A Survey-Based Cross-Sectional Study of Undergraduate Medical Students' Expectations for Medical Education and Attitudes Regarding Artificial Intelligence in Medicine

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ABSTRACT

Background: *Medical technologies have been revolutionized by artificial intelligence (AI), which is widely recognized as a field of computer science that can solve challenging issues. Assessing medical students' acceptance and potential use of AIEd (Artificial Intelligence in Education) is essential in understanding the advantages and challenges of AI in medical education and promoting its successful integration. Understanding medical students' attitudes toward AI is also crucial in influencing their behaviour in the future. This cross-sectional study was carried out among undergraduate medical students in light of the described data in order to evaluate their knowledge, confidence, and perceived dependability of AI as well as their preferences for training related to AI.*

Materials and Methods: *The study was conducted in a Tertiary Care Hospital at Puducherry. Convenience sampling was used to choose undergraduate medical students who met the study's qualifying requirements. A validated and pre-tested semi-structured questionnaire was used to gather data for the study. It has five sections: socio-demographic information, knowledge of artificial intelligence in medicine, attitudes toward AI in medicine, expectations for AI in medical education, and open-ended questions about opinions on AI in medical education. The data collected were entered in Microsoft Excel 2019 and the results were analyzed using SPSS software version 23.0*

Results: *The study found that most undergraduate medical students have neutral to generally positive opinions regarding AI and acknowledge its potential for help in diagnosis and therapy. The perceptions of the majority of participants may have been influenced by their lack of prior exposure to AI-related courses or real-world applications.*

Conclusion: *In order to prepare aspiring doctors for the quickly changing technological landscape in healthcare, the results highlight the significance of including organized AI education in the medical curriculum.*

Key words: *Artificial Intelligence (AI), Medical Education, Convenience sampling*

INTRODUCTION

The term "Medical Technology" broadly refers to a variety of tools that support healthcare professionals in enhancing patient and public health outcomes by enabling early diagnosis, minimizing complications, improving treatment efficiency, offering less invasive procedures, and shortening hospital stays.[1] Artificial Intelligence (AI) has transformed medical technologies and is generally understood as a branch of computer science capable of addressing complex problems.[2] The term AI, created by John McCarthy in 1955, is defined as a machine with intelligent behaviour such as perception, reasoning, learning, or communication and the ability to perform human tasks.[3,4]

AI, machine learning (ML), neural networks (NN), and deep learning (DL) are being anticipated by many physicians and medical experts to be incorporated into diagnostic procedures, prognosis evaluations, and therapeutic approaches.[5-7] Although radiology has seen the most widespread use of AI algorithms, other disciplines like dermatology, ophthalmology, psychiatry, cardiology, oncology, neuroscience, pathology, and general medicine are all seeing an increase in their use.[8–11] However, worries regarding the moral ramifications of using AI systems in the medical industry are growing in importance as their use expands.[12,13]

Medical education is a lifetime learning process stretching from undergraduate to postgraduate and specialty training and beyond.[14] Therefore, it is essential to recognize that in the current period of rapidly changing technology, new works must be built upon the resources already in place in order to advance the topic of artificial intelligence in medical education.[15] Medical educators must strike a balance between teacher-led instruction and artificial intelligence, and medical students must be capable

of critical and autonomous thought. Moreover, interdisciplinary research teams are greatly sought after to guarantee the relevance of AI in medical education.[16]

According to the Theory of Planned Behaviour; people's attitudes greatly impact their intentions and actions in the future.[17] Assessing medical students' acceptance and potential use of AIEd (Artificial Intelligence in Education) is essential to understanding the advantages and challenges of AI in medical education and promoting its successful integration. Understanding medical students' attitudes toward AI is also crucial to influencing their behaviour in the future.[18] This cross-sectional study was carried out among undergraduate medical students in light of the previously described data in order to evaluate their knowledge, confidence, and perceived dependability of AI as well as their preferences for training related to AI.

MATERIALS AND METHODS
After obtaining approval from Scientific Research Committee and Institutional Human Ethical Committee (Ref No: 79/SVMCH/IEC-cert/july.25) the study was conducted in a Tertiary Care Hospital at Puducherry. Undergraduate medical students who satisfied the eligibility criteria were recruited for the study using Convenience sampling technique. The sample size for the study was 120 obtained by using open-epi software.

