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Knowledge and Perception of Artificial Intelligence in Healthcare among Medical Interns: A Cross-Sectional study from a Metropolitan Medical College in India

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ABSTRACT

Background: Artificial Intelligence (AI) is transforming healthcare through advances in diagnostics and patient management. However, awareness and training in AI remain limited among medical interns a pivotal stage of professional development. The objective was to assess knowledge and perceptions among medical interns regarding the application and role of AI in healthcare.

Methods: A cross-sectional study was conducted among interns at a medical college, using a semi-structured questionnaire covering demographic characteristics, knowledge, perceptions, perceived ethical and educational implications of AI applications in healthcare.

Results: Nearly 86.5% of interns reported no formal training in AI, 83.5% recognized AI's potential in key domains such as diagnosis. Job reduction concerns due to AI were expressed by 73%, while 49% felt that AI might influence future specialty choice. A large majority strongly supported the inclusion of AI training within the undergraduate medical curriculum.

Conclusion: Despite limited exposure to structured AI training, medical interns showed awareness of AI's expanding role in healthcare. The findings highlight an urgent need to integrate comprehensive AI education into medical curricula.

Keywords: Artificial Intelligence, Knowledge, Perception, Healthcare, Cross- Sectional Study

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INTRODUCTION

Artificial Intelligence (AI), term introduced by John McCarthy (1955), refers to the ability of machines to perform tasks that typically require human intelligence, including reasoning, learning, and decision-making.[1,2] AI systems simulate intelligence by processing vast amounts of data to draw inferences and perform functions efficiently.[3] AI applications in healthcare are rapidly expanding, to support clinical decision-making and enhance service delivery, which includes disease diagnostics, demonstrating high accuracy in interpreting medical images; drug discovery, where machine learning (ML) accelerates compound screening and development; personalized medicine; continuous health monitoring through wearable technologies; and improved medical data management to streamline patient records.[4-6]

It is thus, essential for future healthcare professionals to possess a sound understanding of its utility, limitations, and ethical implications.[7] Their preparedness will influence the successful and ethical integration of AI. Hence, it is imperative to assess their understanding, identify knowledge gaps, and explore their views on AI's role in shaping future healthcare delivery and career trajectories. This study aims to evaluate the knowledge and perception of AI among medical interns in a metropolitan medical college in India. The findings will help inform medical education policies and ensure that the next generation of healthcare professionals is equipped to harness AI effectively and responsibly. The purpose was to evaluate the level of knowledge and assess perception among medical interns regarding the application, current and future role of artificial intelligence in healthcare.

MATERIALS AND METHODS

The present study was conducted among Interns who were currently undergoing Compulsory Rotatory Medical Internship in a Tertiary Care Centre of a Metropolitan City during the period between January 2025 to March 2025.

Sample Size & Sampling technique: There were 208 medical interns at the Medical College including Foreign Medical Graduates during the above period. It was decided to include all the interns present. As the study aimed to include all eligible interns during the study period, a formal sample size calculation was not applicable, this constitutes a census - type enumeration or total population approach. Those interns who were on leave during the first contact, were contacted again at a later date. However, 8 interns were excluded from the study who were not willing to participate in the study, as they did not fill the questionnaire even after repeated reminder, so the final sample size was 200.

Methods: A cross-sectional study was conducted among 200 medical interns after receiving the approval from the Institutional Ethics Committee (Letter No. IEC/34/25, dt: 6/01/25) and informed consent from the Interns. The questionnaire was prepared as Google Form and was circulated among the Interns. Consent was the 1st question in the Google Form and the interns could fill the rest of the questionnaire only if they had clicked 'Yes' for the consent. Data was collected using a predesigned, pretested, semi-structured questionnaire specifically developed to assess the knowledge and perception of medical interns towards artificial intelligence in the healthcare setting. The tool was carefully designed to ensure clarity, relevance, and comprehensiveness, after doing a thorough Literature review.[2] A Pilot testing of the questionnaire was done on interns who had completed their posting to check completeness, consistency of the questionnaire. The 20 interns among whom pilot testing was done were excluded from the main study. Internal consistency of the questionnaire was evaluated using Cronbach's Alpha, which yielded a reliability coefficient of 0.812, indicating good internal validity.[8] Questionnaire included socio demographic details of the interns, their level of Computer Literacy & Workshops / training attended related to AI, questions to determine knowledge and perception towards AI in Individual Patient care, Health system and Population health. Computer literacy levels were categorized into three groups-computer literate - basic operational skills, computer competent - intermediate functional skills, and computer proficient- advanced technical skills-based on increasing levels of digital skill and autonomy. This classification was adapted from existing digital competence frameworks that describe progressive levels of skill ranging from basic to advanced competencies. [9,10] This classification was chosen to ensure ease of understanding for participants and feasibility during data collection, while still being conceptually aligned with established frameworks of digital competence.

