



Original Article



Perceptions for Utilization of Artificial Intelligence among Early Pediatric Rehabilitation Practitioners: A Survey in Pakistan

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ABSTRACT

Integration of Artificial Intelligence in clinical medicine is rapidly expanding, driven by advancements in computing and extensive datasets. Artificial Intelligence is primarily utilized to design diagnostic tools for numerous medical conditions. **Objective:** To assess perceptions of using Artificial Intelligence among early pediatric rehabilitation practitioners in Pakistan. **Methods:** A cross-sectional online survey was conducted from November 2023 to April 2024, targeting young Masters students of Physical Therapy specializing in Pediatric Care and early pediatric therapists across Pakistan. Nonprobability convenience sampling was utilized. Participants were recruited through mailing lists and social media platforms. The anonymous survey collected demographic data and explored participants' knowledge, expected benefits, fears, and practices regarding Artificial Intelligence using a structured questionnaire. Descriptive statistics were employed for data analysis. **Results:** A total of 120 participants, with a mean age of 26 years and 70% female representation, completed the survey. Approximately 39.1% had received Artificial Intelligence training during their medical education, and 48.3% had utilized Artificial Intelligence tools during their learning. Key findings included 93.3% believing that Artificial Intelligence will enhance medical training and 60.8% agreeing that Artificial Intelligence will improve healthcare access. Despite positive attitudes towards AI, 54.1% had not utilized AI in their practice, indicating a need for further professional education. **Conclusions:** It was concluded that the study highlights a generally positive perception of Artificial Intelligence among novice pediatric rehabilitation practitioners in Pakistan but underscores the need for comprehensive AI education and training.

INTRODUCTION

Artificial intelligence (AI) inventor Marvin Minsky coined AI as "the science of making machines accomplish tasks that would typically necessitate human intelligence" [1]. Integration of AI tools is quickly increasing in clinical medicine, simplified by the extensive accessibility of strong processors and wide-ranging datasets [2]. AI has chiefly been employed in formulating diagnostic tools across various medical circumstances [3]. For example, by employing image recognition methods like convolutional neural networks, AI helps in the detection of fractures on X-rays [4], diabetic retinopathy on digital fundus images [5],

skin cancer [6], and hereditary diseases on facial images [7]. Other than convolutional neural networks, AI-driven diagnostic applications comprise enhancing autism diagnosis [8], recognizing child abuse from medical archives [9], and using natural language processing methods to support clinicians in detecting uncommon disorders [10]. AI also has applications in non-diagnostic areas, supporting chronic illness management like diabetes [11], decision-making, hospital monitoring processes, drug discovery pipelines, and surgical robotics [12]. AI-based healthcare gadgets display potential but



hinge on complex geometric practices and ideas, thereby suggesting both high outlooks and hesitations among practitioners. Several studies have investigated into the information, attitudes, and practices (KAP) of young healthcare professionals toward AI. Sit et al. executed an internet survey among four hundred and eighty-four medical student population in the UK via social media, exploring their knowledge, attitude and practices towards AI and its possible strong impact on selecting radiology as a speciality [13]. Though some students expressed reluctance to specialize in radiology due to AI concerns, the majority recognized AI's importance in medicine and believed AI training would benefit their careers. In France, Lai et al., conducted a qualitative survey focusing on AI perceptions among diverse healthcare stakeholders, revealing varying perspectives across professionals, industrial partners, regulatory agencies, and researchers. While healthcare professionals prioritized patient care and safety, industrial partners viewed AI as a significant breakthrough despite challenges in accessing health data. Researchers hoped for a smoother transition from AI research to practice [14]. Similarly, insights from international surveys that have been conducted among pediatric rehabilitation specialists shed light on their perceptions and utilization of AI in pediatric care. These specialists, while recognizing the potential of AI in improving pediatric rehabilitation outcomes, expressed concerns regarding data privacy, access to AI tools, and the need for further training to effectively integrate AI into practice. Their perspectives contribute valuable visions into the barriers and opportunities related to AI adoption in pediatric healthcare. While existing studies have explored AI perceptions among various healthcare specialities, none have specifically targeted young pediatric allied healthcare professionals in Pakistan.

This study aimed to conduct an online survey to gauge allied healthcare pediatricians' KAP towards AI, aiming to fill this research gap and provide unique insights into AI utilization in pediatric healthcare in Pakistan.

