Unveiling the Attitudes of Medical Faculty Towards the Integration of Artificial Intelligence in Medical Education

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ABSTRACT

Objective: To explore the attitude of faculty members towards integration of artificial intelligence (AI) and to accelerate the appropriate adaptation of AI tools in medical education.

Study Design: A qualitative case study.

Place and Duration of the Study: Department of Medical Education, Bahria University Health Sciences Campus, Karachi, Pakistan, from June to October 2023.

Methodology: A qualitative case study design was employed using a social cognitive theory framework. Participants were selected using a purposive sampling technique. Inclusion criteria were faculty members with five years of teaching experience and who gave consent. Twenty-one participants were included in the study using purposive sampling technique. Data were collected using individual projective interviews and two focus group discussions using the photovoice methodology. Participants were given a presention on tools of AI which can be integrated in teaching and assessment. Pattern matching technique was used for data analysis.

Results: Most of the participants had limited awareness of tools of AI that can be integrated in medical education to enhance teaching and assessment strategies. However, few participants had a good understanding of AI and its utility. However, there was great variation in the attitude of faculty members. Participants voiced on fostering partnerships between healthcare organisations, educational institutes, and technology companies to pool resources and expertise. Faculty members suggested that there should be more faculty development programmes on AI applications in medical education.

Conclusion: Medical faculty needs to be trained as they have limited knowledge and awareness of the integration of AI in medical education.

Key Words: *Artificial intelligence, Medical education, Medical faculty*.

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INTRODUCTION

Artificial intelligence (AI) has the potential to revolutionise curriculum development, provide personalised training experience, improve the simulation-based learning experience, analyse data for evidence-based practice, produce computer-adaptive assessment for immediate feedback, and enhance clinical decision-making.[1] Its usage in medical education has the ability to facilitate complicated tasks and improve efficiency. It can help automate the assessment of written responses or provide feedback on medical image interpretations with excellent reliability. Although the applications of AI in learning, instruction, and assessment are emergent, further exploration is still required.[2] There are few previous research studies on the usage of the AI in medical education in Pakistan.[3,4]

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There is growing awareness among medical educators around the world about the potential of AI. There is a need to spread awareness of the potential benefits of AI in the field of healthcare medical education in Pakistan.

AI refers to computer programmes that are able to think and behave like humans, whereas machine learning is beyond that where data are fed in the machine along with an algorithm which helps the machine with experience. Deep learning is a subset of machine learning where algorithms are organised in the form of artificial neural networks which might have different layers to process input data. In medical education, computer-assisted learning was introduced in the 1960s and 1970s to provide an interactive learning experience which allowed medical students to access medical information and learn from simulated clinical scenarios. In 1980s, an expert system was developed to assist medical diagnosis. Virtual reality (VR) simulators emerged in the 1990s through which students can practise clinical skills and surgical procedures in a controlled environment. In the 2000s, natural language processing technologies were employed by medical students to personalise learning experiences.[5] In the 2010s, with the development of deep learning algorithms which can analyse large amount of data, an adaptive curriculum tailored for indivi-

dual students' progress was developed to ensure optimal learning outcomes for each learner. It is being employed to automate the assessment of the performance of medical students with objective evaluation and constructive feedback.

There is much diversity in the application of AI in medical education. However, the need of the hour is to create awareness of its benefits and train medical educators. This study aimed to explore the attitude of faculty members towards AI.

METHODOLOGY

This study was conducted at the Bahria University Health Sciences Campus, Karachi, Pakistan, from June to October 2023. A qualitative case study research design was employed. Participants were selected using a purposive sampling technique. Social cognitive theory was used to direct the research design. Social cognitive theory emphasises the role of social factors, cognitive processes, and behaviours in learning. In the context of AI in medical education, this framework can be used to explore how interactions with AI systems, as well as observational learning from peers and instructors, influence learning outcomes and behaviours. Applying Social Cognitive Theory (SCT) to AI in health professional education involves examining how individuals' cognitive processes, behaviours, and social interactions influence their learning and adoption of AI technologies. SCT emphasises the role of observational learning where individuals learn by observing others. It was explored as to how health professionals observe and learn from their peers, educators, or AI systems by using AI technologies for education. Self-efficacy, or individuals' beliefs in their ability to perform a task, is a central concept in SCT. It suggests that individuals are more likely to engage in a behaviour if they expect positive outcomes from it. SCT posits that behaviour, personal factors, and environmental influences interact dynamically. Initial five pilot unstructured interviews were done to generate open-ended questions and a questionnaire guide was maintained in which questions were added and removed after reflection by the researcher. Data were collected using semi-structured individual projective interviews of thirty minutes duration and two focus group discussions using photovoice methodology which were of sixty minutes duration. Photovoice methodology explored the phenomenon of interest in depth and it gives rich data by the reflection of participants' perspective and views through reflecting on the pictures chosen by the participants. Participants were asked to choose pictures of teaching sessions and suggest strategies to adapt AI in teaching and assessment at the present study's institute through photographs and explain what are they practising and how they can improve their strategies. Incusion criteria were faculty members with five years of teaching experience and who gave consent. Exclusion criteria were faculty members with less than five years of teaching experience and who did not give consent. Informed consent was taken from participants before interviews and focus group discussions.

