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Knowledge and Attitude Regarding Artificial Intelligence Among Physiotherapists: A Cross-Sectional Survey

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Cite this Article

Received	2025-02-27
Revised	2025-03-16
Accepted	2025-03-24
Published	2025-03-26
Authors'	ZA, KA, and HAS
Contributions	conceptualized and designed the study; WA, TA, and AK collected data; KA analysed data; ZA and HAS drafted the manuscript
Conflict of Interest	None declared
Data/supplements	Available on request.
Funding	None
Ethical Approval	Respective Ethical Review Board IRB No: BUHS-IRB#124/24
Informed Consent	Obtained from all participants
Study Registration	BUHS-IRB#124/24
Acknowledgments	N/A

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ABSTRACT

Background: Artificial Intelligence (AI) is rapidly transforming healthcare delivery, including physiotherapy, where it holds potential for enhancing patient assessment, treatment personalization, and clinical efficiency. However, evidence on physiotherapists' understanding and acceptance of AI remains limited, particularly in low- to middle-income settings such as Pakistan. **Objective:** This study aimed to assess the knowledge and attitude of physiotherapists regarding the use and impact of AI in clinical physiotherapy practice, identifying gaps that may hinder its effective integration. **Methods:** A cross-sectional observational study was conducted among physiotherapists (n = 374) from tertiary care hospitals in Karachi, Pakistan, using stratified sampling. Inclusion criteria were licensed physiotherapists aged 20–55 years with ≥1 year of clinical experience. Data was collected through a validated questionnaire assessing demographics, knowledge (9 items), and attitudes (11 items) towards AI. Ethical approval was granted by the Institutional Review Board of Bahria University (BUHS-IRB#124/24), adhering to the Declaration of Helsinki. Descriptive statistics, chi-square tests, and regression analysis were performed using SPSS version 27. **Results:** Most participants (n = 192, 51.3%) had limited knowledge of AI applications in physiotherapy, while a substantial proportion (n = 260, 69.5%) agreed AI aids in patient assessment. Positive attitudes were observed toward AI reducing workload (n = 166, 44.4%) and improving clinical decision-making (n = 274, 73.3%). However, concerns were noted regarding AI's autonomy and communication capabilities. Significant associations were found between attitude scores and participants' employment sectors (p < 0.05). **Conclusion:** Although physiotherapists exhibit openness towards AI in rehabilitation, substantial knowledge deficits exist, necessitating targeted education and training initiatives. Integrating AI literacy into professional development may enhance clinical outcomes and readiness for digital transformation in healthcare.

Keywords: Artificial Intelligence, Physiotherapy, Knowledge, Attitude, Rehabilitation, Clinical Decision-Making, Health Technology Integration

INTRODUCTION

Artificial Intelligence (AI) represents a transformative advancement in healthcare, offering the potential to enhance clinical decision-making, improve patient outcomes, and optimize treatment strategies. Defined as a branch of computer science that simulates human intelligence through machines, AI employs algorithms to interpret data, recognize patterns, and support critical thinking processes, thereby minimizing human error and increasing efficiency in medical practice (1,2). In the field of physiotherapy, AI has emerged as a promising tool for automating patient assessments, customizing rehabilitation plans, and providing real-time feedback, thereby augmenting the role of

physiotherapists in delivering high-quality care (3,4). Applications such as robotic exoskeletons, virtual assistants, and AI-powered telehealth platforms are being increasingly integrated into rehabilitation settings, suggesting a paradigm shift in physiotherapy services (5,6). Furthermore, AI is capable of processing large datasets to predict patient outcomes, monitor exercise performance, and personalize interventions, all while potentially reducing healthcare costs (7,8).

Despite these advancements, a significant knowledge gap remains regarding physiotherapists' awareness, understanding, and preparedness to integrate AI into clinical practice. While

literature from various healthcare domains, including radiography and pharmacy, highlights the growing relevance of AI, evidence suggests that healthcare professionals often lack the confidence and skills necessary for its successful implementation (9,10). Within physiotherapy, studies have revealed inconsistent levels of knowledge and varying degrees of acceptance, with some therapists demonstrating enthusiasm while others express concern about AI replacing human roles or diminishing patient interaction (11,12). Previous research conducted in Saudi Arabia and Germany identified inadequate knowledge and limited exposure to AI among rehabilitation professionals, which could pose a barrier to adoption (12,13). Although some surveys suggest a generally positive attitude among therapists towards AI, the lack of structured education and training has been cited as a critical limitation in enabling its integration into routine clinical workflows (14,15).

