stimulating properties. Ginger powder may help to increase blood circulation and relieve pain when applied topically. **Ginger Paste:** Fresh ginger root can be grated or blended into a paste and added to ointment formulations for its anti-inflammatory and analgesic effects. Ginger paste can provide immediate relief for muscle soreness, joint pain, or other inflammatory conditions when applied topically.

### Medicinal Use

ginger to help prevent or treat nausea and vomiting from motion sickness, pregnancy, and cancer chemotherapy. It is also used to treat mild stomach upset, to reduce pain of osteoarthritis, and may even be used in heart disease.<sup>[7]</sup>

### Pharmacology

**Anti-inflammatory Effects:** Ginger contains compounds like gingerol and zingerone, which possess anti-inflammatory properties. These compounds can help reduce inflammation in the skin, potentially alleviating discomfort associated with dysmenorrhea.

**Analgesic Properties:** Ginger may act as a mild analgesic when applied topically, helping to relieve pain associated with menstrual cramps. It may work by blocking pain signals or inhibiting the production of pain-inducing substances in the body.

**Improvement of Blood Circulation:** Ginger has vasodilatory properties, which means it can widen blood vessels and improve blood circulation. Enhanced blood flow to the affected area may help reduce cramping and discomfort during menstruation

**Soothing and Relaxing Effect:** The application of ginger cream onto the skin can have a soothing and relaxing effect, which may help ease tension and discomfort in the abdominal and pelvic region.

### How to prepare zinger powder

To prepare ginger powder, start by washing fresh ginger roots thoroughly to remove any dirt. Peel the ginger using a vegetable peeler or a spoon, then slice the ginger into thin pieces. Place the slices on a clean, dry surface or a baking sheet and allow them to dry completely in a well-ventilated area. You can also use a food dehydrator or oven set to a low temperature to speed up the drying process. Once the ginger slices are completely dry and crisp, grind them into a fine powder using a spice grinder or mortar and pestle. Store the ginger powder in an airtight container away from moisture and heat to maintain its flavor and potency.



**2] Cinnamon**

Sr.No.	Attributes	Details
1	Taxonomical Information	Kingdom : plantae Order :laurels Family :lauraceae Genus: Cinnamomum Species: c.zeylani
2	Vernicular Name	Sanskrit : cassia, Chinese cinnamon English : Sthula tvak,Taja Common name : Cinnamon verum
3	Part use	Dried inner bark of the shoots of trees of <i>Cinnamomum zeylannicum</i>

**□ Description**

Cinnamon verum trees are 10-15metres (30-50feet) tall. The leaves are ovate -oblong in shape and 7flowers which are arranged in panicles, have a greenish color and a distinct odour. The fruit is a purple 1cm druple containing a single seed.



Cinnamon (*Cinnamomum verum* and *Cinnamomum zeylanicum*) is one of the plants that belong to the *Lauraceae* family.<sup>[8]</sup> This traditional herbal medicine is from Australia and Asia Based on the antioxidant, antimicrobial, and anticarcinogenic activities of this plant, it is widely used in medical industries . Previous investigations have found cinnamon to have antimicrobial characteristics . Cinnamon has been traditionally used for its antiseptic, antioxidant, and antimicrobial properties. Previous studies have investigated the antimicrobial activities of cinnamon against various bacteria, such as *Bacillus* and *E. coli* . Cinnamon oil has shown antibacterial effects against *E. coli*, *Listeria monocytogenes*, *Bacillus*, *Enterococcus faecalis*, *Salmonella typhimurium*, *Pseudomonas aeruginosa*, *Yersinia enterocolitica* and *Staphylococcus aureus*. This strong antimicrobial activity is based on the presence of cinnamaldehyde and eugenol in cinnamon essential oil. Bacteria such as *Campylobacter jejuni* have been shown to be more inhibited by the essential oil of cinnamon compared to other Gram-negative bacteria such as *Escherichia coli* .Other researchers have demonstrated the mechanism of the antimicrobial action of the essential oil of cinnamon against cell walls of *Listeria monocytogenes*, *E. coli*, and *S. aureus* . The appearance of phenolic substances in cinnamon results in potential antioxidant, antimutagenic, antidiabetic, anticancer, and anti-inflammatory activities. The essential oil of this herb has been shown to have antioxidant activity. Other studies have reported antioxidant activities of water, methanol, and ethanolic cinnamon extracts . This plant shows high anti-influenza virus activity.<sup>[9]</sup>

**Cinnamon use of Medicinal**

In addition to being an antioxidant, anti-inflammatory, antidiabetic, antimicrobial, anticancer, lipid-lowering, and cardiovascular-disease-lowering compound, cinnamon has also been reported to have activities against neurological disorders, such as Parkinson's and Alzheimer's diseases. This review illustrates the pharmacological prospective of cinnamon and its use in daily life.<sup>[10]</sup>



### Health Benefits of Cinnamon<sup>[11]</sup>

Aside from its delightful flavor, cinnamon also offers a range of health benefits. Some of the potential benefits of consuming cinnamon include:

1. **Antioxidant properties:** Cinnamon is rich in antioxidants, which can help protect the body from oxidative damage caused by free radicals.
2. **Anti-inflammatory effects:** The compounds found in cinnamon may help reduce inflammation in the body, which is linked to various chronic conditions.
3. **Blood sugar regulation:** Cinnamon has been shown to improve insulin sensitivity and may help lower blood sugar levels.
4. **Heart health:** Some studies suggest that cinnamon may have a positive impact on heart health by reducing risk factors such as high cholesterol and triglyceride level

### Pharmacology

**Anti-inflammatory Effects:** Cinnamon contains compounds like Cinnamaldehyde and cinnamic acid, which have demonstrated anti-inflammatory properties. These compounds can help reduce inflammation in the skin and pelvic region, potentially alleviating discomfort associated with dysmenorrhea.

**Antispasmodic Properties:** Cinnamon has been traditionally used to relieve muscle spasms and cramps. In dysmenorrhea, cinnamon's antispasmodic effects may help relax uterine muscles, reducing the intensity of menstrual cramps

**Analgesic Action:** Cinnamon contains components that may act as mild analgesics, helping to alleviate pain associated with dysmenorrhea by blocking pain signals or reducing the production of pain-inducing substances.

**Antimicrobial Effects:** Cinnamon possesses antimicrobial properties, which could help prevent or manage infections in the pelvic region, providing additional relief during menstruation.

**Improvement of Blood Circulation:** Some studies suggest that cinnamon may improve blood circulation. Enhanced blood flow to the pelvic area may help reduce cramping and discomfort associated with dysmenorrhea.

**Aroma therapeutic Benefits:** The aroma of cinnamon is often associated with feelings of warmth and comfort. Incorporating cinnamon into a cream may provide aroma therapeutic benefits, promoting relaxation and stress reduction, which could help alleviate dysmenorrhea symptoms.

### How to Prepare Cinnamon Powder

- Break the Cinnamon sticks in to small sticks (This helps the sticks to get powdered without much difficulty)
- Now blend it into a fine powder using a Food processor or blender. Sieve the powdered Cinnamon
- Finally Transfer the sieved powder and sugar in to the blender and blend it. This is however





### 3) Fennel

Sr.No.	Attributes	Details
1	Taxonomical Information	Kingdom: Plantae Division: magnoliophyta Class: magnoliopsida Order: Apiales Family: umbeliferae Geuns: Foeniculum Specie: Foeniculum vulgare
2	Vernicular Name	Hindi/ Panjabi: saunf English: Fennel Marathi: badisaunf Sanskrit: satupusa
3	Synonyms	Fructus foeniculli, Fennel fruit, Fenkel, Florence fennel, Sweet fennel, Wild fennel, Large fennel.



Fennel (*Foeniculum vulgare*) is one of the herbal medicinal plants belonging to the *Apiaceae* family. Its native habitats include shores of Mediterranean Sea. There are some studies on the radical scavenging activity of fennel. These studies have revealed that the antioxidant ability of this plant is due to the presence of high phenolic content in its extracts. Fennel has been shown to have high antioxidant ability. The antioxidant ability of the extract of this plant is due to numerous antioxidant processes such as free radical scavenging, superoxide anion radical scavenging, total antioxidant, and hydrogen peroxide scavenging. The strong antioxidant characteristics of ethanol extracts and essential oil of this plant have been demonstrated by in vitro studies. The hydro-ethanolic extracts of this plant have shown to possess free radical scavenging characteristics directly proportional to the content of phenolic compounds of fennel extract. The extracts and essential oil of this plant have been demonstrated to have significant antioxidant, antimicrobial, and anti-inflammatory properties. The antimicrobial property of the essential oil (EO) and extract of fennel has been proven using the disk diffusion method. Fennel extracts and essential oils have demonstrated high inhibitory activity against *Bacillus megaterium*, *Escherichia coli*, *Bacillus pumilus*, *S. aureus*, *Pseudomonas putida*, *Pseudomonas syringae*, *Salmonella typhi*, *Bacillus cereus*, *Micrococcus luteus*, *Klebsiella pneumonia* and *Bacillus subtilis*. The inhibitory ability of fennel also depends on its dosage. Consequently, fennel extract and oils could be a biosource of medicinal materials needed for the manufacturing of novel antimicrobial agents. Fennel has been shown to be inhibitory against influenza A virus.

#### Part use of fennel

Fennel herb is commonly used for its distinctive flavor and aroma in culinary dishes, as well as for its potential health benefits. Here are some common uses of fennel herb:

##### 1. Culinary Uses:

Fennel seeds: Often used as a spice in cooking, particularly in Mediterranean and Indian cuisines. They have a slightly sweet and licorice-like flavor.<sup>[12]</sup>

Fennel bulb: The bulb can be sliced or chopped and used raw in salads, roasted as a side dish, or added to soups and stews.

Fennel fronds: The feathery green leaves of the fennel plant can be used as an herb to garnish dishes or add flavor to salads, sauces, and marinades.

##### Medicinal Uses:

Digestive Aid: Fennel is known for its carminative properties, which can help relieve bloating, gas, and indigestion.

Respiratory Health: Fennel may have expectorant properties that can help loosen phlegm and relieve coughs. Anti-inflammatory: Fennel contains compounds with anti-inflammatory properties, which may help reduce inflammation in the body.

Antioxidant: Fennel is rich in antioxidants, which can help protect cells from damage caused by free radicals.

##### Herbal Remedies:



Fennel tea: Made by steeping fennel seeds in hot water, fennel tea is a popular herbal remedy for digestive issues and can also be enjoyed as a soothing beverage. Fennel

essential oil: Extracted from fennel seeds, fennel essential oil is used in aromatherapy and may have various health benefits, including reducing stress and promoting relaxation.

### Medicinal use

Fennel is used for various digestive problems including heartburn, intestinal gas, bloating, loss of appetite, and colic in infants. It is also used for upper respiratory tract infections, coughs, bronchitis, cholera, backache, bedwetting, and visual problems.<sup>[13]</sup>

### Pharmacology

**Antispasmodic Effects:** Fennel contains anethole, a compound with antispasmodic properties. When applied topically, fennel may help relax uterine muscles, reducing the intensity of menstrual cramps.

**Anti-inflammatory Properties:** Fennel contains various compounds that exhibit anti-inflammatory effects. By reducing inflammation in the pelvic area, fennel may alleviate pain associated with dysmenorrhea.

**Analgesic Action:** Fennel may act as a mild analgesic, helping to relieve pain by blocking pain signals or inhibiting the production of pain-inducing substances in the body.

**Hormonal Modulation:** Some studies suggest that fennel may have hormonal modulating effects, potentially regulating menstrual cycles and reducing dysmenorrhea symptoms

**Skin Conditioning:** Fennel is often used in skincare products for its skin-conditioning properties. When included in a cream, it can help moisturize and soothe the skin, providing additional comfort during menstruation.

**Aroma therapeutic Benefits:** The aroma of fennel may have calming effects, which could contribute to relaxation and stress reduction, potentially easing dysmenorrhea symptoms.





### Evaluation Testing

Sr.No.	Evaluation Parameter	F1	F2	F3
1)	Colour	Darkish yellow	Yellow	Pale yellow
2)	Odour		Pleasant	Pleasant
3)	Consistency	Creamy but not smooth	Smooth but not Creamy	Smooth & Creamy
4)	Washability	Not all clear	Grease like substance remaining	Easily wash by water
5)	PH	4.5	6.5	5.6
6)	Spreadability	Trackiness	Drag remaining	Good without drag
7)	Skin irritation	Itching	Redness	No adverse effect
8)	Drug Rate	Uncontrolled	Slightly controlled	Controlled
9)	Homogeneity	Floculation	Cake formation	Uniform distribution
10)	Viscosity	Not adhere	Mildly adhere	Easy to adhere



### Formulated Herbal Cream

#### Conclusion & Interpretation :

The formulation and evaluation of the F3 polyherbal cream for dysmenorrhea yielded promising results, indicating its potential as a natural remedy for menstrual pain relief. The cream, containing ginger extract, cinnamon, fennel, borax, tween 80, mentha, and white beeswax, exhibited favorable physical characteristics, including suitable pH, viscosity, and spreadability. In studies demonstrated significant anti-inflammatory activity, suggesting the cream's efficacy in reducing inflammation associated with dysmenorrhea. These findings suggest that the polyherbal cream could provide safe and effective relief from dysmenorrhea symptoms. Further clinical trials are warranted to validate its efficacy and safety in human subjects and explore its potential as an alternative treatment option for dysmenorrhea.

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# EXPLORING E -LEARNING ATTITUDE IN RELATION TO SELF-PERCEPTION AMONG UNDERGRADUATE STUDENTS AT B.P.S. MAHILA VISHWAVIDYALAYA

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## ABSTRACT

*In today's digital age, the use of technology in education is exceptionally important. E-learning provides educational institutions with an opportunity to provide new and dynamic learning experiences for students. Through this approach, students develop the ability to learn according to their own schedule allowing them to work independently and enthusiastically towards their learning goals. This research paper explored the relationship between E-Learning Attitude and Self-Perception among undergraduate students at B.P.S. Mahila Vishwavidyalaya. The study concluded that there is a very low degree of positive correlation between self-perception and E-learning. It is also found that arts students have more positive attitude towards e-learning than science students. This may be due to the fact that science students have lab work as a part of their curriculum, which is not possible through e-learning.*

**KEYWORDS:** - E-learning Attitude, Self-Perception, Undergraduate Students.

## INTRODUCTION

In today's digital age, the use of technology in education is exceptionally important. E-learning provides educational institutions with an opportunity to provide new and dynamic learning experiences for students. Through this approach, students develop the ability to learn according to their own schedule allowing them to work independently and enthusiastically towards their learning goals. E-Learning, characterized by the use of digital technologies to deliver educational content and facilitate learning, has become increasingly prominent in recent years. Over the past few years, e-learning has gained significance in the field of education. The growth might be ascribed to the shift in pedagogical paradigms and the need for adaptable learning alternatives. E-learning, which uses digital technologies to enhance learning beyond the confines of a traditional classroom, has become an essential component of modern educational systems. It enables convenient scheduling and provides remote access to materials. The implementation of e-learning has expedited, particularly in reaction to worldwide occurrences like as the COVID-19 pandemic. In the wake of the COVID-19 pandemic, traditional education, which was formerly confined to physical classrooms and in-person interactions, is now being augmented and occasionally substituted by online learning platforms. E-learning enhances education quality through the provision of diverse learning resources and the facilitation of personalized learning experiences (Ratnawati & Idris, 2020). For instance, e-learning broadens the scope of courses and programs accessible to students (Ozornina et al., 2022). Universities provide a diverse range of courses on online platforms, encompassing specialty or specialized subjects, enabling students to pursue their academic passions, particularly within the COVID-19 epidemic (Basu, 2022). Furthermore, e-learning platforms commonly have features that facilitate collaboration and communication among students and teachers (Ozornina et al., 2022). This form of communication has the potential to promote a sense of community, allow the exchange of knowledge between peers, and permit debates in courses that are conducted remotely or online. E-learning facilitates students in becoming proficient with technology and equips them for the professional environment, where there is a significant need for digital competencies (Akcil & Bastas, 2020). Moreover, online training can offer greater cost efficiency compared to traditional classroom instruction (Thapa et al., 2021), resulting in reduced expenses for transportation, accommodation, and physical course materials. This affordability enhances the accessibility of higher education to students (Abramova & Shishmolina, 2022).