A validated and pre-tested semi-structured questionnaire was used to gather study data. The study process was described to the participants in their native tongue. Sociodemographic information, knowledge of AI in medicine, attitudes toward AI in medicine, expectations for AI in medical education, and open-ended questions on opinions on AI in medical education was the five sections of this questionnaire. Microsoft Excel 2019 was used to enter the data, and SPSS software version 23.0 was used to analyze the findings. Distribution, Mean, Range, and Frequency were used to express quantitative data. Fischer's exact test and the Chi-square test were employed to determine the connection, and a p-value of less than 0.05 was deemed significant. The data was graphically represented using bar graphs and pie charts.
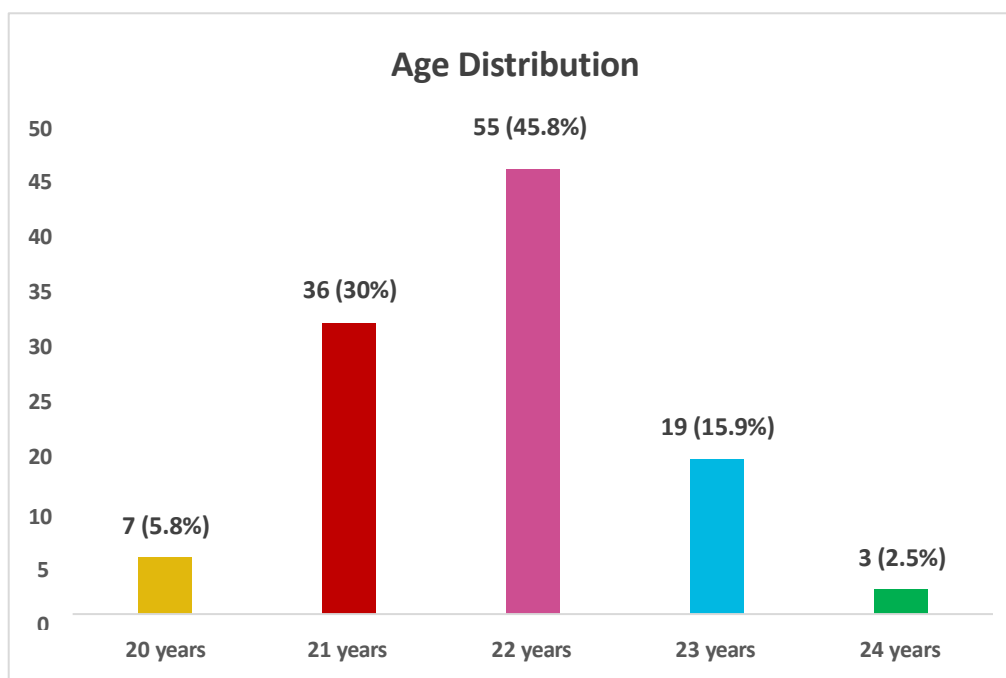
RESULTS

Figure 1: Frequency Distribution of Age among the Participants (N = 120)

Figure 1; illustrates the age distribution among the participants. The largest group comprised 55 individuals (45.8%) who were 22 years old; followed by 36 participants (30%) aged 21, and 19 participants (15.9%) aged 23. Furthermore, 7 participants (5.8%) were 20 years old and 3 participants (2.5%) were 24 years old.
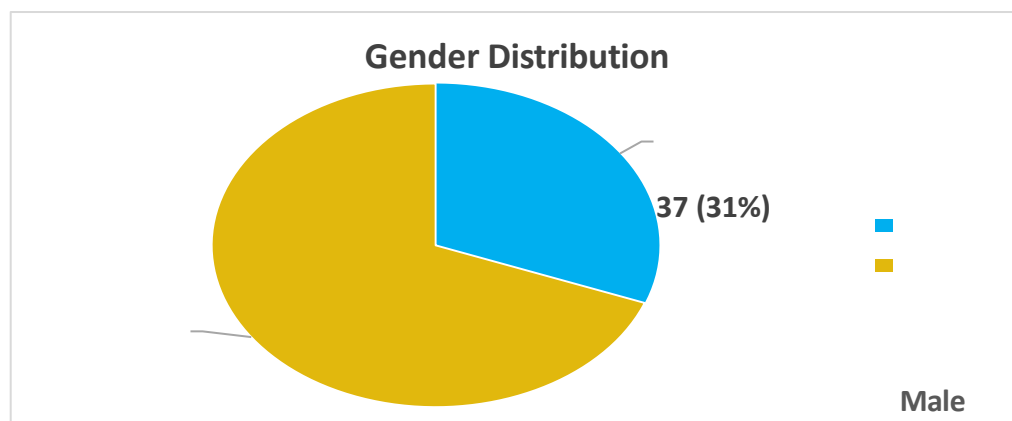
Figure 2: Frequency Distribution of Gender among the Participants (N = 120)

Figure 2; presents a pie chart illustrating the gender distribution among the participants. The majority were female, comprising 83 individuals (69.2%), while male participants numbered 37 (30.8%).
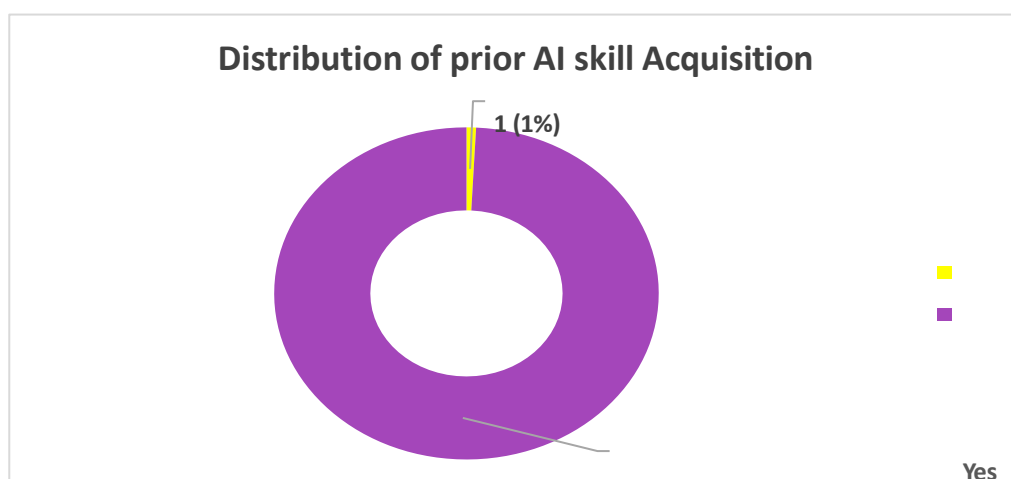

Figure 3: Frequency Distribution of prior AI skill acquisition among the Participants (N = 120)