The tool was prepared & used by the authors for the present study based on thorough Literature review.[11] Knowledge related to AI was assessed using 4 questions, and each question was given 1 mark for 'Yes' and 0 mark for 'No'. For analysis, those having total score of 3 or more were considered to have 'Adequate' knowledge & those with score of 2 of less were considered to have 'Inadequate' knowledge. To determine General perception towards AI, 13 questions were asked, with responses in the form of Likert's scale with scoring ranging from 5 marks for Extremely Likely to 1 mark for Extremely Unlikely. Total scoring being 65 marks, cut off for Low, Medium & High were <=22, <= 44 and above 44 respectively. For final analysis, groups with low & medium perception level were clubbed together. Questions on perception regarding impact of AI on ethics and on medical education, included 11 questions, with scoring for Strongly Agree being '5' to '0' for Strongly Disagree. Total scoring was 55, those having scores above 28 were labelled as 'Yes' - Perceived that AI had an impact on healthcare & <28 was labelled as 'No' - showed that AI would not impact Healthcare. Data was entered in Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were presented in the form of proportions or percentages for categorical

variables. To determine associations between variables, chi-square test was applied, and a p-value of <0.05 was considered statistically significant. Further, logistic regression was conducted to explore the influence of factors found to be statistically significant, on impact perception of artificial intelligence among interns. Logistic Regression with Backward wald was used for finding the variable, which eliminated various factors at different steps.

RESULTS

A total of 200 medical interns participated in the study. The baseline characteristics are presented in Table 1. There was a slight male predominance (55%), and nearly half of the interns were categorized as "competent" in computer literacy (47%). Only a small proportion (13.5%) had received any formal training or attended workshops related to artificial intelligence.

The distribution of knowledge regarding AI concepts is shown in Figure 1. While awareness of the term "artificial intelligence" was high (95%), familiarity declined for more advanced technical concepts such as machine learning and deep learning.

General perceptions of AI applications in healthcare are summarized in Figure 2. A majority of interns expressed confidence in the role of AI in data analysis and diagnostics (83.5%) and preventive care (92.5%). However, relatively lower acceptance was observed for applications requiring human interaction, such as psychiatric or personal counselling (36%).

The perceived impact of AI on healthcare and medical practice is depicted in Figure 3. Most participants acknowledged the potential of AI to improve clinical practice and supported the inclusion of AI training in medical education. At the same time, a substantial proportion expressed concerns regarding job reduction (68.5%) and highlighted ethical (82%), social (76%), and equity-related challenges.

Table 1: General Factors of the Study Subjects (N=200)

Factor	Cases (%)
Gender	
Male	110 (55)
Female	90 (45)
Computer Literacy Level	
Literate	64 (32)
Competent	94 (47)
Proficient	42 (21)
Workshop/training related to AI done	
Yes	27 (13.5)
No	173 (86.5)

Table 2: Factors associated with Perceived Impact of AI among Medical Interns (N=200)

Factor	Perceived Impact		Chi Square (df)	p value	Odds Ratio
	Yes (n=88) (%)	No (n=112) (%)			CI (95%)
Gender					
Male	53 (48.2)	57 (51.8)	1.735 (1)	0.188	Ref
Female	35 (38.9)	55 (61.1)			0.684 (0.389 - 1.204)
Computer Literacy					
Literate/ Competent	77 (48.7)	81 (51.3)	6.844 (1)	**<0.001**	2.679 (1.259 - 5.702)
Proficient	11 (26.2)	31 (73.8)			Ref
Workshop Attended					
Yes	6 (22.2)	21 (77.8)	6.008 (1)	**<0.01**	Ref
No	82 (47.4)	91 (52.6)			3.154 (1.214 - 8.197)
Knowledge Score					
Adequate	35 (35.7)	63 (64.3)	5.354(1)	**<0.01**	0.514 (0.291 - 0.906)
Inadequate	53 (52)	49 (48)			Ref
General Perception					
High	53 (36.8)	91 (63.2)	10.803 (1)	**0.001**	0.349 (0.185 - 0.662)
Medium/Low	35 (62.5)	21 (37.5)			Red