Multiple researches have investigated the perspectives of students regarding e-learning. In their study, Ozaydinet. al. (2021) discovered that the attitudes of pre-service teachers towards e-learning varied based on their learning style, but not on factors such as age, gender, and subject area. Prakasha et al. (2022) conducted a study on the attitudes of university students towards e-learning and discovered that females had more favourable views towards e-learning compared to males. Men had a tendency to avoid e-learning. Uyar (2023) examined the attitudes of university students towards e-learning. The findings indicated that students exhibited a strong positive disposition towards e-learning. In this study, male students, students with previous experience in e-learning, persons who have internet access at home, those who own personal computers, and students enrolled in technical courses demonstrated a more positive disposition towards e-learning. The limitations of e-learning, as identified by students, include limited teacher-student



interaction, unequal access to opportunities, and inadequate knowledge among both students and instructors. Students identified network connectivity issues, insufficient equipment, and limited internet access as challenges in the development of e-learning. Attitude towards e-learning is also related with self-perception. Constructivism posits that e-Learning is a dynamic process of acquiring information, since knowledge is created via personal experience, development, and engagement with the surrounding environment (Lee & Lee, 2008). The present study is an attempt to examine the relationship between self-perception and attitude towards e-learning of undergraduate students.

**STATEMENT OF THE PROBLEM**

*“Exploring E-learning Attitude’s in Relation to Self – Perception Among Undergraduate Students at B.P.S Mahila Vishwavidyalaya.”*

**OBJECTIVE OF THE STUDY**

The study is based on the following objectives.

- To compare the attitude of e-learning among hostler and day scholar undergraduate students.
- To compare the attitude of e-learning among Science and Arts undergraduate students.
- To compare the attitude of e-learning among rural and urban undergraduate students.
- To find out the relationship between e-learning attitude and self-perception among undergraduate students.

**HYPOTHESES**

- There is no significant difference between attitude towards e-learning among hostler and day scholar undergraduate students.
- There is no significant difference between attitude towards e-learning among Science and Arts undergraduate students.
- There is no significant difference between attitude towards e-learning among rural and urban undergraduate students.
- There is no significant relationship between attitude towards e-learning and self-perception among undergraduate students.

**RESEARCH METHODOLOGY OF THE STUDY**

This study was carried out on the basis of descriptive survey method. 200 university students of B.P.S Mahila Vishwavidyalaya were selected using simple random sampling. After selecting the sample, tools were selected to collect the data. Each tool was appropriate for collection of certain type of evidence or information. In this study, the researcher used E-learning Attitude Scale (ELAS) by Gupta and Bansal (2022) and Self- Perception Scale by Agarwal (2015) for data collection. Descriptive statistics mean, standard deviations co-relation and t-test were used to analysis the data .

**RESULT AND DISCUSSION**

**Objective 1.** To compare the attitude of e-learning among hostler and day scholar undergraduate students.

**To achieve this objective following hypothesis is developed:**

There is no significant difference between attitude towards e-learning among hostler and day scholar undergraduate students.

**Table 1. Comparison of the attitude of e-learning among hostler and day scholar undergraduate students.**

Groups	No. of Students	Mean	S.D	t- value	Level of Significance
Hostlers	100	178.02	14.89	0.900	Not Significant at 5% level of significance
Day Scholars	100	180.05	16.93		

**Interpretation**

The table 1 shows that mean of hostler and day scholar towards e-learning attitude is 178.02 and 180.05 and whereas S.D. is 14.89 and 16.93 respectively. The t-value is 0.900. It is found not significant at 0.05 levels of significance which indicates that hostler and day scholar are not significantly differ in their e – learning attitude . so, the null hypotheses “There is no significant difference between attitude towards e-learning among hostler and day scholar undergraduate students is accepted.”

**Objective 2 .** To compare the attitude of e-learning among Science and Arts undergraduate students.

**To achieve this objective following hypothesis is developed:**

There is no significant difference between attitude towards e-learning among Science and Arts undergraduate students.

**Table 2. Comparison the attitude of e-learning among Science and Arts undergraduate students.**

Groups	No. of Students	Mean	S.D.	t-value	Level of significance
Arts Students	100	182.62	17.55	3.124	Significant 0.01
Science Students	100	175.59	14.08		



**Interpretation**

The table 2 shows that mean of Arts and science on e-learning attitude is 182.62 and 175.59 and where as S.D. 17.55 and 14.08 respectively and the t-value is 3.124. it is found significant at 0.01 levels of significance which indicates that Arts and Science students are significantly differ in their e – learning attitude.so, the null hypotheses “There is no significant difference between attitude towards e-learning among between among Science and Arts undergraduate students.”is rejected and concluded that arts students have more positive attitude than science students.

**Objective 3.**To compare the attitude of e-learning among rural and urban undergraduate students.

**To achieve this objective following hypothesis is developed:**

There is no significant difference between attitude towards e-learning among rural and urban undergraduate students.

**Table 3. Comparison the attitude of e-learning among rural and urban undergraduate students.**

Groups	No. of Students	Mean	S.D.	t-value	Level of significance
Urban students	100	179.25	18.23	0.436	Not significant 0.05
Rural students	100	178.26	13.55		

**Interpretation**

The table 3 shows that mean of rural and urban Students on e-learning attitude is 179.25 and 178.26 and where as S.D. 18.23 and 13.55 respectively it can be observed that the t-value is 0.436 it is not found significant at 0.05 levels of significance which indicates that rural and urban students are not significantly differ in their e – learning attitude.so, the null hypotheses “There is no significant difference between attitude towards e-learning among rural and urban undergraduate students” is accepted.

**Objective 4.**To find out the relationship between e-learning attitude and self-perception among undergraduate students.

**To achieve this objective following hypothesis is developed:**

There is no significant relationship between attitude towards e-learning and self-perception among undergraduate students.

**Table 4. Relationship between attitude towards e-learning and self-perception among undergraduate students.**

Variables	No. of students	Co-relation of coefficient
Self-Perception	200	0.049
E-Learning	200	

Table 4 shows that there is a very low degree of positive correlation between self-perception and E-learning which means that if attitude towards e- learning increases than self-perception also increases. So, the null hypothesis ‘There is no significant relationship between attitude towards e-learning and self-perception among undergraduate students. ‘is rejected.

**CONCLUSION**

The present paper analyses the attitude towards e-learning of undergraduate students. Most of the students have positive students towards e- learning due the fact that they find it easy to use and useful for study. The findings concluded that arts students have more positive attitude towards e-learning than science students. This may be due to the fact that science students have lab work as a part of their curriculum, which is not possible through e-learning. The study also concluded that there is a very low degree of positive correlation between self-perception and E-learning. In other words, If a student have a positive attitude towards e- learning then her/ his self perception is also increased .

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UDK: 613.55:616.248-0.53.5:612.66

## EVALUATION OF PHYSICAL DEVELOPMENT IN CHILDREN WITH BRONCHIAL ASTHMA

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Article DOI: <https://doi.org/10.36713/epra16639>

DOI No: 10.36713/epra16639

### ABSTRACT

*Among the diseases capable of negatively affecting the course of bronchial asthma in children and adolescents, disruptions in nutritional status play an important role, including not only excess body weight and obesity, but also insufficient body weight. Since children with the consequences of perinatal central nervous system damage often exhibit signs of protein-energy deficiency, the aim of the research conducted was to assess the indicators of nutritional status of children with bronchial asthma depending on accompanying neurological symptoms by evaluating the body mass index. 126 children with bronchial asthma were examined, divided into two subgroups: the main group included 65 children (51.6%) with the disease occurring against the background of consequences of perinatal central nervous system damage; the comparison group included 61 patients (48.4%) without accompanying neurological symptoms. The average age of the children was  $11.4 \pm 2.9$  years. According to the results obtained, in 50.8% of observations, children in the main group had insufficient body weight and a decrease in body mass index, while in the comparison group, excess body weight was observed in 37.7% of cases.*

**KEYWORDS:** children, bronchial asthma, anthropometry, body mass index, nutritional status, central nervous system

### RELEVANCE

Despite the advances achieved today in healthcare, the incidence of bronchial asthma (BA) is on the rise worldwide. The main reasons for the growth of this disease, including among children and adolescents, is the allergization of the population due to the chemicalization of agriculture and air pollution, as well as the increased use of various chemicals in industrial production. Along with this, the widespread use of antibiotics, vaccines and serums in medical practice is of particular importance. Due to the multiplicity of etiological factors and pathogenetic mechanisms of the disease, the treatment of bronchial asthma is difficult [6,7,15].

The main goal of therapy for asthma is primarily to achieve control over the symptoms, course and risk factors for exacerbation of the disease. It is believed that control of this disease can be achieved in all patients, which has been repeatedly discussed in international consensus documents, including GINA 2016 [1,14]. Despite this fact, in some patients, modern methods of treating BA do not provide adequate control [2,4,14]. That is why, in recent years, much attention has been paid to a personalized approach to the treatment of asthma, taking into account the phenotypes of the disease and comorbid conditions that can affect the course of asthma in a particular patient [5,6], including those with concomitant neurological symptoms.

In the list of diseases that can potentially negatively affect the course of asthma, an important place is occupied by disturbances in the nutritional status of patients, both overweight and obesity, and underweight [7,8].

According to the World Health Organization (WHO) report for 2021, the prevalence of overweight in the population of children under 5 years of age in the world is 7.2%, in the European population - 13.2%. Among children in the European region aged 11 to 13 years, overweight ranges from 5% to 25%. It has been noted that overweight is observed more often among boys than among girls [9]. Based on the results of an epidemiological study for 2020-2021 in Uzbekistan, which included data on 10,223 adolescents aged 12-17 years, the incidence of overweight was 12.8%, obesity was detected in 3.2% [10,14]. According to the same study, in Navoi observed 11.2% of adolescents 12-17 years old with overweight, including 4% with obesity. In some regions of Uzbekistan, in recent years there has been a trend toward an increase in the prevalence of overweight and obesity among children and adolescents [11,14].

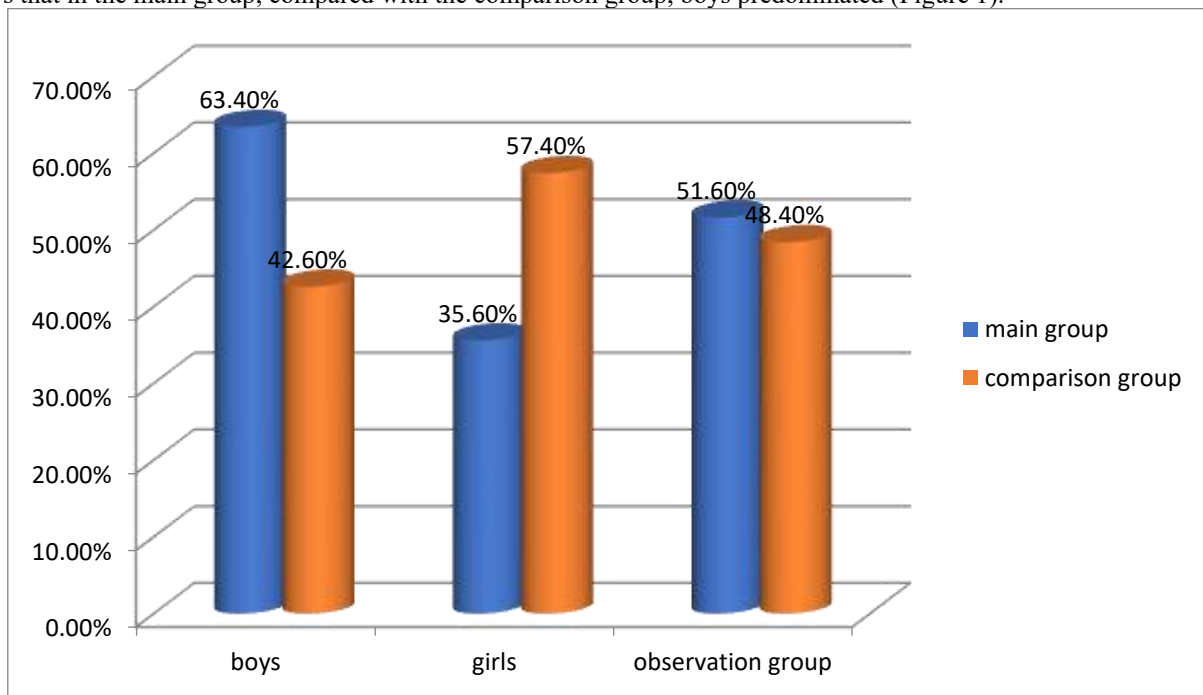
Overweight and obesity are defined as excess and abnormal fat deposits that can be detrimental to health. They can be assessed using several indicators, including body mass index (BMI), body fat content, and anthropometric indices [9]. BMI is currently considered as the main screening tool for assessing nutritional status [12,14].



**THE PURPOSE OF THE STUDY** was to assess the nutritional status of children with bronchial asthma depending on concomitant neurological symptoms by assessing body mass index.

**MATERIALS AND METHODS**

We analyzed data from a study of 126 patients with asthma aged 5 to 17 years, whose average age was 11.4±2.9 years. According to the gender distribution, there are 71 (56.3%) boys and 55 (43.7%) girls. The research group of children with asthma, depending on the presence of concomitant consequences of perinatal damage to the central nervous system (CNS), was divided into two subgroups: the main group included 65 children with asthma (51.6%), occurring against the background of the consequences of perinatal damage to the central nervous system; The comparison group included 61 patients with asthma (48.4%) without concomitant neurological symptoms. Figure 1 shows the distribution of children in the observation groups by gender, from which it follows that in the main group, compared with the comparison group, boys predominated (Figure 1).



**Figure 1. Distribution of children according to gender in observation groups**

The diagnosis of asthma and severity of the disease were established in accordance with the existing GINA 2016-2021 recommendations [14]. All children underwent a standard examination in a hospital setting, which, along with other methods, included the determination of anthropometric indicators, such as body weight in kilograms and height in centimeters, after which BMI was calculated. To assess the physical development and adaptive capabilities of the children's body, graphs and curves were used, developed as a result of multicenter studies based on the guidelines recommended by WHO.

BMI was calculated using the generally accepted formula:

$$BMI = \frac{weight(kg)}{height(m^2)}$$

and assessed using percentile tables (WHO, 2006; ASPEN 2008). WHO tables are BMI parameters for children of the same age and gender in the form of graphs with boundaries of 3, 10, 25, 50, 75, 90 and 97 percentile intervals, and the average values are located between the 25 and 75 percentiles. The graphs have 5 curves: «median - 0, curves -2 and +2 standard deviations (SD), BMI between -2SD and -3SD, between +2SD and +3SD - low and high indicators on the verge of exhaustion and obesity, and the results are below -3SD and above +3SD – abnormal results».

Informed consent was obtained from all patients aged 15-17 years and from parents of patients under 15 years of age.

**RESULTS AND ITS DISCUSSION**

An analysis of the severity of bronchial asthma showed that 15.1% of children were diagnosed with mild intermittent BA, 35.7% with mild persistent BA, 28.6% with moderate BA and 20.6% with severe BA. . From the presented data it follows that the children of the main group were characterized by persistent moderate severity of BA (32.3%), while in the comparison group there was persistent mild severity of the disease (40.9%) (Table 1).



**Table 1**  
**Clinical characteristics of the subjects**

Asthma severity	Study group (n=126)	Main group (n=65)	Comparison group (n=61)
Intermittent	19 (15.1%)	8 (12.3%)	11 (18.1%)
Persistent lung	45 (35.7%)	20 (30.8%)	25 (40.9%)
Persistent moderate severity	36 (28.6%)	21 (32.3%)	15 (24.6%)
Persistent severe	26 (20.6%)	16 (24.6%)	10 (16.4%)

BMI, characterizing the nutritional status of the patient, is a quantitative indicator adjusted for the sex and age of the child. The values of this indicator obtained in this study are presented in table. 2. The distribution of BMI in groups of patients grouped depending on the percentile corridor for BMI (Table 2) showed that there was a statistically significant difference between the groups ( $p < 0.01$ ).

**Table 2**  
**BMI characteristics in observation groups**

Note: \* - reliability of the values in relation to the indicators of the -1SD-(+1SD) group (\*-  $P < 0.05$ ; \*\* -  $P < 0.01$ )

Groups	Body mass index indicators				
	$\leq -2$ SD	$\leq -1$ SD	Median $\pm$ 1SD	$\geq +1$ SD	$\geq +2$ SD
Total group of patients (n=126), abs. number, %	12** (9.5%)	35 (27.8%)	46 (36.5%)	26* (20.6%)	7** (5.6%)
Main group (n=65), abs. number, %	10* (15.4%)	23 (35.4%)	22 (33.8%)	8 (12.3%)	2* (3.1%)
Comparison group (n=61), abs. number, %	2** (3.3%)	12* (19.7%)	24 (39.3%)	18* (29.5%)	5** (8.2%)

Among the examined children in the study group, about a third of the patients had normal BMI values (median BMI -1SD-(+1SD)) - 36.5% of children (46/126): 33.8% in the main group and 39.3% in the comparison group. Somewhat less frequently, overweight was detected in 20.6% (26/126), obesity was diagnosed in 5.6% of patients (7/126). Depending on the severity of neurological symptoms, the proportion of patients with normal BMI values decreased progressively. In the main group, 35.4% of patients (23/65) showed a decrease in BMI -1SD-(-2SD), and in 15.4% (10/65) a decrease in body weight to -2SD-(-3SD), then 50.8% of children had nutritional status disorders such as protein-energy malnutrition. In patients from the comparison group, a decrease in BMI was diagnosed 2 times less often, which amounted to 22.9% (14/61): while a decrease in BMI was within -1SD-(-2SD) in 19.7% (12/61), and only 3.3% (2/61) are below -2SD.