Figure 3 illustrates the distribution of prior AI skill acquisition among the participants. A significant majority, 119 individuals (99%), reported no previous engagement with AI-related courses or workshops. Only 1 participant (1%) indicated having completed such a course or workshop.
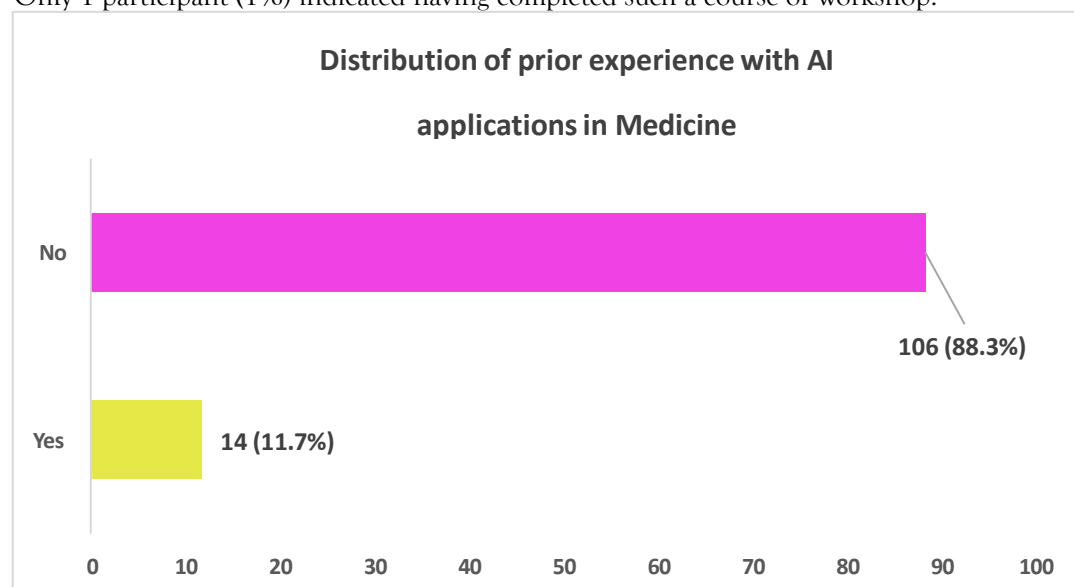

Figure 4: Frequency Distribution of prior experience with AI applications in Medicine among the Participants (N = 120)

Figure 4 illustrates the distribution of participants' prior experience with AI applications in medicine. A substantial majority, comprising 106 individuals (88.3%), reported no previous exposure to AI tools in the medical field. In contrast, 14 participants (11.7%) indicated having experience with such technologies.

Table 1: Frequency Distribution of Knowledge of AI in Medicine (N = 120)

KNOWLEDGE	Response	Frequency (Percentage)		Chi square (P value)
		Male (n = 37)	Female (n = 83)	
Familiarity of AI concepts in general	Very familiar	1 (2.70%)	0 (0.0%)	3.469 (0.343) *
	Moderately familiar	12 (32.40%)	21 (25.31%)	
	Slightly familiar	18 (48.60%)	42 (50.60%)	
	Not familiar at all	6 (16.30%)	20 (24.09%)	
Primary learning about AI in medicine	Self-study	13 (35.10%)	30 (36.16%)	2.292 (0.742) *
	Discuss with peers/mentors	7 (18.90%)	19 (22.89%)	
	Medical Curriculum	1 (2.70%)	6 (7.22%)	
	Workshops/Conferences	3 (8.11%)	8 (9.64%)	
	No prior knowledge	13 (35.10%)	20 (24.09%)	

*Fischer's Exact test

Table 1 shows the frequency distribution of Knowledge of AI in Medicine. Among the male participants, 18 (48.6%) reported a modest familiarity, 12 (32.4%) reported a moderate familiarity, and 6 (16.3%) reported no familiarity at all. Of the female participants, 20 (24.09%) were completely unfamiliar, 21 (25.31%) were moderately familiar, and 42 (50.60%) were slightly familiar. Out of 37 males, 13 (35.10%) had learned about AI in medicine mostly through self-study, 7 (18.90%) from conversations with peers or mentors, 1 (2.70%) from medical curriculum, 3 (8.11%) from workshops or conferences, and 13 (35.10%) had no prior knowledge. The majority of the 83 female participants—30 (36.16%) studied on their own, 19 (22.89%) talked with peers or mentors, 6 (7.22%) came from medical school, 8 (9.64%) attended seminars or conferences, and 20 (24.09%) knew nothing.
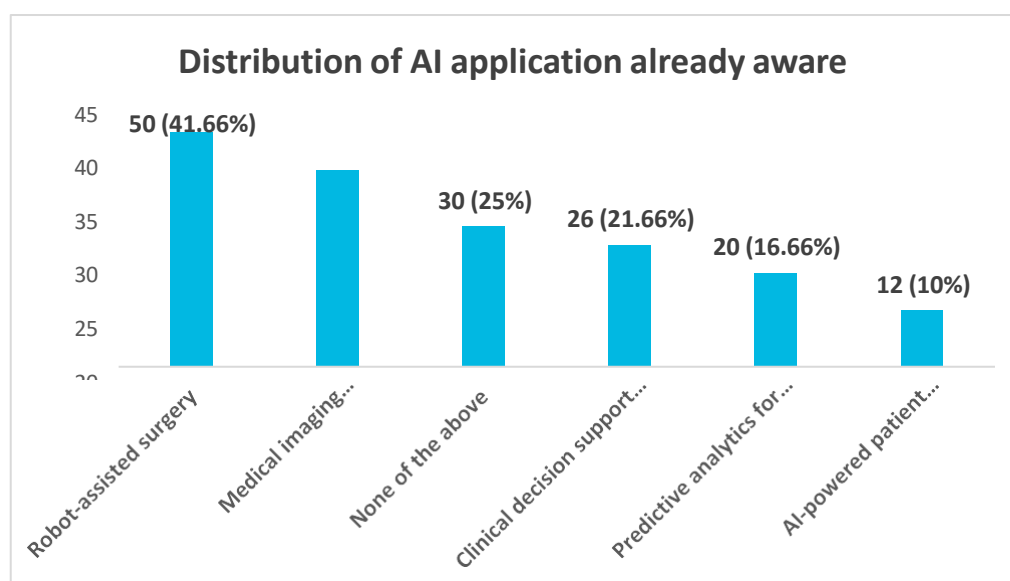

