

Original Research Article

KNOWLEDGE, ATTITUDE, AND PRACTICE TOWARDS ARTIFICIAL INTELLIGENCE AMONG HEALTHCARE WORKERS AND MBBS STUDENTS IN A TERTIARY CARE CENTER: A CROSS-SECTIONAL STUDY

K. Latha¹, Abdulrahman Abdulazeez², Siva.P.M,³ Adhithya K⁴

¹Professor & Head, Department of Pharmacology, Government Medical College & ESI Hospital, Coimbatore India.

²Professor of Pharmacology, Government Medical College, Tiruppur, India.

³Associate Professor, Department of Community Medicine, Tirunelveli Medical College, India.

⁴Independent Researcher, Coimbatore, Tamil Nadu, India.

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Corresponding Author:

Dr. K. Latha,
Professor & Head, Department of
Pharmacology, Government Medical
College & ESI Hospital, Coimbatore
India.
Email: dr.klatha@gmail.com

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ABSTRACT

Background: Artificial intelligence (AI) is increasingly used in healthcare and medical education. Understanding knowledge, attitudes, and practices is essential for its safe and effective implementation. **Objective:** To assess knowledge, attitude, and practice towards AI among healthcare workers and MBBS students in a tertiary care center.

Materials and Methods: A cross-sectional study was conducted among MBBS students, doctors, and nursing staff at Government Medical College & ESI Hospital, Coimbatore. A structured self-administered questionnaire assessed demographic characteristics, AI awareness and use, AI tools, knowledge/familiarity, attitudes/perceptions, and practices/concerns. KAP scores were expressed as median (IQR). Mann-Whitney U and Kruskal-Wallis tests were used for group comparisons, and Spearman's correlation was used to assess relationships between domains. A p-value <0.05 was considered statistically significant.

Results: Among 298 participants, 262 (87.9%) were MBBS students, 19 (6.4%) doctors, and 17 (5.7%) nursing staff. The mean age was 23.7±8.2 years. Most participants had heard of AI (97.0%) and used AI programmes (92.3%). AI was used for study by 68.8% and for obtaining drug information by 53.7%. ChatGPT was the most commonly used tool (66.9%). Median awareness, attitude, behaviour/practice, and composite scores were 8.0, 11.0, 8.0, and 27.0, respectively. Attitude differed significantly by sex (p=0.039) and participant category (p=0.047), while behaviour/practice differed by participant category (p=0.044). Composite scores differed by sex (p=0.021). Awareness, attitude, and behaviour/practice demonstrated significant low positive correlations (p<0.001).

Conclusion: AI awareness and use were high, particularly for education and information retrieval. Structured AI literacy, critical appraisal, ethical training, privacy protection, and responsible-use guidance are needed to support safe integration of AI into healthcare and medical education.

Keywords: Artificial intelligence; knowledge; attitude; practice; medical students; healthcare workers; medical education; ChatGPT; cross-sectional study.

INTRODUCTION

Artificial intelligence (AI) has become increasingly important in healthcare and medical education, with applications in diagnostic support, clinical decision-

making, research, drug development, information retrieval, and education.^[1,2] The rapid expansion of generative AI has further increased access to AI tools among students and healthcare professionals.

In medical education, AI can support personalized learning, information retrieval, simulation, assessment, and educational content generation. However, its implementation raises concerns regarding reliability, transparency, privacy, bias, accountability, and appropriate human oversight.^[3] Students and healthcare professionals may use generative AI even without formal institutional training.

Previous studies among doctors and medical students have demonstrated considerable interest in AI but variable levels of knowledge regarding its applications and limitations.^[4,5] Studies among health-profession students have also identified curriculum gaps, inadequate knowledge, limited access, and ethical concerns as barriers to effective implementation.^[6-9] Healthcare professionals' understanding is particularly important because inappropriate reliance on AI-generated information may affect patient safety and professional accountability.^[1,10]

The World Health Organization (WHO) emphasizes ethics, human rights, accountability, transparency, and appropriate human oversight in the development and use of AI in healthcare¹¹. Despite increasing AI availability, evidence regarding AI-related knowledge, attitudes, and practices among MBBS students and healthcare workers within the same tertiary-care setting in India remains limited. Therefore, this study assessed knowledge, attitudes, and practices regarding AI among MBBS students and healthcare workers at a tertiary care center.