Differences in nutritional status in patients with BA in the observation groups had a tendency,  $\chi^2=25.92$ ;  $p=0.07$ . Clear differences in nutritional status were revealed in patients with asthma of varying severity based on BMI analysis depending on concomitant neurological symptoms. Noteworthy is the greater correlation between nutritional status and the course of asthma in the main group ( $\chi^2=26.83$ ;  $p=0.049$ ) in comparison with the comparison group ( $\chi^2=9.12$ ;  $p=0.89$ ): if in the main group such a relationship has the character of a clear trend, then in children of the comparison group without neurological symptoms it is weakly expressed.

In the comparison group, analysis of the distribution of patients into groups taking into account their BMI demonstrates statistically significant differences in comparison with the median -1SD and +1SD. The presented results show that this group of patients is most characterized by overweight +1SD- (+2SD), identified in 28.5% of children (18/61), and also in 8.2% (5/61) - obesity more than + 2SD, accounting for 37.7% of all observations (23/61). In the main group, nutritional status disorders within +1SD or more were diagnosed 2.3 times less often, amounting to 15.4% (10/65).

## CONCLUSION

Children and adolescents with bronchial asthma experience disturbances in nutritional status of a multidirectional nature, depending on the presence of concomitant neurological symptoms. Thus, children with perinatal complications of damage to the central nervous system are characterized by a decrease in body mass index, while children in the comparison group have an increase in BMI. That is, concomitant neurological symptoms aggravate existing imbalances in the physical development of children with chronic respiratory diseases.

Comparing the possibilities of studying nutritional status and its relationship with bronchial asthma in children and adolescents using body mass index can significantly simplify the analysis of clinical data and obtain new information that is not available when using standard characteristics.

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# PREPARATION AND EVALUATION OF HERBAL EYE MASK USING GRAPES SEED, ALOE VERA AND ISABGOL FOR REMOVING DARK CIRCLE AND COMPUTER VISION SYNDROME(CVS)

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## ABSTRACT

Computer Vision Syndrome (CVS) is a collection of symptoms related to eye disorders due to the use of computer-based digital devices. So considerable safety is needed against injured caused by exposure to blue light by digital devices. Grapes seed are carotenoid that contain antioxidants so that they reduce inflammation. The aims of this research is to provide a topical preparation in the form of a herbal eye mask using grapes seeds, isabgol and aloe vera which is useful for reduce Computer Vision Syndrome (CVS) and Dark Circle. Blue light a high energy short wavelength light is injure your eyes, sensitive cells in the retina and optic nerve cells behind the eyeball. In addition to protect watching and using Computer, mobile, and any listlessness. Herbal eye mask inventive skincare product designed to damage skin around the eyes. These eye mask natural consist of a mix of natural herb, isolations, extracts and other botanical ingredients known for their cool relaxing and antioxidant properties. The use of grapes seeds which contain antioxidant in control Computer Vision Syndrome (CVS) is formulated into a preparation herbal eye mask. The herbal infusion offers a through approach to eye care by essay to reduce Computer Vision Syndrome, dark circle, and puffiness. This is natural formulation. The focus of this research is obtain a preparation of herbal eye mask that can overcome Computer Vision Syndrome (CVS). This article aims to develop an herbal eye mask using black grapes seeds, aloe vera and isabgol for removing dark circle and protective essay against computer vision syndrome (CVS).

**KEYWORD:** Computer Vision Syndrome (CVS), Dark Circle, Black grapes seeds, Isabgol, and Aloe vera, Herbal eye mask.

## INTRODUCTION

Since COVID-19 epidemic has had a healthy impact on society. One of primary impacts that affects the group is the large-scale social restriction that cause all group activities to be limitations. During the COVID-19 epidemic, the government establish Work From Home (WFH) for workers, students and workers Female. So that children, young and adult can spend most of time in front of a Compute or any digital devices. According to Bhattacharya these device can cause injured by release high energy waves that can enter the eye and eventually donate to photochemical injure to retinal cells, which can make a person exposed to various eye problems removing from dry eyes to age-related muscular deterioration<sup>1</sup>. Computer Vision Syndrome (CVS) is the most common problem related to prolonged use mobile and digital devices that can caused objection, such as dry eyes, dark circle and reflection on the screen inappropriate viewing distance, uncorrected vision problem. The main caused of CVS is exposure to blue light source from LED light from digital devices so that exposure to blue light can have a negative effect on eye strain and physiological stress. So important safety is needed against injure caused by published to blue light by digital devices. Black grapes seeds and lutein are also known as carotenoids, which contain antioxidant so they can overcome inflammation have a peaceful effect and can maintain eye health<sup>2</sup>. The use of carotenoids lutein and black grapes seeds which contain antioxidant in overcoming Computer Vision Syndrome (CVS) is formulated into a preparation herbal eye mask. So in this study, a formulation was made herbal eye mask from Black grapes seeds, isabgol, and aloe vera. The focus of this research is obtain a preparation of herbal eye mask that can overcome Computer Vision Syndrome (CVS) and Dark Circle with good pharmaceutical stability<sup>3</sup>.

## OBJECTIVES

1. Computer Vision Syndrome is a collection of related to eye disorder due to the use computer based digital devices.



2. Black grapes seeds are carotenoids that contain antioxidant so that they can overcome information have a peaceful effect and can maintain dark circle and computer vision syndrome.
3. The purpose of this research is to cultivate a topical preparation is the herbal eye mask from black grapes seeds, isabgol, and aloe vera which is useful for dark circle and computer vision syndrome.
4. The prepare of herbal eye mask for reducing dark circle and CVS.
5. To prepare the eco-friendly herbal eye mask using black grapes seeds, isabgol, and aloe vera<sup>4</sup>.
6. To estimate the effectiveness and cooling property of the developed eye mask by quantitative analysis.

## REVIEW OF LITERATURE

**Herbal Eye Mask:** An herbal eye mask is a fabric or other material that you were over your eyes. Its blocks vision in eye and treat some vision problem with what is called occlusion therapy. Mask are also to common to wear after eye procedure.

### Advantages

1. Cross infection is reduced.
2. Protection of care provides.
3. Cost effective.
4. Flexible, soft, and comfortable.
5. Protect skin from friction.
6. May help you to fall a sleep quicker, complete darkness can increase melatonin production.
7. Block out artificial light to help improve sleep quality.

### Disadvantages

1. Herbal drug have slower effects as compare to Allopathic dosage from. Also is requiring long term therapy.
2. If they are too tight, they can leave impressions in your face and around your nose.

### Types of Mask

1. **Cooling eye mask**  
Often fill with ingredient like aloe vera extract to provide a cooling sensation and reduce puffiness and inflammation.
2. **Hydrogel eye mask**  
Some mask contain have a hydrogel base, which can have a expensive feel and may contribute to improve skin elasticity.
3. **Hydra gel eye mask**  
Hydra gel eye mask are hydration sealing, under eye pumping mask. These mask are infused with peptides and plant extracts, that help in reducing dark circle and under eye hollowness. You may feel a tingling sensation when you wear them on, that's the mask working on under eye puffiness reduction<sup>5</sup>.

### Requirements

#### • Formula

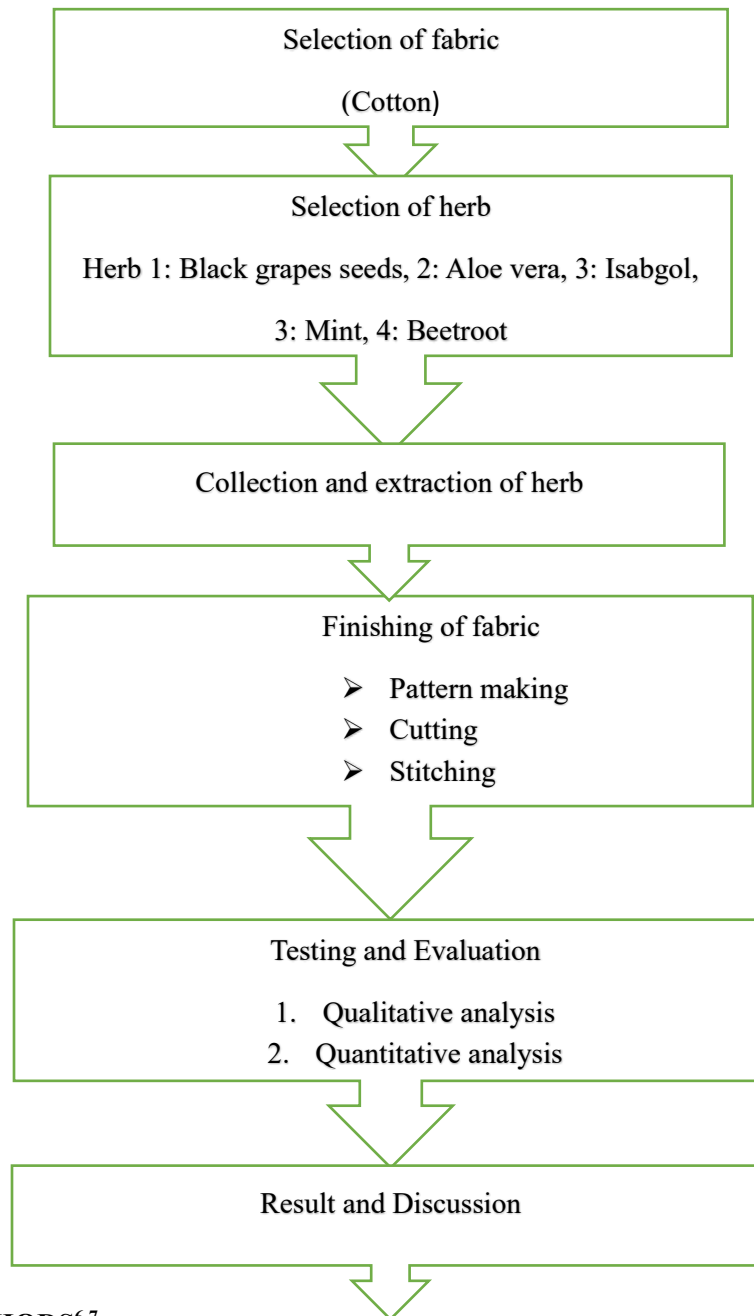
Sr. No.	Ingredients	Quantity	Category
1.	Black grapes seeds	25%	Antioxidant
2.	Isabgol	8%	Psyllium husk
3.	Aloe vera	20%	Antioxidant and Antibacterial
4.	Mint	7%	Antioxidants
5.	Beetroot	10%	Antioxidants
6.	Propyl paraben	5%	Preservatives
7.	Distilled water	25%	-----

#### • Equipment needed

1. Mortar and Pestle
2. pH Meter
3. Shaking Incubator
4. Brookfield Viscometer
5. Weighing Balance



## METHODOLOGY



## MATERIALS AND METHODS<sup>6,7</sup>

### 1) Detail Information about Black Grapes Seeds:

- Family: Vitaceae
- Drug name: carotenoids
- Biological source: Grapes seed extract is made from the crushed seeds of grapes plants. It is a phenolic chemical belonging in the large group of plant phytochemical called flavonoids.
- Biological name: *Vitis vinifera*
- Genus: *Vitis*
- Species: *V. vinifera*
- Geographical source: Europe and Asia





- Morphological characteristics: Pear shaped or oblong to ovoid seeds.
- Physiological characteristics: They contain 8-20% of a high-quality dietary oil rich in polyunsaturated fatty acids and vitamin E, and 5-8% polyphenols with potential antioxidant properties.
- Pharmacological properties: Antioxidant, flavonoids, and melatonin.

#### ❖ Isolation procedure

Take 60 pieces of black grapes seeds and triturated in mortar pistol. Thane take 20ml of distilled water in beaker and heat on 20 min n mixed properly. Than cooled this extract 10min and then after cooling extract then take filter paper and filter out the extraction<sup>8,9,10</sup>.



**Fig:1- Black Grapes Seeds**

#### 2) Details Information about Isabgol

- Family: Plantaginaceae
- Biological source: Isapgol consist of dried seed and dried seed coats of plant known as plantago ovata.
- Genus: Plantago
- Species: Ovata, Psyllium
- Botanical name: Plantago ovata forst
- Geographical source: In India mainly in Gujrat, Panjab and south Rajasthan
- Chemical test: Its mucilage contain up to 85% of different carbohydrates like arabinose, xylose, and galacturonic acid;0.94% proteins; and 4.07% ash.

#### Morphological Characteristics

- Color: Pinkish grey to brown
- Odur: None
- Taste: Mucilaginous
- Shape: Ovate, boat shaped
- Size: 3mm
- Appearance: Seeds are hard, translucent and smooth to the dorsal (convex surface) consist of a small elongated glossy reddish brown spot at the center while the concave surface has a cavity having nil micro meter covered with a thin whitish membrane.

#### Isolation process

Take 5gm of isabgol seeds and triturate in mortar pistol and add 20ml of distilled water as a solvent. Then heat in 10min and filter out the extraction<sup>11,12</sup>.



**Fig no:2- Isolation of Isabgol**

**3) Details Information about Mint:**

- Family: Lamiaceae
- Biological source: Obtained from fresh leaves of *Mentha piperita*.
- Genus: *Mentha*
- Species: *M. spicata*
- Geographical source: Europe, England, India and U.S.A.
- Properties: Antioxidant, antifungal, anti-inflammatory and antifungal

**Morphological Characteristics**

- Color: Dark green, grayish-green or purple in color.
- Odor: Bland flavor with little aroma.
- Taste: Sweet, salty, sour, bitter and the savory characteristic of meat umami.
- Shape: oval, elliptical and liner
- Size: 1-1.5cm

**Extraction process**

Take 10 leaves of mint and crushed in mortar pistol than take 10ml of distilled water in beaker and heated up to 10min than after cooling take filter paper and filter out the extraction of mint<sup>13</sup>.



**Fig No:3- Extraction of Mint**

#### 4) Details Information About Beetroot:

Beet root extract is one of the quickest way lighten dark circle. It'll help brighten the under-eye area while reducing puffiness.

- Family: Amaranthaceae
- Biological source: The beetroot is the taproot portion of a beet plant, usually known in north america as beets while the vegetable is referred to as beetroot in British English, and also known as the table beet, garden beet, red beet.
- Genus: Beta
- Species: Sea beet
- Physiological characteristics: Beetroot is consist of multiple biologically active phytochemicals including betalains it is also a rich source of diverse minerals such as potassium, sodium, phosphorous, calcium, magnesium, copper, iron, zinc.

#### Morphological Characteristics

- Color: Bright red to bluish red
- Odor: Strong scent
- Taste: Sweet
- Size: 3-5 cm
- Shape: globular to long and tapered.

**Properties:** The powerful antioxidant, anti-inflammatory and vascular-protective.

**Extraction process:** To prepare beetroot for extracting, simply wash them thoroughly to remove any dirt, peel them if desired, and cut them into, manageable pieces. Then, use a grinder to extract the juice<sup>14</sup>.

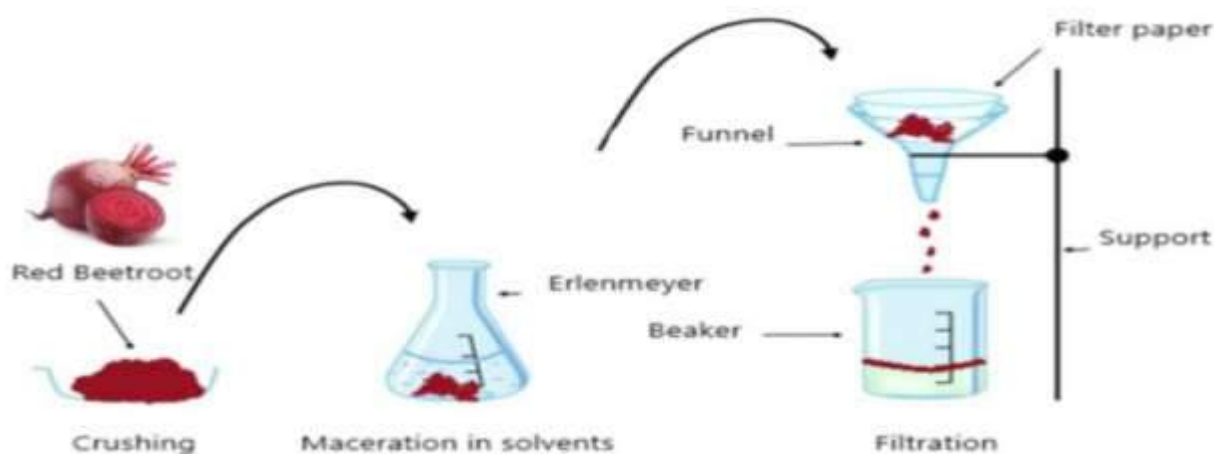


Fig No:4- Extraction process of beet<sup>15</sup>

#### 5) Details information about aloe vera:

- Family: Liliaceae
- Biological source: Aloe is the dried juice collected by incision, from the bases of the leaves of various species of aloe.
- Genus: Aloes
- Species: Barbadosis-Miller
- Geographical source: Africa, India and other arid areas.
- Chemical constituents: Vitamins, enzymes, minerals, sugars, lignin, saponin, salicylic acid, and amino acid.
- Properties: Antioxidant, Anticancer, Antidiabetic, and Antihyperlipidemic

#### Morphological Characteristics:

- Color: Dark brown to greenish brown
- Odour: Characteristic, sour
- Taste: Bitter and Unpleasant
- Shape: Fleshy, triangular leaves are arranged in a rosette.
- Size: 60-100 cm

**Extraction process:** Aloe vera gel is the mucilaginous jelly obtained from parenchyma cells of the Aloe vera plant. After harvesting of aloe vera leaves they are crushed, grinded, filtered and stabilised to get aloe gel. Green fillet is obtained by removing the rind and thus the fillet is homogenised by crushing and grinding.