Figure 5: Frequency Distribution of AI application participants already aware (N = 120)

Figure 5 illustrates the distribution of the participants' prior knowledge of the AI applications in medicine. Robot-assisted surgery was the most well-known use, as reported by 50 participants (41.66%), followed by medical imaging interpretation by 42 participants (35%). Of the participants, 25% (30) were unaware of any applications of AI. Only 12 participants (10%) were aware of AI-powered patient monitoring, whereas 26 participants (21.66%) were aware of clinical decision assistance and 20 participants (16.66%) were aware of predictive analytics for diagnosis and therapy.

Table 2: Frequency Distribution of Attitude towards AI in Medicine (N = 120)

ATTITUDE	Response	Frequency (Percentage)		Chi square (P value)
		Male (n = 37)	Female (n = 83)	
Perception of AI's role in medicine	Neutral	24 (64.90%)	56 (67.50%)	4.715 (0.362)*
	Somewhat Positive	7 (18.90%)	16 (19.30%)	
	Somewhat Negative	5 (13.50%)	7 (8.40%)	
	Very Negative	0 (0.0%)	4 (4.80%)	
	Very Positive	1 (2.70%)	0 (0.0%)	
Think that AI will significantly impact the future of Medicine	Yes, AI will transform medicine entirely	10 (27.00%)	19 (22.90%)	0.516 (0.880)*
	AI will have minimal impact	4 (10.80%)	9 (10.80%)	
	AI will have a moderate impact but not replace human physicians	20 (54.10%)	50 (60.20%)	
	AI is overhyped and will not play a major role	3 (8.10%)	5 (6.00%)	
Believe that AI can inprove diagnostic accuracy	Agree	15 (40.50%)	20 (24.10%)	6.176 (0.192)*
	Disagree	4 (10.81%)	11 (13.30%)	
	Neutral	16 (43.20%)	47 (56.60%)	
	Strongly agree	1 (2.70%)	0 (0.0%)	
	Strongly disagree	1 (2.70%)	5 (6.00%)	
Trust in AI generated medical recommendations	Neutral	14 (37.80%)	35 (42.20%)	2.128 (0.649)*
	No, I Don't	5 (13.50%)	15 (18.10%)	
	Yes, But with human oversight	18 (48.60%)	31 (37.30%)	
	Yes, completely	0 (0.0%)	2 (2.40%)	

*Fischer's Exact test

Table 2 depicts participants' attitudes toward AI in medicine, analyzed by gender. Regarding perception of AI's role, majority of both males 24 (64.90%) and females 56 (67.50%) had a neutral stance, while somewhat positive views were reported by 7 (18.90%) of males and 16 (19.30%) of females. Somewhat negative attitudes were noted in 5(13.50%) of males and 7 (8.40%) of females. Notably, 4 (4.80%) of females held very negative perceptions, and only one male (2.7%) expressed a very positive view.

Of those surveyed, 20 (54.10%) of men and 50 (60.20%) of women said AI would have a moderate impact on medicine without displacing doctors. About 10.8% of both sexes believed AI will have little effect, while just 10 (27.0%) of men and 19 (22.9%) of women said AI would completely change medicine. Five (6.00%) of the women and three (8.10%) of the men believed AI was overhyped and would not be a significant factor.

Regarding diagnostic accuracy, 15 (40.5%) of males and 20 (24.10%) of females agreed that AI can improve it, with 16 (43.20%) of males and 47 (56.60%) of females remaining neutral. Only a small proportion strongly agreed 1 (2.70%) males, and strong disagreement was more among females 5 (6.00%) than males 1 (2.70%).

Regarding trust in AI-generated medical advice, 14 (37.80%) of males and 35 (42.20%) of females indicated neutral trust levels, while 18 (48.60%) of males and 31 (37.30%) of females favored AI use with human oversight. Complete trust was rare, with only 2 (2.40%) of females endorsing it. Fifteen (18.10%) females and five (13.50%) males were found to have no trust. Participants' attitudes did not differ statistically significantly based on gender.
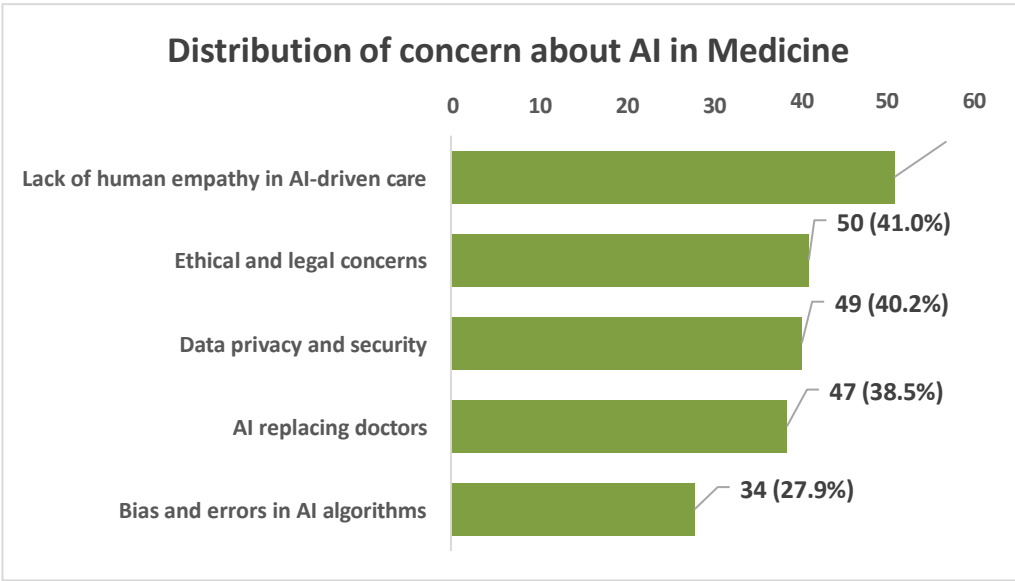