MATERIALS AND METHODS

2.1 Study design and setting

A cross-sectional study was conducted among MBBS students, doctors, and nursing staff at Government Medical College & ESI Hospital, Coimbatore, Tamil Nadu, India, a tertiary-care teaching hospital. The study period was September 2024 to June 2026.

2.2 Study population and sampling

The study included MBBS students, doctors, and nursing staff associated with the institution. Convenient sampling was used. A total of 298 participants were included in the final analysis. Participants were eligible if they belonged to one of the specified categories, were willing to participate, and provided informed consent. Those unwilling to participate or submitting substantially incomplete questionnaires were excluded.

2.3 Study instrument

Data were collected using a structured, self-administered questionnaire assessing AI knowledge/familiarity, attitudes/perceptions, and practices/concerns. The questionnaire contained 22 items distributed across three domains:

1. **AI Knowledge/Familiarity:** 6 items
2. **AI Attitude/Perception:** 8 items
3. **AI Practice/Concerns:** 8 items

The questionnaire also collected demographic information and AI exposure, including awareness of AI, use of AI programs, use for study and drug information, and AI tools used.

The knowledge/familiarity domain assessed familiarity with AI, basic computational principles, AI nomenclature, and its strengths and limitations compared with human experience, as well as medical applications. The attitude/perception domain assessed perceived usefulness, efficiency, trust, educational value, privacy concerns, and concerns regarding replacement of healthcare professionals. The practice/concerns domain assessed AI use for study, drug information, and work-related activities, willingness to use AI in medical decisions, and perceptions regarding emotional limitations, individualized patient care, unexpected clinical situations, and erroneous information.

2.4 Reliability

Internal consistency was assessed using Cronbach's alpha. The alpha values were 0.861 for AI Knowledge/Familiarity, 0.795 for AI Attitude/Perception, and 0.733 for AI Practice/Concerns. ICC for the average measures was 0.861 (95% CI: 0.713–0.946), 0.795 (95% CI: 0.589–0.920), and 0.733 (95% CI: 0.464–0.896), respectively.

2.5 Scoring and statistical analysis

Separate awareness, attitude, and behavior/practice scores were calculated, and a composite score was derived from the domain scores. Continuous variables were summarized as mean $\pm$ SD and range where appropriate, while KAP scores were expressed as median (IQR). Categorical variables were presented as n (%).

Shapiro–Wilk testing demonstrated significant deviation from normality for all four scores ($p < 0.001$); therefore, non-parametric tests were used. Mann–Whitney U test was used for two-group comparisons, and the Kruskal–Wallis test for comparisons involving three groups. Spearman's rank correlation coefficient was used to assess relationships between domains. A two-sided $p < 0.05$ was considered statistically significant.

Correlation coefficients were interpreted as low positive (0.30–0.50), moderate positive (0.50–0.70), high positive (0.70–0.90), and very high positive (0.90–1.00).

2.6 Ethical considerations

The study was approved by the Institutional Ethics Committee of Government Medical College & ESI Hospital, Coimbatore, under proposal number 2410407. The proposal was approved at the IEC meeting held on 20 August 2024. Informed consent was obtained from all participants, and confidentiality was maintained.

RESULTS

3.1 Participant characteristics

A total of 298 participants were included in the analysis. Females constituted 167 (56.0%) and males 131 (44.0%). The mean age was 23.7±8.2 years (range: 18–58 years), with participants aged 21–30 years comprising the largest age group (146; 49.0%). Most participants were MBBS students (262; 87.9%), followed by doctors (19; 6.4%) and nursing staff (17; 5.7%). Among MBBS students, 166 (63.4%) were in second year, 44 (16.8%) in third year, 50 (19.1%) in final year, and 2 (0.8%) were CRMI participants (Table 1).

3.2 AI exposure and use

Most participants had heard about AI (289; 97.0%) and reported using AI programs (275; 92.3%). AI was used for study by 205 (68.8%) participants and for obtaining drug information by 160 (53.7%) (Table 2).

Among the 275 AI users, ChatGPT was the most commonly used AI tool, reported by 184 (66.9%), followed by Google Assistant (80; 29.1%). Meta AI, Pharm AI, Perplexity, and Open Evidence were used by smaller proportions. Multiple responses were permitted (Table 3).

