PERCEPTION AND ATTITUDE OF PHYSIOTHERAPIST TOWARDS ARTIFICIAL INTELLIGENCE IN HEALTHCARE AND REHABILITATION: A SURVEY

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ABSTRACT

The rapid integration of Artificial Intelligence (AI) into healthcare has given rise to questions about its acceptance and implementation in various domains, including physiotherapy. The aim of this research was to evaluate physiotherapists' knowledge, attitudes, and perceptions of AI use in healthcare and rehabilitation. A cross-sectional survey of 353 Indian physiotherapists was administered via a structured questionnaire sent through Google Forms. The questionnaire explored demographics, awareness of AI, actual use, training provided, and perceptions of benefits, applications, and future role of AI in physiotherapy. Results indicated that while 97% of respondents reported having heard of AI in general, awareness dropped to 77% when it was referred to in the context of rehabilitation. Less than 38% of the respondents had formal training in AI. Overall perception of AI was moderately positive in nature but large gaps were observed between awareness and actual application in clinical practice. Statistical analysis showed a significant relationship between employment sector and concerns or opinions about AI. Gender differences were observed in perceived benefits but not in use or impact. A moderate positive correlation was observed between perceived applications and benefits of AI. The study documents a high awareness but low hands-on experience and training among physiotherapists, reflecting a clear knowledge-to-practice gap. These findings emphasize the urgent need for structured AI education and training in physiotherapy curriculum and continuing education. As healthcare evolves with AI, it is essential to know the readiness and concerns of physiotherapy professionals to facilitate ethical and effective application in clinical practice.

INTRODUCTION

All over the world, healthcare costs are skyrocketing. Increasing life hope, taking off rates of chronic illnesses, and the nonstop advancement of expensive modern treatments contribute to this drift. Thus, it comes as no shock that researchers predict a terrible future for the sustainability of healthcare frameworks throughout the world. Artificial intelligence (AI) guarantees to alleviate the impact of these advancements by moving forward healthcare and making it more cost-effective [1].

AI is characterized as the ability of a machine to perform a useful task directed intelligently by humans [2]. AI also describes conditions in which machines are able to learn and analyse like human minds, which enables them to solve problems [3]. Natural language processing, robotics, computer vision, and machine learning are among the few of the subfields that fall under the umbrella of artificial intelligence [4].

Clinical, diagnostic, rehabilitative, surgical, and prognostic techniques are just a few of the medical domains where artificial intelligence (AI) can be applied. AI is also having an impact on clinical decision-making and disease diagnosis, two crucial areas of medicine [5]. Early on, it was determined that one of the most potential fields for AI application was medicine [6].

An AI system can help doctors by giving them the most recent medical data from textbooks, journals, and clinical procedures to help them provide appropriate patient care. Furthermore, an AI system can assist in lowering the unavoidable therapeutic and diagnostic errors that occur in human clinical practice [7]. Many evidence already exist that AI algorithms are outperforming

humans in a variety of tasks, such as evaluating medical images or linking biomarkers and symptoms from electronic medical records (EMRs) to the diagnosis and prognosis of a disease [8]. Various clinical advantages of AI have been noted in the literature [2].

Artificial intelligence (AI) in physiotherapy is essential for managing and rehabilitating a range of neurological and musculoskeletal disorders [9]. AI offers a chance to revolutionize rehabilitation by bringing in intelligent technologies that can track patient progress, automate therapy processes, and support decision-making [10]. According to a proof-of-concept study, wearable sensors could detect balancing exercise objectively in people with Parkinson's disease [11]. In order to reflect motor learning and neuroplasticity, virtual reality (VR) can give patients additional sensory input, a more immersive setting, and real-time feedback while performing particular motor activities [11]. AI becomes proficient in lung and breast cancer screening, it can screen populations more quickly than radiologists and for a far lower price [12].

One of these is an exoskeleton, which is used for hands, arms, and legs in video games that encourage movement and help patients get better. Applications like this are giving medical technology therapists the resources that they need to give patients the kind of support and care they need. Additionally, it significantly reduces the workload for therapists, enabling them to treat more patients than they previously could [13].

Studies on telemedicine have revealed that a physiotherapeutic assessment of the knee using digital instruments (e.g., telehealth) seems to be feasible and consistent. Mobile health apps (mHealth) have been documented to support physiotherapeutic therapy with a high degree of patient satisfaction as yet another relevant digital field [14].

Kemtai motion-tracking, which uses normal cameras on computers, phones, or tablets, may capture every movement patients make while working out at home, therefore transforming any gadget with a camera into a virtual therapist [15].

Nevertheless, there are certain disadvantages to using AI into physiotherapy practice. Concerns about data security and privacy are also present because patient data is extremely sensitive. There is a risk that AI-dependent models would take over, which would lessen the emphasis on clinical and human factors [16]. They voice worries about less personal contact and the possible dehumanizing of the field of work [17]. Additionally, there are expenses, such as the cost of obtaining the AI systems, and smaller clinics or practices might find it difficult to sustain them financially [16].

