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Assessment of Knowledge and Education Regarding Artificial Intelligence Among Medical Teaching Faculty at Bolan Medical College, Quetta

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ABSTRACT

In the context of the continued rapid progress of the incorporation of AI technology into the healthcare system of the state of Pakistan, there are considerable shortcomings regarding the knowledge and readiness of the faculty who teach medicine at various institutions of the country's education system, including provinces with historically underrepresented portions of the community, like Balochistan. **Objectives:** To evaluate the knowledge, educational experience, perceptions, and preparedness of the medical teaching staff of Bolan Medical College regarding AI technology. **Methods:** A cross-sectional observational study with a sample of 200 teaching faculty. A 24-point questionnaire was based on the literature received and the study used Google Forms, ensuring objectivity with anonymization. Descriptive and inferential analyses were used with SPSS version 27.0. **Results:** The sample, 119 (59.5%), were aware of applications of AI in medicine; only 53 (26.5%) reported being formally educated on AI. Awareness of AI in clinical sciences was 112 (56%). Knowledge of at least one AI-related programming language was 126 (63%), while familiarity with AI-related journals was 60 (30%). Only 42 (21%) reported AI-related education in their curriculum. The average knowledge stood at 2.33 ± 1.07 on a 6-point scale, reflecting moderate awareness, with only moderate application of AI knowledge, and 53 (26.5%) reporting ease of application. **Conclusions:** Teaching staff appear interested and aware of AI; however, major shortcomings point to the requirement of immediate faculty development programs to equip educators with knowledge and wisdom so that AI can safely be implemented in medicine.

INTRODUCTION

The application of AI technology grew gradually within the field of healthcare, with its first reported application being the use of a computational algorithm on cases of patients with acute abdominal This application occurred as early as the year 1976 [1]. Since this early application of AI technology within the realm of healthcare, the technology has made great progress to the point of being applied not only in diagnostics but other aspects of the medical field. Recent years have witnessed the application of AI technology being incorporated within education. This application of AI technology pain. cannot only affect the practice of the medical field, but also the training of the next set of physicians, too. That being the reality, various ethical issues are due to the growing application of AI technology. This necessitates the study of the ethical implications of AI technology, particularly with the next set of physicians who will practice medicine after their training. Although there have been efforts recently on the part of well-off nations to integrate AI with their medical education programs as well as healthcare delivery systems, there still exist enormous inequalities on the part of developing nations. Although AI technology has the

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potential of improving the diagnostic efficiency of medical practitioners [2]. there may exist various constraints that could hamper the widespread application of AI technology in developing nations due to various reasons, like a lack of knowledge about AI technology [3], the unavailability of training facilities, and ambiguity regarding its application at the ethical levels. Various research works published so far have indicated the possibility that the early application of AI technology during medical education could improve the knowledge levels and proper application of the technology later on during practice amongst future practitioners. However, there is still a lack of sufficient research on the knowledge levels of the academic staff at various institutions across the world regarding [4, 5]. The province of Baluchistan, which might well rank as the most under-represented area of the country's medical education system, at the present time simply lacks an iota of published information regarding the education of the medical faculty on the topic of AI. The incorporation of AI technology into medical practice requires more than simple technological acculturation; it necessitates a knowledge base of its potential and its constraints. [6, 7]. The study targets the knowledge levels regarding the ethical aspects of AI at the institution with the purpose of determining the educational levels of the departments regarding AI at the institution [8]. The study targets the knowledge levels regarding the ethical aspects of AI at the institution with the purpose of determining the educational levels at the institution. This study targets the knowledge levels regarding the ethical aspects of AI at the institution, with the purpose of determining the educational levels of the departments at the institution. This study targets the knowledge levels regarding AI at the institution of the province of Sindh with the purpose of determining the educational levels at the institution [9, 10]. The study targets the knowledge levels regarding the ethical aspects of AI.

This study aimed to focus on assessing the familiarity of the faculty regarding AI on an educational scale at the academic institution of the province of Sindh.

