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Article

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

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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 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) is an innovative and emerging approach with immense potential to improve healthcare (1). AI is referred to as the technology that enables machines and computer systems to act and simulate human intelligence (2). AI uses algorithms for effective critical decision-making, thereby reducing the chances of human error (3).

The application of AI in physiotherapy assists in examination, diagnosis, and treatment by evaluating patient data, predicting outcomes, and personalizing treatment, which ultimately improves the quality of physiotherapy care (4). Some examples of AI applications in physiotherapy include robotic exoskeletons, AI virtual assistants, and AI-powered telehealth systems (5). According to the evidence, AI has the potential to suggest various exercises and can render patient images or real-time videos (6). Furthermore, AI can aid in the creation of customized rehabilitation management plans and provide continuous monitoring and feedback on exercise performance (7). AI also has the capability to reduce unnecessary medical costs (8).

According to a previous study, clinicians lack the confidence and knowledge required for the successful integration of AI (9). A literature review emphasized the need for physiotherapist education to align with the demands of 21st-century healthcare systems (10). One survey reported that PTs have a positive attitude regarding the application of AI in practice (11). Another study indicated that rehabilitation professionals working in clinical or

non-academic domains also report positive attitudes toward AI (12).

Further research conducted across a broad range of healthcare professionals documented that the majority have superficial knowledge of AI (13). Another study highlighted the importance of enhancing AI training in medical education (14). A recent investigation concluded that certain obstacles must be addressed to bring about a paradigm shift in the field of physiotherapy (15).

Although physiotherapists have shown readiness and lack anxiety toward AI, a survey identified cost as the primary barrier to its adoption (16). Another recent survey emphasized the significant role of AI in the evolving landscape of patient care (17). Alsobhi et al. concluded that lack of resources and high costs are major barriers and also highlighted a considerable knowledge gap among professionals (18). Another study supported the need for AI-related courses and training for educators in physical therapy programs (19). A survey identified a growing trend of AI technologies being used in physiotherapy clinics to automate clinical tasks (20). One study asserted that clarity is needed on how AI impacts patient-provider interactions and stressed the importance of understanding the operational processes behind AI-based algorithms (21).

AI systems enhance hospital administration and nursing efficiency, necessitating an in-depth analysis to provide a balanced perspective on both the advantages and challenges of AI in healthcare (22). A study called for a cultural shift, urging professionals to see AI as a facilitator rather than a threat (23). Research revealed that most medical students possess general baseline knowledge of AI (24). Another study highlighted the need to integrate AI into educational curricula (25), as 70% of students surveyed had not received any formal instruction related to AI (26).

A survey found that the majority of Pakistani physicians lack knowledge about AI applications but have a positive view of its potential and express willingness to adopt it (27). Similarly, a survey conducted in Jeddah revealed that 85.4% of respondents positively perceived the potential impact of AI on improving care quality (28). Evidence suggests that the majority of professionals feel prepared to apply AI (29).

Findings from a recent survey by Shawli et al. highlighted significant grey areas regarding the knowledge and attitude of PTs in rehabilitation settings (5). Therefore, this survey aimed to evaluate knowledge about the role of AI and the attitudes of PTs towards the benefits, use, and impact of AI in physiotherapy so that up-to-date information could be assessed and corrective actions initiated.

MATERIALS AND METHODS

This cross-sectional survey was conducted on 374 PTs using a stratified sampling technique. Ethical approval for the study (BUHS-IRB# 124/24) was obtained from the Institutional Review Board of Bahria University. This survey is reported according to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines. Data were collected from the Physiotherapy Departments of Pakistan Navy Ship Shifa Hospital, Jinnah Postgraduate Medical Centre, and Ziauddin Hospital in Karachi, Pakistan, in November 2024. The study was completed within four months of receiving ethical approval.