Table 3: Association of Perceived Impact of AI among Medical Interns with various corelates using Multiple Logistic Regression Analysis

Factors	Unadjusted OR (CI)	p value	Adjusted OR (CI)	p value
General Perception	0.414 (0.215 - 0.803)	0.009	0.391 (0.204 - 0.749)	0.005
Computer Literacy	0.587 (0.227 - 1.347)	0.264	0.442 90.204 - 0.957)	0.38
Knowledge Score	0.855 (0.459 - 1.593)	0.622		
Workshop Attended	0.640 (0.201 - 2.036)	0.450		

Final Step - Nagelkerke R^2 = 0.099, Hosmer & Lemeshow Test X^2 =0.667, p = 0.716

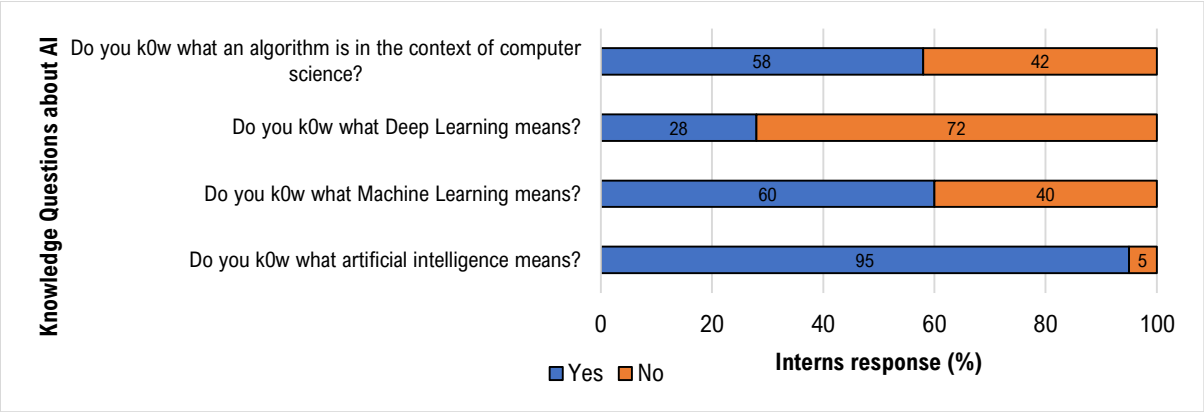

Figure 1: Knowledge regarding Artificial Intelligence among Interns (n=200)

