Research Article

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Exploring Second-Year Medical Students' Perceptions and Use of Artificial Intelligence in Medical Education: A Cross-sectional Survey Study

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The primary aim of the study is to evaluate the second-year medical students' views concerning artificial intelligence, their knowledge, patterns of use, and attitudes toward it in medical education. It also examines the connections between students' trusts, comfort levels, and ethical problems relating to AI. Methods: A descriptive cross-sectional survey was performed among the second-year medical students of the Iraqia University. The Only Gathering Data was a structured questionnaire distributed on-line consisting of items related to demographics, AI experience, attitudes, and educational preferences.

The analysis was done by means of descriptive statistics, Chi-square tests, Pearson correlation, and Cronbach's alpha. Statistical significance was set at $p < 0.05$. The majority of students self-reported a moderate understanding of AI and showed a strong desire for its inclusion in the curriculum with a preference for practical workshops. Informal use of AI tools for studying was common while formal training was rare. The statistically significant association was between gender and support for AI curriculum inclusion ($p = 0.035$). It was Pearson correlation that conveyed a strong positive relationship between fierce

Abstract

Artificial intelligence (AI) is further and further impacting the healthcare system, revolutionizing the ways in which diagnosis work, clinical workflows, and medical education.

belief that AI has educational value and comfort using AI (r = 0.622, p < 0.001). A moderate negative correlation was found between comfort and ethical concerns (r = –0.44). The internal consistency of the attitude scale was low (Cronbach's alpha = 0.21). The second-year medical students are the people who are deeply interested in the use of AI in education yet are ironically not qualified enough with it nor do they receive enough institutional support like structures or programs. Their comfort and confidence in AI tools are laid by the perceived educational value and the previous teaching techniques they have been exposed. AI introduction into medical curricula along with ethical training, and practical learning can occupy the loopholes and train the students better for the tech which morphs healthcare science.

Keywords: Medical Students, Perceptions, Artificial Intelligence, Medical Education

Introduction

The importance of Artificial Intelligence (AI) continues to grow in the healthcare sector, where it is not only influencing the diagnostics and treatment processes but also the medical training of future doctors. It is thus a necessity to integrate AI into medical education so that students are fully prepared for data-centric clinical environments where AI assists in pattern recognition, risk stratification, and decision support systems (1, 2).

Despite the fact that AI has been found to perform excellently in fields like radiology, pathology, and dermatology, the incorporation of it into undergraduate medical curricula is still far from being structured and is mostly unofficial in schools (3). AI technologies are very often introduced to medical students by means of either informal exposure or self-directed learning as opposed to the prescribed formal academic instruction (4). This causes a knowledge and skills gap that might be a possible barrier for students' critical engagement with AI in their future practices.

Various studies have depicted that medical students have a multi-faceted view of AI; many see it as a potential enhancer of the medical education and a tool for the clinical efficiency, while on the other hand, a few have discussed ethical concerns, discomforts, or the fear of being replaced by machines (5, 6).

These beliefs are generally determined by students' academic levels, prior exposure to AI programs, and the conditions of the institution. The second year of medical school is the stage especially where students are to some extent caught between foundational knowledge of the medical course and the clinical experiences they have obtained.

Accordingly, one may find their perspectives and praxis, a key to opening the door for AI educational strategies to be relevant to the context and learners. This study will look into the views, experiences, and comfort levels of second-year medical students on the usage of AI in medical training. This study can yield knowledge on the areas where the students need to learn more, and what kind of institutional support would be required to deliver the curriculum more efficiently, thereby promoting responsible and practical AI integration in medical education.

Materials &Methods

Study Design and Setting

This is a descriptive cross-sectional study conducted among second-year medical students at the University of Iraqia during the 2024-2025 academic year. The study aimed to assess students' knowledge, experiences, and perceptions of artificial intelligence in medical education.

Participants and Sampling

All second-year undergraduate medical students enrolled in the preclinical phase were invited to participate. A total of students responded to the survey. Inclusion criteria included being in the second academic year and voluntary consent to participate. No exclusion criteria were applied.

Instrument Development

Data were collected using a structured self-administered questionnaire developed based on a review of existing literature (5-8). The questionnaire consisted of four sections: (1) demographic information, (2) previous experience and knowledge of AI, (3) perceptions and attitudes towards AI in medicine, and (4) preferences for AI inclusion in the curriculum.

Most items were measured using 5-point Likert scales, dichotomous yes/no questions, and multiple-choice options.

