KNOWLEDGE AND PERCEPTION OF PRACTICING DOCTORS ON ARTIFICIAL INTELLIGENCE APPLICATION IN MEDICINE

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ABSTRACT

Background and Objectives: Artificial Intelligence (AI) is gaining importance in every field, including medicine. The aim of this study was to determine the knowledge and perception of practicing doctors on artificial intelligence application in medicine.

Methods: This study was conducted among doctors of Bahawal Victoria Hospital, Bahawalpur using a non-probability convenience sampling strategy. The tool included questions on socio-demographics and to assess the knowledge and perception of doctors about the application of artificial intelligence in medicine and medical practices. Data were entered and analyzed in SPSS.

Results: Most of the respondents were postgraduate residents (45.7%). There were 73.3% participants who already knew about the applications of AI in medicine but only a few (13.3%) had read any academic literature about it. There were 42.9% participants who think that the AI will 'moderately affect' the field of medicine and around 33% of participants reported that Radiology will be the specialty to be 'most affected' by AI. There were 9.5% of the respondents strongly agreed and 31.5% agreed that AI will replace the future medical practitioners. Still, the majority of the respondents agreed that the medical curriculum should incorporate the component of AI for the students.

Conclusion: Most of the doctors lack formal education in artificial intelligence. However, they hold a favorable opinion of AI in healthcare and open to incorporating it. Because the AI is the future of healthcare, so it is essential to integrate AI training into medical education.

Key Words: Artificial Intelligence, Doctors, Knowledge and Perception, Medicine

How to cite: *Naeem S, Abbas H, Hamna S. Knowledge and perception of practicing doctors on artificial intelligence application in medicine. JAIMC. 2025; 23(2): 63-67*

Artificial Intelligence is in debate for last few years with its increasing application in all industries including the healthcare. Although there are only limited practical examples with evidences for its medical use, there is a lot of discussion going on for Artificial Intelligence (AI).[1] There is a growing evidence that the AI is having extensive media coverage, scholarly articles, policy reports and testimonials from specialized societies.[2] There is no doubt in the beneficial role of AI in healthcare, but there is need to well-inform the medical professionals during this process of adaptation for the AI.[3] The use of AI in healthcare will be a common practice in future, irrespective of the use or effect of old technologies.[4]

According to a study from Northern India about awareness of AI among medical practitioners; 74.4% reported that in the future, AI will be crucial in providing the healthcare services, 79.6% had no knowledge about applications and limitations of AI and 51.6% of the participants were eager to learn more about AI. There were 65.2% of the participants who felt that AI will be useful for their career. Regarding lectures, webinar or courses on AI, 83.5% of the medical students reported that they have never attended any one of them.[5]

Another study from Korea reported a low level of familiarity with AI with a mean score of 2.11/5 for medical students and 2.06/5 for doctors. In the

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Submission Date: 16-06-2025
1st Revision Date: 28-06-2025
Acceptance Date: 03-07-2025

previous year, only 2.9% of doctors attended a course on AI as compared to the 9.8% of medical students.[6] A study from Nepal reported knowledge and perception of AI among interns and medical students. The median "Artificial Intelligence knowledge score" was 11 with Interquartile range of 4. The maximum score was 25. Higher scores were achieved by the final year medical students (*p*-value=0.006) and by those students who got some training on artificial intelligence(*p*-value=0.040). Regarding the job replacement of doctors by AI, more than 49% of the participants strongly agreed or agreed to it.[7]

A cross-sectional study from the Pakistan assessed the the knowledge, attitude, and practice of AI among doctors and medical students in Pakistan. The study reported that 74% doctors and 68.8% medical students had the basic knowledge of AI but only 27.3% of the doctors and 19.4% of the students, were aware of its use in medicine. Regarding attitude, 76.7% of the individuals supported inclusion of AI in the medical curriculum.[8] Another study from Pakistan analysed the AI knowledge, attitudes, and perceptions of healthcare professionals. During their studies or employment, 78.7% participants reported of not receiving any formal sessions or training in AI. There were 70.3% participants who believed that AI would raise more ethical concerns in healthcare. There were 66.4% of participants who believed that at the undergraduate level, AI should be taught.[9]

The era of AI has the potential to improve the practice of future medicine, raising it more accurate, comprehensive and individualized. Pakistan, unlike the Western world is lagging behind in providing AI-based solutions to its health problems. The future chances of implementation of AI in our health systems and our readiness to accept it depends upon the awareness and attitude of our medical doctors on this aspect. So the rationale of this study is to assess their prior knowledge and awareness on this topic. The previous studies in Pakistan on this topic mainly focused on the attitudes of medical students, so we are undertaking this study to know the knowledge and awareness of medical practitioners.