In the study by Brougham and Haar, by 2025, robotics, artificial intelligence, smart technology, and algorithms may replace one-third of current jobs [2]. On the contrary, as AI technologies expand, PTs' demand for AI education becomes crucial. Castagno and Khalifa in 2020 [18] carried out a qualitative study in the UK to investigate healthcare professionals' views and understanding about present and future applications of AI. According to the study, researchers are concerned about the possible repercussions of using AI in clinical practice and lack a thorough understanding of the principles of AI.

Since some of the duties performed by physical therapists (PTs) may be replaced by AI technologies, it is crucial to research PTs' perspectives and readiness for utilizing these innovative devices in order to increase their confidence. Since AI technologies could be able to do some of the job that PTs do, it is critical to look into how PTs see and prepare for employing these innovative instruments. Gaining insight into PTs' perspectives would help to increase comfort and trust in the application of cutting-edge technologies in physical therapy practices in the twenty-first century [2].

Materials and methods
- **Study design:** Survey based study
- **Study type:** Cross-sectional study
- **Study Setting:** India
- **Study Population:** Physiotherapists
- **Sampling method:** Snowball sampling
- **Sample size:** The sample size of 259 people were determined using G_ Power analysis. Responses were collected from 353 participants.

Inclusion Criteria:

- Licensed physical therapist.
- Final year BPT students.
- BPT interns.
- MPT students.
- PHD students in physical therapy.
- People willing to participate.

Exclusion Criteria:
- People outside physiotherapy field.
- People who are not willing to participate or have not submitted their consent form.

Instrumentation:
The study uses a questionnaire adapted from the article "Physical Therapists' Knowledge and Attitudes Regarding Artificial Intelligence Applications in Health Care and Rehabilitation: Cross-sectional Study." The content validity index was 0.8 for the whole survey; however, the content validity index was between 0.8 and 1 for each item [2].

- ✓ Data on physical therapists' expertise and opinions regarding AI applications in rehabilitation was gathered using a Google Forms-hosted survey.
- ✓ There were 23 questions in the survey, which had been divided up into four sections. In order to determine the sample age, sex, years of experience, educational background, number of AI applications at work, and sub-specialization, the survey's initial section asked about the participants' demographics.
- ✓ Participants' knowledge of AI in the healthcare and rehabilitation fields was questioned in the second portion, and their thoughts on the benefits and applications of AI as well as its implications for rehabilitation in the future were gathered in the third.
- ✓ The ethical implications of AI use and participants' interest in learning more about the field were the focus of the final portion. A 5-point Likert scale, which ranges from strongly agree to strongly disagree, and yes/no questions were used to evaluate the survey responses [2].

Procedure:
- ✓ The process for engaging participants with inclusion criteria.
- ✓ Sharing the Google Form's link to physical therapists using different mechanisms (social media, professional associations, via e-mail, etc.).
- ✓ Participants received a short description of the aims of the study in the prefatory part of the survey and information about data safety and anonymity.
- ✓ At the beginning of the questionnaire, the participants will be asked if they agree to participate in the study for their consent.
- ✓ Responses were automatically saved in Google Forms.
- ✓ Data was extracted and analysed using statistical measures.

Data analysis used SPSS v20. Descriptive statistics were used in the handling of demographic and quantitative variables. Internal consistency of the questionnaire was tested using Cronbach's alpha. Normality of data was determined using Kolmogorov-Smirnov and Shapiro-Wilk tests and non-normal distribution was established ($p < 0.05$). Group differences were tested using Mann-Whitney U test (e.g., gender differences) and Kruskal-Wallis H test (e.g., levels of experience). Spearman's rank correlation was used to test relationships between impact, uses, and benefits. Chi-square tests were used to test relationships between qualification and training, and employment area and concerns or judgments about AI. Significance was at $p < 0.05$.

Result
353 people participated in the survey, and approximately equal numbers of males (53%) and females (47%) were included. 45% had 1-5 years of experience, and the next largest group had less than one year. Academic and non-academic sectors were filled almost to the same degree. Educationally, 58% had an undergraduate degree, 39% had a postgraduate degree, and 3% had doctorates. A majority (97%) were aware of AI in general, but the percentage dropped to 88% when it came to AI in medicine and dropped again to 77% when it was AI in rehabilitation. But only 38% of them were

AI-trained. On the usage in the workplace front, 39% used 1–4 AI tools, and 39% said they did not use any.

Reliability analysis confirmed high internal consistency of items, Cronbach's alpha 0.82–0.92. Normality tests revealed non-normal distribution of data. Mann–Whitney U test confirmed statistically significant difference between sexes in perceived benefits of AI (p = 0.048), but not for perceived influence or use. Kruskal–Wallis test revealed no significant difference in perception with years of experience.

Spearman correlation defined a statistically significant, positive, and moderate correlation between perceived uses and advantages of AI (r = 0.536, p < 0.001). AI's influence yielded weak and negative but statistically significant correlations with uses (r = –0.136, p = 0.011) and advantages (r = –0.150, p = 0.005).