The questionnaire was reviewed by experts in medical education and digital health for content validity. A pilot test was conducted on a sample of 10 students to assess clarity and readability; minor revisions were made accordingly.

Results

Correlation Analysis of Knowledge, Attitudes, and Ethics

Figure 1 presents the correlation heat map among five key variables related to students' AI knowledge, attitudes, and ethical considerations. These include: General AI Knowledge, Belief that AI Improves Medical Education, Belief that AI Could Replace Doctors, Comfort Using AI in Study, and Ethical Concerns about AI.

Several statistically relevant patterns emerged:

● A moderate positive correlation was observed between Comfort with AI in Study and Belief that AI Improves Medical Education ($r = 0.51$). This suggests that students who believe AI enhances education are more likely to feel comfortable using it in their studies.

● Similarly, General AI Knowledge was moderately correlated with Comfort with AI in Study ($r = 0.38$), indicating that familiarity with AI contributes to a sense of ease in its application.

● A moderate negative correlation was found between Comfort with AI in Study and Ethical Concerns about AI ($r = -0.44$), implying that students who feel comfortable with AI tend to have fewer ethical reservations about its use in healthcare.

● Weak correlations were found between Belief that AI Improves Education and Belief AI Could Replace Doctors ($r = 0.19$), and between General Knowledge and Ethical Concerns ($r = -0.15$), which were not considered statistically or practically strong.

● The relationship between AI Replacing Doctors and the other variables appeared to be negligible (r values near 0.00 to 0.19), indicating a more neutral stance or uncertainty among students regarding this issue.
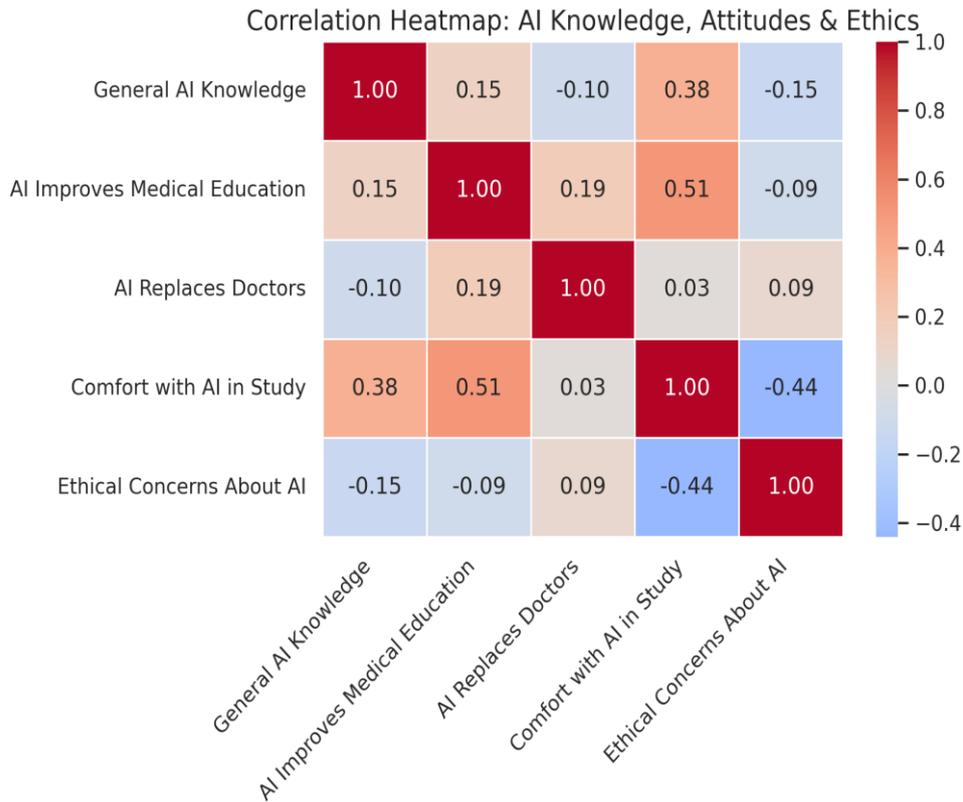
Figure 1: Correlation heat map among variables related to AI knowledge, perceived impact on medical education, perceived threat to medical roles, comfort in using AI, and ethical concern

Chi-square Test Results

To explore the relationship between categorical variables, Chi-square tests were conducted. The results are summarized below:

Comparison	Chi2 Statistic	Degrees of Freedom	p-value
Gender vs. AI Experience	2.828	1	0.093
Academic Stage vs. Use of AI in Study	0.000	0	1.000
Gender vs. Belief in Including AI in Curriculum	4.449	1	0.035

Interpretation: A statistically significant association was found between gender and the belief that AI should be included in the curriculum (p = 0.035). No significant relationships were found between gender and AI experience, nor between academic stage and AI use.

