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Evaluation of cognition, perception, and opinion among faculties and postgraduate medical students regarding artificial intelligence tools in health education and research. A cross-sectional survey.

Dr. Adyasha Anindita Panda[1], Dr. Suvendu Kumar Panda[2], Dr. Snehasini Dash[3], Dr. Jayanti Prava Behera[4]
[1]Assistant Professor, Department of Pharmacology, Government Medical College and Hospital, Phulbani, Odisha
[2]Assistant Professor, Department of Pharmacology, MKCG, Medical College and Hospital, Berhampur, Odisha
[3]Senior Resident, Department of Pharmacology, MKCG Medical College and Hospital, Berhampur, Odisha
[4]Professor and H.O.D, Department of Pharmacology, MKCG, Medical College and Hospital, Berhampur, Odisha

Abstract

Introduction

Artificial intelligence (AI) has substantial transformative potential in enhancing diagnostics, treatment, disease monitoring, health-care delivery, education, and research. Despite these advantages, AI has not yet been formally integrated into the medical curriculum. Therefore, the present study aimed to evaluate the cognition, perception, and opinion of medical teaching faculty members and postgraduate (PG) students regarding the application of AI in medical education and research.

Methods

This cross-sectional survey was conducted among faculty members and PG residents of MKCG Medical College and Hospital, Berhampur, from September 2024 to December 2024. A structured questionnaire comprising 20 items covering cognition, perception, and opinion was administered. A total score of 100 was allotted, with 5 points assigned to each correct response. Analytical statistics were performed using the Chi-square test to assess associations between scores and sociodemographic variables. A p-value <0.05 was considered statistically significant.

Results

Most participants were aged 25–40 years (87%) with male predominance (57%). The Department of Pharmacology contributed the largest share (30%), while only 30% had prior exposure to AI-related CME. Cognition item 6 showed the highest correct response rate (71.6%). In the perception domain, 40% strongly agreed across items, and opinion responses demonstrated agreement ranging from 30% to 80%. The mean cognition score was low (22.46 ± 8.63/50), whereas perception (19.44 ± 3.15) and opinion (20.70 ± 2.21) scores were satisfactory. Significant associations were observed only with designation (PGs vs faculty; p = 0.02) and prior AI exposure (p = 0.04).

Conclusion:

At present, faculty members and postgraduate students have limited knowledge of artificial intelligence but show favourable perceptions toward its integration into medical education and healthcare practice.

Recommendation:

Integrating artificial intelligence education into the postgraduate medical curriculum through structured programs and workshops will enhance knowledge and promote responsible AI use in clinical practice, research, and medical training.

Keywords: *Artificial Intelligence, Attitude of Health Personnel, Cross-Sectional Studies, Education, Medical, Graduate, Faculty, Medical, Health Education, Medical Education, Medical Research, Perception, Postgraduate Education, Questionnaires, Students, Medical.*
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Corresponding Author: *Dr. Adyasha Anindita Panda*
Email id: - ***adyashapanda357@gmail.com.***
Assistant Professor, Department of Pharmacology, Government Medical College and Hospital, Phulbani, Odisha

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Introduction

The term Artificial intelligence (AI) coined by John McCarthy in 1955 refers to "the ability of computers to perform tasks normally requiring human intelligence'' [1]. It has been played many important roles in diagnosis, treatment, monitoring of diseases as well as in the field of health education and research. This technology is very much advanced in developed countries whereas in developing countries, many are unaware about it.

Now it's time for the medical students to be knowledgeable about AI in health sector. One of the reasons, AI is still not a part of medical PG teaching due to reasons firstly, medical students are burdened with heavy curriculum, with added topics periodically made them hesitant to accept new syllabus [2]. Secondly, physicians are unaware of emerging role of AI in health care [3].

Recently, during COVID-19 pandemic, AI had been emerged for seeming less healthcare and cost -effective treatment [4].

So, before introducing AI in medical sector; knowledge, perception and opinion of teaching faculties, researchers and medical students in the field of AI is a priority.

On this background, this study was aimed to evaluate the cognition, perception, opinion among, faculties, medical students regarding artificial intelligence tool in health care, education and research in a tertiary care teaching hospital.

Objectives

To evaluate the cognition, perception and opinion of teaching faculties, PG medical students about application of AI in the field of medical education and research.