3.3 Knowledge/familiarity with AI

Nearly half of the participants (145; 48.7%) reported being familiar with AI. More than half reported understanding basic computational principles of AI (156; 52.3%), being comfortable with AI nomenclature (173; 58.1%), and understanding AI limitations (173; 58.1%). However, only 104 (34.9%) reported awareness of the strengths and limitations of AI compared with human experience, whereas 130 (43.6%) disagreed. Most participants (234; 78.5%) agreed that AI has useful applications in the medical field (Table 4A).

3.4 Attitudes towards AI

Participants demonstrated generally favorable attitudes towards AI, particularly in education. AI was considered helpful for education by 235 (78.9%) participants and helpful for understanding and motivation by 182 (61.1%). However, only 130 (43.6%) considered AI very useful in their area of work.

A total of 192 (64.4%) participants trusted AI's ability to provide high-quality data and assist with medical decision-making, while 194 (65.1%) expressed concern regarding potential privacy risks. Concern that AI could replace participants' roles in

decision-making or care delivery was reported by 111 (37.2%) (Table 4B).

3.5 Behavior and practice related to AI

AI use was particularly common for education and information retrieval. More than two-thirds of participants used AI for study (68.8%), while 53.7% used AI to obtain drug information. In addition, 276 (92.6%) reported using AI programs in their area of work.

Only 63 (21.1%) participants agreed that they would always use AI for medical decisions in the future, whereas 161 (54.0%) disagreed. Participants recognized several limitations of AI: 229 (76.8%) agreed that AI has low ability to sympathize and consider patients' emotional well-being, 236 (79.2%) considered AI insufficiently flexible for individual patients, and 215 (72.1%) agreed that AI could not handle unexpected clinical situations. However, only 112 (37.6%) agreed that AI may produce erroneous data (Table 4C).

3.6 Comparison of KAP scores according to participant characteristics

The overall median awareness score was 8.0 (IQR 6.0–10.0), attitude score 11.0 (IQR 9.0–13.0), behaviour/practice score 8.0 (IQR 6.0–9.0), and composite score 27.0 (IQR 22.0–31.0) (Table 5).

There were no significant differences in awareness, attitude, behaviour/practice, or composite scores across age groups. Attitude scores were significantly higher among males than females (12.0 vs 11.0; $p=0.039$), and composite scores were also higher among males (28.0 vs 27.0; $p=0.021$). The difference in behaviour/practice scores by sex was not statistically significant ($p=0.051$).

Participant category was significantly associated with attitude ($p=0.047$) (Figure 1) and behaviour/practice scores ($p=0.044$) (Figure 2). Nursing staff had the highest median scores for attitude and behavior/practice. Awareness and composite scores did not differ significantly between participant categories (Table 5).

3.7 Correlation between KAP domains

There were statistically significant positive correlations between all three KAP domains (Table 6) (Figure 3). Awareness was positively correlated with attitude ($p=0.480$, 95% CI: 0.384–0.565; $p<0.001$) and behaviour/practice ($p=0.356$, 95% CI: 0.249–0.454; $p<0.001$). Attitude was also positively correlated with behaviour/practice ($p=0.466$, 95% CI: 0.370–0.553; $p<0.001$). According to the predefined classification, all three associations represented low positive correlations.

Table 1: Basic details of study participants

Variables	N	%
Gender		
Male	131	44.0
Female	167	56.0
Age		
≤20	116	38.9
21–30	146	49.0
>30	36	12.1
Mean±SD (Range)	23.7±8.2 (18–58)	

Profession		
MBBS students	262	87.9
• 2 nd year	166	63.4
• Third year	44	16.8
• Final year	50	19.1
• CRMI	2	0.8
Doctors	19	6.4
Nursing staff	17	5.7

Table 2: Exposure and Usage of AI (Knowledge + Basic Application)

Questions	Yes N (%)	No N (%)
Have you heard about AI?	289 (97.0)	9 (3.0)
Do you use AI programs?	275 (92.3)	23 (7.7)
Do you use AI for study?	205 (68.8)	93 (31.2)
Do you use AI for getting drug information?	160 (53.7)	138 (46.3)

Table 3: AI Tools in Use (Sub-category of Application)

AI Tools Used (n = 275)	N (%)
ChatGPT	184 (66.9)
Google Assistant	80 (29.1)
Meta AI	5 (1.8)
Pharm AI	3 (1.1)
Perplexity	2 (0.7)
Open Evidence	1 (0.4)