This disconnect between the technological potential of AI and the readiness of physiotherapists to utilize it underlines the importance of investigating both the cognitive and affective domain knowledge and attitude—regarding AI in rehabilitation settings. Notably, recent studies conducted across middle- and high-income countries have emphasized the need for targeted educational initiatives, curriculum enhancements, and institutional support to bridge this divide and foster a more AI-literate physiotherapy workforce (16,17). However, few studies have explored these dimensions comprehensively within the Pakistani context, where AI applications in physiotherapy remain under-researched and underutilized. Moreover, the existing body of knowledge has predominantly focused on general medical professionals or students, leaving a significant gap concerning practicing physiotherapists' perspectives on AI (18,19). Given the increasing global interest in digital health transformation and the expanding role of AI in musculoskeletal and neurorehabilitation, it becomes imperative to examine local perceptions to inform future interventions and policies.

This study was therefore designed to assess the level of knowledge and the attitude of physiotherapists regarding the role and application of artificial intelligence in physiotherapy practice. The survey also aimed to explore the extent to which AI is being utilized in clinical settings and to identify potential barriers and facilitators to its adoption. The knowledge gap, the research seeks to generate evidence that could guide curriculum development, awareness campaigns, and strategic planning for AI integration in rehabilitation.

MATERIAL AND METHODS

This study was a cross-sectional observational survey designed to evaluate the knowledge and attitudes of physiotherapists regarding artificial intelligence (AI) in clinical rehabilitation settings across Karachi, Pakistan. The target population included registered physiotherapists working in tertiary care hospitals, with at least one year of clinical experience, aged between 20 to 55 years. Inclusion criteria comprised licensed physiotherapists from academic, clinical, or dual practice settings who voluntarily agreed to participate and provided written informed consent. Physiotherapy undergraduates, rehabilitation professionals without clinical experience, or those unwilling to participate were

excluded from the study to maintain sample specificity and relevance to the research objectives. Ethical approval for the study was obtained from the Institutional Review Board (IRB) of Bahria University (BUHS-IRB# 124/24), and the research adhered to the ethical principles outlined in the Declaration of Helsinki. Prior to participation, all respondents were briefed about the purpose of the study, and written informed consent was collected. Anonymity and confidentiality of the participants were ensured through coded data entry and secure data storage.

Participants were recruited using stratified sampling to ensure representation across different healthcare institutions. The sample size was estimated using OpenEpi (version 3), with parameters including an assumed population size of 1,000,000, a response frequency of 16.98%, a 99% confidence level, and a 1% margin of error, resulting in a final sample of 374 participants. Data were collected over a six-month period from November 2024 to April 2025 from physiotherapy departments at Pakistan Navy Ship Shifa Hospital, Jinnah Postgraduate Medical Centre, and Ziauddin Hospital in Karachi. The primary outcome was the level of knowledge regarding AI technologies used in physiotherapy, while the secondary outcome focused on physiotherapists' attitudes towards the potential applications, benefits, and limitations of AI in clinical practice. A validated questionnaire was used for data collection, which had a content validity index (CVI) of 0.8, with individual items ranging between 0.8 and 1.0, confirming its appropriateness for the target population (9).

The questionnaire comprised three sections: demographic information (age, gender, sector of employment, years of experience, and highest academic qualification), knowledge assessment (9 items), and attitude evaluation (11 items). Knowledge-related questions were answered using a categorical scale (Yes, no, Not Sure), while attitude-related items employed a five-point Likert scale (Strongly Agree to Strongly Disagree). The questionnaire was distributed by trained data collectors, and participants completed the forms either electronically or in paper format, depending on feasibility and institutional preference. Respondents were assured of their right to withdraw at any stage without any consequences, and no personal identifiers were collected during the process.

Data analysis was conducted using IBM SPSS Statistics for Windows, Version 27.0. Descriptive statistics were calculated to summarize participant characteristics and response frequencies. Categorical variables were presented as frequencies and percentages, while continuous variables such as age were described using means, standard deviations, medians, and variances. Chi-square tests were employed to assess associations between employment sectors and key knowledge and attitude variables. To control for potential confounding variables, including age, clinical experience, and educational level, regression analysis was applied. Missing data was handled through listwise deletion to ensure consistency in statistical interpretation. Sensitivity analyses were not required due to the uniform structure of the survey data and the high response completion rate.