After focus group discussions, strategies to integrate AI in medical education were shared with all participants in the form of PowerPoint presentation. They were also given handouts on the same strategies to accelerate attitude and adaptation on AI in medical education. Triangulation of data collection methods was done. Member check technique was used to ensure that participants endorse the results and interpretations. Confidentiality was maintained by asking the participant if they wanted to remove certain aspects which can reflect their private life perspective and if they were not comfortable sharing the same. All participants were faculty members of Bahria University Health Sciences Campus, Karachi, Pakistan. Researcher had no prior relationship with the participants who were involved in the study. However, the researcher was also a faculty member of the same institute.

AI tools were presented to participants in focus group discussions to generate discussion. Teaching and learning tools presented were a virtual reality patient simulator, an adaptive personalised learning tool, and AI PowerPoint presentation tools as Beautiful AI. Assessment AI tools presented were an automated graded system, formative assessment with analysis, computer adaptive formative assessment, and AI item analysis tool.

RESULTS

A total of twenty-one participants participated in the study. Eighty-five percent of the participants had limited knowledge of tools that can be integrated in medical education to enhance teaching and assessment strategies. However, there was variation in participants' attitude towards learning AI application in medical education. Few participants have good understanding of AI and its utility.

Participants voiced on fostering partnerships between healthcare organisations, educational institutes, and technology companies to pool resources and expertise. They also emphasised on the importance of providing comprehensive training to medical educators, so that they can attain appropriate skills to incorporate AI in the curriculum, teaching, and assessment. Data analysis reflected that seeing others successfully integrating AI into their practices or receiving recommendations from trusted colleagues were the main factors which influence their decisions to adopt AI tools in teaching and research. Health professional educators perceived their efficacy in using AI technologies for educational purposes as inadequate and unsatisfactory. Their prior experience with technology hinders their confidence in using AI tools effectively. Health professional educators have diminutive expectations regarding the outcomes of using AI in medical education. These include expectations about improved learning outcomes, efficiency gains, or enhanced collaboration with peers, and these outcome expectations influences their motivation to adopt AI technologies.

Support or resistance from colleagues, administrators, or professional organisations influences their willingness to

explore and integrate AI technologies into their teaching and learning practices. Institutional policies, resource availability, and interaction of faculty members with AI technologies shape their experiences and perceptions of using AI in health professional education.

DISCUSSION

In recent years, there has been a significant increase in research studies on the application of AI in medical education. Although few studies explored the attitude and perceptions of medical faculty and students on artificial intelligence, most previous studies explored how AI tools can enhance learning activities and curriculum outcomes.[6,7] Previous studies also focused on the ethical aspects of integrating AI in teaching and learning.[8] AI is playing an increasingly vital role in revolutionising health professional education, and its significance cannot be overstated. AI enables personalised learning experiences, health education is not one-size-fits-all, as students have varying levels of proficiency and learning styles. AI-powered algorithms can tailor educational content according to the individual's needs, ensuring that the students receive right information at the right time. Furthermore, AI facilitates continuous assessment and feedback. By analysing students' performance and behaviour, AI can provide real-time feedback and identify areas where improvement is needed.[9,10] This not only enhances students' understanding but also helps faculty members to adapt their teaching methods. In the field of healthcare, staying up-to-date with the latest research and practices is crucial. AI can sift through a vast amount of medical literature, identifying the most relevant and recent information for students and medical faculty alike, keeping them well-informed of the latest developments.[11,12] AI also enables the simulation of real-world medical scenarios, allowing students to practise in a safe and controlled environment. This hands-on experience can be invaluable for developing clinical skills without putting patients at risk. AI empowers future healthcare professionals to be better prepared, more knowledgeable, and ultimately more effective in their roles in clinical practice.[13,14] AI in medical education will empower medical students through individualised learning experiences. It will equip them with skills to excel in the rapidly developing landscape of healthcare while maintaining patient-centred and evidence-based practice.

CONCLUSION

Medical faculty needs to be trained to change their attitude towards AI and its application in medical education as they have limited awareness of the integration of artificial intelligence in medical education.

ETHICAL APPROVAL:

Ethical approval was obtained from the Institutional Review Board of the Bahria University Health Sciences Campus, Karachi, Pakistan (No: BUHS-IRB#009/23).

PATIENTS' CONSENT:

Informed consent was taken from participants before interviews and focus group discussions.

COMPETING INTEREST:

The author declared no conflict of interest.

AUTHOR'S CONTRIBUTION:

KF: Conception, design of the work, acquisition, analysis, interpretation of data, drafting of the work, revising the manuscript critically for important intellectual content, and final approval of the manuscript to be published.

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