METHODS

This cross-sectional study was conducted at the Bahawal Victoria Hospital, Bahawalpur from April 2022 to September 2022. By using the non-probability convenient sampling strategy 120 doctors from surgery, medicine and pathology department were approached for the study. A total of 105 individuals (87.5%) completed the questionnaires out of the 120 distributed. There was no any inclusion and exclusion criteria and only consent to participate in the study was required. After consent, questionnaire having the variables on sociodemographic information like age, gender, designation in the hospital and source of AI information was addressed. The questionnaire was having the component of knowledge and application of AI in medical practice. After field and office editing, data were entered in the excel and further analysis was done on the SPSS version 23. Mean and standard deviation was calculated for quantitative variables while frequency and percentages were calculated for qualitative variables.

RESULTS

There were 53 male and 52 female participants. The

Table 1: Sociodemographic characteristics of study participnats (n=105)

Characteristics	n (%)
Age 'in years'	
20-30	56 (53.3)
31-40	36 (34.3)
41-50	11(10.5)
51-60	02 (1.9)
Gender	
Male	53 (50.5)
Female	52 (49.5)
Designation	
House officer	40 (38.1)
Medical officer	10 (9.5)
Postgraduate Resident	48 (45.7)
Assistant Professor	07 (6.7)
Sources for AI information	
Mentors & teachers	23(21.9)
Peers & friends	25 (23.8)
Articles & other online forums	31 (29.5)
Television & movies	26 (24.8)

mean age of the participants was 31.25 years (SD =±7.36). We got a response from 35 participants from each of the three departments i.e. pathology, surgery and medicine. Out of these, 40 (38.1%) were House officers, 48 (45.7%) were post graduate residents, 10 (9.52%) were medical officers and 07 (6.67%) were assistant professors. The most popular source of information of AI for study participants was articles and online (Table 1).

Table 2: Study participant's knowledge for the 'application of AI in medical practice' (n=105)

Knowledge for the application of AI	Yes	No
	N (%)	N (%)
"Did you already know about the applications of AI in medical practice?"	77 (73.3)	28 (26.7)
"Do you have any basic knowledge about how AI works?"	65 (61.9)	40 (38.1)
"Were you aware of other applications of AI in our daily lives (speech-text recognition, face detector, self-driving cars etc.)?"	84 (80.0)	21 (20.0)
"Have you read any academic literature about AI in medicine or done any such course?"	14 (13.3)	91 (86.7)

Concerning the knowledge about AI in medical practice, 77 (73.3%) agreed that they already knew about artificial intelligence while 28 (26.7%) didn't and 65 (61.9%) agreed that they have basic knowledge about the working principles of AI. While 40 (38.1%) didn't know, and 84 (80%) of respondents were aware of the applications of AI in daily life and 24 (20%) were ignorant. Only 14 (13.3%) participants had read any academic literature about AI (Table 2).

Table 3: Study Participant's response about the impact, enthusiasm and the speciality affected by AI (n=105)

Response	n(%)
How big an impact do you think AI will have on the practice of medicine	
Not significant	19 (18.1)
Minor- Few aspects of Medicine and Surgery	10 (9.5)
Moderate- Many aspects of medicine and surgery	45 (42.9)
Major- all aspects of medicine and surgery	31 (29.5)
How AI will affect the enthusiasm of the respondents towards their specialty (or aspired specialty)	
Would make me much more enthusiastic	33 (31.4)
Would make me enthusiastic	28 (26.7)
Wouldn't affect my enthusiasm	25 (23.8)
Make me less enthusiastic	12 (11.4)
Make me much less enthusiastic	07 (6.7)
Speciality most affected by the AI	
Surgery	32 (30.5)
Radiology	35 (33.3)
Pathology	10 (9.5)
Medicine	15 (14.3)
Cardiology	03 (2.9)
Dermatology	06 (5.7)
Urology	01 (0.95)
Oncology	03 (2.9)

Regarding their perception about AI in medicine, majority (42.96%) of the respondents think that AI

Table 4: Study Participant's awareness about the 'applications of AI in medical practice' (n=105)