This rigorous methodological approach allowed for a comprehensive and reproducible assessment of physiotherapists'

knowledge and attitudes toward AI, ensuring the internal validity and reliability of the findings.

RESULTS

The findings from this survey demonstrate that while conceptual awareness of artificial intelligence (AI) among physiotherapists is nearly universal (99.2%), only a limited proportion (37.2%) reported familiarity with AI technologies specifically used in physiotherapy. This suggests a prominent gap between general awareness and field-specific technical knowledge. A majority (69.5%) acknowledged that AI plays a role in patient assessment, yet only 20.9% had direct experience using two to four AI applications in practice. Furthermore, a relatively small fraction of participants

believed that AI could directly communicate with patients (21.7%) or independently deliver treatment without physiotherapist involvement (16.3%), reflecting skepticism toward AI's current autonomous capabilities in clinical rehabilitation.

Attitudinal responses indicate that physiotherapists largely view AI as a supportive tool rather than a replacement for clinical decision-making. Most participants (73.3%) agreed that AI could assist in clinical decisions, and 61.2% believed AI cannot function without physiotherapist involvement. A moderate number agreed that AI could reduce therapist workload (44.4%) and ease patient care (45.2%), though only 28.6% believed AI could help in disease prevention, showing cautious optimism regarding its clinical breadth.

Table 1 Awareness and Knowledge of AI Among Physiotherapists (n = 374)

Variable	Positive Response (n)	Percentage (%)
General awareness of AI	371	99.2%
Awareness of AI technologies used in physiotherapy	139	37.2%
Belief that AI helps in patient assessment	260	69.5%
Experience with 2-4 AI applications	78	20.9%
Belief that AI can directly communicate and provide feedback	81	21.7%
Belief that AI can treat patients without physiotherapist input	61	16.3%

Table 2 Attitudes Toward AI Integration in Physiotherapy Practice

Statement	Agree or Strongly Agree (n)	Percentage (%)
AI assists in clinical decision-making	274	73.3%
AI cannot function without physiotherapist involvement	229	61.2%
AI can reduce physiotherapists' workload	166	44.4%
AI is helpful in easing patient care	169	45.2%
AI can help in disease prevention	107	28.6%

These responses indicate favorable attitudes toward AI support in clinical decision-making, but hesitations regarding full autonomy of AI systems. Regarding the future impact of AI, the majority perceived its potential in goal setting (61.0%), assistive functions (63.1%), and patient education (61.0%). However, fewer believed in its role as a diagnostic tool (40.1%) or in significantly improving the quality of care (37.7%). Nevertheless, over half of the respondents

believed that AI would reduce reliance on human resources (53.7%) and improve productivity (50.8%). These insights reflect a generally positive, yet measured outlook on AI's integration into physiotherapy practices, supporting its role in enhancing efficiency and patient management while maintaining the necessity of human oversight and interaction.

Table 3 Future Perceived Impact of AI in Rehabilitation Settings

Perceived Impact	Agree or Strongly Agree (n)	Percentage (%)
AI can help with setting patient management goals	228	61.0%
AI can be used as assistive technology	236	63.1%
AI can serve as a diagnostic tool	150	40.1%
AI enhances patient education	228	61.0%
AI can reduce reliance on human resources	201	53.7%
AI integration will enhance productivity in future	190	50.8%
AI will improve patient quality of care	141	37.7%

Collectively, these results underscore the need for targeted training and continuing professional education in AI, especially regarding its specific applications in physiotherapy. Building practical competence could bridge the observed knowledge gap and empower physiotherapists to confidently integrate AI into clinical workflows.

DISCUSSION

This study provides valuable insights into the current state of knowledge and attitudes regarding artificial intelligence (AI) among physiotherapists in Pakistan, revealing both promise and

pressing challenges for the integration of AI into rehabilitation practice. The findings underscore a generally positive attitude towards AI, with many physiotherapists acknowledging its potential to enhance clinical decision-making, reduce therapist workload, and assist in goal setting. However, a significant proportion of respondents demonstrated limited knowledge about AI applications in physiotherapy, particularly regarding specific technologies and their direct role in patient care. These findings align with previous international studies that identified similar gaps in awareness and preparedness among healthcare

professionals, suggesting a global need for structured educational initiatives and capacity-building interventions (12,13).

