

Awareness towards Artificial Intelligence Among Indian Medical Graduates and Undergraduates: A Cross-sectional Study

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ABSTRACT

Background: Artificial intelligence (AI) is rapidly reshaping healthcare worldwide, offering tools for diagnostics, treatment planning, and medical education. However, the level of awareness and readiness among Indian medical graduates and undergraduates to adopt AI in clinical practice remains underexplored.

Objective: To assess the awareness, perceptions, and attitudes toward AI among Indian medical undergraduates and graduates.

Methods: A cross-sectional study was conducted across India between January and June 2025. A validated, structured questionnaire was developed, pilot-tested, and disseminated nationwide using a QR code shared via social media platforms. A total of 700 medical students (undergraduates and graduates) participated. The questionnaire assessed demographic variables, knowledge of AI concepts, perception of AI's role in medicine, and self-reported readiness to integrate AI into future practice. Descriptive statistics, chi-square tests, and logistic regression were used to analyze associations.

Results: Among the 700 respondents, 58.4% were undergraduates and 41.6% were graduates. Overall, 62.1% demonstrated moderate knowledge of AI, while only 18.6% had high knowledge scores. Nearly 75% believed AI would play a critical role in diagnostics, while 68% felt AI could enhance medical education. However, 42% expressed concerns about job replacement by AI. Graduates exhibited significantly higher knowledge compared to undergraduates ($p < 0.05$). Logistic regression revealed that prior exposure to AI workshops or online training significantly predicted higher awareness levels (OR = 2.31, 95% CI: 1.58–3.14).

Conclusion: Awareness regarding AI among Indian medical undergraduates and graduates is moderate, with graduates showing significantly higher understanding. While students recognize AI's potential in diagnostics and education,

apprehensions about job security persist. Integrating AI-focused modules into the Indian medical curriculum may bridge knowledge gaps and prepare future physicians for AI-driven healthcare.

Keywords: Artificial intelligence, Medical education, Awareness, Medical graduates, India, Cross-sectional study

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1. INTRODUCTION

Artificial intelligence (AI) has become one of the most transformative forces in modern medicine, influencing domains such as radiology, pathology, dermatology, surgery, and personalized medicine [1]. Machine learning algorithms, natural language processing, and deep learning techniques are enabling healthcare providers to achieve greater diagnostic accuracy, predict disease outcomes, and optimize treatment protocols [2, 3]. The COVID-19 pandemic further accelerated AI's integration into healthcare, particularly in epidemiological modeling, screening, and telemedicine [4]. In India, where healthcare infrastructure is often stretched, AI presents opportunities to bridge gaps in access, quality, and efficiency [5]. However, effective integration of AI into clinical practice requires a workforce that is knowledgeable, skilled, and confident in utilizing these tools [6]. Medical students and recent graduates, representing the future healthcare workforce, must therefore develop a foundational understanding of AI applications in medicine. Globally, studies indicate that while medical students acknowledge AI's potential, their actual knowledge and preparedness remain limited. Integrating Artificial Intelligence (AI) into medical education helps graduates adopt AI-driven tools in healthcare and rehabilitation. Evidence shows that AI can improve performance, prevent injuries, and enhance rehabilitation outcomes. Incorporating AI-focused curricula equips medical graduates to bridge the gap between theoretical knowledge and practical applications, improving patient care and clinical efficiency [7, 8]. A survey of medical students in the United Kingdom revealed strong enthusiasm for AI in radiology but also significant gaps in technical knowledge [9]. Similar findings have been reported in the United States and Canada, where students express both optimism and apprehension about AI's impact on their future roles [10]. In the Indian context, little is known about the awareness and perceptions of AI among medical undergraduates and graduates. Given India's diverse healthcare needs and rapidly expanding medical education system, assessing current awareness levels is crucial. This knowledge will help guide curriculum development, capacity-building initiatives, and policy reforms. This study aimed to evaluate awareness, perceptions, and attitudes toward AI among Indian medical graduates and undergraduates, using a nationwide cross-sectional survey.

2. MATERIALS AND METHODS

Study design, setting, participants and sampling: This was a cross-sectional, questionnaire-based survey conducted between January and June 2025 among medical undergraduates and graduates across India. Participants included MBBS undergraduates (1st to final year) and MBBS graduates (interns, postgraduates, and recent graduates preparing for higher studies). Convenience and snowball sampling techniques were used. A total of 700 responses were included in the final analysis.