Materials and methods

Study Design

This study was conducted as a cross-sectional questionnaire-based survey among medical faculty members, postgraduate students, and senior residents.

Study Setting

The study was carried out at MKCG Medical College and Hospital, Berhampur, Odisha, over a period of four months from September 2024 to December 2024.

Participants

Participants included teaching faculty members, postgraduate medical students, and senior residents from various medical disciplines.

Inclusion criteria

Faculty members, PG students, and senior residents working in medical institutions

Participants willing to provide informed consent

Participants able to access and complete the online questionnaire

Exclusion criteria

Incomplete questionnaire responses

Study Size

A total of 200 participants were included in the study. The sample size was determined based on feasibility and availability of eligible participants during the study period.

Sampling Technique

A questionnaire was designed by the investigators based on different published articles and validated by a group of faculties of different medical disciplines. It consists of 4 parts as follows:

1st part - Demographic details of participants

2nd parts – Cognition about AI

3rd part - Perceptions of participants

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4th part – Opinion regarding use of AI

The questionnaire in Google form was shared in different Groups of faculties, PGs and SRs through Whats app and Face book and responses were collected.

Participants giving their consent only accepted for this study and assured of their response confined to authors and their identity would not disclose.

Study procedure:

The demographic details collected as 8 set of close ended questions as in annexure I.

Cognition related to the use of artificial intelligence (AI) in diagnostics, therapeutics, medical education, and research was assessed using a 10-item structured questionnaire with four response options. Each correct response was awarded 5 points and incorrect responses 0 points, yielding a maximum cognition score of 50. Perception and opinion toward the integration of AI in the health sector, particularly in medical education and routine clinical practice, were evaluated using a 5-point Likert scale across 10 items. The response options included: strongly disagree, disagree, neutral, agree, and strongly agree. These responses were scored in descending order from 5 points for "strongly agree" to 0 points for "strongly disagree," resulting in a maximum score of 50 for the perception and opinion domain. An exception was applied to perception question 2, in which responses were scored as follows: "AI enhances skills, not replacing clinicians" (5 points), "not concerned" (4 points), "neutral" (3 points), "concerned" (2 points), and "AI replaces clinicians" (1 point).The overall questionnaire thus comprised 20 items with a total maximum score of 100 points. The scoring framework and item construction were adapted from previously validated instruments described by Sit et al. and Pinto dos Santos et al.[5-7]

Bias Control

To minimize selection bias, the questionnaire was circulated among different medical disciplines and institutions. Response bias was minimized by ensuring anonymity and voluntary participation.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee (IEC) of MKCG Medical College and Hospital, Berhampur on 21 August 2024. (Approval number: 18/Chairman-IEC/MKCG MCH /2024/8/21).

Statistical analysis

Data were collected and complied into Microsoft Excel Worksheet and analyzed by using SPSS version 22.0. Continuous variables were expressed in mean and standard deviation and analyzed by using ANOVA with post hoc test and unpaired Student's t-test. Categorical variables were expressed in frequency and percentage. p value < 0.05 was considered as statistically significant.

Results

Table No-1

Demographic distribution of Faculties and postgraduate Students Involved in the Study (n=200)

		Frequency	Percentage
Age Range	25-40	174	87.0%
	41-55	23	11.5%
	56-65	2	1.0%
	>65	1	0.5%
Gender	Male	114	57.0%
	Female	86	43.0%
Institutions	Government Institution	168	84.0%
	Private Institution	22	11.0%
	Central Institution	10	5.0%
Designation	PG Resident	174	87%
	Faculty	26	13%

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Location of Institution	Odisha	143	71.5%
	Outside Odisha	57	28.5%
Heard the term AI	Deep Learning	22	11.0%
	Machine Learning	93	46.5%
	Neuronal Network	12	6.0%
	All terms	73	36.5%
Received AI talk	Yes	60	30.0%
	No	140	70.0%

The Table no-1 displayed the demographic profile of the 200 study participants, comprising faculty members and postgraduate students. Most participants (87.0%) were aged 25–40 years, with a male predominance. The majority were affiliated with government institutions (84.0%) and were postgraduate residents (87.0%). Geographically, most respondents were from Odisha (71.5%). Regarding AI awareness, the highest familiarity was reported with machine learning (46.5%), while most participants (70.0%) had not attended any formal AI-related academic sessions or talks.