The sample size of 374 PTs was calculated using the statistical tool OpenEpi, version 3, with a population size of 1,000,000, a frequency of 16.98%, a 99% confidence interval, and a margin of error of 1%.

Volunteer PTs aged between 20 and 55 years, with at least one year of clinical experience, were enrolled in the study. However, undergraduate physiotherapy students and rehabilitation professionals who were unwilling to participate were excluded. A validated questionnaire was used to collect data addressing knowledge about the role of AI and attitudes towards AI among physiotherapists. The questionnaire demonstrated a strong content validity index of 0.8, with individual item validity ranging from 0.8 to 1 (9). The questionnaire was reviewed by field experts and pilot-tested beforehand.

It included demographic questions such as age, gender, employment sector, years of experience, and highest qualification. A total of 9 questions assessed physiotherapists' knowledge regarding the role of AI in physical therapy. Responses were recorded as "yes," "no," or "not sure." Attitudes towards the benefits, use, and impact of AI were assessed through 11 questions, with responses measured on a Likert-type scale: strongly agree, agree, neutral, disagree, and strongly disagree.

Following approval of the study synopsis by the Institutional Review Board of Bahria University, data collection commenced. Data collectors were trained in the data collection process. Data were collected using the questionnaire, and all ethical considerations were observed. Detailed information about the study was provided to participants, who were informed of their right to withdraw at any time without any consequences. Only volunteer physiotherapists meeting the eligibility criteria and who gave written informed consent were enrolled. Participant confidentiality and data control were strictly maintained throughout the data collection process.

Data analysis was performed using IBM SPSS Statistics for Windows, version 23. The selection of this statistical tool was based on its user-friendly interface and robust capabilities in data management. Descriptive statistics were used to present means, frequencies, and percentages. Potential confounding variables such as age, years of experience, and educational level were controlled using chi-square tests and regression analysis.

RESULTS

This cross-sectional survey included 374 physiotherapists (PTs). The mean age of participants was 26 years (SD = 3.451, variance = 11.908, median = 26). Most of the participants were female, comprising 243 (65%). The clinical experience of participants ranged from 1 to more than 10 years. The majority of PTs, 256 (68.4%), held a bachelor's degree, while only 8 (2.1%) had a PhD. Most participants worked in the clinical sector (n=214, 57.2%), followed by those employed in both academic and clinical roles (n=87, 23.3%), and the purely academic sector (n=73, 19.5%) (Figure 1).

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The majority of physiotherapists reported having heard about Artificial Intelligence (AI) (n=371, 99.2%). However, only 139 (37.2%) had heard about AI technologies specifically used in healthcare settings, and a statistically significant difference was observed between the academic, clinical, and dual employment sectors ($p < 0.001$). Additionally, 260 (69.5%) physiotherapists agreed that AI could aid in patient assessment, and a statistically significant difference was again noted between employment sectors ($p < 0.001$). Regarding practical experience, only 78 participants (20.9%) reported having used between 2 to 4 AI applications in their clinical work, with no significant difference between employment sectors ($p = 0.164$).

Participants expressed varied perceptions regarding the capabilities of AI, as summarized in Table 1. Notably, most physiotherapists believed AI could not independently provide patient treatment (n=247, 66.0%, $p = 0.014$) nor directly communicate with patients effectively (n=190, 50.8%, $p < 0.001$). Furthermore, although a substantial majority agreed that AI assists in clinical decision-making (n=274, 73.3%), fewer participants (n=60, 16.0%) believed AI could function entirely independently from PTs, indicating the perceived necessity of physiotherapist involvement ($p = 0.001$).