Figure 6: Frequency Distribution of concern about AI in Medicine (N = 120)

Figure 6 illustrates the frequency distribution of concern about AI in Medicine. Lack of human empathy in AI-driven care was the most commonly mentioned problem, with 62 (50.8%) listed, followed by ethical and legal issues (50, 41%) and data privacy and security (49, 40.2%). There is considerable fear regarding both the technical and human elements of integrating AI in healthcare, as seen by the noteworthy concerns around bias or faults in AI algorithms 34 (27.9%) and AI replacing doctors 47 (38.5%).

Table 3: Frequency Distribution of Expectations for AI in Medical education (N = 120)

EXPECTATIONS	Response	Frequency (Percentage)		Chi square (P value)
		Male	Female	
AI should be included in the	Yes, as an elective course	28 (75.70%)	65 (78.30%)	
	Yes, as a mandatory subject	2 (5.40%)	3 (3.60%)	

medical curriculum	No, AI is not necessary in medical education	7 (18.90%)	15 (18.10%)	0.230 (0.862)*
Interested in taking an AI-related elective course if offered	Yes	14 (37.80%)	33 (39.80%)	0.971 (0.634)
	No	11 (29.70%)	18 (21.70%)	
	Maybe	12 (32.40%)	32 (38.60%)	
Opinion on integrating AI education into medical school	Standalone AI course	20 (54.10%)	21 (25.30%)	10.932 (0.009)*
	Integrated into existing subjects (e.g., radiology, pathology)	4 (10.80%)	8 (9.60%)	
	Workshops and practical training sessions	2 (5.40%)	4 (4.80%)	
	AI should not be included in medical education	11 (29.70%)	50 (60.2%)	

*Fischer's Exact test

Table 3; presents the participants' expectations regarding AI education in medicine, categorized by gender. The majority of women (65, or 78.30%) and men (28, or 75.70%) felt that AI ought to be taught as a required course in medical school. As an elective, just a small portion of respondents preferred it. Two (5.40%) men and three (3.60%) women believed AI was not required in medical education, whereas seven (18.90%) men and fifteen (18.10%) women agreed.

Fourteen (37.80%) of the males and 33 (39.80%) of the females said "Yes" when asked if they would be interested in taking an AI-related elective if it were provided, while 11 (29.70%) of the males and 18 (21.70%) of the females said "No" and others stated they were not sure ("Maybe").

Only 21 (25.30%) of the female respondents chose a standalone AI course, whereas 20 (54.10%) of the male respondents chose this approach. It's interesting to note that a greater percentage of females 50 (60.20%) than males 11 (29.70%) thought AI shouldn't be taught in schools. When the p value is less than 0.05, the gender-wise difference in opinion on the course format was statistically significant (χ^2 = 10.932, p = 0.009).

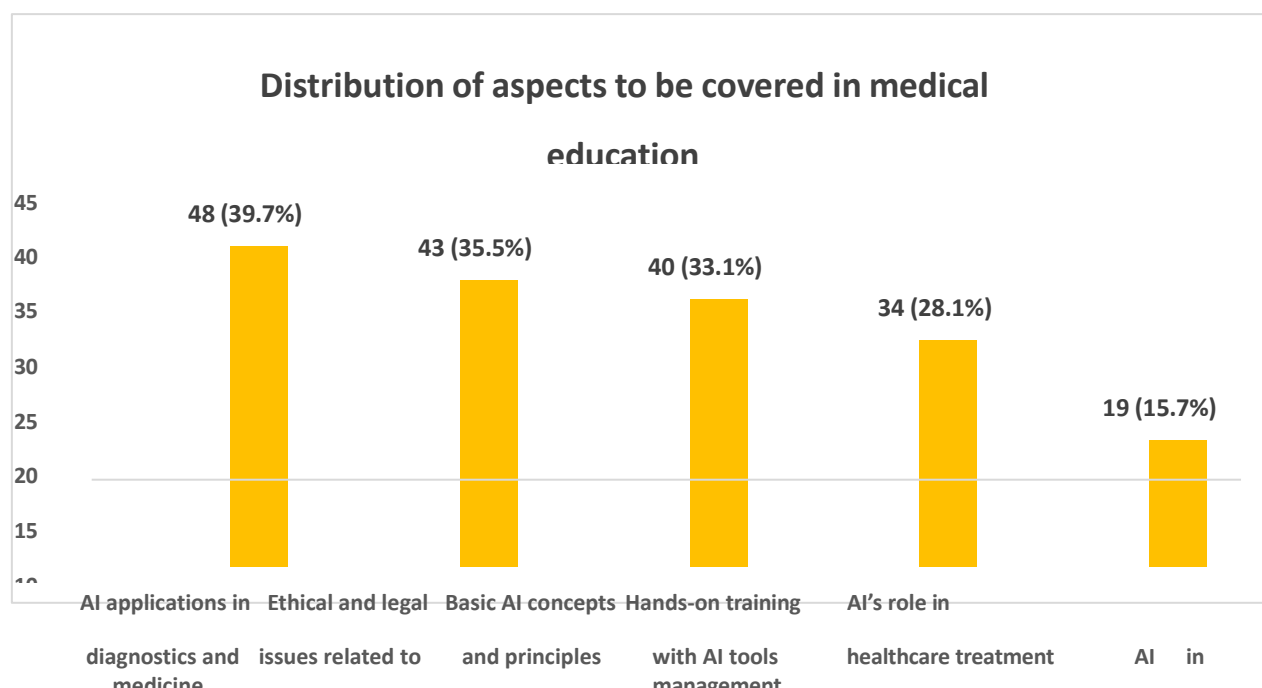**Figure 7: Frequency Distribution of aspects of AI should be covered in medical education (N = 120)**