Table 4: Distribution of Participants' Awareness, Attitudes, Behavioural Insights, and Perceptions Regarding Artificial Intelligence

Cognitive Awareness of AI			
Awareness Questions	Agree N (%)	Disagree N (%)	Don't Know N (%)
I am familiar with AI	145 (48.7)	57 (19.1)	96 (32.2)
I understand basic computational principles of AI	156 (52.3)	58 (19.5)	84 (28.2)
I am comfortable with the nomenclature of AI	173 (58.1)	51 (17.1)	74 (24.8)
I understand limitations of AI	173 (58.1)	43 (14.4)	82 (27.5)
I am aware of the strengths and limitations of AI compared to human experience.	104 (34.9)	130 (43.6)	64 (21.5)
AI has useful applications in the medical field	234 (78.5)	16 (5.4)	48 (16.1)
Attitudes Toward AI in Healthcare			
Attitude Questions	Agree N (%)	Disagree N (%)	Don't Know N (%)
AI is very useful in my area of work	130 (43.6)	159 (53.4)	9 (3.0)
AI is a useful tool in improving efficiency and reducing errors in my area of work.	135 (45.3)	78 (26.2)	85 (28.5)
I trust AI's ability to provide high-quality data and assist in making medical decisions.	192 (64.4)	34 (11.4)	72 (24.2)
AI has no emotional or physical limitations	217 (72.8)	34 (11.4)	47 (15.8)
AI is helpful for understanding and motivation	182 (61.1)	92 (30.9)	24 (8.1)
AI is helpful for education	235 (78.9)	53 (17.8)	10 (3.4)
I am concerned about the potential privacy risks associated with AI	194 (65.1)	27 (9.1)	77 (25.8)
I am concerned that AI will replace my role in decision-making or care delivery	111 (37.2)	111 (37.2)	76 (25.5)
Practice and Behavioural Insights into AI Use (Caution Toward AI Use)			
Behaviour/Practice Questions	Agree N (%)	Disagree N (%)	Don't Know N (%)
I would always use AI for medical decisions in the future.	63 (21.1)	161 (54.0)	74 (24.8)
I use AI for getting drug information	160 (53.7)	138 (46.3)	0 (0.0)
I use AI for study	205 (68.8)	93 (31.2)	0 (0.0)
I you use AI programs in my area of work	276 (92.6)	22 (7.4)	0 (0.0)
AI has low ability to sympathize and consider the emotional well-being of the patient	229 (76.8)	23 (7.7)	46 (15.4)
AI is not flexible for individual patients	236 (79.2)	18 (6.0)	44 (14.8)
AI cannot handle unexpected clinical situations	215 (72.1)	21 (7.0)	62 (20.8)
AI may produce erroneous data	112 (37.6)	160 (53.7)	26 (8.7)

Table 5: Comparison of awareness, attitude, behaviour and practice scores according to participant characteristics (N = 298)

Participant characteristic	Awareness score, Median (IQR)	Attitude score, Median (IQR)	Behaviour & practice score, Median (IQR)	Composite score, Median (IQR)
Overall (N = 298)	8.0 (6.0–10.0)	11.0 (9.0–13.0)	8.0 (6.0–9.0)	27.0 (22.0–31.0)
Age group				
≤20 years	8.0 (5.0–11.0)	11.0 (9.0–13.0)	8.0 (6.0–8.0)	27.0 (21.5–30.5)
21–30 years	8.0 (6.0–10.0)	11.0 (9.0–13.0)	8.0 (6.0–9.0)	27.0 (23.0–31.0)
>30 years	8.5 (6.0–10.5)	12.0 (10.0–15.0)	8.0 (6.0–10.0)	29.0 (23.0–32.0)
Kruskal–Wallis p-value	0.940	0.076	0.125	0.400
Sex				
Male	9.0 (5.0–11.0)	12.0 (10.0–13.0)	8.0 (7.0–9.0)	28.0 (23.0–32.0)
Female	8.0 (6.0–10.0)	11.0 (8.0–13.0)	7.0 (6.0–8.0)	27.0 (21.0–30.0)
Mann–Whitney U p-value	0.157	0.039	0.051	0.021
Respondent category				
MBBS students	8.0 (6.0–10.0)	11.0 (9.0–13.0)	8.0 (6.0–8.0)	27.0 (22.0–31.0)
Doctors	8.0 (7.0–9.0)	12.0 (8.0–14.0)	7.0 (5.0–9.0)	27.0 (23.0–32.0)
Nursing staff	9.0 (4.0–12.0)	13.0 (11.0–15.0)	9.0 (7.0–10.0)	30.0 (25.0–34.0)
Kruskal–Wallis p-value	0.850	0.047	0.044	0.289

Note: Values are presented as median (interquartile range). $p < 0.05$ was considered statistically significant. Kruskal–Wallis test was used for comparisons involving three groups and Mann–Whitney U test for comparisons involving two groups. The overall scores were non-normally distributed (Shapiro–Wilk $p < 0.001$ for all domains).