	'Strongly agree'	'Agree'	'Not sure'	'Disagree'	'Strongly disagree'
"Would AI replace the future physicians/surgeons?"	10	33	23	20	19
	-9.50%	-31.50%	-21.90%	-19.10%	-18.10%
"Would AI help future practitionersto become more skillful at their work?"	15	51	18	11	10
	-14.30%	-48.60%	-17.10%	-10.50%	-9.50%
"Should AI be a part of medical training?"	28	49	14	13	1
	-26.70%	-46.70%	-13.30%	-12.40%	-0.95%

will have a moderate influence on medicine. While responding to the specialty to be the most affected by AI, radiology and surgery was reported as the most affected speciality by AI (Table 3).

When asked about whether AI will replace the future physicians, 31.5% agreed, 9.5% strongly agreed and 21.9% were not sure on this. On the other hand, when asked about AI in making practitioners more skillful, 14.3% strongly agreed, 48.6% agreed; 17.1% were not sure. However, the majority of the study participants asserted that AI should be made a part of medical training, 26.6% strongly agreed and 46.67% agreed (Table 4).

DISCUSSION

We found that a relatively greater number of individuals are of the opinion that AI will replace the future medical doctors although a good number of individuals are silent on this. A recent study in Germany suggested that AI will result in a better diagnosis than physicians.[10] Paradoxically, most of our respondents also think that AI will help the future medical practitioners to become more proficient in their work. Perhaps, they think that in the initial stages of the integration of AI into medicine, doctors will work together with AI technologies to yield better clinical outcomes, but later AI will completely take hold of medical practice. The latter response of our participants is consistent with the finding of a study done in Pakistan, wherein the respondents considered AI as an aid in early patient diagnosis and in error reduction, instead of physician's replacement.[11]

Majority of our respondents think that radiology will be the most affected specialty, surgery being the second. Surveys in UK and Canada suggested that due to ill-advised information from the media that radiology will soon be replaced as a specialty by AI, students are giving up this specialty choice.[12] In another study, even half of the medical students who had considered radiology as their first specialty choice, are now rethinking about the selection of other choices.[13] Perhaps media and online forums are important factors in propagating anxiety in medical students and doctors. In conformity with this, majority of our study respondents also agreed to receive most of the information about this topic from online forums. Our study respondents strongly agree with the notion that AI should be made a part of medical training. Previous studies show the same tendency of respondents towards this change.[11] However, in contrast to these, a recent study 20 in Ireland indicated that there was a trend towards younger participants being less interested to learn about AI or machine learning (ML).[12]

Over the past few years many studies across different countries, have shown that medical students are willing to have AI courses in their medical school and postgraduate residency programs. It is also shown that having the appropriate knowledge about AI and radiology, reduces the anxiety about the use of AI in medical practice.[13] Our study also has the same findings.

Moreover, AI can become a key tool for providing health equity around the world, and the World Health Organization (WHO) has begun to lay down guiding principles to regulate the use of AI.[14,15] Furthermore, drawing on the experiences at the University of Toronto and MIT (Massachusetts Institute of Technology) Critical DataGroup, the authors of a study advocate that medical students can develop dual skills i.e., medicine and AI to face the future challenges. The same study proposes that even after the graduation, competencies related to AI can be developed through continuing medical education.[16]

CONCLUSION

Our study revealed that still a reasonable proportion of our medical doctors don't know about AI. Even of those who do know, only a few of them have done any academic or formal learning on this topic. A large number of doctors even think that "AI will replace them in the future". Knowing that the future of medical practice is with AI, it is therefore

necessary to incorporate AI courses into the curricula of our medical schools and residency programs. Radiology is the speciality which is highly affected by the use of AI, therefore this field of medicine should take the lead in educating AI to the undergraduate and postgraduate students and warding off any negative information. Since the AI is the future of healthcare, so it is recommended to incorporate AI training into medical education to prepare the future doctors for the upcoming challenges of advancement in medical practices.

Ethical approval:

Ethical approval for this study was obtained fom the Institutional Ethical Review Board, Quaid-e Azam Medical College, Bahawalpur (No. 2692/DME/QAMC Bahawalpur).

Conflict of Interest: *None*

Funding Source: *None*

AUTHOR'S CONTRIBUTION

Shahla Naeem: Data Collection

Huda Abbas: Data Analysis, Statistical Analysis

Sundas Hamna: Manuscript Writing and Revision

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