Figure 7 illustrates participants' opinions on aspects of AI that should be covered in medical education. The most frequently chosen topic was AI applications in diagnostics and treatment 48 (39.7%), followed by ethical and legal issues related to AI in medicine 43 (35.5%). Basic AI concepts and principles were selected by 40 (33.1%), while hands-on training with AI tools was suggested by 34 (28.1%). The least selected aspect was AI's role in healthcare management, noted by only 19 (15.7%) of participants.

DISCUSSION

Artificial Intelligence (AI) is revolutionizing healthcare and holds significant potential for enhancing medical education.[16] At its 2018 annual conference, the American Medical Association (AMA) adopted its inaugural policy on augmented intelligence, endorsing research that emphasized the integration of AI into medical education.[15] This highlights the significance of incorporating AI into Medical education. In line with the findings of research by Yüzbaşıoğlu E, Al saad MM et al, and Singh N et al, where the mean ages were 21.36 ± 1.93, 21.34 ± 2.43, and 22.7 ± 1.98 years, respectively, the mean age of participants in our study was 21.7 ± 0.86 years.[19–21] 45.8% of participants were 22 years old, which is a large proportion that is similar to the study conducted by Asmatahasin M et al.[21] In line with the findings of Seram T et al., Asmatahasin M et al., and Santos DPD et al., the majority of participants in our study—69.2%—were female.[22–24] In contrast, the majority of participants in the research by Duan S et al. and Ahmed et al. were male.[18, 22] In our study, around 99% of participants said they had never learned any AI-related skills before, and 88.3% had never used AI in medicine. The results of Scheetz J et al., Rainey C et al., and Qurashi AA et al. are in agreement with this observation.[25–28]

The majority of participants (50.1%) had a rudimentary understanding of broad AI principles, which is consistent with findings from studies by Bedia AS et al., Seram T et al., and Duan S et al. [18,22,29] For 35.8% of participants in our study, self-study was the main way they learned AI. Singh N et al. and Asmatahasin M et al., however, observed a different result, with 55.2% and 67.41% of participants, respectively, citing social media as their primary source of information about artificial intelligence. [21] Robot-assisted surgery was chosen by a larger percentage of participants (41.66%) as the most well-known use of AI in medicine, with 35% of people choosing medical imaging interpretation. On the other hand, 51% of respondents to a study by Sur J et al. felt that AI can be helpful in deciphering complex radiographic scans, which was corroborated by a study by Asmatahasin M et al.[23, 29] Additionally, according to a study by Seram T et al., 47.8% of participants said AI is very helpful when making decisions about diagnosis and treatment, followed by 33.6% who said it is very helpful when it comes to direct treatment (including surgical robots).[22]

Of the 120 participants, 66.6% view AI's function in medicine as neutral, with 19.2% viewing it as somewhat positive. A similar result of 45.56% was seen in the study of Asmatahasin M et al.[23] Studies like Ahmed et al. and Al Saad MM et al., on the other hand, firmly believe that AI will play a bigger role in medicine.[20, 25] AI will have a moderate impact on medicine in the future, but it won't replace human doctors, according to the majority of our survey (58.3%). According to the Santos DPD et al. study, most participants are unconcerned about AI taking the place of human doctors.[24] Only 29.3% of respondents to the Gong B et al. study felt that AI would eventually replace radiologists, which supports our conclusion.[30] Regarding the belief that AI can improve diagnostic accuracy, 52.6% was neutral and 29.1% agreed in our study. In a study by Asmatahasin M et al., and Oh S et al., that 50.74% and 83.4%, believed AI as definitive diagnostic tool.[23,31] About 40.8% of participants in this study trust AI generated medical recommendations. In contrast a study by Seram T et al., identifies only 14.2% will believe AI opinion.[22]

About the concern of AI in medicine majority (50.8%) of participants in our study stated that Lack of human empathy in AI driven care, followed by Ethical and legal concerns by 41%. This finding was supported by Weins J et al., and Chustecky M. studies.[32,33] Around 77.5% of participants insisted to include AI into medical curriculum as an elective course. This was supported by Fernandes S et al., Asmatahasin M et al., Dumic-cule I et al., Wood EA et al., Qurashi et al. and Ejaz H et al.[23,28,34–37] Among 120 participants 39.1% were interested in attending an elective course on AI. This finding was similar to the studies done by Liu DS et al., and Jebreen K. et al.[38,39] There was statistically significant difference among gender regarding the opinion on integrating AI into medical education. In contrast no statistical significance was noted by Asmatahasin M et al.[23] Opinion on aspects to be covered in medical education in our study shows higher proportion 39.7% supporting AI applications in diagnostic and treatment, followed by ethical and legal issues related to AI. This was supported by Seram T et al.[22]