Development of questionnaire: A structured questionnaire was developed after an extensive literature review and consultation with subject experts [7, 8, 9]. The questionnaire underwent face and content validation by a panel of five medical educators and data scientists. Internal consistency was confirmed with a Cronbach's alpha of 0.82. The questionnaire comprised four sections:

- A. **Demographics:** Age, gender, year of study, institution type, region.
- B. **Knowledge of AI:** Basic concepts, applications in medicine, limitations.
- C. **Perceptions and Attitudes:** Views on AI's role in diagnostics, medical education, patient care, and job security.
- D. **Training and Readiness:** Previous exposure to AI-related courses/workshops, willingness to learn.

Collection of data: The validated questionnaire was digitized, converted into a QR code, and circulated through popular social media platforms (WhatsApp, Telegram, Instagram, etc.). Participation was voluntary and anonymous. Institutional Ethics Committee approval was obtained prior to the study (Ref No: TMU/IEC/2024-25/FACULTY/25 Dated: 01-12-2024). Informed e-consent was taken before participation.

Statistical analysis: Data were analyzed using SPSS version 27. Descriptive statistics (mean, SD, percentages) were used. Associations between categorical variables were tested using chi-square tests. Logistic regression was used to identify predictors of higher AI awareness. A p-value < 0.05 was considered statistically significant.

3. RESULTS

Demographic characteristics: Of the 700 participants, 409 (58.4%) were undergraduates and 291 (41.6%) were graduates. The mean age was 23.2 ± 2.8 years. Males constituted 52.6%, and females 47.4%. Representation was obtained from all five regions of India, with maximum responses from southern (31%) and northern (28%) India.

Knowledge of AI: We found **high knowledge in** 18.6% of the study population, **moderate knowledge in** 62.1% of the study population, and **low knowledge in** 19.3% of the study population.

Graduates scored significantly higher on knowledge questions than undergraduates ($\chi^2 = 15.2$, $p < 0.01$). Prior exposure to AI workshops correlated with higher knowledge scores ($p < 0.001$).

Perceptions of AI: 75% participants believed AI would revolutionize diagnostics, 68% felt AI would enhance medical education and simulation-based learning, 61% agreed AI could improve patient outcomes, 42% expressed concern about AI threatening physician job security, 54% felt AI cannot replace clinical judgment but may act as an assistive tool.

Training and readiness: Only 16.7% had attended AI-related workshops or online courses. However, 81% expressed willingness to undergo training if incorporated into the medical curriculum. Logistic regression showed prior training significantly predicted higher awareness (OR = 2.31, 95% CI: 1.58–3.14, $p < 0.01$).

4. DISCUSSION

This nationwide study provides one of the first insights into the awareness and perceptions of AI among Indian medical undergraduates and graduates. The findings reveal **moderate overall awareness**, with **graduates scoring significantly higher** than undergraduates. Our results align with international studies reporting enthusiasm but limited technical understanding among medical students [8, 9]. The majority of participants acknowledged AI's role in diagnostics and education, consistent with evidence that AI enhances radiological accuracy, pathology workflows, and personalized learning [2, 10]. However, the concern regarding job security, noted in 42% of respondents, mirrors apprehensions expressed in previous global surveys [6, 8]. This highlights the need for structured guidance and reassurance that AI complements rather than replaces physicians. The striking gap in formal training is concerning. With only 16.7% of participants having attended workshops, there is an urgent need for **integration of AI-focused modules** into the Indian medical curriculum. The National Medical Commission (NMC) could consider introducing AI literacy as part of competency-based medical education, aligning India with global trends [11]. The integration of technology into healthcare, including digital mental health interventions and internet-based cognitive behavioral therapy, highlights the growing role of artificial intelligence and related innovations in medical practice [12].

Strengths: Large sample size, nationwide representation, validated questionnaire.

Limitations: Convenience sampling and online dissemination may have excluded less digitally active students; self-reported data may introduce bias.

Implications: Policymakers and medical educators must address this knowledge gap. AI-related training should be implemented early in the medical curriculum to prepare future doctors for AI-driven healthcare.

5. CONCLUSION

Awareness of AI among Indian medical undergraduates and graduates is moderate, with graduates demonstrating higher knowledge levels. While students recognize AI's transformative role in diagnostics and education, concerns regarding job displacement persist. Integrating structured AI education into the Indian medical curriculum will help bridge knowledge gaps, reduce misconceptions, and foster confident adoption of AI in healthcare practice.

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