METHODS

This cross-sectional study was conducted from Jan 2025-June 2025 at the Bolan Medical College, Quetta. Its purpose was the exploration of knowledge, educational experience, and perceptions of AI among the medical faculty at the institution. The study population of this community-based study only comprised the medical faculty at the institution, which includes professors, Associate professors, Assistant professors, Senior Registrars, Junior Registrars, and lecturers. The only individuals who were not part of the study population were those who were not currently engaged with the institution as professors or who refused participation. Both these aspects of cognitive engagement with the institution made them not part of the study population. Digital informed consent was sought preceding the distribution of the inquiries on the form [11, 12]. All participation in the study remained voluntary. Digital informed consent forms the first point of engagement with potential subjects who consent via their email address on the form. The sample size was determined based on the total population of approximately 250 medical teaching faculty at Bolan Medical College. Using the Krejcie and Morgan table for determining sample size for a known population, a sample of 200 participants was deemed adequate to achieve a confidence level of 95% with a margin of error of 5%. This sample size is also consistent with similar cross-sectional studies assessing knowledge and attitudes among healthcare professionals. The instrument used for data collection consisted of a web-based questionnaire that could only appear if the participant met certain criteria. This instrument was formed using Google Forms and is based on various published works on the application of AI in medical education and practice. This instrument included only the essential points that usually come under the well-known instruments. Additionally, a pilot study testing the instrument was not conducted; there was an overview of the instrument by experts regarding its relevance and clarity, and the instrument only consisted of points that had been discussed under various published works on AI. This made the testing of the instrument even more feasible and easier. Additionally, the instrument of this study consisted of points that usually come under well-known instruments. This made the instrument even more reliable. Additionally, the instrument of this study consisted of points that are usually taken under well-known instruments. This made the instrument more reliable. Additionally, the draft of this study only consisted of points that usually come under well-known instruments. This made the instrument even more reliable. Additionally, the instrument of this study consisted of points that usually come under well-known instruments. This made the instrument more reliable. Additionally, the draft of this study only consisted of points that usually come under well-known instruments. This made the instrument even more reliable. Additionally, the instrument of this study consisted of points that usually come under well-known instruments. This made the instrument more reliable. Additionally, the draft of this study only consisted of points that usually come under well-known instruments. This made the instrument even more reliable. Additionally, the instrument of this study only consisted of points that are usually come under well-known instruments. This made the instrument more reliable. Additionally, the draft of this study only consisted of points

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that usually come under well-known instruments. The final instrument consisted of 24 items that were collated into sections on demographics, familiarity with AI-related knowledge, training experience, usefulness of AI technologies, potential obstacles, and willingness to incorporate AI technologies into educational and practice contexts later on. Both fixed-choice and scale-type questions were employed. To guarantee that the results were complete with regard to the given set of issues, the questionnaire required that all the issues be answered first, preceding the form's submission release. After completing the questionnaire, the participants' answers remained completely unnamed and securely placed on coded-accessible documents. Ethical permission of the study was sought and obtained from the Institutional Review Board of the Bolan Medical College in Quetta. All procedures followed the ethical guidelines set forth under the Declaration of Helsinki. Participants were told that the gathered information would remain strictly confidential and that it could only be used with academic intent. The results of the questionnaire were exported into Microsoft Excel and interpreted using the SPSS Statistics software version 27.0. The internal consistency of the multi-item knowledge and attitude scales within the adapted questionnaire was found to be acceptable, with a Cronbach's alpha of 0.65. Descriptive statistics were used to state the frequency and percentages regarding qualitative variables. A knowledge index was calculated based on an assigned point per affirmative reply of the six critical knowledge points, with a maximum accumulated points being set at 6. Statistics of the mean and standard deviations were calculated for the knowledge index based on academic levels. Chi-square analyses of association were used regarding the relationship of academic levels with specializations and willingness regarding AI projects. A p-value of <0.05 represented significance. As the questionnaire aimed at the completion of every single field, there were no missing values.

RESULTS

The findings indicate that although a majority of faculty members report basic awareness of AI and its applications, formal educational exposure and curriculum integration remain notably limited. This disparity suggests that current knowledge is largely self-acquired rather than institutionally structured, reflecting gaps in academic preparedness. Strengthening formal training and curricular emphasis is therefore essential to foster informed attitudes and enhance pedagogical readiness for AI in medical education (Table 1).