Participants in our survey acknowledged a number of significant benefits of AI in medicine, such as increased learning through the summarization of extensive literature, faster decision-making, more accurate diagnosis, and more precise therapy. Many valued AI's capacity to save time, analyze large amounts of data, and provide reliable results without getting tired. However, challenges with AI's lack of empathy, limited ability to customize care, and dependability were also brought up. While some highlighted AI's incapacity to adjust to the intricate, multifaceted nature of medical care, others expressed concern that it would completely replace doctors. The "black box" dilemma, in which AI's decision-making is still opaque, data bias, and ethical issues were all major themes.

Participants also gave opinion on improving AI related education in medicine like workshops, elective postings, and practical sessions with case-based AI simulations can provide hands-on experience. Including content on algorithmic bias and decision audits will equip students to critically evaluate AI outputs. Continuous Medical Education (CME) sessions and awareness programs can further build competency and ensure responsible integration of AI into healthcare

LIMITATIONS OF THE STUDY

The main limitation of this study includes its conduct within a single institution or restricted geographic area, which may limit the generalizability of the findings to a wider population. Additionally, the limited integration of AI topics in the existing medical curriculum may have impacted the participant's level of awareness and the nature of their responses.

RECOMMENDATIONS

From the study, it is evident that AI is a promising tool that can aid and enhance the current state of medical sciences. Thus, it is recommended to encourage interdisciplinary collaboration between medical and technical faculties to design context-relevant AI education programs, structured AI modules have to be included in the undergraduate medical curriculum.

CONCLUSION

This study found that most undergraduate medical students had neutral to generally positive opinions regarding AI and acknowledge its potential for help in diagnosis and therapy. The perceptions of the majority of participants may have been influenced by their lack of prior exposure to AI-related courses or real-world applications. The most prevalent concerns were lack of human empathy, ethical and legal concerns, and data privacy. All things considered, the results highlight how crucial it is to include structured AI instruction in the medical curriculum in order to prepare aspiring doctors for the quickly changing technological landscape in healthcare.

ACKNOWLEDGEMENTS

REFERENCES

1. Steinhubl SR, Muse ED, Topol EJ. The emerging field of mobile health. Sci Transl Med 2015;7(283):283rv3.

2. Peng Y, Zhang Y, Wang L. Artificial intelligence in biomedical engineering and informatics: An introduction and review. Artificial Intelligence in Medicine 2010;48(2):71–3.

3. McCarthy J, Minsky ML, Rochester N, Shannon CE. A proposal for the dartmouth summer research project on artificial intelligence, August 31, 1955. AI magazine 2006

4. Nilsson NJ. Artificial Intelligence: A New Synthesis. San Francisco: Morgan Kaufmann Publishers, Inc; 1998.

5. Haleem A, Javaid M, Khan IH. Current status and applications of Artificial Intelligence (AI) in medical field: An overview. Current Medicine Research and Practice 2019;9(6):231–7.

6. Habuza T, Navaz AN, Hashim F, Alnajjar F, Zaki N, Serhani MA, et al. AI applications in robotics, diagnostic image analysis and precision medicine: Current limitations, future trends, guidelines on CAD systems for medicine. Informatics in Medicine Unlocked 2021;24:100596.

7. Artificial Intelligence in Medicine | New England Journal of Medicine [Internet]. [cited 2025 May 7]

8. The Role of the Internet on Patient Knowledge Management, Education, and Decision-Making | Telemedicine and e-Health [Internet]. [cited 2025 May 7].

9. Crilly P, Hassanali W, Khanna G, Matharu K, Patel D, Patel D, et al. Community pharmacist perceptions of their role and the use of social media and mobile health applications as tools in public health. Research in Social and Administrative Pharmacy 2019;15(1):23–30.

10. Al-Shorbaji N. E-health in the Eastern Mediterranean Region: a decade of challenges and achievements. East Mediterr Health J 2008;14 Suppl:S157-173.

11. Altuwaijri MM, Bahanshal A, Almehaid M. Implementation of computerized physician order entry in National Guard hospitals: Assessment of critical success factors. J Family Community Med 2011;18(3):143–51.

12. Briganti G, Le Moine O. Artificial Intelligence in Medicine: Today and Tomorrow. Front Med [Internet] 2020 [cited 2025 May 7];7. Available from: https://www.frontiersin.orghttps://www.frontiersin.org/journals/medicine/articles/10.3389/fmed.2020.00027/full

13. The need for a system view to regulate artificial intelligence/machine learning-based software as medical device | npj Digital Medicine [Internet]. [cited 2025 May 7];Available from: https://www.nature.com/articles/s41746-020-0262-2

14. Chan KS, Zary N. Applications and Challenges of Implementing Artificial Intelligence in Medical Education: Integrative Review. JMIR Med Educ 2019;5(1):e13930.

15. MIR MM, MIR GM, RAINA NT, MIR SM, MIR SM, MISKEEN E, et al. Application of Artificial Intelligence in Medical Education: Current Scenario and Future Perspectives. J Adv Med Educ Prof 2023;11(3):133–40.