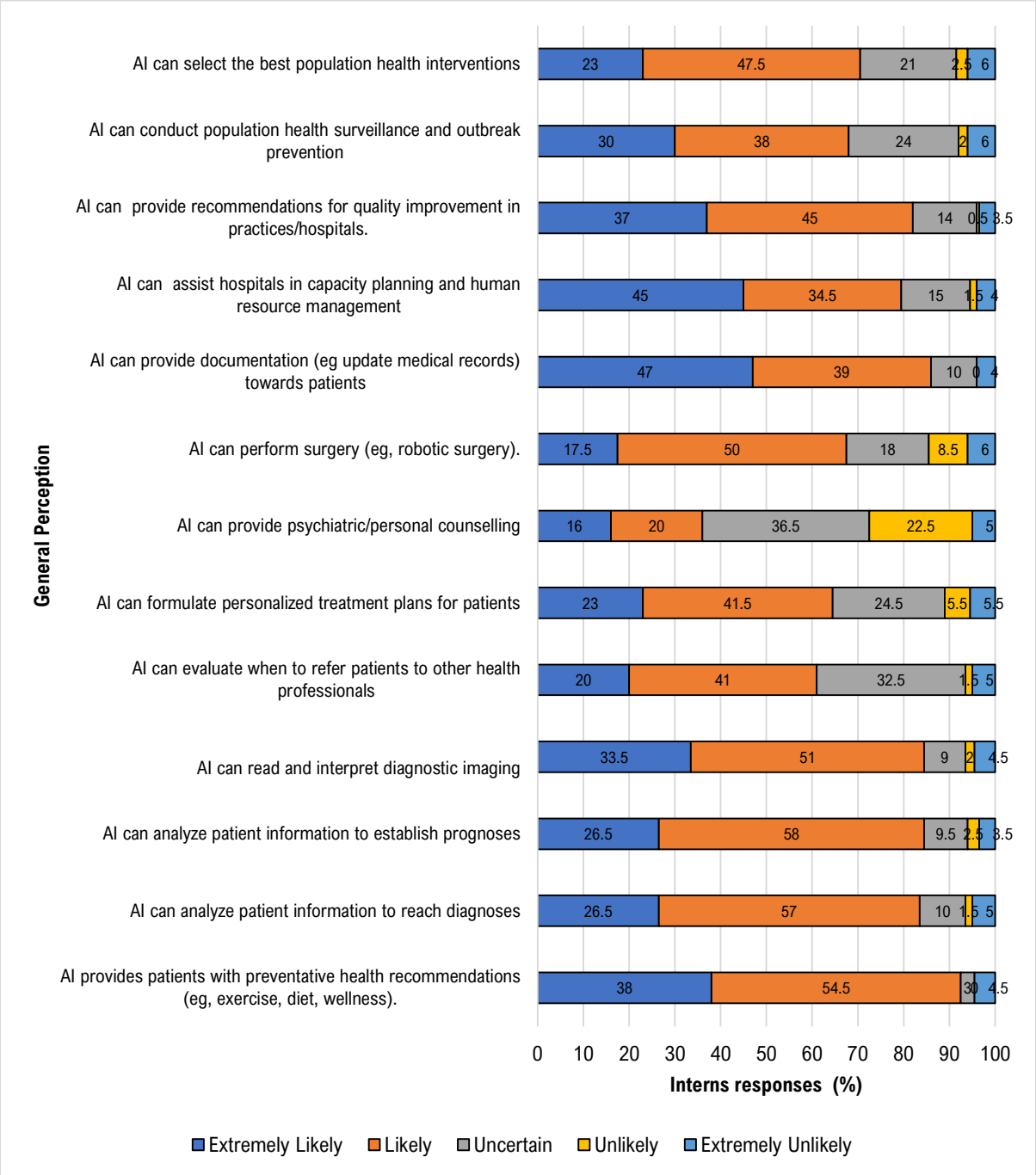

Figure 2: General Perceptions about Artificial Intelligence (n=200)