Fig No:5- Extract of Aloes<sup>16</sup>

#### Preparation of the herbal eye mask

1. Take 10ml of black grapes seeds extract in beaker.
2. Add 100ml of distilled water and heated on 10min.
3. Added 5ml of isabgol extract and add 2ml of mint extract and stir properly.
4. Then after added isabgol and mint extract then added propyl paraben and stir properly.
5. Then the solution was containing a gel base little by little.
6. Then add 2ml of beet root extract as coloring agent and stir.
7. The herbal gel is molded according to the shape is adapted to the under eye area.

8. after 10min cool solution then put the gel in mask and seal.



Fig No:6- Herbal Eye Mask

Testing and evaluation of herbal eye mask:

1) **pH Meter**

A pH meter is a scientific instrument that measures the hydrogen- ion activity in water based solutions, indicating its acidity or alkalinity expressed as pH. The surface pH of herbal gel mask was measured using pH meter portable. The pH value of this herbal mask was determined by using digital pH value of this activated grapes seeds of eye mask was found to be 5.89.



Fig No:7- pH Meter

2) **Organoleptic**

The preparations were observed for size, shape, color, and odor as well as changes in color and odor changes.

3) **Quantitative Analysis**

The developed product was physically evaluated using a group of 10 people. A questionnaire was prepared based on the used of the reusable diaper and eco-friendly product. People's review about the product is taken as the major aspects and other details like positive and negative feel of the product was also question below.

4) **Estimation of weight and size**

Evaluation of the weight and thickness of the mask, mask were taken and weighed one by one. The weight of herbal mask was measured using a digital scale, while the length, width, and thickness of the herbal mask were measured using a caliper.



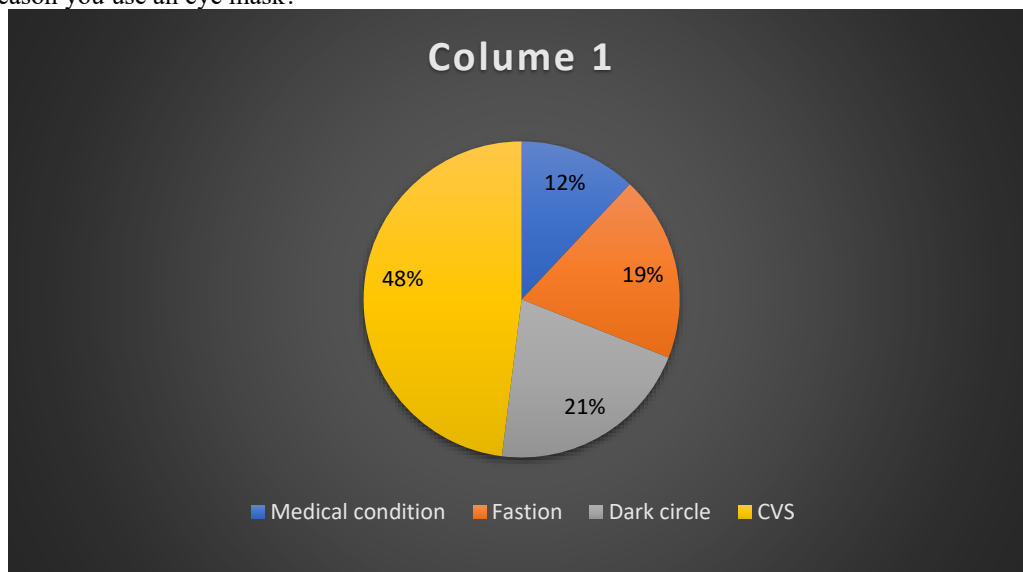
**5) Homogeneity test:**

All herbal gel preparation developed were tested for their homogeneity visually. The homogeneity test was carried out by applying the herbal gel eye mask formula on the object glass. The herbal was placed on a slide then covered with a deg glass to see the clarity and presence of aggregate in the herbal gel mask preparation.

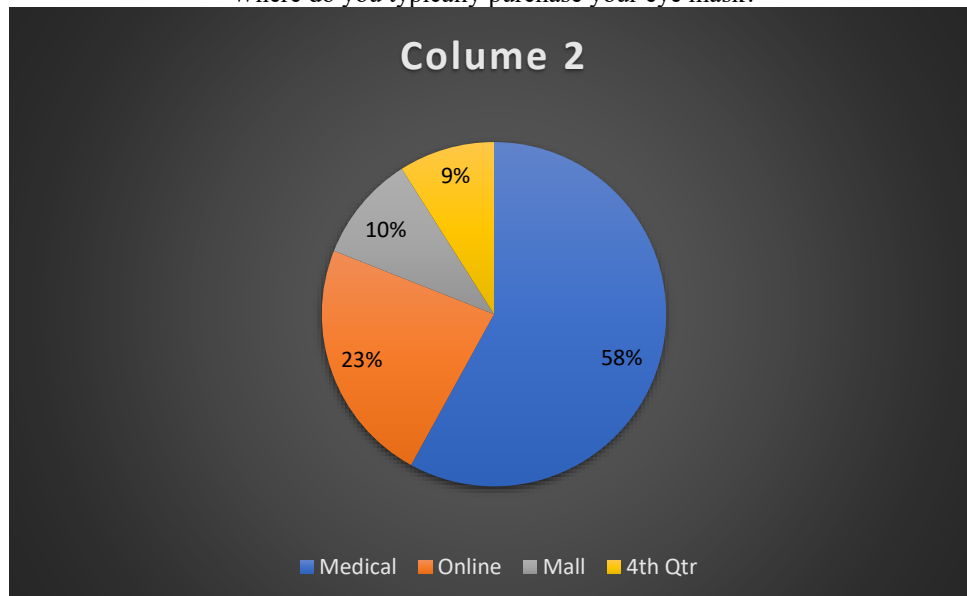
**Eye mask product survey questionnaire**

- 1) What is primary reason you use an eye mask?
- 2) Where do you typically purchase your eye mask?
- 3) How do you feel wearing this eye mask?
- 4) What material do you prefer for your eye mask?
- 5) Did you face side effects by using this eye mask?

What is primary reason you use an eye mask?

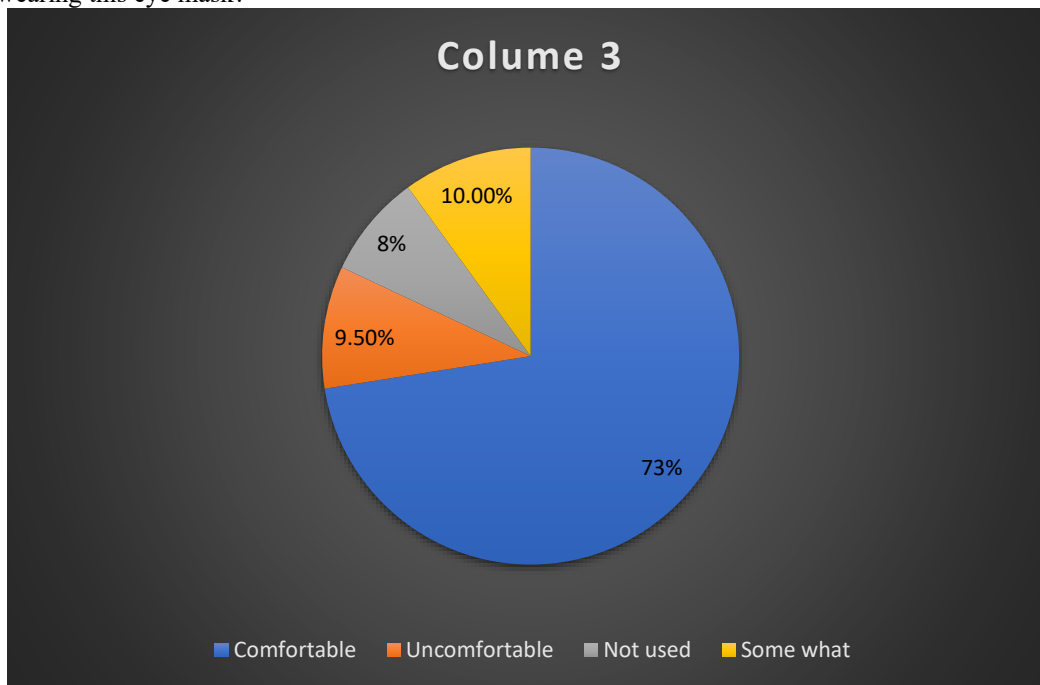


Where do you typically purchase your eye mask?





How do you feel wearing this eye mask?



#### Future Scope

- This product is very good source for computer vision syndrome, dark circle, eye irritation and also gives cooling effect. If this gives good result of course it will have sales rate because of these benefits also it is budget friendly the ingredients used this sleeping eye mask like grapes seeds isolation, isabgol isolation, Aloe vera extract, mint extract, and beet root as coloring agent is also budget friendly. Also it is very essential in today's life style.
- To sell this product it is good to make a tie-up with famous cosmetic or beauty companies. It is not that easy to have a tie-up with famous beauty or cosmetic company. Step by step process will give successful output.

#### Summary and Conclusion

Eye mask is a best product for reducing computer vision syndrome and reduce dark circle. In this modern world most of the people using time in their mobile phones. So their will get irritated and it will cover with dark circles. This eye mask will be really helpful for them to get rid of dark circles and reduce their irritation in their eyes. Regular use of this mask will gives a good result. In this study, it was found that using earplugs and eye masks for patients in an intensive care unit during the night was effective in improving patient's computer vision syndrome and reducing dark circle and problems in vital signs.

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### Developed Eye mask







## LINGUOCULTUROLOGICAL ANALYSES OF REALIAS IN THE TRANSLATIONS OF THE NOVEL “DAYS GONE BY” BY ABDULLA KADIRI

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### ABSTRACT

The novel "Days Gone by" by the Uzbek writer Abdulla Kadiri is not only the first masterpiece of Uzbek literature but also one of the unique historical novels of all world literature. The author reflects the events of Turkestan in the second half of the XIX century and describes many social problems of that time and accurately conveys the way of life of the Uzbek people. For this reason, this work has been translated several times into many languages of the world. Today the novel "Days Gone By" attracts the attention of many researchers in the field of theory of translation.

This article discusses the translated versions of the novel into Russian and English, demonstrating the difference between the methods of translating word realias, such as the principles of historical, cultural, and national adequacy in translation, and also reflects the problems arising in the translation of realias into another language.

**KEYWORDS:** Background information, realias, household realias, translation, methods of transmitting text, nationality, hypo-hyperonymic method, periphrastic method, transcription, equivalent.

## ЛИНГВОКУЛЬТУРОЛОГИЧЕСКИЙ АНАЛИЗ РЕАЛИЙ И ИХ ПЕРЕВОДА В РОМАНЕ «МИНУВШИЕ ДНИ» АБДУЛЛА КАДЫРИ

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**Аннотация:** Произведение «Минувшие дни» узбекского писателя Абдуллы Кадыри является не только первым романом в узбекской литературе, но также одним из самых прекрасней произведений, уникальным в своем роде исторический романом всей мировой литературы. В романе отражены события истории Туркестана во второй половине XIX века и поднимает многие общественные проблемы того времени, и в точности передает быт и жизненный уклад узбекского народа. По этой причине данное произведение было многократно переведено на многие языки мира. И на сегодняшний день роман «Минувшие дни» привлекает внимание многих исследователей в рамках теории перевода.

В данной статье рассматриваются переводы романа, осуществленные на русский и английский язык, на своем примере демонстрируя отличие методов перевода слов-реалий, такие как принципы исторической, культурной, национальной адекватности при переводе, а также отражают проблемы, возникающие при переводе реалий на иной язык.

**Ключевые слова:** Фоновая информация, слов-реалий, бытовые реалии, перевод, способы передачи текста, национальность, гипо-гиперонимический метод, перифрастический метод, транскрипция, эквивалент.

### ВВЕДЕНИЕ.

Фоновая информация или же фоновые сведения — это совокупность национальных, социологических, исторических и культурных особенностей народа или нации, которые нашли свое отображение в определенном языке. Именно по этой причине сохранение в переводе национального колорита подлинника зависит в первую очередь от верного восприятия и передачи фоновой информации.



Категория слов-реалий считается одной из обширных в передаче фоновой информации. Согласно «Лингвистическому словарю» Ахмановой, «**реалии** – это элементы быта и культуры исторической эпохи и социального строя, государственного устройства и фольклора данного народа, чуждых другим народам».

С. Влахов и С. Флорин определяют **реалии**, как «слова (и словосочетания), называющие объекты, характерные для жизни (быта, культуры, социального и исторического развития) одного народа и чуждые другому; будучи носителями национального и/или исторического колорита, они, как правило, не имеют точных соответствий (эквивалентов) других языках, а, следовательно, не поддаются переводу на общих основаниях». [1. 47]

Из этого следует, что лексика любого языка содержит специфические слова, на которых отпечатались национальная и культурная самобытность народа, их образ мышления и мировоззрения. Так как реалии называют различного рода понятия, характерные определенному аспекту жизни народа и его культуры, то проблема классификации реалий представляется весьма актуальной.

### ОСНОВНАЯ ЧАСТЬ

В результате анализа установлено, что перевод реалий, как одной из групп, передающих фоновую информацию, можно назвать одним из самых трудоемких процессов, ибо именно слова-реалии, как концепт отражающий социокультурные особенности народа или же конкретного носителя языка, позволяют переводчику максимально близко и аутентично передать и воссоздать в своем переводе такие понятия как национальный колорит и историчность.

<b>Оригинал</b>	Tashqarida bir qo`sha sozandalar <u>dutor, tanbur, g`ijjak, rubob, nay</u> va amsoli <u>sozlar</u> bilan dunyoga jon suvi sepib shaharning mashhur hofizlari ashula aytadirlar. -Tur Savra! Havlig`a olov yoqib <u>childirmangni</u> qizit!. [2. 52,57]
<b>Русский перевод (М. Сафарова)</b>	Во дворе не переставая звучит музыка, играют на <u>дутарах и танбурах, на гиджаках и рубабках, на наях, сазак</u> и других инструментах.... -Вставай, Савра! Пойди во двор, разведи костер и разогрей <u>дойру</u> . [3. 56,60]
<b>Английский перевод (К. Эрмакова)</b>	The courtyard rings with music, the continuous melodies of so many <u>folk instruments</u> , bright as the dawn chorus -Get up, Savra! Go into the courtyard, light the fire and heat up <u>the duira-tambourine!</u> . [4, 54,57]
<b>Английский перевод (М. Рииз)</b>	The constant interplay of instruments resonated from the outer yard; <u>the dutars, tamburs, rababs, and nays</u> were accompanied by the most renowned singers of the city. Stand up, Sevara! Make a fire in the yard and heat your <u>childirma</u> . [5, 112,117]

**Музыкальные инструменты**, как одна категория **бытовых реалий**, являются предметом рассмотрения. Как известно, в узбекской культуре музыка сопровождает людей в течение всей жизни. Всякое мероприятие в доме - свадьба, различные обычаи, традиции и игры проводятся под красивые мелодии и песни талантливых исполнителей. По этой причине, узбекские танцы, узбекские национальные музыкальные инструменты, а также песни, как народный вид искусства, по праву считаются национальным достоянием всего народа. Особенно важную роль музыка играет на узбекских свадьбах. И в вышеприведенном примере, свадьба Кумуш и Атабека проходит под задорные звуки музыкальных инструментов. В доме Кутидора, народные певцы - хафизы своими песнями и мастерской игрой встречают и развлекают гостей. Мелодичные звуки «дutarов, танбуров, гиджаков, рубабов, наев и сазов» также ярко указывают на важность и помпезность мероприятия.