Table No-2: Distribution of Different Streams Postgraduate Students and Faculties Involve in the Study (n=200)

	Frequency	Percentage
Anatomy	3	1.5%
Anesthesia	10	5.0%
Biochemistry	11	5.5%
Community Medicine	5	2.5%
Dental Surgery	1	0.5%
Dermatology	5	2.5%
Emergency Medicine	1	0.5%
E.N. T	13	6.5%
Forensic Medicine	4	2.0%
General Medicine	12	6.0%
Microbiology	14	7.0%
O & G	8	4.0%
Orthopedics	3	1.5%
Pathology	10	5.0%
Pediatrics	2	1.0%
Pharmacology	60	30.0%
Physiology	8	4.0%
Ophthalmology	1	0.5%
Psychiatry	12	6.0%
Radiology	1	0.5%

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Radio-diagnosis	5	2.5%
Surgery	11	5.5%

The Table no-2 presented the distribution of Faculties and postgraduate students from various academic streams who participated in the study (n=200). The highest representation was from the Department of Pharmacology, accounting for 30.0% of the total participants. The least representation came from Dental Surgery, Emergency Medicine, Ophthalmology, and Radiology, each contributing 0.5% of the participants.

Table No-3: Distribution of Survey Responses of Cognition about AI of Study Participants to the Structured AI TOOL knowledge Questionnaire (n=200)

Questions	Option A n(%)	Option B n(%)	Option C n(%)	Option D n(%)	Correct Responses
1. Highest application of AI	123 (61.5%)	42 (21.0%)	15 (7.5%)	20 (10.0%)	123(61.5%)
2. Lowest Application of AI	82 (41.0%)	47 (23.5%)	34 (17.0%)	37 (18.5%)	82(41.0%)
3. ChatGPT invented in year	25 (12.5%)	41 (20.5%)	42 (21.0%)	92 (46.0%)	42(21.0%)
4. CanSAR integration of data of	28 (14.0%)	69 (34.5%)	43 (21.5%)	60 (30.0%)	69(34.5%)
5. NIRAMAI Tool	38 (19.0%)	32 (16.0%)	117 (58.5%)	13 (6.5%)	117(58.5%)
6. pitfall of AI	19 (9.5%)	8 (4.0%)	20 (10.0%)	153 (76.5%)	153(76.5%)
7. AI for ppt	46 (23.0%)	77 (38.5%)	50 (25.0%)	27 (13.5%)	77(38.5%)
8. Name of tool (image based)	83 (41.5%)	38 (19.0%)	28 (14.0%)	51 (25.5%)	38(19.0%)
9. Statistical analysis AI	51 (25.5%)	33 (16.5%)	74 (37.0%)	42 (21.0%)	74(37.0%)
10. IBM Watson used in	65 (32.5%)	16 (8.0%)	45 (22.5%)	74 (37.0%)	65(32.5%)

Table No-3 summarized the distribution of responses from study participants (n=200) to a structured questionnaire assessing their cognitive awareness regarding Artificial Intelligence (AI) tools. Participants had highest correct responses to question number 6 (76%) followed by question number 1 (61%) and lowest correct responses to image-based question number 8 (19%).

Table No-4: Distribution of Survey Responses of Perception about AI of Study Participants to the Structured AI TOOL knowledge Questionnaire (n=200)

Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. AI improve diagnostics	74(37%)	91(45%)	25(12.5%)	3(1.5%)	2 (1%)
2.AI on job security of doctor	8(4%)	62 (31%)	15 (7.5%)	20 (10%)	95 (47.5%)

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3.Teaching should be focused on AI	39(19.5%)	68(34%)	54(27%)	26(13%)	13(6.5%)
4. Anybody would use AI after understanding	62(31%)	70(35%)	39(19.5%)	24(12%)	5(2.5%)
5.Help in bio medical research	75(37.5%)	87(43.5)	27(13.5%)	6(3%)	5(2.5%)

NB: -Only for question number 2 Responses were
Enhance skill
Not replaced
Not concern
Concerned
Replaced

The Table no- 4 illustrated the distribution of responses assessing participants' perceptions of artificial intelligence (AI). Most respondents expressed a positive outlook, with 82.0% agreeing or strongly agreeing that AI can improve diagnostics. Nearly half of the participants (47.5%) perceived AI as a potential threat to doctors' job security after recategorization. Attitudes toward integrating AI into teaching were favourable, with 53.5% agreeing or strongly agreeing. A similarly positive trend was observed regarding willingness to use AI after adequate understanding (66.0% agreement) and the role of AI in biomedical research, where 81.0% agreed or strongly agreed, indicating an overall positive perception toward AI adoption.