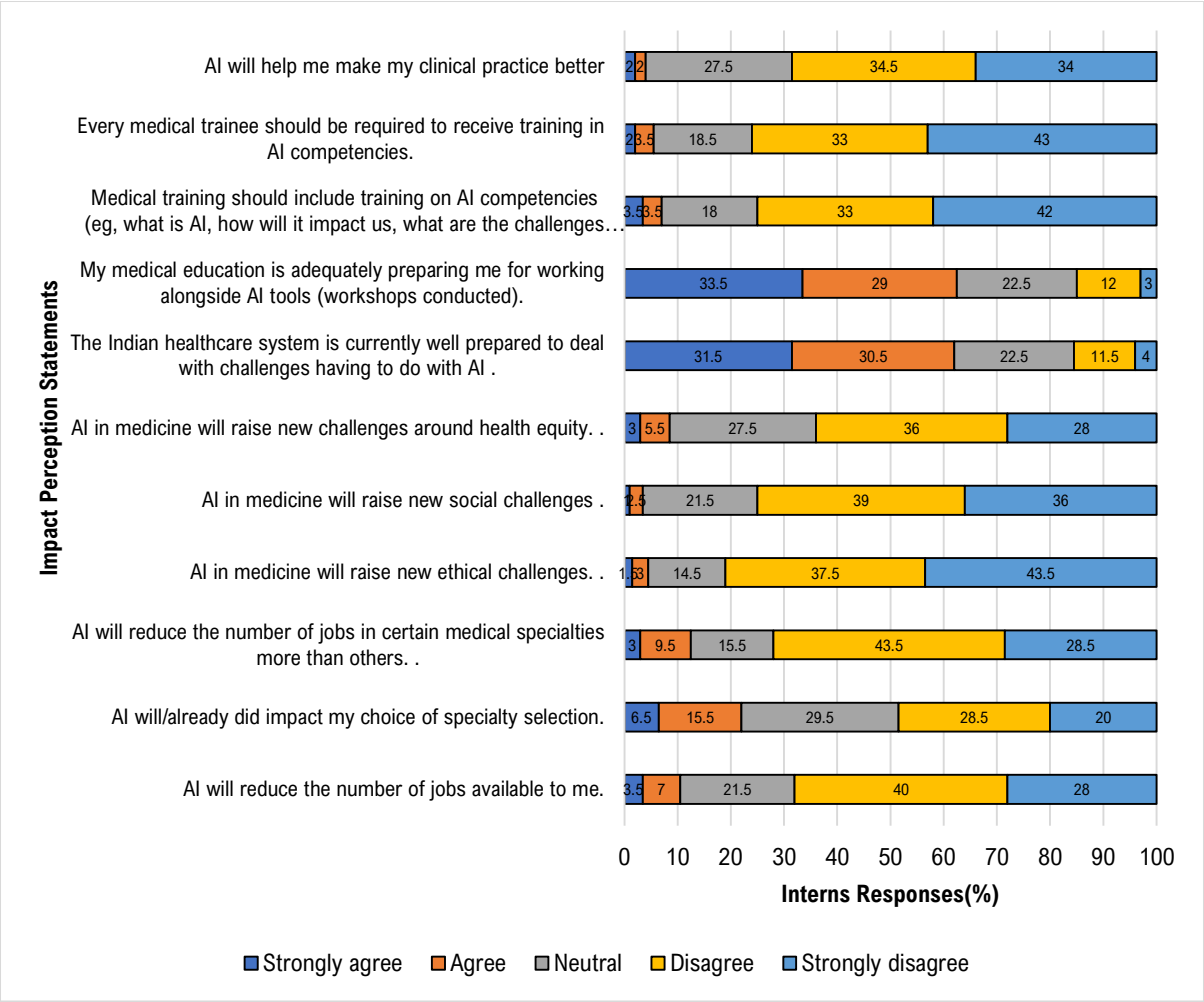

Figure 3: Perceived impact of Artificial Intelligence on Healthcare (n=200)

The association between selected factors and perceived impact of AI is presented in Table 2. Computer literacy (p <0.001), prior AI training (p <0.01), knowledge level (p <0.01), and general perception (p = 0.001) were significantly associated with perceived impact.

Further analysis using multiple logistic regression (Table 3) showed that general perception of AI remained an independent predictor of perceived impact (Adjusted OR = 0.391, p = 0.005).

DISCUSSION

The present study explored the knowledge and perceptions of medical interns regarding artificial intelligence (AI) and identified important gaps in training and preparedness.

A male predominance was observed among participants, similar to several previous studies.[12-15] However, some studies have reported a higher proportion of female participants.[16,17] These differences are likely attributable to variations in institutional demographics and enrolment patterns rather than gender-specific differences in AI awareness. Thus, gender may not be a strong determinant of AI-related knowledge, but rather reflects the study setting.

With respect to computer literacy, the majority of interns were categorized as “competent,” indicating a moderate level of digital familiarity. However, this level of literacy may not equate to readiness for engaging with advanced AI technologies. General computer literacy typically involves operational skills, whereas AI requires higher-order understanding of data interpretation and algorithmic reasoning. This gap suggests that existing digital competencies among interns may be insufficient for effective AI integration, highlighting the need for targeted AI-specific training.

A large proportion of interns had not received formal training in AI, consistent with previous study.[18] Despite this, awareness of AI as a concept was high, while knowledge of advanced concepts such as machine learning and deep learning was comparatively lower. Similar patterns have been reported in earlier studies.[12,13,15,17-20] while in some studies participants did not know much about AI[14,21]. This discrepancy may be explained by the increasing exposure to AI through media, online platforms, and informal learning, which enhances superficial awareness but does not ensure conceptual depth. From a practical perspective, this indicates the need for structured and curriculum-based AI education rather than reliance on self-directed learning.