There was no strong correlation between qualification in education and training in AI (p = 0.814). There was correlation between sector of work and concerns (p = 0.021) and judgments (p = 0.024) regarding the application of AI.

DISCUSSION

The current research examined the perceptions and attitudes of physiotherapists towards the application of artificial intelligence (AI) in healthcare and rehabilitation. The findings provide evidence of high awareness of AI among physiotherapists as a whole (97.2%), with 97.2% familiarity with the concept in itself. But, knowledge related to AI in healthcare (88.1%) and rehabilitation (76.8%) showed stepwise decline, indicating a persistent gap between overall awareness of AI and specific knowledge of application of AI in physiotherapy practice. This finding is in agreement with previous studies which have shown that, theoretically, health professionals are aware of AI but have insufficient knowledge of its application and purpose in their daily clinical practice.

Emphasizing the problem, only 37.7% of the questionnaires returned by the physiotherapists reported receiving any training related to AI, pointing to one of the main gaps to implementation—lack of structured educational exposure1. Alsobhi et al. (2022) also reported similar findings, identifying a lack of formal training as a major barrier to adoption of AI in rehabilitation [2]. This lack of formal training may result in uncertainty and fear among practitioners towards adopting new technologies, as also reported by Amann et al. (2020), who emphasized the need for explainability and clearly defined instructional models in order to establish confidence in AI-based systems [1].

Statistical analysis of the responses to the survey indicated that high frequency of use of AI was associated with greater perceived benefits, evidenced by a moderate correlation (Spearman's rho, r = 0.536, p < 0.001) between use and perceived benefits. Perceived influence was only associated with trivial, statistically significant, negative correlations with use and benefits, of no practical significance. The results indicate that practical experience of operating AI systems can enhance perceptions of their utility but will not necessarily change more general attitudes to their overall effect on the profession. This is in line with other research highlighting that concrete experience needs to be experienced in order for attitudes to be positive.

While there may be benefits, there are also some drawbacks among physiotherapists, including data protection, high initial costs, the risk of less clinician-patient interaction, and the risk of dehumanizing the care. These drawbacks must be addressed urgently, particularly among small or low-resource clinics where budgetary and infrastructural constraints may limit the adoption of technology.

In interpreting these findings, a number of limitations need to be borne in mind. First, the sample size of 353, although large, constrains statistical power and generalizability. Second, the relatively high proportion of respondents were undergraduate students, not experienced clinicians, and as such may have biased understanding away from perceptions likely to be held by established clinicians. Imbalance of clinical experience may bias findings, especially in relation to actual use of AI in the real world. A second important limitation is low level of awareness of participants about AI applications per se in rehabilitation, which may have constrained the range and depth of responses, especially to open-ended survey questions. Another limitation is

the use of snowball sampling, which may have introduced selection bias. Lastly, not all participants necessarily answered well or thoughtfully to the survey as a result of lack of interest or a wish to get the questionnaire done as quickly as possible, introducing potential response bias and lowering data quality.

In addressing these challenges, follow-up research must involve larger and more representative sample sizes, with more experienced practitioners as a priority in order to make more advanced and valid inferences. Longitudinal study designs are also recommended to evaluate evolving attitudes and expanding knowledge over time as practitioners grow more expert with AI technologies. Research must explore and overcome the practical problems of AI application in physiotherapy through targeted interventions. Comparative international research is also required to explore variations in perceptions and use of AI across various healthcare systems and cultural settings.

By acknowledging these constraints and implementing these recommendations, the profession can transition toward a more holistic, broad-based, and pragmatic approach to the integration of AI in physiotherapy practice.

CONCLUSION

This study highlights a clear gap between physiotherapists' high awareness of artificial intelligence and their limited training and practical application in rehabilitation Findings indicate that while most physiotherapists have awareness of AI from a theoretical perspective, fewer possess in-depth knowledge of its application in the health sector and far fewer on its specialized application in the rehabilitation sector. This gap is also addressed by the low percentage of professionals who have received formal AI training or practical experience with AI technology, issues that are key to fostering favorable attitudes and confident adoption. Findings also recognize persistent concerns with data protection, implementation costs, and the potential to reduce personalized clinician-patient interaction as concerns, with a need to overcome ethical and practical challenges to realize the full potential of AI in physiotherapy.

Ideal integration of AI into future physiotherapy practice will require concerted education reforms in terms of systematic AI courses and exposure to novel technology within clinical environments. Needed as well are effective solutions to resource problems and the augmentation of support for small clinics and diverse practitioner groups. Future research will need to employ longitudinal and multicenter study designs with larger, more experienced populations to enable follow-up of evolving attitudes and real-world application of AI. Comparative international studies will equally shed light on wider comparisons of the impact of various healthcare systems on AI adoption in rehabilitation. By tackling these education, experience, and systems challenges, the profession can enable AI to enhance physiotherapy outcomes without losing those all-important human touches of care.

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