Table No-5: Distribution of Survey Responses of Opinion of Participants About AI For Future Use of Study Participants to the Structured AI TOOL knowledge Questionnaire (n=200)

Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Will use AI in daily practice	47(23.5%)	92(46%)	42(21%)	15(7.5%)	4 (2%)
2. Medication error reducing	55(27.5%)	97(48.5%)	32(16%)	15(7.5%)	1(0.5%)
3. Patient control of health in remote setting	50(25%)	93(46.5%)	33(16.5%)	16(8%)	8(4%)
4.Training required to solve ethical problems	172(86%)	21(10.5%)	3(1.5%)	2(1%)	2(1%)

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5.Used as willingness to practice only	71(35.5%)	86(43%)	34(17%)	6(3%)	3(1.5%)

The Table No-5 represented the distribution of responses reflecting participants' opinions on the future use of artificial intelligence (AI) in medical practice, as captured through a structured questionnaire involving 200 study participants. All participants strongly agreed and agreed to the all five opinion-based questions, showing their positive outlook to AI use in diagnostics / therapeutics / research

Table No-6: Distribution of Mean Score of Different Section of Questionnaire

	Mean±SD
Cognition Score	22.46±8.63
Perception Score	19.44±3.15
Opinion Score	20.70±2.21
Total Score	62.51±9.81

The Table no-6 showed that the mean cognition score was 22.46 ± 8.63 (out of 50), indicating a moderate level of AI knowledge with considerable variability. The mean perception score was 19.44 ± 3.15 (out of 25), reflecting an overall positive perception with limited variation. The opinion score averaged 20.70 ± 2.21 (out of 25), suggesting consistently favourable views toward AI. The combined total score was 62.51 ± 9.81, indicating an overall satisfactory level of understanding and attitude toward AI among participants.

Table No-7: Comparison of Total Score of Different Section of Questionnaire Across Various Demographic Parameters

		Mean±SD	P Value
Age Range	25-40	62.30±9.96	0.501
	41-55	64.43±9.16	
	56-65	62.00±1.41	
	>65	54.00±00	
Gender	Male	63.69±8.83	0.074
	Female	60.90±10.86	
Institutions	Government Institution	62.30±9.64	0.077
	Private Institution	66.13±8.42	
	Central Institution	55.00±15.05	
Designation	PG Resident	61.57±9.61	**0.021**
	Faculty	66.36±9.48	
Location of Institution	Odisha	63.05±9.70	0.357
	Outside Odisha	61.07±10.06	

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Received AI talk	Yes	64.18±10.96	**0.048**
	No	61.11±9.18	

The Table no- 7 compared total AI questionnaire scores across demographic variables. The highest mean score was observed in the 41–55-year age group (64.43 ± 9.16), though age-related differences were not statistically significant (p = 0.501). Males scored slightly higher than females (63.69 ± 8.83 vs. 60.90 ± 10.86), without statistical significance (p = 0.074). Participants from private institutions showed higher mean scores (66.13 ± 8.42) compared with government (62.30 ± 9.64) and central institutions (55.00 ± 15.05), with no significant intergroup difference. Faculty members scored significantly higher than postgraduate residents (66.36 ± 9.48 vs. 61.57 ± 9.61; p = 0.021). Scores did not differ significantly by institutional location (p = 0.357). Attendance at AI-related talks was associated with significantly higher scores (64.18 ± 10.96 vs. 61.11 ± 9.18; p = 0.048).