Table 6: Spearman's correlation between awareness, attitude, and behaviour and practice scores (N = 298)

Variable pair	Spearman's ρ	95% CI	p-value	Interpretation
Awareness – Attitude	0.480	0.384–0.565	<0.001	Low positive correlation
Awareness – Behaviour and practice	0.356	0.249–0.454	<0.001	Low positive correlation
Attitude – Behaviour and practice	0.466	0.370–0.553	<0.001	Low positive correlation

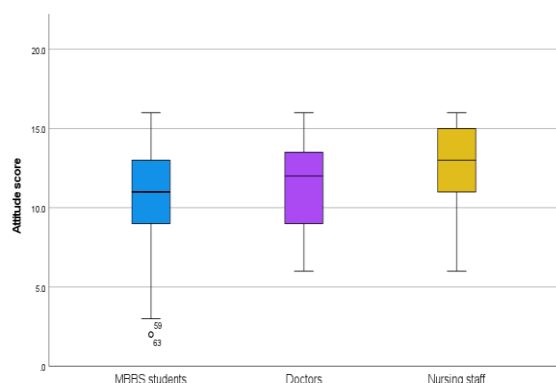


Figure 1: Association between respondents and Attitude score

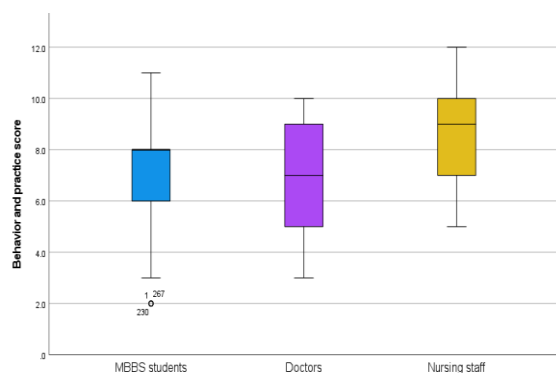


Figure 2: Association between respondents and Behavior and practice score

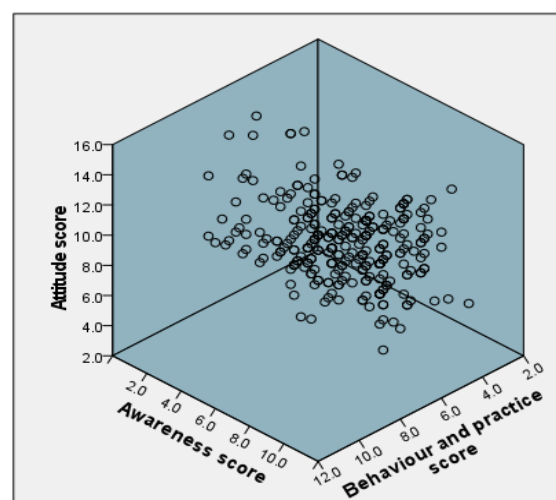


Figure 3: Correlation between Awareness, Attitude and Behavior and practice scores

DISCUSSION

This study demonstrated high awareness and substantial AI use among MBBS students and healthcare workers in a tertiary-care center. Almost all participants had heard of AI and more than 90% reported using AI programmes. The findings are consistent with previous studies showing substantial interest in AI among doctors and medical students, although detailed knowledge and understanding of AI limitations remain variable.^[4–6]

ChatGPT was the most commonly used AI tool, and educational use was particularly prominent. More

than two-thirds of participants used AI for study and over half used it for drug information. The increasing accessibility of generative AI has made these systems attractive for information retrieval and education. AI may support personalized learning, content generation, assessment, and other educational activities, but appropriate oversight is necessary.^[3,7]

An important finding was the difference between general awareness and comprehensive AI literacy. Although 58.1% reported understanding AI's limitations, only 34.9% reported understanding its strengths and limitations relative to human experience. Furthermore, only 37.6% recognized that AI may produce erroneous information. This represents an important safety concern because AI-generated responses may appear plausible despite containing inaccurate or fabricated information. Independent verification against authoritative sources is therefore essential, particularly when AI is used for drug or clinical information.