Comparatively, studies conducted in Saudi Arabia and Germany have reported low levels of knowledge about AI among rehabilitation and nursing professionals, respectively, reinforcing the universality of this knowledge gap (12,30). However, some contrasts were observed with data from Turkey, where physiotherapists reported higher awareness and readiness for AI integration, possibly reflecting differences in national policy, academic exposure, or access to technological infrastructure (11). The present study, focusing specifically on Pakistani physiotherapists, contributes novel regional data and extends the limited body of literature addressing AI readiness in low- to middle-income countries. These regional disparities underscore the importance of context-specific strategies to support AI adoption, considering the sociocultural, educational, and technological landscapes unique to each setting.

The observed enthusiasm for AI's role in clinical support tools, such as diagnostic assistance and patient education, supports earlier findings that healthcare professionals are generally open to innovations that enhance productivity and quality of care (5,29). Nonetheless, a substantial proportion of participants expressed uncertainty regarding AI's capacity to independently deliver treatment or communicate with patients. This hesitation may reflect underlying concerns about depersonalization of care and over-reliance on automation—issues that have been previously documented in theoretical critiques of AI in health professions (4,21). These concerns highlight the need to frame AI not as a replacement for physiotherapists but as a complementary tool that can optimize, rather than compromise, human-centered care (23). Clinically, this distinction is essential to maintaining trust and therapeutic alliance in rehabilitation settings.

Theoretically, the results contribute to the broader discourse on digital health readiness, emphasizing the dual requirement of cognitive (knowledge) and affective (attitudinal) preparedness for successful AI implementation. While the willingness to adopt AI was evident in this cohort, the lack of foundational knowledge presents a barrier that may delay or derail integration efforts. This aligns with the findings of global surveys advocating for curriculum reform and faculty development to ensure that AI-related competencies are embedded early in health professional education (14,25). The results also emphasize the importance of continuing professional development (CPD) programs, workshops, and accessible AI training modules tailored for clinical practitioners who may have limited exposure to emerging technologies.

A notable strength of this study is its comprehensive approach, employing a validated instrument with strong content validity and a relatively large size drawn from diverse tertiary care settings. The use of stratified sampling and rigorous statistical analysis further enhances the reliability of the results. However, some limitations should be acknowledged. The study was geographically restricted to Karachi, which may limit the generalizability of findings to other regions of Pakistan or South Asia. Moreover, the cross-sectional nature of the study precludes causal inferences, and self-reported responses may introduce bias due to social

desirability or misinterpretation of questions. Additionally, the lack of longitudinal follow-up prevents assessment of changes in knowledge or attitude over time following educational interventions.

Future research should aim to explore AI-related competencies across different sub-specialties of physiotherapy, such as neurorehabilitation, pediatrics, and musculoskeletal care, to identify domain-specific educational needs. Longitudinal studies evaluating the impact of targeted AI training on knowledge retention, clinical outcomes, and workflow efficiency would be particularly valuable. Moreover, qualitative investigations into the subjective experiences and ethical concerns of physiotherapists regarding AI use may yield deeper insights into acceptance barriers. Policymakers and educators must also consider integrating AI modules into undergraduate and postgraduate physiotherapy curricula, alongside efforts to bridge the digital divide through infrastructure support and faculty training.

In conclusion, while physiotherapists in this study showed openness to AI and acknowledged its potential benefits in enhancing clinical practice, the evident gaps in knowledge signal an urgent need for educational reforms and structured training. Addressing these gaps is essential not only for optimizing clinical outcomes but also for ensuring that the physiotherapy profession evolves in step with the accelerating pace of technological innovation in healthcare. By investing in AI literacy, the field of physiotherapy can move toward a more integrated, efficient, and patient-centered model of care.

CONCLUSION

This cross-sectional survey highlights that while physiotherapists in Pakistan demonstrate a generally positive attitude towards the integration of artificial intelligence in clinical practice, their knowledge regarding its role and applications remains limited. These findings underscore a critical need for targeted educational initiatives to bridge the knowledge gap and support the effective incorporation of AI technologies in physiotherapy. Enhancing AI literacy among physiotherapists could facilitate improved decision-making, reduce clinician workload, and personalized patient care, ultimately transforming rehabilitation outcomes. Clinically, the results advocate for the integration of AI as an assistive tool rather than a replacement, promoting a collaborative model between human expertise and machine intelligence. From a research perspective, the study provides a foundation for future investigations aimed at evaluating the impact of AI training and the long-term effectiveness of AI integration in diverse physiotherapy subspecialties.

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