Discussion

In the present study, most participants were postgraduate residents (87%) and belonged to the 25–40-year age group, reflecting a young and academically active medical workforce in India. Similar demographic trends were reported by Buabbas et al. in Kuwait, where participants were predominantly medical students with a mean age of 22.1 ± 1.8 years (Buabbas AJ et al., 2023). Similarly, Stewart et al. in Western Australia found that most respondents were in the 20–29-year age group and pursuing postgraduate medical degrees (Stewart J et al., 2023). The inclusion of an older cohort with faculty members in the present study offers a broader and more mature perspective across varying levels of medical training and professional experience. Although gender-based differences were not statistically significant, males demonstrated slightly higher confidence in AI usage, a trend consistent with previous studies (Ahmad zz etal) indicating persistent gender disparities in technology adoption among healthcare trainees.

Only 30% of participants reported prior exposure to AI-related academic sessions, indicating limited curricular integration of AI education. Similar trends have been reported internationally, including Western Australia, where 87.5% of medical students had no AI teaching, and Kuwait, where 84% lacked formal AI training. (Buabbas AJ et al., 2023; Stewart J et al., 2023). Awareness of specific AI terminologies was limited, with 46.5% of participants familiar with machine learning and only 6% recognizing neural networks. This trend is consistent with the findings of Stewart et al., where 59% of students were aware of machine learning and only 19% were familiar with convolutional neural networks (Stewart J et al., 2023). These findings suggest that while general awareness of AI is present, in-depth understanding of underlying computational concepts remains limited. The relatively higher awareness of applied tools such as NIRAMAI (58.5%) may reflect the growing visibility of indigenous AI-based healthcare innovations in India.

The mean cognition score of 22.46 ± 8.63 suggests a moderate level of AI-related knowledge among participants. Similar trends were reported by Buabbas et al., where a majority of respondents self-reported understanding of AI principles, though their actual comprehension was uncertain (Buabbas AJ et al., 2023). Stewart et al. also observed that 84.8% of medical students believed they understood AI, yet only one-third correctly identified its computational basis (Stewart J et al., 2023). These findings underscore the gap between perceived and actual knowledge, highlighting the need for structured curricular interventions integrating both theoretical instruction and practical exposure to AI tools.

The study demonstrated a generally favourable perception toward AI, with about 82% of participants acknowledging its potential to improve biomedical research and 70% supporting its integration into routine clinical practice. These observations are consistent with earlier studies where 93.4% of Kuwaiti medical students believed AI would play an important role in healthcare (Buabbas AJ et al., 2023) and 74.4% of Australian students agreed that AI would improve medicine in general (Stewart J et al., 2023). Additionally, 86% of respondents strongly endorsed the need for ethical training in AI, underscoring its growing importance for responsible AI adoption. While Buabbas et al. highlighted ethical and regulatory challenges in AI implementation, the present findings quantitatively demonstrate high moral and

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professional readiness among healthcare learners (Buabbas AJ et al., 2023).

Job replacement concerns were notable, with 47.5% perceiving AI as a threat to employment, comparable to findings by Stewart et al. and Buabbas et al., who reported similar apprehensions regarding AI's impact on medical careers. (Buabbas AJ et al., 2023; Stewart J et al., 2023). These mixed views likely reflect differences in AI exposure and understanding; however, in line with international literature, many respondents regarded AI as an augmentative tool rather than a replacement for physicians (Stewart J et al., 2023).

Significant institutional and demographic differences were observed, with faculty members and participants from private institutions scoring higher than postgraduate residents from government institutions. Prior exposure to AI-related talks was also associated with significantly higher scores ($p = 0.048$), highlighting the value of structured educational exposure. Similar patterns were observed by Buabbas et al., who reported that senior medical students (phase III) demonstrated better understanding of AI limitations than junior students (Buabbas AJ et al., 2023).

In line with findings from Kuwait and Australia, the results indicate a global trend of positive yet superficial AI awareness among medical professionals, with over 80% recognizing its importance but fewer than one-third receiving formal AI training, underscoring a universal curricular gap.

Structured AI training significantly improved cognitive and perceptual scores, highlighting the impact of educational interventions. Integrating AI modules, workshops, simulations, interdisciplinary collaboration, and faculty development, supported by policy-level initiatives, is essential to bridge knowledge gaps and prepare clinicians for AI-enabled healthcare.

Generalizability

Although this study was conducted primarily among participants affiliated with MKCG Medical College and associated institutions, the findings provide insight into the awareness and perception of artificial intelligence among medical professionals in similar tertiary care teaching settings in India. However, caution should be exercised when extrapolating these findings to other regions or healthcare systems with different educational infrastructures.

