Original article

Awareness and Knowledge of Libyan Undergraduate Medical Students About Artificial Intelligence Use in Medical Education

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Abstract

Artificial intelligence (AI) shows enormous potential across multiple applications, including patient diagnosis and educational decision-making. Medical students' perspectives and readiness are critical factors for AI implementation in medical education and healthcare. The current study sought to determine medical students' awareness of and knowledge about AI use in medical education. A cross-sectional study was carried out using Google Forms to collect data from undergraduate medical students studying at various medical colleges at the University of Tripoli, Libya. Descriptive statistical analysis was performed via Microsoft Excel. A total of 117 medical students participated in the survey. Approximately 54.70% of the students agreed that they are comfortable using AI, and half (55.55%) of them agreed that they are aware of AI's use in healthcare and medical education, whereas 82.05% agreed that AI has the potential to enhance medical education. A high proportion (82.91%) of the study participants agreed that AI can improve their learning experience, whereas 66.67% agreed that the information provided by AI is useful. However, only 22.22% of the participants agreed that AI can keep their data confidential. Our findings indicate that undergraduate medical students believe that AI has potential and will be useful if it is implemented in medical education. Students at the undergraduate level should be made aware of the use of AI tools and applications.
Keywords. *Artificial Intelligence, Awareness, Knowledge, Undergraduate Medical Students.*

Introduction

Artificial intelligence (AI) has emerged as one of the most transformative technologies of the 21st century, finding applications across various sectors, including healthcare and education [1]. For medical students, AI offers a revolutionary approach to learning, skill acquisition, and clinical decision-making. The integration of AI into medical education represents a transformative shift in how future healthcare professionals are trained [2]. This transformative potential of AI is not merely theoretical; it is already being realized in numerous ways, from personalized learning platforms to sophisticated virtual simulations [3].

AI technologies offer innovative solutions that can enhance learning experiences, improve clinical decision-making, and prepare students for a rapidly changing healthcare environment. AI encompasses a range of technologies designed to simulate human intelligence processes, including machine learning, natural language processing, and robotics. In the context of medical education, AI can be utilized in various ways, such as personalized learning, in which AI systems can analyze individual student performance data to tailor educational content and resources to meet specific learning needs [4]. This personalized approach allows students to progress at their own pace and focus on areas where they require additional support [3,4].

One of the most significant advantages of incorporating AI into medical training is its potential to enhance clinical decision-making skills among students [5]. By leveraging vast amounts of medical data, AI algorithms can provide evidence-based recommendations that inform diagnosis and treatment options. For example, diagnostic support, in which AI systems can analyze patient symptoms, history, and test results to suggest possible diagnoses or highlight critical information that may be overlooked by human practitioners. This capability not only aids students in developing diagnostic acumen but also fosters a culture of collaborative decision-making between humans and machines [6,7]. However, despite its numerous benefits, the integration of AI into medical education is not without the challenge of data privacy concerns. The use of patient data for training AI models raises ethical concerns regarding privacy and confidentiality [8].

The use of AI in medical education also addresses existing knowledge gaps within traditional curricula to access information to obtain extensive databases and research articles powered by natural language processing capabilities, and students can quickly retrieve relevant information during their studies or clinical rotations. This immediacy enhances their ability to stay current with evolving medical knowledge [9]. Interdisciplinary learning of AI encourages collaboration by integrating insights from fields such as computer science, engineering, ethics, and public health into medical training programs. Such collaboration fosters a holistic understanding of healthcare challenges and promotes innovative problem-solving approaches [10,11].

To successfully integrate AI into medical education in the future, we believe that understanding medical students' perspectives as end users of AI applications is critical. To address the aforementioned gap, we conducted this study to determine how well our undergraduate medical students are familiar with AI and what their perceptions are about it.

Methods

Study design and setting

A cross-sectional study was carried out by circulating a questionnaire through Google Forms to gather information from undergraduate students studying in medical colleges at the University of Tripoli, Libya. This study was carried out from December 2024 to March 2025 and was approved by the research ethical committee of the faculty of medical technology at the University of Tripoli.

