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RESEARCH ARTICLE

Knowledge and barriers regarding telerehabilitation among physical therapists

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ABSTRACT

Background: Using technology and communications networks to deliver rehabilitation treatments remotely is known as telerehabilitation (TR). It covers a range of patient care topics, such as evaluation, monitoring, and treatment.

Objective: The aim of this study was to determine physical therapists' perceived knowledge and obstacles to tele-rehabilitation installation and utilization and the association between experience and knowledge of telerehabilitation.

Methods: The descriptive cross-sectional study (Ref/IRS/REC-0002156) was conducted over six months in Rawalpindi and Islamabad, targeting physical therapists working in public and private healthcare facilities. Using non-probability convenience sampling, 146 physical therapists were recruited comprising both genders with six months of experience and those older than 24. A modified 14-item questionnaire created by Majmaah University was used to gather data, and SPSS version 25 was used for analysis.

Results: Out of 146 participants, 59 (40.4%) were male and 87 (59.6%) were female. 55.5% of participants were familiar with the notion of telerehabilitation, whereas 44.5% of participants reported that they had no knowledge about telerehabilitation. 4.8% of providers were unwilling to use telerehabilitation, 43.2% had technical problems, 23.3% had staff competence problems, 13.7% had high costs, and 4.1% identified healthcare location as a barrier. After testing for normality using the Shapiro–Wilk test, a non-parametric chi-square test was applied, which showed no significant association between physical therapists' knowledge of tele-rehabilitation and years of experience ($p = 0.185$).

Conclusion: Physical therapists comprehend tele-rehabilitation at an average level, yet a significant percentage still don't know enough about it. Financial difficulties, human incompetence, and technological problems are the primary barriers to the utilization of telerehabilitation.

Keywords: Barriers, knowledge, physical therapists, telerehabilitation.

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Introduction:

Tele-health is the delivery of many aspects of health information, prevention, monitoring, and medical care using a virtual platform powered by technology.(1) Telehealth encompasses both clinical and nonclinical modalities, such as e-health, telemedicine, telematics, and telerehabilitation (TR).(2) "eHealth is an emerging field in the intersection of medical informatics, public health, and business," according to Eysenbach, who coined the word. It refers to health services and information that are provided or improved through the Internet and related technologies. In a broader sense, the phrase refers to a mindset, an attitude, and a duty to adopt a global, networked perspective in order to improve healthcare at the local, regional, and international levels through the use of technology for information and communication.(3)

Telerehabilitation also called e-rehabilitation (4) is the term used to describe the use of telemedicine and/or telehealth in physical therapy. A variety of rehabilitation services, such as "evaluation, assessment, monitoring, prevention, intervention, supervision, education, consultation, and coaching," are included in telerehabilitation (TR), which is the practice of providing rehabilitation using a variety of technologies.(5,6) Telerehabilitation is an intervention

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that involves several components and disciplines.(7) It can significantly shorten the duration of physical therapy interventions. Image-based, sensor-based, and virtual reality (VR)-based telerehabilitation are the three main categories into which telemedicine-based physical rehabilitation technologies are typically separated.(8) In image-based telerehabilitation, patients are guided through therapeutic activities remotely using visual aids like images, films, or real-time video conversation.(9) Although this technique has been around since the 1960s, videoconferencing gained popularity in the 1990s. Wearable sensors are used in sensor-based tele-rehabilitation to monitor joint motions in real time and give prompt feedback while engaging in rehabilitation exercises.(10) These devices allow for evaluations of range of motion, coordination, and dynamic performance, which is especially helpful in home-based treatment, such as following anterior cruciate ligament (ACL) surgery.(11)

Rehabilitation with virtual reality offers engaging, interactive settings that improve cognitive and motor abilities.(12) It has been demonstrated to help people with moderate cognitive impairment or neurodegenerative diseases like Alzheimer's disease with their memory, visual attention, and stress levels. (13) The COVID-19 epidemic made remote therapy more practical by highlighting the benefits of virtual reality (VR) in tackling the rise of mental health problems brought on by isolation. Through creative, patient-centered digital platforms, these technologies work together to increase access to care and enhance rehabilitation results.