3.   Pearson Correlation Analysis

Pearson correlation was used to explore associations among key attitude variables:

Variable A	Variable B	Pearson r	p-value
AI Improves Education	Comfort Using AI in Studies	0.622	<0.001
AI Improves Education	AI Could Replace Doctor Roles	0.196	0.016
AI Improves Education	Ethical Concerns About AI	-0.143	0.080
AI Could Replace Doctor Roles	Comfort Using AI in Studies	0.109	0.185

Interpretation:

- A strong positive correlation exists between belief that AI improves education and comfort using AI (r = 0.622, p < 0.001).

- A weak but significant correlation is found between belief in AI's benefit to education and belief that AI could replace doctors (r = 0.196, p = 0.016).

- Other correlations were not statistically significant.

4.   Visual Correlation Charts

The scatter plot in Figure 2 shows a strong positive linear relationship (r = 0.622, p < 0.001). As students' belief in the educational value of AI increases, their comfort level in using AI tools in their studies also tends to rise significantly. Figure 3 illustrates a weak but statistically

correlation (r = 0.196, p = 0.016). This suggests that students who are more optimistic about the educational role of AI are also slightly more inclined to believe that AI might eventually replace certain clinical tasks traditionally performed by physicians.

Beyond the key associations above, several other relationships were examined:

- There was no significant correlation between believing AI could replace doctors and feeling comfortable using AI (r = 0.109, p = 0.185), suggesting that concerns about job displacement do not strongly influence comfort in educational usage.

- The association between AI improves education and ethical concerns about AI was negative but not statistically significant (r = – 0.143, p = 0.080), indicating a trend where students who value AI's educational

potential may worry less about its ethical implications, though this pattern was weak.
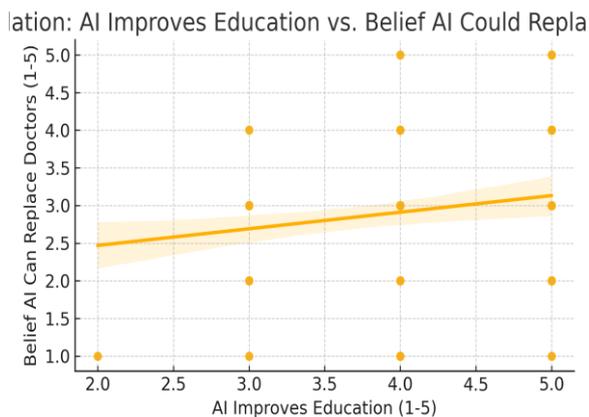

Figure 2: Correlation between belief that AI improves education and comfort using AI

Figure 3 illustrates a weak but statistically significant correlation.

Discussion

In the second year, medical students' perceptions of AI in medical education are reported, the experiences that they have had and their attitudes towards the use of AI. Findings indicated that the majority of participants perceived their general AI knowledge as average and informed of AI tools, mostly for the purpose of learning, such as summarizing lectures or simulating clinical scenarios in those situations where prior exposure was mentioned.

The formal training attended, however, was limited to the courses and workshops that were offered by the universities. This scenario is characteristic of a worldwide pattern that is gradually creeping into medical schools, where the use of AI tools is mainly self-initiated and informal rather than integrated into the official syllabus (9). The attendance of students has mainly been enthusiastic in the inclusion of AI in the curriculum besides their dominant preference for practical workshops as a method of teaching rather than the lectures. This suggests that there is a need for learning through experience that combines the development of technical skills with diverse applications in the real world. These findings coincide with suggestions from up-to-date literature that AI concepts should be introduced early in medical education, including machine learning, algorithmic thinking, and ethical decision-making (10).