The overall perception of AI among interns was largely positive, particularly in areas such as data analysis, diagnostics, and preventive healthcare. However, skepticism was evident regarding its application in domains requiring human judgment and empathy, such as psychiatric counselling. Similar findings have been reported in previous studies.[17] This may reflect a strong cultural and professional emphasis on the doctor-patient relationship, where empathy and interpersonal communication are considered irreplaceable. Clinically, this suggests that AI is more readily accepted as a supportive tool rather than a substitute for human clinicians, reinforcing the concept of AI as an adjunct to clinical practice.

Concerns regarding job reduction and impact on specialty choice were prominent among interns, consistent with findings from other studies.[12,17,18] This perception may be driven by the rapid advancement of AI in certain specialties such as radiology and pathology, where automation appears more feasible. However, this concern may also stem from incomplete understanding of AI's role, as it is more likely to augment rather than replace clinicians. This highlights the importance of incorporating discussions on the scope and limitations of AI within medical education to reduce unnecessary apprehension and support informed career decision-making.

A notable finding of the study was that interns with higher computer literacy, prior AI training, better knowledge, and stronger general perception were less likely to perceive AI as having a significant negative impact on healthcare. This may be because individuals with greater exposure and understanding of AI are better able to appreciate its capabilities as well as its limitations, thereby reducing fear and uncertainty. In contrast, those with limited knowledge may perceive AI as a disruptive and potentially threatening technology. This finding underscores the role of education in shaping perceptions and suggests that improving AI literacy may foster more balanced and evidence-based attitudes among future healthcare professionals.

The study also demonstrated a high level of awareness regarding the ethical, social, and equity-related challenges associated with AI, consistent with previous research.[12,17,22,23] This may reflect growing global discourse on issues such as data privacy, bias in algorithms, and unequal access to digital technologies. From a policy perspective, this highlights the need for integrating ethical training alongside technical education to ensure responsible implementation of AI in healthcare.

A majority of interns expressed the need for formal training in AI competencies, while only a small proportion felt that the current healthcare system is adequately prepared to handle AI-related challenges. This indicates a gap between awareness and system readiness. Addressing this gap will require curriculum reforms, faculty training, and infrastructure development to support AI integration in medical education and practice.

From a broader healthcare perspective, the integration of AI into clinical practice has significant potential to improve efficiency, accuracy, and accessibility of care, particularly in low- and middle-income settings. Applications such as telemedicine, teleradiology, and digital health platforms can strengthen primary healthcare delivery and health information systems. However, successful implementation will depend on addressing challenges related to training, infrastructure, and ethical governance.

LIMITATIONS

The present study has certain limitations that should be considered while interpreting the findings. First, the study utilized a self-developed questionnaire that had not undergone formal validation, which may have affected the reliability and validity of the collected data. Second, the cross-sectional study design limits the ability to establish causal relationships between the variables studied, allowing only the assessment of associations at a single point in time. Third, as the data were self-reported and collected through a Google Form, there is a possibility of social desirability bias, wherein participants may have provided responses they perceived to be socially acceptable rather than their true opinions or behaviors. Finally, the study was conducted in a single medical college, which may limit the representativeness of the sample. Therefore, the findings may not be generalizable to medical students in other institutions or settings.

CONCLUSION

The findings from this study highlight both the enthusiasm and the concerns of medical interns regarding the growing role of AI in healthcare. It also underlines the necessity for curriculum reform to ensure future doctors are well-equipped to harness AI effectively in clinical practice. Addressing these educational gaps will be crucial in fostering a confident and competent healthcare workforce that can leverage AI for better patient outcomes. Future research on the same could be taken up as a longitudinal, multicentric study to assess and validate a standardized AI literacy tool for Indian medical graduate, after integrating the necessary curriculum change.

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Availability of data: The data that support the findings of this study are available from the corresponding author on reasonable request.

Declaration of non-use of generative AI Tools: This article was prepared without the use of generative AI tools for content creation, analysis, or data generation. All findings and interpretations are based solely on the authors' independent work and expertise.

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