Table 1: AI Knowledge & Application by Employment Sector (Participants answering 'Yes')

Question	Academic (n=73)	Both (n=87)	Clinical (n=214)	Total (n=374)	p-value
Heard about AI	71	87	213	371	.108
Heard about AI technology in PT	40	32	67	139	.000
AI helps in assessment	47	50	163	260	.000
Used 2–4 AI applications	17	22	39	78	.164
AI provides treatment independently	14	23	24	61	.014
AI assists in clinical decision-making	49	68	157	274	.205
AI works without PT involvement	15	22	23	60	.001
AI can communicate directly with patients	25	27	29	81	.000

Physiotherapists demonstrated generally positive attitudes toward AI applications in physiotherapy, with substantial support noted for AI's role in decreasing workload (total agreement n=233, 62.2%, $p < 0.001$), easing patient care (n=220, 58.8%, $p < 0.001$), and assisting in goal setting (n=284, 76.0%, $p < 0.001$). Notably, a significant proportion also recognized AI's utility as assistive technology (n=284, 75.9%, $p = 0.029$) and in enhancing patient education (n=293, 78.4%, $p = 0.002$). The attitudes were somewhat mixed regarding AI's role in disease prevention (n=141, 37.7%, $p = 0.003$) and prediction (n=178, 47.6%, $p < 0.001$). Detailed summaries are presented in Table 2.

Table 2: Attitudes toward AI by Employment Sector (Agree + Strongly Agree)

Attitude Statement	Academic (n=73)	Both (n=87)	Clinical (n=214)	Total Agreement (n=374)	p-value
AI reduces PT workload	57	75	101	233	.000
AI eases patient care	49	60	111	220	.000
AI prevents diseases	39	30	72	141	.003
AI predicts disease	40	59	79	178	.000
AI aids goal setting	53	66	165	284	.000
AI as assistive tech	53	67	164	284	.029
AI as diagnostic tool	39	51	97	187	.001
AI improves education	57	72	164	293	.002
AI reduces HR dependence	50	52	157	259	.004
AI boosts productivity	55	75	133	263	.000
AI improves patient care quality	50	68	98	216	.000

Regarding future expectations, physiotherapists acknowledged AI's potential impact significantly, with the majority agreeing that AI would likely reduce dependence on human resources (n=259, 69.2%, $p = 0.004$), enhance productivity (n=263, 70.3%, $p < 0.001$), and improve the overall quality of patient care (n=216, 57.8%, $p < 0.001$).

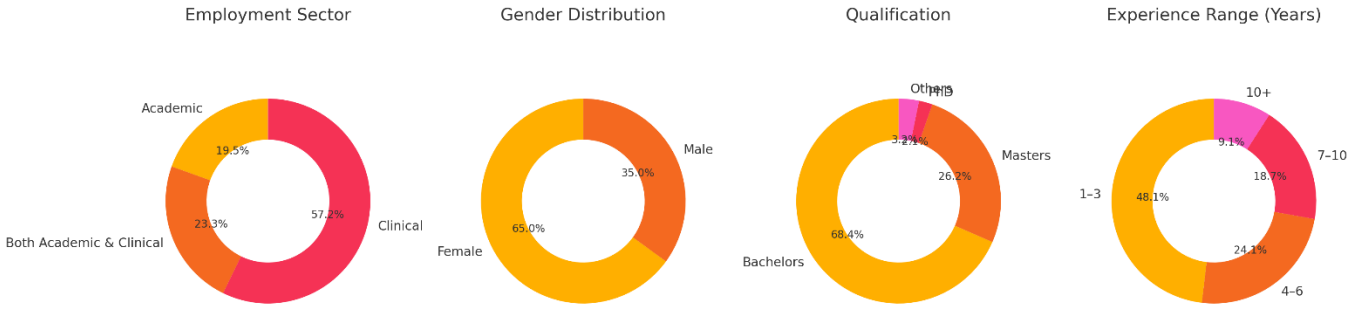

Figure 1: Demographic and Study Variables

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Differences between employment sectors were statistically significant across these future-oriented perceptions, suggesting variations in expectations depending on employment context (Table 2).

DISCUSSION

This study played a significant role in highlighting the knowledge regarding the role of AI and the attitude towards AI among physiotherapists, so that awareness could be created, barriers identified, and resolved, thereby allowing the field of physiotherapy to benefit from the innovative approach of AI.