Access to outpatient rehabilitation and treatment for non-urgent cases is restricted due to the global spread of coronavirus illness (COVID-19), which has changed people's lives in a number of ways, and the implementation of various precautionary measures, such as social distance, to lessen the risk of exposure. (14,15) Given the impact of the COVID-19 pandemic on locals' activities and adoption of social distance, telerehabilitation could seem like a suitable substitute for providing in-person rehabilitation services during and after the prolonged quarantine. A rehabilitation program should be started as soon as possible, continued for as long as is practical, and continued during the healing process. Patients may typically complete the initial stages of rehabilitation at home following an illness or injury, even though they need precise and careful attention. These factors led to the development of telerehabilitation, which offers the same outcomes as traditional hospital rehabilitation or in-person sessions with a physiotherapist.(16)

The clinical application of TR includes post-stroke TR service, traumatic brain injury (TBI) TR service, and orthopedic TR service.(17) In addition to assisting patients who face barriers to rehabilitation services due to pandemics, epidemics, disasters, or physical, financial, and geographic constraints, tele-rehabilitation improves access to care that would otherwise be unavailable. Furthermore, the COVID-19 pandemic has accelerated the adoption of telerehabilitation for outpatients with chronic disabilities to support continuity of care and promote overall health.(18)

Physiotherapists encounter several obstacles while using tele-rehabilitation. High implementation costs, technological problems, and a lack of skilled staff are major barriers.(19) Inadequate e-health knowledge along with stakeholders' lack of adoption and comprehension of telehealth are some of obstacles.(20) The lack of national e-health policy, data privacy laws, and organized health information systems are examples of organizational difficulties.(21) Implementation is further limited by technological constraints including inadequate internet access and a shortage of appropriate equipment.(22) Institutional barriers can come into play, such as a lack of employment regulations and insufficient assistance.(16) Both patients and clinicians are impacted by financial limitations since the expenses of purchasing, maintaining, and running the necessary technology might be unaffordable, which restricts the practical use of telerehabilitation.(23) There is no study conducted in Pakistan to assess the knowledge and barriers of telerehabilitation. This study determines the knowledge of telerehabilitation among physiotherapist and the barriers in its implementation.

Methods:

The descriptive cross-sectional survey was conducted to determine the objectives of study which is to assess awareness of tele-rehabilitation among physical therapists in Rawalpindi and Islamabad. Islamabad Physiotherapy and Rehabilitation Center (IPRC), National Institute of Rehabilitation Medicine (NIRM), X Fit Therapy, Pedia Care Therapy, and PIMS, Islamabad were among the hospitals and clinics where the study was carried out. Physical therapists working in both public and commercial healthcare facilities made up the target group. The sample size of 146 was calculated using the WHO sample size calculator.(19)

Non-probability convenience sampling technique was used to select the participants. Physical therapists working in Rawalpindi and Islamabad who were 24 years of age or older and had at least six months of professional experience were eligible to apply; those

with less experience or from other professions were not. A modified 14-item questionnaire created by Majmaah University in Saudi Arabia in which 14 questions are used to assess knowledge of TR among physiotherapist of Saudi Arabia was used to gather data. Questionnaire was modified due to cultural differences and need of study. Ethical approval was received from the PIMS (F-5-2/2024(ERRC)/PIMS) and SZABMU (Ref/IRS/REC-0002156) committees. Participants provided informed consent prior to participation. All data were safely archived, and participant information was kept anonymous and confidential. No harm, either psychological or financial, was anticipated for the participants involved in this study. Descriptive statistics were utilized.