METHODS

This cross-sectional online study targeted young Masters students of Physical Therapy specializing in Pediatric care and novice pediatric therapists from across Pakistan. The study objective is to explore their perceptions, knowledge, and applications of artificial intelligence (AI) in pediatric rehabilitation. An online survey was conducted from November 2023 to April 2024, participants were recruited using several regional and nationwide emailing lists and media platforms. The study was designed to include new professionals registered on various Facebook pages and groups such as "Young Physiotherapist," "Physiotherapy in Pakistan" and specific pediatric rehabilitation promotion

groups. Therapists between the age group of 24 to 34 were recruited in the study. The survey was anonymous, and only individuals identified as pediatric therapists were eligible for participation. Though there were no stringent age parameters, the majority of participants belonged to young physician groups, typically Master residents and fellows. The online survey form, formulated and administered through Google Forms, comprised several sections. The initial questions collected demographic data such as age, gender, faculty, experience level, and any further training. The survey was then organized into four portions: (1) information about AI, (2) probable benefits of AI, (3) uncertainties toward AI, and (4) practices about AI. Answers to closed queries were collected using a 5-point Likert scale, with choices extending from disagree to agree. Questions expecting numerical entries provided ranges of probable scores. Social media groups and emailing lists received a distinct form, and answer files were combined for analysis. Partial replies were included in the analysis, and it was not required to answer all survey questions. Descriptive statistics, including means, medians, and percentages, were used for data analysis. All analyses were conducted using SPSS Version 23.0 software. Participation in the survey was voluntary, and informed consent was considered obtained upon completion of the questionnaire. Participant responses were anonymized, and individuals had the right to view and omit their replies. Due to the anonymous nature of the questionnaire, duplicate responses were unlikely.

RESULTS

One hundred and twenty individuals participated in the survey. 70% of the sample constituted female pediatric novice therapists. Respondents' mean age was 26.2 years. Socio-demographic characteristics are shown in table 1.

Table 1: Socio-Demographic Characteristics of Participants

| Characteristics | Values |
|----------------------|------------|
| Age (Mean, SD) | 26.2 (5.2) |
| Gender | |
| Male | 43 |
| Female | 77 |
| Working Place | |
| Private Clinic | 48 (40%) |
| Special School | 34 (28.3%) |
| Hospital | 12 (10%) |
| Others | 26 (21.6%) |

A significant majority, 93.3%, believed that AI would enhance medical training, indicating strong confidence in its potential. When it came to gathering information from patients, opinions were more mixed; 51% affirmed AI's ability to improve this process, while 19.1% disagreed and 29.1% remained neutral. Similarly, nearly half of the respondents (48.3%) thought AI would assist in analyzing

medical data, although 16.6% did not share this view, and 35% were neutral. In terms of improving healthcare access, 60.8% of participants supported the idea that AI could make a positive impact, while only 12.5% opposed it. The responses regarding AI's role in enhancing patient compliance with treatment and follow-up showed greater variability, with 35% believing it could help, 26.6% disagreeing, and 38.3% remaining neutral. Finally, for the question of whether AI would aid in accessing patient data to provide the most appropriate therapeutic options, 48.3% agreed, 14.1% disagreed, and 37.5% were neutral. Overall, the data reflected strong support for AI's potential benefits in medical training and healthcare access, while opinions were more divided on its effectiveness in patient compliance and information gathering. Survey responses regarding the perceived benefits of AI in healthcare across five key areas are summarized in table 2.

Table 2: Responses Regarding Benefits of AI

| Question | Frequency (%) |
|---|---------------|
| Do you believe AI will enhance medical training? | |
| Yes | 112 (93.3%) |
| No | 6 (5.0%) |
| Neutral | 2 (1.6%) |
| Do you think AI will improve the process of gathering information from patients? | |
| Yes | 62 (51%) |
| No | 23 (19.1%) |
| Neutral | 35 (29.1%) |
| Do you think AI will assist in analyzing medical data? | |
| Yes | 58 (48.3%) |
| No | 20 (16.6%) |
| Neutral | 42 (35.0%) |
| Do you believe AI will improve healthcare access? | |
| Yes | 73 (60.8%) |
| No | 15 (12.5%) |
| Neutral | 32 (26.6%) |
| Can AI enhance patient compliance with treatment and follow-up? | |
| Yes | 42 (35.0%) |
| No | 32 (26.6%) |
| Neutral | 46 (38.3%) |