Strengths of the Study

This study addresses a timely and underexplored aspect of Indian medical education by systematically evaluating cognition, perception, and opinion regarding artificial intelligence among postgraduate students and teaching faculty. Inclusion of participants across multiple designations, disciplines, and institutional types ensures a balanced and representative perspective. Use of a structured, validated questionnaire strengthens internal validity and facilitates comparison with international literature. Domain-wise scoring allows objective assessment of knowledge gaps and attitudinal readiness, while appropriate statistical analyses identifying associations with designation and prior AI exposure offer actionable inputs for curriculum development.

Limitations of the Study

The cross-sectional design precludes causal inference between AI exposure and outcomes. Use of a self-reported online questionnaire may introduce response and selection bias. The cognition domain primarily assessed factual knowledge and may not capture applied AI competence. Single-institution conduct limits generalizability, and the lack of qualitative assessment restricts deeper exploration of ethical concerns, expectations, and contextual barriers to AI adoption.

Conclusion-

It can be concluded that Medical students as well as faculties are interested to introduce AI in curriculum but little knowledge about tool .so it can be emphasized that AI could implemented in Postgraduate curriculum so that it pave the road in more efficient , less time consuming, new posts creation in medical practice .It's also vital to have sound knowledge on ethical aspects ,risks involvement , job vulnerability of Doctors so that all accept AI driven medical practice and research without fear leads to development of future healthcare professionals who can leverage AI tools in a clinical context.

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Recommendations

Based on the findings of this study, integration of structured **AI educational modules**, workshops, and interdisciplinary training programs into the medical curriculum is recommended. Such initiatives may improve knowledge levels while addressing ethical, professional, and practical concerns associated with AI implementation in healthcare.

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Conflict of Interest

The authors declare that there are no conflicts of interest associated with this study.

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Data Availability

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

List of Abbreviations

Abbreviation	Full Form
AI	Artificial Intelligence
PG	Postgraduate
SR	Senior Resident
IEC	Institutional Ethics Committee
SPSS	Statistical Package for the Social Sciences
SD	Standard Deviation
ANOVA	Analysis of Variance
IBM	International Business Machines
PPT	PowerPoint
COVID-19	Coronavirus Disease 2019
NIRAMAI	Non-Invasive Risk Assessment with Machine Intelligence
CanSAR	Cancer Research and Drug Discovery Knowledgebase
ML	Machine Learning
DL	Deep Learning
CNN	Convolutional Neural Network
OR	Odds Ratio
p-value	Probability Value
SD	Standard Deviation
KAP	Knowledge, Attitude, and Practice

Authors' Biography:

1.Dr Adyasha Anindita Panda, Principal Investigator
Assistant Professor, Department of Pharmacology ,Government Medical College and Hospital, Phulbani ,Odisha
Email id:- adyashapanda357@gmail.com.
Phone no:-8144741166
2.Dr Suvendu Kumar Panda, Second and Corresponding author
Assistant Professor, Department of Pharmacology, MKCG, Medical College and Hospital, Berhampur, Odisha
Email id: suvendukumarpanda041@gmail.com
Phone no. 9437748309
Address: Academic block, MKCG Medical College and Hospital, Berhampur, Odisha, 760004
3.Dr Snehasini Dash, Third Author
Senior Resident, Department of Pharmacology, MKCG Medical College and Hospital, Berhampur, Odisha
Email id: luvsneha.81@gmail.com
Phone no. 7978556346
Address: Academic block, MKCG Medical College and Hospital, Berhampur, Odisha, 760004
4.Dr Jayanti Prava Behera, Fourth author
Professor and H.O.D, Department of Pharmacology, MKCG, Medical College and Hospital, Berhampur, Odisha
Email id: pravabeherajayanti@yahoo.in
Phone no. 9438115115
Address: Academic block, MKCG Medical College and Hospital, Berhampur, Odisha, 760004

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Author Contributions

- **Dr Adyasha Anindita Panda:** Conceptualization, study design, data collection, manuscript drafting
- **Dr Suvendu Kumar Panda:** Statistical analysis, interpretation of results, manuscript editing and correspondence
- **Dr Snehasini Dash:** Data collection, questionnaire validation, literature review
- **Dr Jayanti Prava Behera:** Supervision, critical revision of manuscript, final approval of the manuscrip

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