16. Zhang W, Cai M, Lee HJ, Evans R, Zhu C, Ming C. AI in Medical Education: Global situation, effects and challenges. Educ Inf Technol 2024;29(4):4611–33.

17. Cao G, Duan Y, Edwards JS, Dwivedi YK. Understanding managers' attitudes and behavioural intentions towards using artificial intelligence for organizational decision-making. Technovation 2021;106:102312.

18. Duan S, Liu C, Rong T, Zhao Y, Liu B. Integrating AI in medical education: a comprehensive study of medical students' attitudes, concerns, and behavioural intentions. BMC Medical Education 2025;25(1):599.

19. Yüzbaşıoğlu E. Attitudes and perceptions of dental students towards artificial intelligence. Journal of Dental Education 2021;85(1):60–8.

20. Al Saad MM, Shehadeh A, Alanazi S, et al. Medical students' knowledge and attitude towards artificial intelligence: an online survey. Open Public Health J 2022;15(1).

21. Singh N, Pandey A, Tikku AP, Verma P, Singh BP. Attitude, perception and barriers of dental professionals towards artificial intelligence. Journal of Oral Biology and Craniofacial Research 2023;13(5):584–8.

22. Seram T, Batra M, Gijwani D, Chauhan K, Jaggi M, Kumari N. Attitude and perception of dental students towards artificial intelligence. UNIVERSITY JOURNAL OF DENTAL SCIENCES [Internet] 2021 [cited 2025 May 9];7(3). Available from: https://ujds.in/index.php/ujds/article/view/536

23. Asmatahasin M, Pratap KVNR, Padma TM, Kalyan VS, Kumar VS. Attitude and Perception of Dental students towards Artificial Intelligence. ijbamr 2021;10(3):305–14.

24. Pinto dos Santos D, Giese D, Brodehl S, Chon SH, Staab W, Kleinert R, et al. Medical students' attitude towards artificial intelligence: a multicentre survey. Eur Radiol 2019;29(4):1640–6.

25. Ahmed Z, Bhinder KK, Tariq A, et al. Knowledge, attitude, and practice of artificial intelligence among doctors and medical students in Pakistan: a cross-sectional online survey. Ann Med Surg 2022;76.

26. Scheetz J, Rothschild P, McGuinness M, Hadoux X, Soyer HP, Janda M, et al. A survey of clinicians on the use of artificial intelligence in ophthalmology, dermatology, radiology and radiation oncology. Sci Rep 2021;11:5193.

27. Rainey C, O'Regan T, Matthew J, Skelton E, Woznitza N, Chu KY, et al. Beauty Is in the AI of the Beholder: Are We Ready for the Clinical Integration of Artificial Intelligence in Radiography? An Exploratory Analysis of Perceived AI Knowledge, Skills, Confidence, and Education Perspectives of UK Radiographers. Front Digit Health 2021;3:739327.

28. Qurashi AA, Alanazi RK, Alhazmi YM, Almohammadi AS, Alsharif WM, Alshamrani KM. Saudi Radiology Personnel's Perceptions of Artificial Intelligence Implementation: A Cross-Sectional Study. J Multidiscip Healthc 2021;14:3225–31.

29. Sur J, Bose S, Khan F, Dewangan D, Sawriya E, Roul A. Knowledge, attitudes, and perceptions regarding the future of artificial intelligence in oral radiology in India: A survey. Imaging Sci Dent 2020;50(3):193–8.

30. Gong B, Nugent JP, Guest W, Parker W, Chang PJ, Khosa F, et al. Influence of Artificial Intelligence on Canadian Medical Students' Preference for Radiology Specialty: ANational Survey Study. Academic Radiology 2019;26(4):566–77.

31. Oh S, Kim JH, Choi SW, Lee HJ, Hong J, Kwon SH. Physician Confidence in Artificial Intelligence: An Online Mobile Survey. J Med Internet Res 2019;21(3):e12422.

32. Wiens J, Shenoy ES. Machine Learning for Healthcare: On the Verge of a Major Shift in Healthcare Epidemiology. Clin Infect Dis 2018;66(1):149–53.

33. Chustecki M. Benefits and Risks of AI in Health Care: Narrative Review. Interact J Med Res 2024;13:e53616.

34. Fernandes S, Bafna Y, Patel C, Parmar D. Knowledge Attitude and Practice of Dental students towards Artificial Intelligence (AI): A Questionnaire based survey. J Xidian University 2022;16(8).

35. Dumić-Čule I, Orešković T, Brkljačić B, Kujundžić Tiljak M, Orešković S. The importance of introducing artificial intelligence to the medical curriculum – assessing practitioners' perspectives. Croat Med J 2020;61(5):457–64.

36. Wood EA, Ange BL, Miller DD. Are We Ready to Integrate Artificial Intelligence Literacy into Medical School Curriculum: Students and Faculty Survey. J Med Educ Curric Dev 2021;8:23821205211024078.

37. Ejaz H, McGrath H, Wong BL, Guise A, Vercauteren T, Shapey J. Artificial intelligence and medical education: A global mixed-methods study of medical students' perspectives. Digit Health 2022;8:20552076221089099.

38. JMIR Medical Education - Perceptions of US Medical Students on Artificial Intelligence in Medicine: Mixed Methods Survey Study [Internet]. [cited 2025 May 28]; https://mededu.jmir.org/2022/4/e38325/?utm_source=chatgpt.com

39. Jebreen K, Radwan E, Kammoun-Rebai W, Alattar E, Radwan A, Safi W, et al. Perceptions of undergraduate medical students on artificial intelligence in medicine: mixed- methods survey study from Palestine. BMC Med Educ 2024;24(1):507.