A minority, 39.1%, reported having received AI training during their medical college education, while 60.8% indicated they had not. Regarding the utilization of AI tools during their learning, 48.3% affirmed that they had used such tools, whereas 51.6% had not. In terms of practical application, 45.8% stated they had utilized AI in their practice, while 54.1% had not. When asked whether specific AI training should be provided to healthcare practitioners, a significant majority of 70% agreed, indicating strong support for enhanced training. Additionally, 61.6% believed that the ethical challenges associated with AI use should be part of the education for healthcare practitioners, while 38.3% disagreed. Overall,

the data reflected a clear recognition of the importance of AI training and education on ethical issues among healthcare professionals, despite a lack of widespread training and tool utilization in their current practices. The descriptive statistics regarding the experiences and opinions of medical practitioners concerning AI training and its application in healthcare and these are shown in table 3.

Table 3: Responses Regarding Practices of AI

| Question | Frequency (%) |
|--|---------------|
| Have you received AI training during your medical college? | |
| Yes | 47 (39.1%) |
| No | 73 (60.8%) |
| Have you utilized AI tools during your learning? | |
| Yes | 58 (48.3%) |
| No | 62 (51.6%) |
| Have you utilized AI in your practice? | |
| Yes | 55 (45.8%) |
| No | 65 (54.1%) |
| Do you believe specific AI training should be given to healthcare practitioners? | |
| Yes | 84 (70.0%) |
| No | 36 (30.0%) |
| Do you believe the ethical challenges associated with AI use should be educated to health care practitioners? | |
| Yes | 74 (61.6%) |
| No | 46 (38.3%) |
| Total | 120 (100%) |

Confidence in the reliability of AI systems was mixed, with 36.6% expressing confidence, 43.3% lacking it, and 20% neutral. A majority (54.1%) thought over-relying on AI could lead to negative consequences in decision-making, whereas opinions on AI's impact on job security varied; 28.3% were concerned, 42.5% were not, and 29.1% were neutral. Overall, the data reflected significant apprehension regarding ethical issues and potential negative outcomes associated with AI, alongside mixed feelings about its reliability and job security implications. 50% of respondents believed AI decision-making in healthcare raised ethical concerns, while 14.1% disagreed and 35.8% remained neutral and these observations are shown in table 4.

Table 4: Uncertainties Towards AI

| Question | Frequency (%) |
|--|---------------|
| Do you believe that AI decision-making in healthcare raises ethical concerns? | |
| Yes | 60 (50%) |
| No | 17 (14.1%) |
| Neutral | 43 (35.8%) |
| Are you confident that current testing methods ensure the reliability of AI systems in critical applications? | |
| Yes | 44 (36.6%) |
| No | 52 (43.3%) |

| | |
|--|------------|
| Neutral | 24 (20%) |
| Do you think over-relying on AI could lead to negative consequences in decision-making processes? | |
| Yes | 65 (54.1%) |
| No | 32 (26.6%) |
| Neutral | 23 (19.1%) |
| Are you concerned that AI will significantly impact job security in various industries? | |
| Yes | 34 (28.3%) |
| No | 51 (42.5%) |
| Neutral | 35 (29.1%) |

Four key barriers to implementing AI in healthcare were illustrated. It identified a gap in knowledge among practitioners, highlighting their lack of understanding of AI technologies. Additionally, it pointed out the lack of data, which hindered the effectiveness of AI tools. The attitudes of healthcare professionals were also noted, as their perceptions could influence their willingness to adopt AI. Lastly, the figure addressed the cost burden associated with implementing AI solutions, which could deter investment from healthcare facilities. A model was proposed on the reasons for decreased AI adoption amongst pediatric rehabilitation specialists in Pakistan as shown in figure 1.