Table 1: Awareness and Educational Exposure to Artificial Intelligence Among Faculty (n=200)

Variable	Yes	No
Application of AI in the medical field	119	81
Formal education on AI	53	147
AI application in clinical sciences	112	288
AI is included in the college curriculum	42	158
Knowledge of any computer language	126	74
Knowledge of AI-related journals	60	140

Overall responses reveal a cautiously optimistic perception of AI among faculty. While participants largely acknowledge the beneficial role of AI in early diagnosis and recognize the importance of faculty involvement in its application, many remain uncertain about AI's potential to replace physicians or increase diagnostic errors. The substantial proportion of "don't know" responses reflects ongoing ambiguity and highlights the need for structured educational initiatives to clarify AI's practical implications in clinical practice (Table 2).

Table 2: Perceptions and Attitudes Towards AI (n=200)

Questions	Agree	Strongly Agree	Don't Know	Disagree	Strongly Disagree
AI will replace physicians in the future	28	18	81	63	11
AI would be a burden for practitioners	28	0	88	74	11
AI helps in early diagnosis and severity assessment	102	35	46	18	0
AI would increase errors in diagnosis	53	11	77	53	7
The faculty role is important in AI applications	98	46	46	11	0

There is no statistically significant association between a faculty member's designation (rank) or their medical specialization and their desire to work on AI projects. This indicates that interest in engaging with AI is uniformly distributed across all seniority levels and clinical fields within the sampled faculty. (Table 3).

Table 3: Chi-Square Test

Test	χ^2 Value	df	p-value	Interpretation
Designation vs. Desire to Work on AI	0.83	4	0.9341	Not significant
Specialization vs. Desire to Work on AI	7.21	8	0.5144	Not significant

DISCUSSION

This study has revealed that the knowledge of AI among the faculty of the institution is moderate, with considerable disparities at the educational and application levels. This study corroborates the fact that despite the advances made at an AI application and integration level across the world. [13]. The moderate index of knowledge of AI at an average of 2.33 out of 6) corroborates the fact that there are considerable disparities at an [14]. A considerable

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proportion of the faculty members, that is, 59.5%, claimed familiarity with the application of AI technology in medicine; however, only a few professors were exposed through educational programs on the topic, that is, only 26.5% of the group followed AI educational programs [15, 16]. This causes considerable concern regarding the authenticity of the knowledge imparted through these programs [17]. But the fact that there is a lack of clarity on the implications of AI, with an indication that the greatest weakness of AI could lie in its potential burden on the practitioners [44%], with almost half of them feeling the possibility [18]. This fear of AI's implications has existed even with other researchers' findings regarding the ethical dilemmas of AI6,7. As a result of this fear of AI and its implications, with particular relevance to AI's ethical aspects modeled on the requirements of medicine and health delivery, the professional development programs of the faculty must consider knowledge of the ethical implications of AI as well [19]. More than two-thirds of the subjects never worked with AI at their place of work. Additionally, only about a quarter of the subjects found AI easy to apply. This disparity between theoretical knowledge and practical experience with AI persists as an area of study in AI-related educational literature6. Some investigations have indicated that the lack of direct practical experience greatly hinders the capacity of educators within the medical field to effectively incorporate [20]. The relevance of this issue at the practice levels of the medical field cannot possibly be overemphasized since the success of AI technology within the field of medicine and education highly depends on the capacity of practitioners to effectively apply these technologies. Notably, there was no statistical association between the faculty type/specialization and their desire to incorporate AI. This implies that there could be widespread enthusiasm about integrating AI across faculty types. This fact could be viewed as an encouraging point about the training programs within the institution. This phenomenon of widespread enthusiasm over AI across different demographic segments has indeed been reported elsewhere across the region and the world34. This implies that the AI training programs could effectively apply across different faculty segments without the requirements being highly specific [21]. Through the application of a complete knowledge index and chi-squared analyses, there is both breadth and depth added to the study regarding the readiness of faculty members to adapt AI technology. Some of the disadvantages of the study lie in its application of a hypothetical set of data that made it feasible to assess more faculty members effectively, but at the same time, restricted the applicability of the results of the study to the general faculty [22, 23]. Future studies must attempt to confirm these results through the collection of original data with more representative samples at various medical colleges across Pakistan and other countries. Longitudinal research study designs will further prove useful in determining the effects of AI training programs on the knowledge and application levels of the faculty. Furthermore, other forms of research focusing on the various issues and motivational variables affecting the proclivities of the faculty toward AI issues may offer deeper insights regarding more useful strategies of education.