Данные инструменты относятся к традиционным узбекским струнным, струнно-смычковым и духовым музыкальным инструментам. К примеру, «Дутар - двухструнный инструмент с большим грушевидным корпусом, длинной шейкой. Танбур - трех- или четырехструнный инструмент. Инструмент имеет грушеобразный вид, с декой (корпусом) и длинный гриф. Гиджак – трех- и четырехструнный инструмент. Гиджак имеет шарообразный корпус и круглую короткую шейку, более толстую сверху и суживающейся книзу. Струнно-смычковый инструмент рубаб имеет долбленный корпус круглой формы – чашу, затянутой сверху кожаной мембраной, и длинную шейку, заканчивающуюся отогнутой назад головкой. Най - узбекский духовой инструмент, по форме и звучанию схож с духовым музыкальным инструментом флейтой. Саз - струнный щипковый музыкальный инструмент». [6]

Вышеперечисленные слова, в качестве реалий, большинстве случаев были переведены на русский язык **методом транскрипции** и обозначены как «национальные струнные и духовые инструменты». Американский переводчик Марк Рииз также воспользовался **транскрипцией** при переводе, однако в конечном варианте «the dutars, tamburs, rababs, and nays» в отличие от оригинала, отсутствуют некоторые слова-реалии: «гиджак и саз». При этом в примечаниях было дано детальное



объяснение. «Dutars, tanburs, rababs, and nays: The author describes a four-piece ensemble. A dutar is a two-stringed instrument with a pear-shaped resonator and sounding board; strings are plucked. A tanbur is a long-necked lute with a deep pear body with a number of frets and three to four strings often plucked with fingers or plectrum. The strings are made of metal, silk, in the novel's setting, at times played upright with a bow, called a sato. The Rubab has five strings, and the main body is made of wood and skin. The Nay is a central Asian flute». [5, 602]

В отличие от вышеперечисленных вариантов, при переводе на английский язык К. Эрмакова заменила ряд однородных членов предложения на обобщающее слово «folk instruments», что дословно переводится как «народные инструменты». Данный прием можно назвать гипо-гиперонимическим методом. В данном случае словосочетание «folk instruments» будет являться **гиперонимом**, то есть понятием, обозначающим более широкую сущность по отношению к другому понятию. А реалии «дутар, танбур, гиджак, рубаб, най и саз» - гипонимом, т.е. понятием с более конкретным значением. Использование именно **гиперонимического перевода** в данном случае можно назвать весьма удачным. «Чрезмерное увлечение транскрибированием иноязычных слов, называющих реалии, а не так уж редко принимаемых за них, не только не способствует сохранению национального колорита, а наоборот, уничтожает его, загромождая русское повествование и заставляя читателя спотыкаться на каждом шагу о ненужные экзотизмы». [7, 107] Из этого следует, что в некоторых случаях пренебрежение реалиями в переводе возможно и даже необходимо, так как это облегчит чтение в целом, а использование гиперонима позволит сохранить коннотативное значение.

Следующее выделенное слово в примере также относится к **бытовым реалиям** и является подтипом музыкальных инструментов. Узбекское слово «childirma» - «*ёғоч гардишига тери қоплаб ясалган, чертиб чалинадиган мусиқа асбоби: доира, чирманда, даф*». [8] также обозначает узбекской музыкальный инструмент. Будучи сходным с инструментом «дойра», данный инструмент «состоит из круглой обечайки (сделана из сухой виноградной лозы, орехового или букового дерева) и натянутой на нее с одной стороны мембраны (из рыбьей или козлиной кожи, иногда желудка животного) диаметром 360-450 мм. Перед игрой дойру нагревают на солнце или у огня для большего натяжения мембраны, что способствует чистоте и звонкости звучания. Маленькие металлические кольца приложены по внутренней части деревянного кольца. Раньше дойра был женским инструментом, потому что был связан с женскими ритуалами». [6]

В контексте романа, «childirma» или же «doira» встречаются при описании свадьбы Кумуш. Как было отмечено выше, этот инструмент является частью женских обрядов и в этом случае во время специального вечера для невесты и ее подруг, то есть девичника, «childirma» остается главным музыкальным инструментом.

В качестве реалии, слово «childirma» была переведено на русский язык посредством **транскрибирования синонима**, в результате чего появилось слово «дойра». Основной причиной выбора синонима для перевода может быть широкое использование слова «дойра» среди коренного населения, в отличие от «childirma», которое является более архаичным и менее распространенным. Сам переводчик, определяет реалию как «бубен», то есть «ударный мембранный музыкальный инструмент в виде обода с натянутой на него кожей (иногда с бубенчиками или металлическими пластинками по краям)». [9] Следовательно, использование абсолютно синонимичного слова «дойра» позволило в целом облегчить текст для чтения и при этом сохранить смысл, а также национальный колорит.

Перевод Кэрол Эрмаковой немного отличается от того, который был осуществлен на русский язык. В этом случае, слово-оригинал «childirma» также было заменено синонимом «duira», однако от русского варианта, этот перевод различается наличием слова «tambourine». В результате, переводчик создал новое сложное слово «duira-tambourine», в котором «duira» — это реалия, а «tambourine» - смежное по значению слово-определение. Согласно Кембриджскому словарю, «tambourine» — это «small musical instrument consisting of a circular wooden frame with metal discs loosely attached to it, shaken or hit with the hand to make the discs ring», то есть, это английское слова является эквивалентом русского «бубна». Данный способ перевода следует относить к **методу транскрипции**, так как первая часть слова была транскрибированной версией от русского перевода «дойра». В то же время **перифрастический метод** будет уместным, поскольку вторая часть слова «tambourine» объясняет смысл реалии. Отсюда следует, что данный вариант синтезирует два способа перевода слов, в частности транскрипцию и перифрастический прием, при этом значение и культурный оттенок слова-реалии сохраняются. Стоит так же отметить, что такой метод исключает необходимость специальных примечаний переводчика, ибо второе определяющее слово, знакомое читателю, обуславливает семантику реалии.

В переводе Марка Рииза, аналогично русскому, был использован **метод транскрипции**, однако само слово «childirma» (узб.) было передано на английский язык как «childirma» (англ.). В этом случае переводчик, не используя более



общеупотребительный синоним «дойра», предпочел сохранить слово-оригинал. Он также поясняет, что «Doira or Childirma: both round skin-covered tambourine-type instruments with rings around the edge of the frame. Often musicians will heat the skin over the fire for better play».[5] В своих примечаниях М. Рииз дает пояснения и описывает национальный инструмент, похожий на бубен, а так же дополняет, что «дойру» следует разогреть на костре перед игрой. Таким образом, сюжет самого текста, то есть просьбу к Савре зажечь огонь и разогреть инструмент, так же излагается читателю, не знакомому с узбекской культурой.

## ЗАКЛЮЧЕНИЕ

Из вышеуказанных примеров следует отметить, что бытовые реалии, как один из наиболее распространенных видов, в большинстве случаев переводятся методом **транскрипции**, который требует дополнительную информацию для разъяснения от самого переводчика. Данный пласт лексики на практике передается различными методами перевода, в зависимости от стилистических и семантических особенностей языка-оригинала и языка, на который осуществляется перевод. К тому же, использование гипонимов и гиперонимов для обозначения ряда однородных реалий в значительной мере компенсирует специфичность слов, и облегчает чтение и понимание текста.

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# THE ROLE OF CHILDREN'S LITERATURE IN THE FORMATION OF ARTISTIC AND AESTHETIC IN ELEMENTARY STUDENTS

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## ANNOTATION

*This article tells about the development of artistic and aesthetic abilities in primary school students through the means of children's literature and the development of educational abilities in them through this.*

**KEYWORDS:** *spirituality, artistry, complex skills, practical knowledge, thinking skills, scientific competence.*

## INTRODUCTION

**Folk oral fiction** - as a phenomenon manifested in a variety of literary types and genres, is a word art with a multitasking socio-aesthetic essence in the history of the personality society. He came to represent the aspirations of the people who were his creators at all times, and, moreover, he is acting as an important educational tool in the spiritual and moral formation of the people, not only himself, but also children. Children are studying the life experience of ancestors, the science of Labor and struggle from folk creativity. They were born from folk songs, epic tales, legends, love-to-love, sincerity, humanity, patience, dedication in labor, and, most importantly, the great ancestors who fought for the land and freedom of the land on the basis of the perception of the feelings of the Fatherland, where the fathers lived and lived, Tomaris, Shiroq, Spitamen, Muqanna, Temur Malik, Jaloliddin Manguberdi, Mahmud Tarabi and Amir are learning from the Temur's exploits, driving away from the romance of living and creating. Consequently, folk art has been a lesson for children from ancient times to the present to appreciate goodness and hate evil, becoming more and more polished as they become full of fanaticism and move from mouth to mouth, providing generations of spiritual and moral succession for centuries, with a more thoughtful reflection of the national spirit of the people. Like a fairy tale, the centuries went, from language to language, to the "Red Hat" (which shone the hearts. Perro), "Robinson Crusoe" (D. Defoe), "Gulliver's travels" (J. Swift), "Dumchahan" (H. Andersen), "Goldfish" (a. S. Pushkin), "What Tom Sawyer went through", "The Prince and the gado" (M. Twain), "Children of Captain Grant", "Austin-Austin" (PG. J. Verne), "Don Quixote" (J. Cervantes), which exasperates the interests of young souls in relation to the universe. Built in the 20th Century, "Maugli" (R. Kipling), "The Little Prince" (A. De Saint-Exupéry), "Carlson The Elder and the younger" (a. Lindgren), "Tashkent - non CITY" (A. Neverov), "Winnie The Pooh" (A. Miln), "A tale of a stupid mouse" (PG. Marshak), "Three frogs" (Y. Olesha), "Cheerful japbags" (B. Kerboboev), "Dr. Aybolit" (K. Chukovsky), "Ômur and his team" (a. Gaidar), "The adventures of Chipollino" (J. Rodari), "Uncle Styopa" (PG. Mikhalkov), "Who am I?" (V. Mayakovsky), "In the city of the unknown Sun" (N. Works like Nosov) traveling the world make a great impression on the children of Uzbek readers. Works mentioned above a young reader is taught something, challenged to something. Many of these works include love for the Mother - Motherland, giving life for her freedom and happiness ("three frogs"), not being ungrateful, listening to parental pand-advice ("a fairy tale about a stupid mouse"), great affection for nature ("Maugli"), preserving nature, loving the animal world ("doctor Aybolit"), doing human service, helping beminnat ("Temur and his team"), being self-indulgent, not revealing inner secrets to others ("Red shapeshifter"), exemplary studies, vocational training ("who am I?"), being sober, entrepreneurial, and striving for cheerfulness ("cheerful japbags") - the laying down of noble ideas cultivates the children's curiosity and passion for translation works.

Good and evil is a paired concept in the science of ethics. Expresses a positive or negative assessment of people's behavior, social phenomena. Goodness is the most important quality and symbolizes the original and long-standing essence of human activity. He is equal to giving a person a strong spiritual flavor, leading him to true happiness, which makes him a person. That is why the concepts of "good (good) thought", "good (good) word", "good (good) deed" have taken a leading place in all Bibles, from Avesto. Good comes to the surface in the moral and practical activities of a person, in which qualities such as humility, openness, courage, honesty, dishonesty, Justice, truthfulness are embodied. Evil is the opposite of good, an illusion that prevents the development of the individual and society. It is manifested in such concepts as falsehood, inferiority, hypocrisy, obscenity, compassion, indecency,



betrayal. Thinkers teach that in order to exclude evil from human life, it is necessary to eliminate the social conditions that give rise to it. The concepts of good and evil have the property of evaluating human activity: it can be likened to the sacred scales that measure the glory or abyss of a person. In which Society good increases and evil decreases, the same society reaches moral heights, well-being, progress faster; in personal relationships, vices such as betrayal, anger, arrogance, envy, revenge, hypocrisy gradually disappear, such qualities as sympathy, honesty, tolerance occupy a more place, resulting in the process of upbringing, it is necessary not to prepare people indifferent to life, to quickly take action against it if they perceive this trait. Without the formation of personality, without development, it is impossible to develop both the state and society. Continuing education is the most important factor that dynamically affects the process of personality maturation. Personnel training includes components of an integrated process consisting of the individual, state and society, continuing education, science, production. Consequently, the person is the main subject of the Personnel Training System, consumer and author of educational services, regulating and controlling the activities of the state and society educational and personnel training system, receiving social phenomenon, guarantors, continuing education-the basis of competitive personnel training, types and standards of Education, Personnel Training the priority of good in society. Another of the requirements for primary school teachers is precisely to avoid such situations, includes the training system; the power of production of Science-high-level pedagogical technologies, production is the customer of students who are put in the training of personnel, their quality.

In the primary education system, it is necessary to educate a comprehensively mature, creative personality, ensure that at all stages of the educational process for the continuous development of the student, the components of the pedagogical system are interconnected, aligned and oriented towards perspective, and determine the didactic conditions for their implementation. Ensuring continuity in the continuing education system, one of the main components of the national model of Personnel Training, has priority in the implementation of the tasks set out in the national program, requiring the acceleration of scientific research on the further improvement of the mechanisms for ensuring the vertical and horizontal continuity of the educational system. The main idea of basic education. In the national model of Personnel Training, this idea was developed, the person was recognized as the main subject and object of the Personnel Training System, a consumer of services in the field of Education. In the educational reforms carried out in our republic, the development of personality is seen as a continuous process, in which the educational process is harmonized not only with cognition, but with developing educational ideas that imply a creative interpretation of acquired knowledge. This marked the shift from informational-based teaching to person-oriented education, from memory-based teaching to active acquisition-based teaching.

The problem of adapting elementary students to new educational conditions is always relevant in the educational system. His research places a strong emphasis on child psychologists, teachers, doctors, and scientists. Childhood in elementary age is a favorable period for the formation and development of fundamental skills. The development of basic mental processes - memory, attention, thinking, imagination-also actively develops in the preschool age. The first and main task facing pedagogical communities is to create favorable conditions for the process of transferring a child from kindergarten to school educational institution. An elementary school student is at an incomprehensible distance to a child who is used to the fact that a teacher who is an elementary school teacher is a close person and a first assistant. The correct and timely restoration of the child's vision of his teacher is a joint task of family members and employees of educational institutions. Ancient customs, rituals and myths played a decisive role in the emergence of folk oral creativity. The decision of folk oral creativity as an independent genre began from periods when primitive concepts of the universe were expressed in an imaginary form. Indeed, in the epic genres of Uzbek folklore, such as epic, fairy tale, the emergence and widespread popularity of the traditional motive of seeking a path or marrying another seed was based on the folk view associated with exogamy, the narrative genre of which is based on the series of motives in the plot system it also had its influence on its formation. Such features of folklorism are also known, in which social problems of the environment are expressed, and not just issues of domestic life. In this place we mean such works as "poor girl", "in three lies, forty lies". It was through these tales that the people expressed their disapproval of the conditions of the social life in which they lived in the ancient past. In particular, the fact that human life is fleeting, that the world is unfaithful, the reverse rotation of the Carpenter is expressed in proverbs, epics.

Fairy tales are no exception. The fact that one child in the tale "forty lies in three lies" died and died and three, and the fish bone did not go hot from the fire to the body, is just a hint of the inversion of time. Curragh on, "says D.Zelenin. N. Ye. Onchukov also noted the absence of women's fairy tales, however the fact is that in folk folklore it seems that events are being described in which it is advisable to arouse laughter in the listener. But when the content of folklore is treated from the point of view of an experienced person, it is known that on the philosophical basis of this work there is a very important reflection. The main goal of the creation of folk oral creativity in the eyes of the creator is also associated with this meditation. The existence of a traditional morphological case in the oral creativity of the peoples of the world as a whole, in Uzbek folk oral creativity, in particular, in the plot and composition of works given to children, has been proven by folk scientists. "Children's fairy tales are told by accent grandmothers, nannies, aunts, they will be about animals and so women claim to have a fairytale. Indeed, mothers are the creators, performers of fairy tales, Yors, various songs. They have either a piece of bread, not to mention the absence in the House of their husbands, who went to work in the city, in search of bread, or to faraway places as a sickle, if to their children, then the infant, if not in the wild,



ate sorrel, on Long Dark Nights, ovens on cold winter days, on the edge of the hearth-bonfire while in ancient times, in the structure of fairy tales told from folk oral creativity, the ideas of bringing people back from evil by calling them to good were put forward, now these tales are more polished, calling on the history of el yurt and the younger generation to respect.