Results:

The study involved 146 participants (59 males and 87 females) who met the inclusion criteria. Of these, 65 individuals (44.5%) did not know anything about tele-rehabilitation, whereas 81 participants (55.5%) had a sufficient knowledge about telerehabilitation. (Figure 1) The majority showed an excellent understanding of tele-rehabilitation with 47.3% agreeing and 57.1% strongly agreeing about its understanding.

Among smaller groups working at Pedia Care (2.1%) and X Fit Therapy (4.1%), the majority of participants are employed by organizations like Dr. Ali Therapy (26.7%), NIRM (24.0%), PIMS (21.9%), and IPRC (21.2%). It is evident that the majority of participants are recent graduates because the largest cohorts graduated in 2022 (23.3%) and 2023 (29.5%). Less than 1% come from earlier graduating years like 2003 to 2010. The majority of participants (86.3%) had experience between 0 and 5 years, followed by 6 to 10 years (8.2%), with very little representation in higher experience groups. Telerehabilitation is not widely used, as evidenced by the fact that only 17.8% of participants stated that it is accessible at their place of employment and only 20.5% actively utilize it. Significant infrastructure and preparedness deficiencies are also shown by the fact that just 11.6% of respondents think their workplace is adequately equipped for telerehabilitation. (Table 1)

Technical difficulties (43.2%), a lack of staff expertise (23.3%), and exorbitant expenses (13.7%) were the most often mentioned obstacles. (Table 2) Issues with provider preparedness (4.8%) and location (4.1%) were less common. 50.7% of individuals viewed a lack of training as a considerable or serious barrier, making it a major impediment. Another issue was patient resistance to telerehabilitation (Table 3), which 67.8% of respondents considered to be a moderate to severe barrier. With 74.6% rating privacy and security concerns as moderate to severe hurdles, these concerns were the most often stated.

The most popular technique was image-based telerehabilitation (31.5%), which was followed by virtual reality (11.0%) and sensor-based techniques (6.8%). Evaluation, diagnosis, prognosis, intervention, and follow-up were among the main goals (26.0%).

After applying Shapiro Wilk Test for normality, non-parametric (chi square) test was applied to check association between physical therapist knowledge and years of experience. Years of experience and telerehabilitation expertise did not significantly correlate, according to the chi-square test ($p = 0.185$). This implies that a physical therapist's familiarity with telerehabilitation is not significantly impacted by their degree of experience. (Table 4)

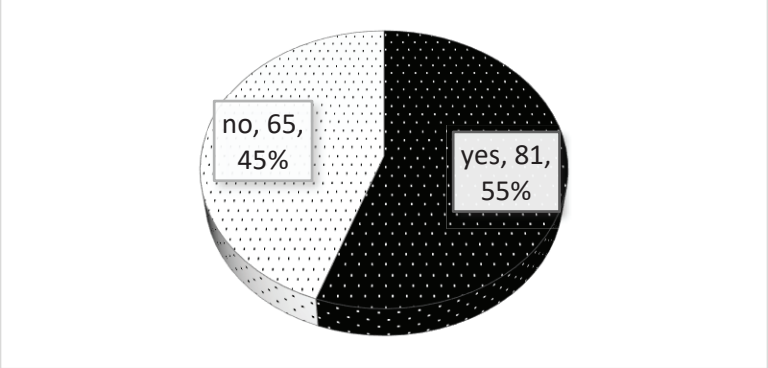

Figure 1: Knowledge of Telerehabilitation

Table 1: Telerehabilitation at workplace

	Yes	No
Tele-rehabilitation at work	N=26 ,17.8%	N=120,82.2%
Use of tele-rehabilitation at work	N=30, 20.5%	N=116, 79.5%
Well preparedness of work place	N=17, 11.6%	N=129,88.4%