Participants showed favorable attitudes towards AI in education, with 78.9% considering it helpful. However, trust in AI coexisted with significant privacy concerns: 64.4% trusted AI for high-quality information and medical decision-making, while 65.1% expressed concern about privacy risks. Similar concerns have been reported in studies among healthcare students and professionals.^[10] This highlights the need for education on confidentiality, data protection, responsible use of patient information, and the limitations of AI-generated outputs.

Participants also recognized the limitations of AI in patient-centered care. Most agreed that AI had limited ability to consider emotional well-being, individual patient needs, and unexpected clinical situations. Only 21.1% indicated that they would always use AI for medical decisions. These findings suggest that participants generally viewed AI as a supportive technology rather than an unconditional replacement for professional judgment. This approach is consistent with WHO recommendations emphasizing human oversight, accountability, transparency, and ethical governance of AI in health.^[11]

The low proportion recognizing the possibility of erroneous AI-generated information is particularly important. Because AI was already being used for study, drug information, and professional activities, inadequate awareness of AI errors could increase the risk of inappropriate reliance. AI literacy programs should therefore emphasize hallucinations, source verification, uncertainty, bias, and the distinction between AI-generated information and validated clinical evidence.

Age was not significantly associated with any KAP score. However, males had significantly higher attitude and composite scores than females. These findings represent associations rather than causal effects and may reflect differences in educational or professional composition. Participant category was

significantly associated with attitude and behaviour/practice, with nursing staff demonstrating the highest median scores. These findings should be interpreted cautiously because the numbers of doctors and nursing staff were considerably smaller than the number of MBBS students.

Awareness, attitude, and behaviour/practice were significantly correlated, although the correlations were low and positive. Awareness had the strongest association with attitude ($p=0.480$), followed by attitude with behaviour/practice ($p=0.466$). These findings suggest that greater AI awareness may be associated with more favorable attitudes and greater engagement. However, the modest correlations indicate that knowledge alone does not determine behavior. Effective AI education should therefore combine theoretical concepts with practical skills, ethical reasoning, critical appraisal, privacy and data-security principles, and appropriate clinical application.^[6-8]

The findings support systematic incorporation of AI literacy into undergraduate medical education and continuing professional development. Training should address basic AI concepts; machine learning and generative AI; clinical applications; limitations; verification of AI-generated information; bias; privacy; accountability; and ethical use. Healthcare institutions should also establish clear policies on confidentiality, acceptable AI applications, output verification, and professional accountability.

5. Limitations

The cross-sectional design prevents causal inference. The study was conducted at a single tertiary-care center, limiting generalizability. AI use and KAP were self-reported and may be affected by recall or social-desirability bias. The sample was predominantly MBBS students, while doctors and nursing staff were relatively few, limiting professional-group comparisons. The study did not objectively assess the accuracy of AI-generated information or participants' ability to detect AI errors. Finally, no multivariable analysis was performed; therefore, associations with sex and participant category should be regarded as unadjusted.

CONCLUSION

This study demonstrates high awareness and substantial use of AI among MBBS students and healthcare workers at a tertiary-care center. AI was used predominantly for education and information retrieval, with ChatGPT the most commonly used tool. Participants generally recognized AI's usefulness, particularly in education, while also acknowledging limitations related to emotional understanding, individualized patient care, and unexpected clinical situations.

However, the relatively low recognition that AI may generate erroneous information represents an important AI-safety and critical-appraisal gap.

Significant differences were observed in attitudes and composite scores by sex, and in attitudes and behavior/practice by participant category. Awareness, attitude, and behavior/practice were significantly but modestly correlated.

These findings support integrating structured AI literacy, critical appraisal, ethical and privacy training, and responsible AI-use guidance into medical education and healthcare professional development. AI should augment rather than replace professional clinical judgment and patient-centered care.

Ethics approval: The study was approved by the Institutional Ethics Committee, Government Medical College & ESI Hospital, Coimbatore, under proposal number 2410407. The IEC meeting was held on 20 August 2024.

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