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# INNOVATIVE APPROACH IN RAISING SOCIAL SPIRITUALITY

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## ABSTRACT

*In this article, scientific-practical work on ensuring the integrity of spiritual education in the family, educational organizations and neighborhoods, organizing spiritual and educational work in higher education and further improving the spirituality of students has been researched. In today's era of globalization processes, our state is paying special attention to the issues of developing the education and upbringing of the youth who are the future of our country, growing their outlook, and forming a generation that will serve the development of our country. The reason is that a generation with nationalistic, patriotic, universal moral qualities is the backbone of any society or state.*

**KEY WORDS:** *youth, education, culture, cultural heritage, potential, intellectual potential, human capital, mentality, spirituality, culture, cultural heritage, value, culture, globalization, development.*

Along with the fact that young people, who are the social stratum of society, occupy an important place in social and political life, the fact that the future development is directly under the responsibility of young people is the constant attention of our intellectuals. The President of Uzbekistan Sh.M.Mirziyoev, in most of his speeches and articles since his work as the head of state, has focused on the issue of youth and has emphasized the need to create all opportunities for the material and spiritual development of young people by improving education and upbringing. kidlab: "To pay more attention to the life problems of our youth, to increase modern jobs suitable for them, to support noble aspirations and initiatives, innovative ideas, to improve the social and household conditions of our young generation improvement will continue to be the most basic, decisive task of all levels of government agencies" [1. - B. 495.], - they say. As our head of state noted, supporting the initiatives and talents of young people as members of society means developing their creativity, and this factor is important in strengthening the foundations of an enlightened society. It is known to all of us that there are current global threats, and at the heart of them are aspirations to turn the youth into a weapon of various destructive forces by affecting the spirituality of the youth. Therefore, in the conditions of today's intense struggle of ideas, at a time when the danger of alien ideas invading the thinking of some of our young people is increasing, it is necessary to develop a strong immunity against such factors that lead to a crisis of spirituality and morality, to protect the spiritual worldview formed in the minds of today's youth by the Motherland and It is important to be able to guide people in the right direction as a requirement of the time.

In addition to the identity of the representatives of the nation, their integrity, hard work, creativity and loyalty, it is noteworthy that the national characteristics and traits are in these factors is manifested.

It is known that national values are a feature reflecting the cultural psyche of a certain ethnos or ethnic group, and are formed from the cultural heritage preserved in the social lifestyle of the ethno-social unit, customs and traditions in its daily life, as traditions of succession. is passed down from generation to generation. National values are, first of all, customs, traditions, spiritual heritage of the ethno-social unit, i.e., mental characteristics related to the development of thinking, and are examples that are expressed and valued in everyday life. Adhering to such values with respect and having a nice attitude also ensures the moral integrity of the members of the society, so that the socio-spiritual success of an individual or society is directly related to this factor. The patriotism, philanthropy, and creativity of the members of our society, especially our youth, are directly valuable and important for the development of the society. The pursuit of knowledge and intelligence, hard work, creativity, politeness, nobility, generosity, and generosity among the mature generation are also factors within the framework of national values.

One of the main and most urgent issues that should be paid attention to in order to ensure mutual solidarity at a time when the current regional cooperation issues are being recognized as an urgent task of the day by the head of our state is tolerance for the young generation, or while forming the character of tolerance, in order to ensure the success of this factor, spiritual and educational education and promotional activities should be carried out from kindergartens and preschools to educational institutions and work groups. must be established in new ways. These aspects are of leading importance in the development of social morality and the spiritual image of society, especially in the determination of tolerance features in the thinking of young people.





Enlightenment, science and intelligence are the factors that increase the characteristics of tolerance in the young generation, and ensuring the continuity of tolerance in the thinking of young people is one of the tasks of our intellectuals. In order to develop the young generation as a spiritually and morally mature and perfect person, it is important to enjoy the samples of the spiritual and cultural heritage left by the ancestors and to promote them as an innovative approach.

In the conditions of today's Uzbekistan, which is recognized as a leading socio-political unit in the Central Asian region after independence, has turned from national revival to national growth, unlike the false generality of the former totalitarian regime as a "single Soviet nation", optimal aspects of national values formation of self-absorbed tolerance and inculcating the positive aspects of national and universal values on these bases is also important as one of the important innovative approaches in increasing the effectiveness of spiritual and educational work in society. So, turning to the works of our classical thinkers, instilling in the hearts and minds of the young generation the teachings and wisdom that call for moral excellence, as well as the wide assimilation of the enlightened teachings of our modern scholars and scientists of the recent past by our youth. providing is important as an important task of our time. The above-mentioned aspects are important in the development of the characteristics of tolerance in our youth, which contribute to the strengthening of the activities of civil society institutions. is significant as an innovative method of promotion.

Historical monuments, which are an important part of cultural factors in the development of spiritual and educational qualities of members of our society, especially young people, have their own special place. After all, historical and cultural monuments are clear examples of the social activities of our ancestors in the past, such as creativity, enlightenment, and the pursuit of prosperity. 'hna is honored as a jewel of our history. It is also important as an innovative approach that affects the development of social thinking and the spirituality of society. Because these historical and cultural monuments raise the historical consciousness of the young generation, realize their identity, and become worthy heirs of these ancestral values. "Historical monuments, mosques-madrasas, mausoleums, and monuments in our old cities such as Samarkand, Bukhara, Kokan, Tashkent, Karshi, Termiz, Khiva, Margilan, Shahrisabz are also an integral part of cultural heritage" [2. - B. 272.]. The old and ever-modern Samarkand, which is full of historical and cultural monuments, is a proof of the creative activity of our ancestors, which embodies the aesthetic taste. , these aspects are the optimal innovative method that develops the character of patriotism, philanthropy and striving for enlightenment. For this purpose, from the first days of national independence, the head of the country focused on the restoration of historical and cultural structures, sky-high monuments, sacred shrines of saints and prophets, which had been neglected for many years, and those who are enjoying them it is important in the spiritual and moral education of our young people, including their spiritual development.

In the conditions of today's development, a number of new, socially and culturally important complexes have been built on the initiative of the head of our state, which demonstrate the strength of our country and the potential of our people, the creative activity of representatives of our nation, and the political will of our state. The main goal of preserving and renovating the historical and cultural structures that are adding to the fame of our country is to convey the cultural heritage that has reached the present day from our ancestors to the future generations, and they will develop their historical consciousness and think about their ancestors, the past and it is to increase the sense of pride and pride in respect to the sacred monuments that embody these aspects. These aspects are also important as an innovative approach that raises the morale of society. At the same time, these historical and cultural structures, which are an example of the greatness, strength and potential of the nation in the midst of the greatness of the country and the whirlwind of historical events, occupy an important place in the thinking of the members of the society, especially the youth, in instilling the ideas of creativity characteristic of the ancestors. "It is well known to us from the experience of the historical development of humanity that any country, any nation that values and honors its cultural heritage, preserves its existing national-cultural traditions, historical monuments, and architectural monuments. if he invites citizens to honor him, if he forms a spirit of respect for those who created material and spiritual wealth, then cultural-spiritual, economic-political stability reigns in that state, that society... Glorification of the national cultural heritage , its comprehensive study will make a worthy contribution to the formation of national consciousness and national pride in every citizen of our country, especially in the youth who are the future of our society" [3. - B. 35]. The growth of national consciousness and national pride is a sign of the spiritual growth of a person, which is very important in the conditions of New Uzbekistan.

It is known that the Samarkand factor occupies a leading place in the composition of our national and cultural values and in the mentality of our people. The city of Samarkand, as an ancient, beautiful and modern city of Uzbekistan, embraces dozens of cultural monuments that are considered masterpieces of humanity, and these are priceless masterpieces of Eastern classical architecture. As this historical city is famous in the world for its unique architectural structures, the beauty and sophistication of these monuments, in addition to raising the sense of pride in the minds of the members of our society, especially our youth, as the inheritors of such a material and cultural heritage. also imposes responsibility, which directly encourages further stimulation of aspects of creativity and cultural development of the Uzbek national character. This ensures the moral elevation of the members of the society. Also, this feature directs us to fight with ideological determination against some destructive influences that try to



penetrate into social life, to devote our society's members to their social activities for creativity and creativity. The above aspect is also important as a unique method of innovative approach.

At the same time, ensuring the effectiveness of spiritual and educational work in society today:

1. Spirituality is an important factor in a person's personal growth. Therefore, by strengthening education and upbringing, it is possible to ensure the educational maturity of the society;
2. It serves to ensure the better quality of the society of enlightened and moral people, and if we take into account that universal development is directly dependent on this factor, the essential nature of the issue becomes clear;
3. Forms intelligent and intellectually high-level society members. Today, when the foundations of civil society are being strengthened, this factor is important and serves to expand the opportunities for qualitative growth of New Uzbekistan in terms of personnel;
4. It serves to ensure the success of production processes in our country by creating people with knowledge and skills. This aspect is important in the conditions of market relations and is significant as a real demand of today's material reality;
5. Due to recent instability in the countries of the region, there are cases of radicalism that are trying to penetrate into our society, the situation of stressing the differences between sects, the cases of trying to penetrate currents that are contrary to our national culture and religious views, religious extremism, terrorism. and serves to isolate the population from the ideas of fundamentalism and further expand the ranks of society members who can resist such forces;
6. Under the influence of the above-mentioned factors, it ensures the creation of unanimous hatred in the population for the introduction of drugs and narcotics, which are manifested as a threat to social stability in society, aimed at undermining the morals of society members and ensuring the violation of the national gene pool;
7. In the thinking of the members of the society, the priority of spiritual and educational factors is important in the development of the worldview against various disgusting diseases (COVID-19, AIDS, various infectious diseases).

It serves to ensure the development of ideological immunity, which is extremely important in today's environment where the influence of various disgusting factors is observed.

Independence opened up new opportunities in social and cultural spheres. Today, it is gratifying that paying attention to the development of young people, who are the leading social stratum in society, and mobilizing their daily activities for the development of the Motherland and the people by ensuring their physical and spiritual maturity, is being recognized at the level of state policy.

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## **MECHANISMS OF INTERACTION OF NATIONAL IDENTITY AND NATIONAL CULTURE ON HISTORICAL MEMORY**

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### **ABSTRACT**

*The article discusses the role of the concepts of historical consciousness and historical memory in the spiritual life of society and the formation of the national social memory created through it. Also, the social factors that are the main impetus for the formation of historical consciousness and historical memory, the writing of school history textbooks, the current situation, and the current state of social memory formed on this basis are described. It is known from the past that historical memory is the only axiological force that regulates social life, and it is necessary to shape it in society. But the future of national statehood and the nation has an important place in strengthening and improving this historical memory. The theoretical research of the historical memory of the society is being studied in the scientific-theoretical and practical studies of the leading scientific research institutes.*

**KEY WORDS:** *history, homeland, historical consciousness, worldview, memory, globalization, value, patriotism, education, social memory.*

As a result, memories of interest to individuals and society are strengthened, memory information is transmitted from one society representative to another, remembered and restored. P. Nora opposes history to memory, that is, in his opinion, "memory is always suspicious of history, its real task is to destroy and suppress it [1. - p. 17-50.]". Historical memory acts on the basis of certain laws as a large system of information flow. Social information serves as a complement to historical memory. It is developing through digital technologies, mass information space, internet, language, cultural objects, social communication and others.

Historical memory is a dissociation of the social space determined by the system of dominant social institutions and its specific system of social institutions (archives, museums, libraries).

Historical memory as a phenomenon means: the ability of a person to relate cause and effect, the ability to compare, the science of finding resources, the ability to classify history, the ability to analyze from the point of view of historicity and logic, the ability to coordinate the awareness of identity with other members of the community. "cultural memory is the mysterious ability to imagine a story as one's spirituality. This ability is inherent in every human being. It is realized in a twofold movement: self-awareness and knowledge of history.

The issue of national identity is a feature that always arises as the psyche of the nation, and it, in turn, gives rise to national consciousness. But these processes are characterized by their emergence and development through historical consciousness. Another aspect of the historical memory created by the national and historical consciousness, which affects the outlook and thinking of the individual, then the community, and then the society, is the sense of national unity, solidarity and cooperation. The reason is that, on the basis of these feelings, a person feels himself as a whole person and realizes that he belongs to a separate ethnic group, moreover, he strives to study his history and future destiny in depth, and serves to develop the social capital of the society.

Regardless of how migration and assimilation processes go, national identity must survive. Why is that? It is understandable if a person is born into a certain nation and lives in the community and space of that nation. But if you pay attention to today's generations of representatives of the local Indian tribes who immigrated to the territory of the United States hundreds of years ago or experienced decline in the assimilation of the territory of the region, in some sense the national identity lives on. The weakening of the sense of national unity and responsibility is the main reason for the spiritual crises that occur in the life of the country and the people. National consciousness also represents the ability of the nation to manage itself independently. For this, historical consciousness and historical memory should be raised to the level of people's worldview as elements of national consciousness, because "a nation that has no memory, forgets its history, and does not value its ancestors has no future. Personal history proves this fact."



At the same time, "memory" means remembering our ancestors who passed away from this mortal world, lighting their lamp and continuing their good deeds. This is an ancient quality of our people" [3. – B.407.]. The feeling of national unity in society is economic-[2. - p 23.], includes issues of spiritual freedom. It is difficult to establish an independent national state and protect national interests in a country economically, politically and spiritually dependent on others. "Only where national unity and solidarity are stable will the national state, language, culture, values, and traditions rise, and wide opportunities will arise for the realization of national goals and interests" [3. – B.407].

National consciousness, historical consciousness, historical memory are the basis of national unity - national will, national conscience. National unity is first formed in the hearts of people as ideology, belief, morality, will, duty, and conscience. At the same time, objective and true knowledge of history not only forms the national consciousness, but also serves as a reliable shield to protect young people not only from the emergence of separatism, but also from religious extremism, nationalism and chauvinism. "The main object of memory, unlike experienced history, is not the event itself, but its image in the mind, first transmitted by its direct participants and then reconstructed by subsequent generations according to certain laws. Experienced injuries and heroic events are preserved in memory and connected to each other on the basis of memorization and forgetting" [5. - P. 43.].

Years ago O'tkir Kayumov and Dilyara Yengulatova "Youth of Uzbekistan in the mirror of sociological research[6. - B. 97-100.]” the article mentions the following: "Public opinion" study of the public opinion of the Republic of Uzbekistan, which was conducted in 2001 and covered about 2,000 young men and women aged 14-29. In sociological research by the center, the topic of historical consciousness and historical memory of young people was also discussed. During the analysis of research results, a number of conclusions on our topic are presented. The results of concrete sociological studies indicate that the outlook of young people has been formed, their life goals, aspirations and goals have changed dramatically during the years of independence. There are three perspectives that interest young people the most: 1) enrollment; 2) employment; 3) achieving economic independence.

National identity or historical memory is not only to expand the range of information, but also to strengthen confidence in the future. American psychologist Abraham Maslow's "hierarchy of human needs" believes that after natural needs, the need for peace and security, and the need for confidence in the future. In a situation where the society is destroyed by internal disputes, class conflicts, civil wars, inter-ethnic and inter-religious conflicts, the confidence in the future decreases sharply, today's worries do not allow us to have great hopes for tomorrow and make grand plans.

In fact, as the English physicist John Bernal rightly noted, "the cultural level of a nation today is determined by its attitude to its history [7. - S. 277]".

Identity emerges in the process of social development of life and is related to the feeling of belonging to a whole system, and means that a person is a part of this system. Identity helps a person to find his place in society and to satisfy needs. The national identity formed during social development embodies the national spirit and national character factors. At the same time, socio-cultural identification reflects the proportion of people living in the society with their adaptation to the social environment and socialization. Identity arises in a person based on the questions "who am I", "what makes me different from others?" P. Alter divides national identity into different components (cultural-national identity and civil-political identity). According to him, it covers the basis of cultural-national identity - traditions, customs, religious belief, common language. Forms of civil and political identity are formed by the integrating factor related to the development of political consciousness and legal culture of the population living in the society. Abu Nasr Farabi said that "every person is structured in such a way that he needs many things in order to live and reach the highest level of maturity. He alone cannot acquire such things, in order to acquire them, a community of people is needed [8. - B.186.]" says.

"Turning the cultural heritage of the past into a component of the nation's spiritual world, in other words, creatively mastering it, giving it a new meaning, is only one aspect of national-cultural development. The second, more important aspect of this process is the renewal of culture, the emergence of new, unique and unique phenomena, the assimilation of new layers of universal culture" [9. - B. 73].

"There are two characteristics of national identity - generality and uniqueness" [1. - S. 13.]. Commonality is seen in communities. In this case, common history, unity of territory, common language, culture, religious beliefs and values, common historical and artistic monuments constitute unity (homogeneity), and these are its internal attributes. The manifestation of these attributes in the international arena is its external features.

The existence of a state with a national identity depends on the possession of the identity of the population. Therefore, it determines the historical development of the state. If the socio-political crisis of the state depends on the national identity, then the following situations are observed in social life: first, political and social institutions disintegrate; secondly, bribery, nepotism, and



corruption will increase in society; thirdly, the formation of small inter-ethnic historical conflicts and enmity will intensify, fourthly, the flow of leaving the country (migration) will accelerate; fifthly, sectarianism, religious or religious division, and legal and moral norms weaken. As a result, stagnation, internal decay, processes dependent on external factors arise in the state. "Learning history and learning from it is necessary for every person. It is equally important for a specialist dealing with philosophy and for an ordinary reader studying it. History is a great teacher, an educator who teaches lessons from the past. After all, there is no future without the past!" [11. - B. 4.].