Table 2: Barrier to Telerehabilitation

	Frequency	Percentage
Provider willingness'	7	4.8%
Technical issue	63	43.2%
Staff skill issue's	34	23.3%
High cost	20	13.7%
Location of healthcare	6	4.1%
Other	16	11%

Table 3: Barriers of Telerehabilitation

	Not at all	Slightly	Moderately	Significantly	Extremely
Lack of training as barrier	N =5	N =23	N =44	N =37	N =37
Patient resistance toward TR	N =19	N =28	N =56	N =30	N =13
Patient privacy and security hindrance	N =7	N =32	N =55	N =29	N =22

Table 4: Association of experience and knowledge of Telerehabilitation

	Knowledge Present	Knowledge Absent	p-value
Knowledge of TR	81	65	0.185

Discussion:

This study provides a thorough examination of Pakistani healthcare workers' understanding, use, and difficulties with telerehabilitation (TR). With 146 individuals (59 men and 87 women), important new information on the knowledge and obstacles around telerehabilitation was discovered.

Just 81 individuals (55.5%) claimed having a basic understanding of telerehabilitation, and 17.8% said their companies used it. According to a research by Höher J,et al, telerehabilitation is currently underused since healthcare systems are not fully aware of it.(12)11.6% of interviewees reported having well-prepared workplaces, but only 20.5% of participants regularly utilized telerehabilitation. This is supported by Ahmad et al. (2022), who highlighted how inadequate infrastructure is in environments with little resources.(24)

Similar to Smith et al. (2021), who noted professional training deficiencies as a key telerehabilitation barrier, more than 50% of respondents reported inadequate training as a major barrier. Smith et al. (2021) and recent study both point to inadequate training as a significant obstacle to the uptake of telerehabilitation. About 38.4% of patients indicated moderate resistance, which was explained by their lack of knowledge or skepticism about telerehabilitation. This result is consistent with that of Brown et al. (2020), who reported that skepticism is a barrier to the adoption of telemedicine.(25)

52.1% of respondents rated privacy concerns as moderate to severe. This was in line with research by Almutairi et al. (2019), which identified data security and privacy as the two main telerehabilitation problems.(26)

57.1% of participants strongly agreed with telerehabilitation's usefulness, indicating a positive view toward it. In a similar vein, Ergin et al. (2021) discovered that telerehabilitation is becoming more well acknowledged for its adaptability and promise in healthcare delivery.(27) Due to its affordability and ease of use, image-based telerehabilitation was the most often utilized modality (31.5%). These results are consistent with those of Lee et al. (2020), who observed comparable preferences in environments with restricted resources.(28) In terms of objectives, 26% used telerehabilitation for several uses, such as follow-ups, intervention, and assessment. These many uses demonstrate its versatility, which Nesrin et al. (2021)

have confirmed.(29)

Experience and graduation year have no impact on familiarity with telerehabilitation. Workforce is predominantly young/early-career (86.3%); however, only 11.6% of organizations were adequately prepared to implement telerehabilitation, indicating significant structural challenges.(19) The study has several limitations, including its cross-sectional design, small sample size, limited geographic coverage (Rawalpindi and Islamabad only), restricted resources affecting scope and depth, and the potential for response bias due to inaccurate or incomplete participant answers.

Conclusion:

The goal of the study was to assess Pakistani physiotherapists' telerehabilitation expertise and obstacles. The findings showed that while many physiotherapists have a basic knowledge of tele-rehabilitation, there are still gaps in both practical application and comprehension. Since many organizations lack the necessary resources to conduct telerehabilitation effectively, its use is still modest. Technical difficulties and insufficient staff training are major obstacles, highlighting the need for improved infrastructure, professional development, and legislative efforts to enable tele-rehabilitation's wider acceptance in clinical practice.

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Authors Contribution:
Afzal MT: Analysis of data, critical review.
Rehman N: Draft and design of review.
Saleem S: Data collection.
Noor M: Data interpretation.
Rizvi MM: Intellectual contribution to the concept.