The findings of this survey showed that the majority of participants had inadequate knowledge regarding the role of AI in physiotherapy. However, a study conducted in Saudi Arabia to understand the perception of physiotherapists about knowledge regarding AI applications in healthcare concluded that PTs had lower knowledge about AI (12). Furthermore, a survey conducted in Germany also reported limited knowledge regarding AI among nurses (30). Therefore, it is necessary that awareness sessions be organized to enhance the knowledge of PTs.

The findings of a study carried out in Turkey to explore how PTs perceive their own levels of awareness, preparedness, and anxiety regarding AI in rehabilitation indicated that PTs were more knowledgeable about AI (11). Additionally, another case study claimed that females had a higher level of knowledge regarding AI compared to males (31). In contrast, a provincial survey indicated that medical students are optimistic regarding AI capabilities (32). Another study conducted in Jordan concluded that there is moderate knowledge and positive attitudes towards AI in pharmacy practice (33). However, in this study, it was found that the majority of participants had average to poor knowledge about AI. This highlights the need to promote evidence-based knowledge among physiotherapists, particularly concerning AI technologies.

A study conducted in Saudi Arabia reported that PTs had a positive attitude and recognized the promising future of AI in healthcare (5). In contrast, this research found that many participants displayed poor attitudes and expressed concerns about the integration of AI in healthcare and rehabilitation. To address this gap, it is essential to hold awareness sessions aimed at improving physiotherapists' understanding of AI's potential. Additionally, fostering evidence-based education on AI technologies through workshops will be vital in advancing physiotherapy practice (34).

A study revealed that PTs in India generally had a highly positive attitude towards AI (35). However, this research found that many participants expressed poor attitudes and concerns about AI. A study also reported that the attitude of patients towards AI is crucial in their management (36). Hence, it is essential to develop strategies to enhance attitudes regarding AI and harness its potential to improve the quality of care.

A survey study conducted among physical therapy practitioners in Saudi Arabia suggested that AI technology would increase productivity and reduce the need for human resources (12). However, this research revealed that many participants displayed negative attitudes and raised concerns about the use of AI in rehabilitation. To address these challenges, it is crucial to promote the effective integration of AI in physiotherapy.

A study in a middle-income country, Vietnam, revealed a generally positive view among therapists, but specific issues suggested a novelty effect and cultural perceptions of robots, indicating the need for tailored strategies. There is limited understanding of therapist acceptance on a global scale, highlighting the need for more research in this area (37). Furthermore, a study conducted in Canada reported a positive impact of AI on patient care (38). These findings were further endorsed by a study claiming that the application of AI in musculoskeletal physical therapy will help bring a paradigm shift in physiotherapy practice (38). Ramanandi also reported a positive scope of AI (38). In contrast, this survey found that many participants displayed poor attitudes. Therefore, fostering evidence-based education on AI technologies will be vital in advancing physiotherapy practice.

Some of the limitations associated with this study include the relatively small sample size and that the data were collected only from specific settings, which might have affected the generalizability of the findings. However, key confounding variables were statistically controlled. Future research should be conducted with larger sample sizes to explore knowledge regarding AI applications in various sub-specialties of physiotherapy and to assess the long-term effects of AI integration in physiotherapy.

CONCLUSION

The results revealed that there is a need to take measures to upgrade knowledge regarding the role of AI in rehabilitation. Furthermore, progressive actions are also needed to improve attitudes regarding AI among PTs. Reinforcement strategies such as AI awareness campaigns, incorporation into study curricula, and organizational support providing access to AI resources are some of the measures that can enhance knowledge and attitudes. The findings of this survey have important policy implications for integrating AI. This approach will contribute to bringing a paradigm shift in clinical practice by enhancing the quality of patient treatment and reducing reliance on human resources.

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