The main manifestations of national identity: national, religious, territorial, ethnic and civil. Among them, ethnic identity occupies an important place. It is an emotional-cognitive process that indicates the ethnic group of a person. One of its interesting aspects is that it represents the opposite of the general national identity formed in society.

The socio-cultural world of the world cannot be imagined without culture. The concept of culture is divided into types of local, community, regional, universal culture, and their historical core is the culture of primitive society. Historical development has caused the cultural development and crisis of various nations, ethnic groups, peoples. During the rotation of the wheel of development created by mankind, various local cultures were formed. Each of them came into existence in its own form, developed and declined. Therefore, "while analyzing the events that the nation has experienced in its history, its positive and negative sides, it is necessary to understand why these events happened and what should be done to prevent their repetition in the future and to preserve and develop the achievements"[12] . We want to say that culture also has a historical end. For example, ancient Egyptian culture, ancient Chinese and Indian cultural civilizations, cultural development of South American peoples, etc. But cultural development can spiral back. As an example of this, we can cite countries such as China and India, which occupy an important place in determining today's world economic development.

However, the formation of principles, norms, value system, cultural development, national and cultural identity that unites society is related to national culture, but it is a difficult issue to implement. Advances in the current global information and communication tools can simultaneously strengthen national unity and identity or provoke a cultural crisis in society by intensifying the processes of social disintegration.

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# SYNTAX ISSUES IN *BAḤṬ AL-MAṬĀLIB WA ḤASS AL-ṬALIB* BY IBN FARHĀT

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## ABSTRACT

The article examines the innovative approach of the prominent scientist and religious figure Bishop Gavriel Herman Farhāt in *Baḥṭ al-maṭālib wa ḥass al-ṭālib* when covering issues of syntax, also the style and language of Ibn Farhāt in compiling his work were analyzed. Moreover, the issue of recognition of *Baḥṭ al-maṭālib wa ḥass al-ṭālib* by Muslim intellectuals is raised here. The solution to the tasks set in this article was carried out based on the use of general scientific research methods within the framework of scientific description, comparative typological, structural-semantic and comparative historical analysis. As a result of the study, the following was revealed: the author of this work, based on the tradition of Arabic linguistics, took an innovative approach in systematizing and presenting grammatical material, which leads to the following conclusions: Gavriel Herman Farhāt, having a huge number of sources at hand, chose from them for his book everything that was necessary in his opinion, while he often commented on intricate quotations from earlier classical sources, presenting them in an accessible form. This contributed to its recognition and fame among Muslim and Christian linguists.

**KEY WORDS:** syntax, classical Arabic sources, Arabic linguistics, sentence, grammar

## INTRODUCTION

It is known that Arab linguists highly valued the role of syntax (النحو) in the grammar of the Arabic language. Some even wrote *beyts* about him:

حَنَّتْ وَأَنْتَ إِلَيْهِ بِالْمَنَاقِيرِ  
نَبْحُ الْكِلَابِ وَأَصْوَاتُ السَّنَانِيرِ<sup>1</sup>

لو تعلم الطَّيْر ما في النَّحْوِ من شَرْفٍ  
إِنَّ الْكَلَامَ بلا نَحْوٍ يُمَاتِلُهُ

If the birds knew how much honor  
[lies] in syntax

then they would strive for it with their beak

After all, speech [without following the rules] of syntax  
is similar to the barking of dogs and the meowing of cats

Issues of syntax were addressed not only by Muslim authors, such as Abbas Hasan, Ibn al-Malik, etc., but also by Christian ones, among whom the pioneer in this area is the scientist and religious figure Herman Gabriel Farhāt (hereinafter Ibn Farhāt), who compiled a grammatical essay *Baḥṭ al-maṭālib wa ḥass al-ṭālib* (“Studying questions and encouraging the student [to study Arabic], hereinafter *Baḥṭ al-maṭālib*).”<sup>2</sup> Ibn Farhāt spoke quite harshly about the early classical sources in the following words:

[...] I collected the principles of Arabic morphology and syntax that were scattered in various books. I highlighted what we needed and removed what was strange to us [...] I left out tedious interpretations and flawed counterarguments. When I saw that Ibn al-Ḥāḥib hid understanding with his detailed stories, and Ibn Hishām destroyed [any] illusions [of language mastery] with his intentions, and Ibn Malik subjugated minds with his excesses [I realized] that this is only an exaggerated study and carefully thoughtful investigation. Or [maybe] that they are pursuing a goal that does not concern us, and we do not need it. That's why they are in one valley, and we are in another.<sup>3</sup>

<sup>1</sup> أقوال السلف في أهمية النحو. - <https://trends.alnfaee.net/e-225780>

<sup>2</sup> We used the manuscript in the Foundation of the National Library of Israel in Jerusalem, Inc. No. 397. L. 1<sup>b</sup>-150<sup>a</sup>. Available at: [https://www.nli.org.il/ar/manuscripts/NNL\\_ALEPH003366587/](https://www.nli.org.il/ar/manuscripts/NNL_ALEPH003366587/)

<sup>3</sup> *Baḥṭ al-maṭālib*, L. 2<sup>a</sup>.



The personality of Ibn Farhāt has attracted the attention of scientists for a long time, including Jirjis Manash,<sup>4</sup> Nihad Razzouk,<sup>5</sup> Kristen Brustad,<sup>6</sup> who mainly focused on his life and work, only partly focusing on his writings. It should be noted that one of his popular works, *Baḥṭ al-maṭālib*, despite its popularity in Christian educational circles in the 18th century, remains poorly studied. However, in articles by researchers such as N.I.Serikov,<sup>7</sup> Rosella de Luca,<sup>8</sup> Manuel Capomaxio,<sup>9</sup> an attempt was made to highlight some aspects of *Baḥṭ al-maṭālib*. So, for example, the Russian scientist N.I.Serikov considered the introduction (*muqaddima*) of this work, written in a Christian context. Rosella de Luca touched upon such an issue as the interaction of nineteenth-century scientists with Ibn Farhāt's *Baḥṭ al-maṭālib*, which was used as an early modern textbook for Ottoman schools. Moreover, in her article she compared it with other grammatical works compiled by his students based on *Baḥṭ al-maṭālib*. In turn, Manuel Capomaxio in his work emphasized the work of scientists who tried to simplify the grammar of the Arabic language, adapting them to non-native speakers, including Joseph Simonius Assemani and Ibn Farhāt. However, the above-mentioned works did not examine in detail the content of Ibn Farhāt's work.

Returning to the above passage, one is left wondering. So, what did Ibn Farhāt not like about the earlier sources? What prompted him to compose a grammatical essay at his discretion and how did he cope with the above tasks in terms of morphology and syntax? These and other questions determined the purpose of our article, which is to consider the issue of Ibn Farhāt's method in covering syntax in *Baḥṭ al-maṭālib*.

## MATERIALS AND METHODS

The solution to the tasks set in this article was carried out based on the use of general scientific research methods within the framework of scientific description, comparative typological, structural-semantic and comparative historical analysis.

## RESULT AND DISCUSSION

If the second part of the book about morphology is not replete with references to earlier sources, then the third book, devoted to syntax (النحو), often contains quotes from famous Muslim linguists. In the very first chapter, which deals with the spread of syntax (مستنبط النحو), the author writes the following:

As Shaykh Yaḥyā says in his seventh book entitled "Growth of Dominance" (ارتقاء السيادة), the first one who spread (استنبط) the syntax (النحو) is 'Ali bin 'Abū Ṭālib. As al-'Āri notes in the margin (حاشيته) to the commentary on the book of al-Urjūmiyya, [from the pen of] al-'Azhari, 'Ali bin 'Abū Ṭālib encouraged 'Abu 'Aswad al-Duwali by saying: "Follow this direction" (أنح هذا النحو), i.e. pursue this goal (أقصد هذا القصد). Since then, this science (الفن) is called nahw (نحو) in Arabic, i.e. its purpose (قصد). [As a result] 'Abu 'Aswad al-Duwali divided the chapters into definition (النعته), connection (العطف), amazement (التعجب), question (الاستفهام). After 'Abu 'Aswad al-Duwali, some of his students, of whom al-Khalīlī continued his work, and he surpassed the rest of the students [in this area] (فأفهم). Al-Sibaviyhi studied with al-Khalīlī (أخذ عنه) and surpassed all those remaining (فأفوق الجميع). He put together all the parts of the nahw and questions regarding it (مسائله) into one work and called it "al-Kitāb", which was commented on by al-Siraḥī and called al-Sibaviyhi "Imām of the Grammarians" (إمام النحاة). Al-Sibaviyhi's views are [more] preferable (مقدم) than those of all the grammarians taken (الجميع).<sup>10</sup>

A.B. Khalidov believes that the initial stage of Arabic linguistics is shrouded in the fog of legends, and the reports that Khaliph 'Ali ordered the development of the grammar of the Arabic language, according to the famous scientist, are semi-legendary. Also, A.B. Khalidov noted in his study that such an early emergence of grammatical ideas must be considered implausible.<sup>11</sup>

<sup>4</sup> جبرجيس مناش. مطالب في بحث المطالب. المشرق 23 (1900)

<sup>5</sup> نهاد رزوق. جرماتوس فرهاد. حياته وأثاره.

<sup>6</sup> Kristen Brustad, "Jirmānūs Jibrīl Farḥāt," in *Essays in Arabic Literary Biography: 1350–1850*, eds. Joseph E. Lowry and Devin J. Stewart (Wiesbaden: Harrassowitz, 2009), 246.

<sup>7</sup> Serikov N. (2020) "Maronitskii pisatel' Gavriil German Farkhat (1670–1732) i ego popytki okliucheniia sochinenii khristianskikh arabskikh avtorov v virtual'nyi katalog" *arabskoi musul'manskoi literatury*. // *Orientalistica*, 2020, no. 3. - S. 143–159. [https://www.orientalistica.ru/jour/article/view/200?locale=ru\\_RU](https://www.orientalistica.ru/jour/article/view/200?locale=ru_RU)

<sup>8</sup> Rossella De Luca. *The Engagement of Nineteenth-Century Scholars with Jirmānūs Farḥāt's Baḥṭ al-Maṭālib: An Early Modern Textbook for Ottoman Schools*. *Philological encounters*. 2021. P. 470–503.

<sup>9</sup> Manuel CAPOMACCIO. *Tashīl al-sarf wa nahw in the 18<sup>th</sup>- century Syriac and Arabic grammars: the cases of Joserhus Simonius Assemani and Girmanus Farhat*. *Parole de l'Orient* 47, 2021. P. 263–277.

<sup>10</sup> *Baḥṭ al-maṭālib*, L. 57<sup>a</sup>.

<sup>11</sup> A.B. Khalidov. *Arabskie rukopisi i arabskaya rukopisnaya traditsiya*. M. «Nauka». 1985. P. 49.



Let's return to *Baḥṭ al-maṭālib*, where the author, after defining *naḥw*, writes the following:

*Naḥw* - in the language (فى اللغة) means the goal, and as a term (فى الاصطلاح) - it is the science of rules (أصول), thanks to which one can find out whether a word is inflected (إعرابًا) or does not vary by case (بناء). The purpose of this science is to know about changes by inflections (معرفة الإعراب), which means expressing the subject (الفاعل) in the nominative case (رفع), the complement (المفعول) in the accusative (نصب), and "muḍāf" (المضاف) in the genitive case (جر). The objects of *naḥw* are the word (الكلمة) and the sentence (الكلام).

Next, Ibn Farhāt explains the difference between *kalima* (الكلمة), *lafẓ* (اللفظ), *qawl* (القول), *wad* (الوضع), where *kalima* is a word that carries a semantic concept in the singular (معنى مفرد), *lafẓ* is a set of sounds consisting from letters of the alphabet, i.e. in other words, it means pronunciation, *qawl* includes both semantic and abstract words, *wad* - emphasizing one thing by another thing (تخصيص شيء بشيء), for example, emphasizing a word (تخصيص الكلمة) by pronunciation (باللفظ).<sup>12</sup>

Explaining the only number, the author clarifies that it is not composite, like *بَطْرُسُ قَامٌ* or *بَطْرُسُ قَائِمٌ*. But consisted of one word, like *بَطْرُسٌ* and *رَجُلٌ*. Along with this, he notes that a verb (الفعل) can only be in the form of a sentence, since it always contains either an "explicit" pronoun or a "hidden" pronoun (ضمير بارز أو مستتر), such as *قَامَ* and *قُعْتُ*.<sup>13</sup>

Having given a general understanding of the basic terms and shown their differences, Ibn Farhāt begins to consider them separately. He first takes up *kalima* and explains it based on *al-Kāfiya fi al-naḥw*,<sup>14</sup> where, referring to Ibn al-Ḥājjib, he notes that the *kalima* is divided into a verb (الفعل), a name (الاسم) and a particle (الحرف).

In the next chapter, the author writes that *lafẓ* is divided into three parts: *kalima*, *kalām* (الكلام) and *kalim* (الكلم). If *kalima* is a singular word (مفردة), such as *رَجُلٌ*, then *kalām* is a complex compound sentence that has a complete meaning (مركب مفيد), such as *قَامَ بَطْرُسٌ*. As for *kalim*, it is a complex sentence with an incomplete meaning (مركب غير مفيد), for example *بَطْرُسٌ*.<sup>15</sup>

In the following chapter, the author talks about the signs of a name, verb, particle in *kalām* and he begins with a name, where he writes that a name has verbal (اللفظية) and semantic (المعنوية) signs (العلامات). Verbal features include adding the definite article, preposition and *tanvīn* to the name. While the semantic feature comes into play when the name is the predicate of a nominal sentence (الأخبار عن الاسم).<sup>16</sup>

Continuing the theme, Ibn Farhāt talks about the signs of a verb in *kalām*, which includes the feminine gender with the *sukūn* vowel (تاء التانيث الساكنة), which is added to the past tense verb *سَنَ* (الماضي) and *سَوْفَ* concerning the future tense verb, *قَدْ*, used as in the past and the present-future tense (المضارع), as well as in the feminine gender (ياء المؤنثة) in the imperative mood (الأمر).<sup>17</sup>

Next, the author dwells on the signs of a particle in *kalām* and, referring to the words of al-Azhari, notes that its sign is rejection (عدم القبول) of the signs of a name and a verb.<sup>18</sup>

Ibn Farhāt talks about the types of name, verb and particles. Thus, the name is divided into the following types:

1. Demonstrative pronouns (الأسماء المبهمة), like *هذه*, *هذه*;
2. Personal pronouns (الأسماء المضمرة), like *أنا*, *أنت*;
3. "Explicit" names (الأسماء الظاهرة), like *رجل*, *بطرس*.

In turn, the verb is the following:

1. Past tense (الماضي), for example, *دحرج*, *ضرب*;
2. Present tense (الحال), for example, *يدحرج*, *يضرب*;
3. Imperative mood (الأمر), for example, *دحرج*, *اضرب*.

As for particles, they are divided into the following categories:

1. Particles relating to the name, such as prepositions (حروف الجر), such as *إلى*, *من*;
2. Particles related to the verb (حروف الجزم), such as *لم*, *ألم*;

<sup>12</sup> *Baḥṭ al-maṭālib*, L. 58<sup>a</sup>.

<sup>13</sup> *Ibid.*

<sup>14</sup> كافية في علم النحو والشافية في علمي التصريف والخط. تأليف ابن الحاجب. القاهرة. 2014 م.

<sup>15</sup> *Baḥṭ al-maṭālib*, L. 58<sup>a</sup>.

<sup>16</sup> *Ibid.*

<sup>17</sup> *Baḥṭ al-maṭālib*, L. 59<sup>a</sup>.