CONCLUSIONS

This study reaches the conclusion that despite the encouraging levels of awareness and positivity regarding the incorporation of AI technologies in the field of medicine being exhibited by the medical education faculty of the Bolan Medical College at Quetta, there are still considerable discrepancies that exist regarding the education and application of AI technology. This indicates that the medical education faculty at the Bolan Medical College at Quetta could greatly benefit if specific training programs are designed that could enable them to apply the knowledge of AI technology within the field of medicine.

Authors Contribution

Conceptualization: MA
Methodology: MK
Formal analysis: MJ
Writing and Drafting: MA
Review and Editing: MA, AK, MJ

All authors approved the final manuscript and take responsibility for the integrity of the work.

Conflicts of Interest

The authors declare no conflict of interest.

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REFERENCES

[1] Che Ghazali R, Abdul Hanid MF, Mohd Said MN, Lee HY. The Advancement of Artificial Intelligence in Education: Insights from A 1976–2024 Bibliometric Analysis. Journal of Research on Technology in Education. 2025 Jan: 1-7. doi: 10.1080/15391523.2025.2456044.

[2] Creswell Jw and Creswell Jd. Research Design: Qualitative, Quantitative, And Mixed Methods Approaches. Sage Publications. 2017 Dec.

[3] Aderibigbe AO, Ohenhen PE, Nwaobia NK, Gidiagba JO, Ani EC. Artificial Intelligence in Developing Countries: Bridging the Gap Between Potential and Implementation. Computer Science and IT Research Journal. 2023 Dec; 4(3): 185-99. doi: 10.51594/csitrj.

DOI: https://doi.org/10.54393/pbmj.v8i12.1332

v4i3.629.

[4] Chan KS and Zary N. Applications and Challenges of Implementing Artificial Intelligence in Medical Education: Integrative Review. JMIR Medical Education. 2019 Jun; 5(1): e13930.doi: 10.2196/13930.

[5] Naseer MA, Saeed S, Afzal A, Ali S, Malik MG. Navigating the Integration of Artificial Intelligence in the Medical Education Curriculum: A Mixed-Methods Study Exploring the Perspectives of Medical Students and Faculty in Pakistan. BioMed Central Medical Education. 2025 Feb; 25(1): 273. doi: 10.1186/s12909-024-06552-2.

[6] Knopp MI, Warm EJ, Weber D, Kelleher M, Kinnear B, Schumacher DJ *et al.* AI-Enabled Medical Education: Threads of Change, Promising Futures, and Risky Realities Across Four Potential Future Worlds. Journal of Medical Internet Research Medical Education. 2023 Dec; 9: e50373. doi: 10.2196/50373.

[7] Jha D, Durak G, Sharma V, Keles E, Cicek V, Zhang Z, *et al.* A Conceptual Framework for Applying Ethical Principles of AI To Medical Practice. Bioengineering. 2025 Feb; 12(2): 180. doi: 10.3390/bioengineering12020180.

[8] AInsour MM, Qouzah L, Aljamani S, Alamoush RA, AL-Omiri MK. AI In Education: Enhancing Learning Potential and Addressing Ethical Considerations Among Academic Staff _A Cross-Sectional Study at the University of Jordan. International Journal for Educational Integrity. 2025 May; 21(1): 16. doi: 10.1007/s40979-025-00189-4.

[9] Sajjad W, Inam A, Ahmed B, Zahir M, Mujtaba A, Khan Z *et al.* Knowledge, Attitude, And Practices Regarding Use of Artificial Intelligence for Medical Writings Among Doctors of Khyber Pakhtunkhwa, Pakistan: A Cross-Sectional Study. Annals of Medicine and Surgery. 2025 Mar; 87(3): 1190-9. doi: 10.1097/MS9.0000000000002953.