Questionnaire content and validation

An online questionnaire adopted from a previous study [12] was used to gather the information. At the initial stage, the questionnaire was evaluated by 3 academic experts in the field of medical and information technologies to make the questionnaire valid, with their comments being incorporated within the questions when appropriate to prepare the final version of the questionnaire. Pilot testing of the questionnaire was subsequently performed on a sample of 5 undergraduate medical students to provide feedback on the clarity and feasibility of the questions. Data obtained from pilot testing were not included in the final analysis. The internal consistency and reliability of the questionnaire were evaluated via Cronbach's α values of ≥0.922 for all the study domains, indicating high reliability.

The questionnaire contains three sections. The first section included information related to the demographic characteristics of the study participants (3 questions). The second and third sections included information related to the study participants' awareness and knowledge of AI (8 questions). All the questions were mandatory for the submission of the questionnaire. A three-point Likert scale (disagree, neutral, and agree) was used for the selected questions to determine the study participants' responses in different sections.

Sample size calculation

The minimal sample size for this study was calculated via the following standard formula: $n = P \times (1-P) \times z^2/d^2$. A sample size of 117 students was considered representative. To determine the sample size, we used the most conservative proportion ($P = 50\%$), with 5% absolute precision and a 95% confidence level.

Selection criteria

Only students from medical specialties and studying at the University of Tripoli were considered eligible for participation. Students whose studies were outside the mentioned university or who had not ever used AI were excluded.

Data collection

Following a pilot study, a Google Forms questionnaire and consent form were distributed online via social media platforms (Facebook, WhatsApp, and Telegram) with the assistance of medical college colleagues. This ensured data reliability, with participation limited to the University of Tripoli. The participants provided online consent, confirming their voluntary participation, understanding that their identities would remain confidential, and that no rewards would be offered.

To enhance data credibility and quality by preventing duplicate submissions, participants were required to submit the questionnaire with their email address.

Statistical analysis

The data collected through Google Forms was transferred to Microsoft Excel for data analysis, and descriptive statistics were used. The data are presented as numbers and frequencies.

Results

A total of 117 undergraduate medical students participated in the survey. The majority of participants (36.7%, n=43) were in the 4th year of their study, with 84.61% (99/117) being females (Table 1). The majority of participants were from the faculty of medical technology (53.85%, n=72), followed by medicine (25.64%, n=30) and pharmacy (12.82%, n=15).

Table 1. Demographics of the participating medical students

Demographics	Male (n = 18) (15.37%)		Female (n = 99) (84.61%)		Total (n=117)
	Number	Percentage	Number	Percentage	
Academic year					
1st Year	0	0%	3	2.56%	3
2nd Year	2	1.71%	3	2.56%	5
3rd Year	5	4.27%	32	27.35%	37
4th Year	5	4.27%	38	32.48%	43
5th Year	6	5.12%	23	19.66%	29
Faculties					
Medicine	7	5.98%	23	19.66%	30
Pharmacy	2	1.71%	13	11.11%	15
Medical Technology	9	7.69%	63	53.85%	72

Figure 1 shows that most of the surveyed medical students (80.34%) indicated that they were aware of the existence of AI, while 82.91% of them had used AI.
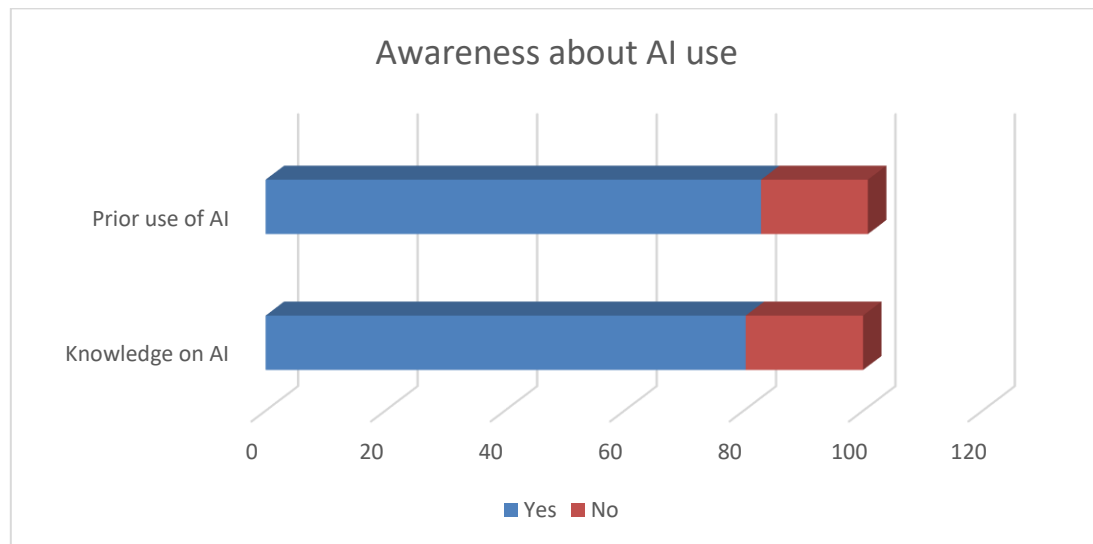