<sup>18</sup> *Ibid.*





3. Particles belonging to both a name and a verb (المشترك بينهما), such as هل، بل.<sup>19</sup>

In the next chapter, the author dwells on the category of certainty and uncertainty and notes that the uncertain state (النكرة) is the root (الأصل), and the definite state is its branch (الفرع). A noun in the indefinite state is every common noun to which the definite article al (ال) can be added, like الرجل and الضارب. Ibn Farhāt, quoting al-Ḥarīri, writes that the indefinite state of a name can also be determined by adding رُبَّ to it, such as لَقِيْتُهُ رُبَّ رَجُلٍ مُؤْمِنٍ (Perhaps I met a believing man).<sup>20</sup>

Continuing the theme, Ibn Farhāt talks about a certain category and which parts of speech are considered in a certain state. He lists the following:

1. Pronoun (الضمير);
2. Demonstrative pronouns (اسم الإشارة);
3. Relative pronouns (اسم الموصول);
4. A name identified by the article al (المعزف بال);
5. *Muḍaf* is a word determined by the genitive case (المضاف);
6. The name is in an indefinite state, after the particle of address (النداء).<sup>21</sup>

In the next chapter, Ibn Farhāt talks about *nun al-wiqāya* (نون الوقاية), i.e. about the nuna of the fused 1st person pronoun. The author explains the reason for the name as follows:

When a fused 1st person pronoun (ياء المتكلم) is attached to a verb or particle, then [the letter] ن is added to it, which is called *nun al-wiqāya* (نون الوقاية), i.e. she [as if] protects (تقي) the end of the word from kasra. [...]<sup>22</sup>

As for adding *nūn al-wiqāya* to particles, the author notes that it can be either permissible, obligatory, or prohibited (ممتنع). Acceptable particles include such particles as لَكِنَّ، لَكِنَّ، obligatory prepositions such as عَنْ، مِنْ، and prohibited ones لَعَلَّ.<sup>23</sup>

Next, the author talks about a proper name (العلم)، which he divides into two parts: a proper name of persons (العلم الشخصي)، like يُسُوع، مَرْيَمُ and a common noun (العلم الجنسي)، like قَيْصَرُ (Emperor of Rome)، كِسْرَى (Khosroes, ancient Persian title kings). He also notes that a proper name can be singular (المفرد) or compound (المركب). If it is singular, then it is either improvised (مرتجل)، as in دِمَشْقُ، or borrowed (منقول)، as in مَدِينَةُ حَلَبُ، which was a past tense form, and then borrowed and made a proper noun. As for the compound proper name, it can be either in *idāfa* form (عَبْدُ اللَّهِ)، or as a combination of two words into a single concept (مزجي)، for example، بَعْلَبَكُ (the name of an ancient city in Lebanon)<sup>24</sup> in the original there were two words بَعْلُ and بَكُ، or predicative (إسنادي)، such as عَاقِبِيهَا (name of a valley near Tripoli, the capital of Libya). The author concludes the chapter with an explanation of *laqab* (اللقب) and *kunya* (الكنية).<sup>25</sup>

One of the first grammar topics that students learn in Arabic lessons is demonstrative pronouns (أسماء الإشارة). However, what Ibn Farhāt writes on this topic is quite different from what is given in domestic textbooks. Consider this passage:

*Demonstrative pronouns are called "indefinite" (المبهم)، since they indicate the subject with a definite indication (إشارة محسوسة إليه). Pronouns come in three types: singular, dual, and plural. Each of them has either a masculine or feminine form. The masculine singular [form] is لَآ and there are several feminine [forms]: ذَ، تَ، تِ، نِ. In the dual number, the masculine pronoun [has the form] in the nominative case, بَانُ in the genitive and the accusative case, بَانِ. [As for] the feminine gender, [it has the form] in the nominative case بَانُ in the genitive and accusative cases بَانِ. The plural [form] أُولَاءُ [is used] for both masculine and feminine genders. Note (التنبيه): You can add هَا to the beginning of [the above] pronouns, such as هَؤُلَاءُ. Demonstrative pronouns [are divided into those used] for close, middle and far distance. For the masculine pronoun of close distance [used] هَذَا، for the middle gender هَذَا and for the distant ذَلِكَ. Close feminine pronouns [have the forms] هَذِي، هَاتِي، هَذِي، for the middle gender هَاتِي and for the distant تِلْكَ. In the dual number, masculine pronouns of close distance in the nominative case are expressed as بَانُ [while] middle and long distance in the accusative and genitive cases as بَانِ. The feminine pronouns of close, middle and long distance in the dual number in the nominative case [have the*

<sup>19</sup> Baḥṭ al-maṭālib, L. 59<sup>a</sup>.

<sup>20</sup> Ibid.

<sup>21</sup> Ibid., L. 60<sup>a</sup>.

<sup>22</sup> Ibid.

<sup>23</sup> Baḥṭ al-maṭālib, L. 60<sup>a</sup>.

<sup>24</sup> For more details see: Ba'albik. <https://ar.wikipedia.org/wiki/>

<sup>25</sup> Baḥṭ al-maṭālib, 60<sup>b</sup>-61<sup>a</sup>.



*form] بُنَانٌ and in the accusative and genitive cases بُنَيْنٌ [As for] the plural, [for forms of] masculine and feminine pronouns of close distance [uses] هُوَ لَأَمْ، and for middle and long-distance أُولَئِكَ [...] ]<sup>26</sup>*

As you know, our textbooks do not highlight middle-distance demonstrative pronouns, but are limited to only near- and far-distance pronouns.<sup>27</sup>

In the next order, Ibn Farhāt dwells on the following concept, which is also considered in a certain state and these are relative pronouns (اسم الموصول). He begins his chapter with Ibn al-Hājib, who argues that relative pronouns (الموصول) acquire meaning (يتم) precisely thanks to the attributive clause (الصلة) and the “reflexive pronoun” (العائد).<sup>28</sup>

Further, the author, continuing the topic, notes that relative pronouns are special (خاص), which include أَلْتِي and أَلَّذِي, as well as general (مشترك), which include مَنْ، مَا، أَيُّ.<sup>29</sup>

Moreover, he adds that relative pronouns are divided into nominal (اسمي) and partial (حرفي). Speaking about the difference between them, Ibn Farhāt notes that nominal ones begin with special and general relative pronouns (see above) and which in turn are divided into prepositional pronouns, such as جاء الذي قام أبوه and predicate, similar to a sentence (شبه الجملة), like جاء الذي عندك. While partials with conjunctions such as أَنْ، أَنْ do not require a “reflexive pronoun” such as بلغني أن تقوم.<sup>30</sup>

In the next chapter, Ibn Farhāt examines the definite article al, which, according to the author, goes back to the general Semitic definite article هل. Here he notes the three main meanings of this article, where the first is the setting of a word from an indefinite state to a definite one, known to all of us. For example, الرَّجُلُ – الرَّجُلُ. Ibn Farhāt gives here an example from a Biblical topic, more precisely about Judah. Here's what he writes:

كقول البشير وعرفاه عند كسر الخبز.<sup>31</sup>

As Jesus said: “And you will know him when you break bread.”

The second meaning is a generalization of individual objects, in the singular as representatives of the entire genus or species (الجنس). Eg:

I like fruit (not just one fruit) on trees (not on a tree) -

يعجبني الثمر على الشجر.<sup>32</sup>

As for the third meaning of the definite article al, it is added to substantiated proper names to remind that they were originally adjectives (الصفة) or *masdar*. Like, خازن – الخازن. At the same time, the author notes the obligatory omission of the tanvin when adding the definite article al to a word in an indefinite state.<sup>33</sup>

Next, the author talks about the first term of the conjugate state (المضاف). Consider what he writes about this:

*Each name in an indefinite state (تكررة) when added to one of the above categories of a definite state (المعارف) becomes in a definite state (معرفة). For example, if it is added to a fused pronoun, like غُلَامِي; to a proper name, as غُلَامُ بَطْرُسَ; to a demonstrative pronoun, like هَذَا غُلَامٌ هَذَا; to a relative name, like الغُلَامُ الَّذِي قَامَ أَبُوهُ; with a name defined with the definite article al (ال), as غُلَامُ الرَّجُلِ; to the first term of the conjugate state (المضاف) in the indeterminate state (تكررة), as ائِنَّ غُلَامُ رَبِّي، ائِنَّ غُلَامِي، etc. [...] ]<sup>34</sup>*

Ibn Farhāt completes the topic of definiteness by explaining the name in an indefinite state, after the particle of address (النداء), which he explains by saying that when addressed to a specific person, it becomes definite (معرفة) as a proper name (العلم). As for example, يَا رَجُلُ.<sup>35</sup>

At this point, one cannot fail to note the style and language of Ibn Farhāt in compiling his work. It should be noted that his perfect command of the Arabic language, creative activity in poetry, as well as his translation of works into Arabic are not demonstrated in

<sup>26</sup> Baḥṭ al-maṭālib, L. 60<sup>a</sup>.

<sup>27</sup> To find souser

<sup>28</sup> Baḥṭ al-maṭālib, L. 61<sup>b</sup>.

<sup>29</sup> Ibid., L. 61<sup>b</sup>-62<sup>a</sup>.

<sup>30</sup> Ibid., L. 62.

<sup>31</sup> Ibid., L. 63<sup>a</sup>.

<sup>32</sup> Baḥṭ al-maṭālib, L. 63<sup>a</sup>.

<sup>33</sup> Ibid.

<sup>34</sup> Ibid., L. 63.

<sup>35</sup> Ibid.



the compilation of *Baḥṭ al-maṭālib*. Nevertheless, his poetic nature can still be traced in places. For example, these words of his at the end of his essay:

*This is the completion (نهاية) of where the pen (ما جال القلم) traveled in the fields (ميدان) of the draft (تسويدة), the white paper (تبييض) and its editing (تحريره). Praise be to the Lord for giving (أنعم) it to us at the beginning (الابتداء) [of the work] and completing it (ختمه) at the end (الانتهاء). [...]*<sup>36</sup>

When studying this source, one can be convinced more than once that he rather thought about the reader, tried to convey complex topics of grammar to the latter in a simple and accessible language, where one often gets the impression that he is as if he is having a conversation with him. Here's a good example:

*[...] If you form a plural from a relative name consisting of four letters, then put (ضع) instead of the relative letter ya (ياء النسبة) and the feminine (تاء التأنيث) and say بَرَابِرٌ - بَرَابِرَةٌ - مَمَشِقِيٌّ - مَمَشِقَةٌ [...]*<sup>37</sup>

Or another excerpt:

*[...] A pronoun is something that is used instead of another (كناية عن غيره) and it is divided into two parts (قسمان): fused (متصل), like ضَرَبْتُ and dividing (منفصل), like هُوَ يَضْرِبُ. We looked at this topic in the book on verb declension (تصريف الأفعال), you need to repeat [it] (عليك بالمراجعة). [...]*<sup>38</sup>

Moreover, very often there are clarifications of vowels and explanations of the word, such as:

*[...] Like, for example, حُبَارَى, where the vowel of the letter ر is fatha, this is the name of a bird and the plural has the form حُبَارِيَاتٌ [...]*<sup>39</sup>

Sometimes it seems that the author seems to be talking to himself. For example, here is this passage:

*After we have finished talking about the states of individual words (أحوال المفردات), we can begin to consider the states of compound words (أحوال المركبات).*<sup>40</sup>

A clear indication that *Baḥṭ al-maṭālib* was addressed to Christian students can be found in the chapter in which the author talks about writing (الخط). Here's what he writes about it:

*A letter is the representation of words (تصوير اللفظ) in alphabetical letters (حروف هجائية). Al-hajw (الهجور), al-hijā (الهجا), al-tahjiyya (التهجية), al-tahajja (التهجي) is a listing of letters by their names (بأسمانها). Each alphabetic letter has an object and its name (اسم ومسمى). For example, ج is pronounced "jim", but it has the name "jim". Words are written by their pronunciation, not by their names. For example, بَطْرُس - Peter, when spelled, their name is used: ط، ر، س، but when reading, their pronunciation is used: الباء، الطاء، الراء، السين.*<sup>41</sup>

It is not uncommon for Ibn Farhāt to interpret quotations from earlier sources. Here, for example, is the following:

*As al-Sinhaji says in his Jurumiyyah: "The particle is used for meaning" (الحرف جاء لمعنى). This means that a particle acquires meaning only when it is attached to a name and a verb, such as prepositions (حروف الجر), conditional particles (حروف الجزم), etc. [...]*<sup>42</sup>

A distinctive feature of Ibn Farhāt is that he, as it were, summarizes the above topic to further explain it, highlighting it in a separate chapter with the title "in more detail about the above (في تفصيل ما تقدم ذكره)".<sup>43</sup>

It is impossible not to notice Ibn Farhāt's passion for statistics, since he very often gives the number of one or another grammatical category. For example, the following passage:

*Number of prepositions 18, particles of address 5, compatibility 1 (والمعية), particles likened to verbs 6 (الحروف المشبهة بالأفعال), particle لا aspect negation 1 (لا النافية للجنس), particles similar to لَيْسَ (الحروف المشبهة بالليس) 3 (particles, putting the verb in the subjunctive mood 4, particles putting the verb in the truncated mood 6, verbs of incomplete meaning 13 (الأفعال الناقصة), verbs of proximity of action 12 (الأفعال المقاربة), verbs of judgment 14 (أفعال المدح والذم) 4 (أفعال المدح والذم). [...]*<sup>44</sup>

Ibn Farhāt turned to the main primary sources, diligently drawing from them what he considered necessary or suitable for writing his book. However, it should be noted that Ibn Farhāt, while preserving the entire essence of the grammar of the Arabic language, presents the material, or rather, designs his book in the style of European linguistics. Unlike the early authors of Muslim linguists, he begins his work from the content (*fihrist*), divides it into parts (الكتاب الأول، الأقسام), and begins each chapter with its title. Moreover,

<sup>36</sup> *Ibid.*, L. 150<sup>b</sup>.

<sup>37</sup> *Baḥṭ al-maṭālib*, L. 53<sup>a</sup>.

<sup>38</sup> *Ibid.*, L. 60<sup>a</sup>.

<sup>39</sup> *Ibid.*, L. 52<sup>b</sup>.

<sup>40</sup> *Ibid.*, L. 138<sup>b</sup>.

<sup>41</sup> *Ibid.*, L. 55<sup>b</sup>.

<sup>42</sup> *Baḥṭ al-maṭālib*, L. 59<sup>a</sup>.

<sup>43</sup> *Ibid.*, L. 68<sup>a</sup>, 70<sup>a</sup>.

<sup>44</sup> *Ibid.*, L. 138<sup>a</sup>.



he explains the grammatical topic closer to the European style. For example, compare two passages from *al-Kāfiyya fi fl-nahw* of Ibn al-Hājib 2and *Baḥṭ al-maṭālib*. Let's start with *al-Kāfiyya*:

The subject of a nominal sentence (المبتدأ) is a name free (المجرد) from control words (العوامل اللفظية), has with it a predicate (مسنداً إليه) or an adjective located after the negation particle, the interrogative particle أ. Mubtada, if it is "explicit", is placed in the nominative case. For example: زَيْدٌ قَائِمٌ، مَا قَائِمٌ زَيْدَانٌ، أَقَائِمٌ زَيْدَانٌ.

If [adjective] agrees (طابقت) with [name] in singular (مفرداً), then two options (الأمران) are allowed (جاز). The predicate of a nominal sentence (الخبر) is [name] free (المجرد), supported (المسند به), different (المغاير) from the mentioned qualities (الصفة المذكورة). As a rule, mubtada precedes khabar, but [there are times] when it is possible to place khabar before mubtada. [For example]: فِي دَارِهِ زَيْدٌ. [However], not allowed (امتنع) [next option]: صَاحِبُهَا فِي الدَّارِ.<sup>45</sup>

And here is an excerpt on the same topic from *Baḥṭ al-maṭālib*:

The subject of a nominal sentence (المبتدأ) is a name in the nominative case (المرفوع) free (المجرد) from control words (العوامل اللفظية) for predication (للابتناد). The predicate of a nominal sentence (الخبر) is a name in the nominative case, [acting as] a "support" (المسند) for the mubtad. Mubtada [stands] in the nominative case, [so] the sentence begins with it, and khabar [is expressed] in the nominative case, [because] mubtada [stands] in the nominative case. For example: Jesus is a faster (يسوع صائم). [Here] Jesus is the subject, and the fasting man is the predicate. Mubtada [is divided] into two types: [expressed by a name] – "explicit" (ظاهر), as we gave the example above, and [expressed] by a personal pronoun (مضمر منفصل), as for example: I am a believer (أنا مؤمن). Khabar must agree with the mubtada in number and gender, since it is part of the mubtada.<sup>46</sup>

Often Ibn Farhāt sheds light on the reason for naming terms in one way or another. So, for example, he writes the following:

Verbs of the "heart" (أفعال القلوب) are called so because most of them (أغلبها) [mean] doubt (الشك), confidence (اليقين) associated with the heart (القلب).<sup>47</sup>

## CONCLUSIONS

Thus, summing up the above, it can be argued that *Baḥṭ al-maṭālib* is the totality of Ibn Farhat's many years of pedagogical activity, his multifaceted creativity, and translation activities, which results in the method of composing a grammatical essay.

Ibn Farhāt, having thoroughly studied earlier sources, tried to compose the work in a more systematic and orderly form, which traces the European method of compiling or, in other words, designing books. It is undeniable that Ibn Farhāt mainly pursued the goal of conveying to the reader the complex material of the grammar of the Arabic language, rather than demonstrating his knowledge and skills in this area.

The success of *Baḥṭ al-maṭālib* was also closely related to the style, accessible language of Ibn Farhat and his methodological approach, which was expressed in the ability to conduct a conversation with the reader, clarify points, summarizing the grammatical material covered, and most importantly, when compiling his book, the author thought about the reader, about ways of conveying material to the latter, without special demonstrations of one's skills in poetry and recitation in Arabic.

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<sup>46</sup> *Baḥṭ al-maṭālib*, L. 136.

<sup>47</sup> *Ibid.*, L. 141<sup>a</sup>.



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