[10] Estrada-Araoz EG, Manrique-Jaramillo YV, Díaz-Pereira VH, Rucoba-Frisancho JM, Paredes-Valverde Y, Quispe-Herrera R *et al.* Assessment of the Level of Knowledge on Artificial Intelligence in a Sample of University Professors: A Descriptive Study. Data and Metadata. 2024; 3: 285. doi: 10.56294/dm2024285.

[11] Maaß L, Grab-Kroll C, Koerner J, Öchsner W, Schön M, Messerer DA, Böckers TM *et al.* Artificial Intelligence and Chatgpt in Medical Education: A Cross-Sectional Questionnaire on Students' Competence. Journal of Continuing Medical Education. 2025 Dec; 14(1): 2437293.4. doi: 10.1080/28338073.2024.2437293.

[12] Boillat T, Nawaz FA, Rivas H. Readiness to Embrace Artificial Intelligence Among Medical Doctors and Students: Questionnaire-Based Study. Journal of Medical Internet Research Medical Education. 2022 Apr; 8(2): e34973. doi: 10.2196/34973.

[13] Baseer S, Jamil B, Khan SA, Khan M, Syed A, Ali L. Readiness Towards Artificial Intelligence Among Medical and Dental Undergraduate Students in Peshawar, Pakistan: A Cross-Sectional Survey. Biomed Central, Medical Education. 2025 Apr; 25(1): 632. doi: 10.1186/s12909-025-06911-7.

[14] Al-Qerem W, Eberhardt J, Jarab A, Al Bawab AQ, Hammad A, Alasmari F *et al.* Exploring Knowledge, Attitudes, And Practices Towards Artificial Intelligence Among Health Professions' Students in Jordan. BioMed Central Medical Informatics and Decision Making. 2023 Dec; 23(1): 288.doi: 10.1186/s12911-023-02403-0.

[15] Ojo O. Promoting Artificial Intelligence Education in K–12 Through Pre-Service Teachers' Development. 2023 Dec.

[16] Schrum L. Educators and the Internet: A Case Study of Professional Development. Computers and Education. 1995 Apr; 24(3): 221-8. doi: 10.1016/0360-1315(95)00012-B.

[17] Liu Y and Chang P. Exploring EFL Teachers' Emotional Experiences and Adaptive Expertise in the Context of AI Advancements: A Positive Psychology Perspective. System. 2024 Nov; 126: 103463. doi: 10.1016/j.system.2024.103463.

[18] Szontagh PI. Teacher Candidates' Fears and Expectations About the use of Artificial Intelligence in Education: Reflections at the Beginning of Research. Practice and Theory in Systems of Education. 2025 May; 20(1): 34-44. doi: 10.63145/ptse.v20i1.32.

[19] Chong T, Yu T, Keeling DI, De Ruyter K, Hilken T. Stakeholder Engagement with AI Service Interactions. Journal of Product Innovation Management. 2026 Jan; 43(1): 31-56. doi: 10.1111/jpim.12786.

[20] Pedro F, Subosa M, Rivas A, Valverde P. Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development. 2019.

[21] Young AT, Amara D, Bhattacharya A, Wei ML. Patient and General Public Attitudes Towards Clinical Artificial Intelligence: A Mixed Methods Systematic Review. The Lancet Digital Health. 2021 Sep; 3(9): E599-611. doi: 10.1016/S2589-7500(21)00132-1.

[22] Maier C, Thatcher JB, Grover V, Dwivedi YK. Cross-Sectional Research: A Critical Perspective, Use Cases, And Recommendations for is Research. International Journal of Information Management. 2023 Jun; 70: 102625. doi: 10.1016/j.ijinfomgt.2023.102625.

DOI: https://doi.org/10.54393/pbmj.v8i12.1332

[23] Schmier JK and Halpern MT. Patient Recall and Recall Bias of Health State and Health Status. Expert Review of Pharmacoeconomics and Outcomes Research. 2004 Apr; 4(2): 159-63. doi: 10.1586/14737167.4.2.159.