Interestingly, a gender difference in regard to one's belief that AI should be part of the curriculum was significantly different (p = 0.035). It might indicate different levels of technological confidence or the perceived relevance of the two different genders' AI. This observation is confirmed by earlier research conclusions that male students have often shown more interest in handling quickly adopted technologies than while female students are likely to be more prudent with those same technologies, particularly when there is no structured support or moral

guidance available (11-12). The correlation analysis gave a lot of information to better understand the student attitudes. There was a strong positive correlation between the belief in educational AI operations and the comfort of using AI tools (r = 0.622, p < 0.001). This implies that when the perceived utility is high the confidence among the users is also high. Besides, a somewhat weaker though statistically significant correlation was observed (r = 0.196, p = 0.016) between the belief that AI enhances education and the belief that AI can take over a few medical profession tasks. This might be due to both acknowledging the benefits of AI and the chance of it to displace existing medical professionals. It is worth mentioning, that the correlation of ethical concerns with the comfort level (r = -0.44) is moderate negative, which means that students who are more confident with AI tend to see fewer ethical dilemmas, which may be due to their deep knowledge or callousness over time in respect to AI. Though these are some of the insights that the researchers gained, however, the attitude scale showed a weak internal consistency (Cronbach's alpha=0.21), thus, pointing out the need for a new approach in choosing the items to reflect an adequately shared concept. The scale may have included multiple different features, namely ethical trepidation, educational hopeful, and personal ease, which can be analyzed separately in the future by applying factor analysis or other methods of this kind.

Conclusions:

The conclusions of the study are the ones carrying important implications for the curriculum designers. First of all, the program of instruction in a medical school which includes structured AI training should come in the early years to whet the students' appetite for this issue. Secondly, the subject of ethics should be interwoven with the technical training so that students are able to weigh the pros and cons of using AI in clinical decision-making. Thirdly, the institutions should offer hands-on experience on real AI machines, simulations, and discussions across disciplines to be able to foster engagement and confidence (students). Thus, limits accompany the informed study. It should be noted that the sample was related to one academic year in one institution, which translates into the issues of generalizability. Besides, the self-reported data utilization brings the bias risk with it. Future research should opt for bigger sample sizes, longer time frames, and undertaking comparative studies across different institutions and academic levels to gain broader perspectives concerning the shifting role of AI in medical education.

References

1. Topol EJ. High-performance medicine: the convergence of human and artificial intelligence. *Nat Med*. 2019 Jan;25(1):44–56.
2. Jha S, Topol EJ. Adapting to Artificial Intelligence: Radiologists and Pathologists as Information Specialists. *JAMA*. 2021;316(22):2353–4.
3. Kolachalama VB, Garg PS. Machine learning and medical education. *NPJ Digit Med*. 2018;1:54.
4. Jackson P, Ponath Sukumaran G, Babu C, Tony MC, Jack DS, Reshma VR, Davis D, Kurian N, John A. Artificial intelligence in medical education-perception among medical students. *BMC Medical Education*. 2024 Jul 27;24(1):804.
5. Pinto dos Santos D, Giese D, Brodehl S, Chon SH, Staab W, Kleinert R, Maintz D, Baeßler B. Medical students' attitude towards artificial intelligence: a multicentre survey. *European radiology*. 2019 Apr 1;29(4):1640-6.
6. Chan KS, Zary N. Applications and challenges of implementing artificial intelligence in medical education: integrative review. *JMIR Med Educ*. 2019;5(1):e13930.
7. Kolachalama VB, Garg PS. Machine learning and medical education. *NPJ Digit Med*. 2018;1:54.

8. Pinto dos Santos D, Giese D, Brodehl S, Chon SH, Staab W, Kleinert R, Maintz D, Baeßler B. Medical students' attitude towards artificial intelligence: a multicentre survey. *European radiology*. 2019 Apr 1;29(4):1640-6.

9. Wartman SA, Combs CD. Medical education must move from the information age to the age of artificial intelligence. *Academic Medicine*. 2018 Aug 1;93(8):1107-9.

10. Hegde S, Nanayakkara S, Jordan A, Jeha O, Patel U, Luu V, Gao J. Attitudes and perceptions of Australian dentists and dental students towards applications of artificial intelligence in dentistry: A survey. *European Journal of Dental Education*. 2025 Feb;29(1):9-18.

11. Park SH, Han K. Methodologic guide for evaluating clinical performance and effect of artificial intelligence technology for medical diagnosis and prediction. *Radiology*. 2018 Mar;286(3):800-9.

12. Mittelstadt BD, Allo P, Taddeo M, Wachter S, Floridi L. The ethics of algorithms: Mapping the debate. *Big Data Soc*. 2016;3(2):2053951716679679.