Figure 1. Awareness (%) about AI use among medical students

Table 2 highlights both the opportunities and challenges in integrating AI into medical education, and addressing these issues can help maximize its potential benefits. Approximately 54.70% of the students agreed that they were comfortable using AI, while 39.32% disagreed. Almost half (55.55%) of the study participants agreed that they were aware of AI's use in healthcare and medical education, whereas 82.05% agreed that AI has the potential to enhance medical education. A high proportion (82.91%) of the study participants agreed that AI can improve their learning experience, while 66.67% agreed that the information provided by AI is useful. However, only 22.22% of the participants agreed that AI can keep their data confidential.

Table 2. Knowledge of medical students about AI

Quires	Agree	Neutral	Disagree
Are you comfortable with using AI	64(54.70%)	7(5.98%)	46(39.32%)
Are you aware of using AI in healthcare and medical education	65(55.55%)	42(35.9%)	10(8.55%)
Do you think that AI has the potential to enhance medical education	96(82.05%)	13(11.11%)	8(6.84%)
Do you think that AI can improve your learning experience	97(82.91%)	18(15.38%)	2(1.71%)
Do you think that the information provided by AI is useful	78(66.67%)	36(30.77%)	3(2.56%)
Do you think that AI can keep your data confidential	26(22.22%)	50(72.74%)	41(35.04%)

Discussion

The research findings highlight future doctors' views on AI applications in medical education. The medical students who took part in our study demonstrated an understanding of how AI applications function within the healthcare field. They concluded that medical education must integrate AI knowledge and application skills. A few students appeared to lack familiarity because they had not yet mastered technological skills and continued to learn through traditional textbooks. AI usage as a study resource among pupils continues to grow in popularity [2]. The fast-paced expansion of AI use in medicine demands that educational programs begin integrating learning and training on these technologies early on.

In the present study, the high awareness and usage of AI among participants (as shown in Table 2) are consistent with findings from other studies, which report those medical students generally recognize the potential of AI in healthcare and education [13,14]. However, the gender and faculty disparities in this study suggest that awareness levels may vary based on demographic factors, which should be considered when designing AI education programs [15].

The majority (54.7%) of the participants in the current study were comfortable using AI, while 39.3% were neutral. This aligns with the findings of a previous study showing that while AI adoption is growing, many users remain uncertain due to unfamiliarity with or concerns about reliability [16]. Over half (55.55%) are aware of AI applications, and 82.05% of them believe that AI has the potential to enhance medical education. Jackson et al. evaluated medical students' perceptions of 'AI in medicine' and reported that AI was viewed as an assistive technology for reducing medical errors by 57.2% of students and that 54.2% believed that AI could enhance medical decision accuracy, emphasizing AI's ability to improve personalized learning and decision support [14]. Similarly, 82.91% believe that AI can improve their learning, supporting studies that suggest that AI-driven tools enhance engagement, efficiency, and adaptability in medical training [9].

Concerning the usefulness of AI-generated information, approximately 66.67% of the participants agreed that the information provided by AI is useful, suggesting a positive perception of AI-generated content. However, 30.77% remain neutral, which aligns with concerns from prior studies about AI accuracy and potential biases in medical knowledge dissemination [17]. In addition, only 22.22% of the respondents trusted AI with confidentiality. This doubt is consistent with the literature highlighting concerns about patient privacy, data security, and ethical implications in AI applications [18,19].

Conclusion

The study revealed that a majority of the participants understood AI applications in medical education and supported their role in enriching educational outcomes. The study also demonstrated that medical education needs to grow as technology evolves.

Conflict of interest

The authors declare that they have no conflicts of interest related to this article.

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