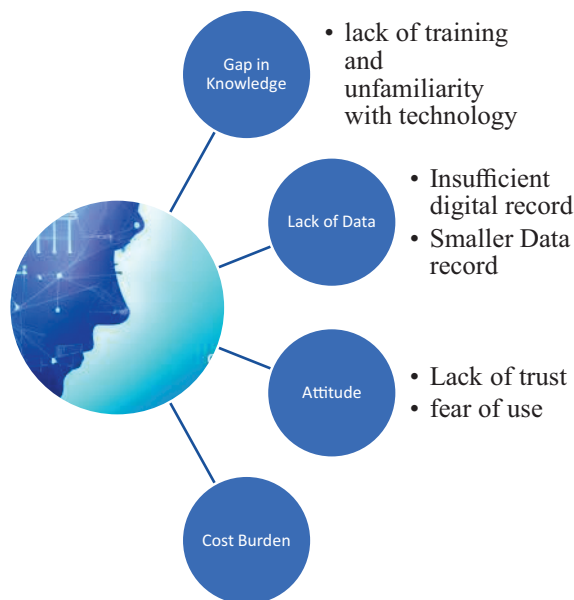


Figure 1: Sources of Decreased Utilization of AI in Pakistan

DISCUSSION

The objective of this study was to ascertain the level of knowledge that Pakistani pediatric rehabilitation specialists have about AI and various types of realities, as well as to evaluate their awareness and practical use of AI. With rapid advancements being made in the field of AI, it is becoming increasingly common for this technology to support the digital transformation of healthcare and

provide evidence-based care [15]. Globally, this shift towards integrating AI into healthcare necessitates understanding the extent to which pediatric rehabilitation specialists are knowledgeable about, aware of, and practicing with AI, as they are the conduits through which this technology is introduced to patients. On a national level in Pakistan, a developing country lagging in the implementation of AI in healthcare [16], understanding the relationship between medical consultants and AI can shed light on narrowing the educational, research, and clinical gaps of AI between Pakistan and the developed world. The study's participant demographic was about 35% female and 65% male, which is in line with previous research. Fewer people wished to remain anonymous about their gender. The participants' average age was 32.0 years, which is comparable to the findings of other studies. Although slightly higher than in studies conducted in other developing countries like Iran and India, 39.1% of the participants indicated they had taken courses or training related to AI [17]. Despite this, the percentage is still low, indicating a significant need for AI-related education within Pakistan's medical landscape. 95.5% of participants reported using the Internet every day, and 97.7% of participants said they had a smartphone or tablet, indicating that medical consultants have extensive access to the Internet. Similar studies did not measure this parameter, probably because they assumed that most medical practitioners had access to this kind of equipment. The majority of participants (60.5%) said they were comfortable utilizing or working with computers and other devices, indicating a fundamental understanding of and ability to use such technology. Other studies—possibly because they are more relevant to the goal—did not ask about levels of fundamental technological competence instead focusing exclusively on issues regarding artificial intelligence. It is crucial to comprehend technical affinity in a country like Pakistan, where it is not possible to make the same assumptions about this metric as in developed states. Medical consultants have a strong technical background, which influences the national conversation regarding AI. Mixed responses regarding the analysis of medical data (48.3% yes, 35% neutral) and patient compliance (35% yes, 38.3% neutral) suggest a need for more detailed education on the specific capabilities and applications of AI in these areas. These findings align with previous studies indicating that even though healthcare experts recognize the strength of AI, they also express concerns about its practical implementation and efficacy in certain aspects of patient care. The majority of respondents stated they either agree or strongly agree with the concept that AI will provide an advantage in accessing patient information (51%) and had an overall

optimistic or very confident view about the usage of AI in medicine and enhanced medical training (93.3%). This idea is communal across other research, signifying that Pakistan is parallel to other countries based on attitude towards AI in health care [18]. A common concern about AI is its positive strength to adhere patients to treatment plans [19]. However, 26.6% of participants disagreed that AI enhances patient compliance with treatment and follow-up, a belief common in participants of other studies. At the same time, 54.1% of participants agreed with the notion that they didn't utilize AI in their practice, suggesting that despite favourable opinions about AI, more professional knowledge is needed before clinical implementation. The findings of the current study highlight the significance of integrating AI education into the medical curriculum for novice pediatric rehabilitation practitioners. Given the swift developments in AI and its growing role in healthcare, it is crucial to equip practitioners with the necessary skills and knowledge to effectively utilize AI tools [20]. This includes not only technical training but also education on the ethical implications of AI, which is essential for ensuring responsible and effective use of technology in patient care. Moreover, addressing the concerns and neutrality expressed by participants regarding specific applications of AI, such as data analysis and patient compliance, could foster greater acceptance and confidence in AI tools. Providing practical examples and case studies demonstrating the successful implementation of AI in these areas may help bridge the gap between theoretical knowledge and practical application.

CONCLUSIONS

It was concluded that while there is a generally positive attitude towards the benefits of AI, there is also a clear need for enhanced education and training.

Authors Contribution

Conceptualization: Ss¹

Methodology: SS¹, SR, SQ, SS²

Formal analysis: R, SS²

Writing review and editing: SS¹, SAA

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

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