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Patient's Perspective of In-Home Telerehabilitation Physiotherapy Services: A Cross-Sectional Survey

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DECLARATIONS

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ABSTRACT

Background: Tele-rehabilitation is delivered remotely using digital media that can be audio or video recorded. With interactive communication technology, it is employed in a community setting to serve patient needs through diagnostic, restorative, preventive, motivating, and consulting services. **Objective:** To find the patients' perception of in-home tele-rehabilitation physiotherapy services. **Methodology:** This cross-sectional study was conducted over a period of six months, data collected from the residents of Lahore. A total of 112 participants were enrolled in the study using a non-probability convenience sampling. Individuals aged 15 years and above, of either gender, who had experienced any form of musculoskeletal disorder. Participants were excluded if they presented with psychological disorders, chronic systemic illnesses (such as cardiovascular or respiratory conditions), or critical musculoskeletal injuries. Before participation, informed written consent was obtained from all eligible subjects. The data collection tool consisted of a self-administered questionnaire designed to assess participants' perceptions of tele-rehabilitation. Age distribution was presented using a histogram, while other categorical variables were represented through bar charts. **Results:** The mean age of participants included in the study was 38.48±8.92 years. 21.4% of the participants were males, and 78.6% were females. 43.8% participants had secondary education, and 56.3% had graduated or had higher education. The study included participants from 10 different cities in Pakistan. The maximum number of participants was included from Lahore (33%) and Islamabad (25%). 58.9% participants took musculoskeletal or orthopedic services by tele-rehabilitation, 10 (8.9%) participants took pediatric services, 2 (1.8%) took neurology services, and 34 (30.4%) took occupational services. **Conclusion:** Majority of the participants were satisfied with tele-rehabilitation (53.6%) with most of the aspects of their experience, including the therapists' competency (75%), the improvement in their medical condition (69.6%), the effectiveness of exercise program (67.9%), the technology, and the support provided by the technical team (85.7%). Most of the participants believed that management by tele-rehabilitation is as effective as face-to-face rehabilitation (54.5%).

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INTRODUCTION

A rehabilitation service known as tele-rehabilitation (TR) is delivered remotely using digital media that can be audio or video recorded. With interactive communication technology, it is employed in a community setting to serve patient needs through diagnostic, restorative, preventive, motivating, and consulting services. It is also described as the process of providing rehabilitation services to individuals located in different locations, such as their homes, by means of information and communication technologies (ICT). It is considered a subdivision of telemedicine. Robotic and virtual reality technology, synchronized cooperation with online content, and remote monitoring systems may all be used to provide clients with a wide range of diagnostic and therapy approaches.[1]

Significant demographic shifts, such as a growing elderly population, longer life expectancies, and a rise in the frequency of chronic illnesses, are placing more pressure on global health care systems. Additionally, shorter hospital stays suggest that patients are returning home sicker and less capable.[2] Various methods of delivering health services have been created and suggested to better satisfy these evolving demands. As an alternate method of service delivery, in-home telehealth, which includes tele-rehabilitation programs, is growing in popularity.[3] The primary purpose of tele-rehabilitation is to provide unbiased access to rehabilitation services to subjects who are geographically distant from the rehabilitation specialist.[4] Some additional benefits of tele-rehabilitation include reduced treatment costs, maximising the timing and level of intensity, better access, and ongoing care for patients with infectious disorders to provide the patient the best possible functional outcome. Hence, it is proposed that tele-rehabilitation improves quality of life.[5]

Programs for home telehealth, in particular, are only slowly being successfully integrated and implemented.[6] However, virtual treatment can be challenging at times and may not be well-received by patients or caregivers. Primary practitioners with experience in mobility,[7] pain management, functional rehabilitation,[8] and injuries are specifically included in the physical therapy group. These physiotherapists (PTs) treat patients using a combination of hands-on and hands-off techniques,[9] which typically necessitates extensive physical contact between the patient and the therapist, which cannot be achieved using tele-rehabilitation. Even with skilled personnel and a technical care paradigm, tele-rehabilitation services still need to be improved. This is particularly true for treating patients at home.[10] Considering the global prevalence of patients' perspectives regarding tele-rehabilitation, literature shows that studies dealing with cardiac or neurological conditions rehabilitation showed that tele-rehabilitation was successful, 18% were not successful, while 11% concluded that the status was not clear.[11] Considering the role of tele-rehabilitation in the physical therapy department, a study was conducted to report patients' perspectives who had undergone total knee arthroplasty (TKA). The study concluded that patients were pleased with the services they obtained.[12]

A study conducted in Pakistan to evaluate the perspective of the Pakistani population towards tele-rehabilitation concluded that the rehabilitation industry in Pakistan is aware of ICT and tele-rehabilitation, and its experts are open to using tele-rehabilitation apps and programs. The study thus concludes that tele-rehabilitation in Pakistan has a promising future, but it will need the attention of policymakers and non-governmental organizations to develop a national program.[13] Applications for telerehabilitation, including home environment evaluation and physical and communication rehabilitation, have been growing over the past ten years. These applications have helped adults and children with a variety of physical and communication problems get assessment and intervention services. The technology used in these applications has ranged from basic phones to pricey, fully immersive virtual-reality systems with haptic feedback, as well as internet-based video-conferencing systems with specialized software tools and physical sensors.[4,14]

An observational study was conducted by Megan H. Ross et al in 2023 at The University of Queensland, located in Australia. The goal of the study was to identify the essential components of a successful, quick implementation of tele-rehabilitation in municipal hospital physiotherapy units in response to COVID-19. A total of 25 physiotherapists were included in the study. The study concluded that Tele-rehabilitation can be quickly implemented in a hospital setting with the help of administrative, management, and organizational support; physiotherapists who are

open to adopting the program; high-quality software and connections; supplies and space that are readily available; and optimized systems and procedures. Effective communication, demonstration, enlisting the assistance of a third party, and clients who are ready and prepared to participate are essential components of a successful tele-rehabilitation session.[15]

Miia M Jansson et al submitted a systematic review in 2022 from the University of Oulu, located in Finland. The purpose of the study was to investigate the safety and efficacy of tele-rehabilitation for individuals undergoing lower limb joint replacement. A total of nine studies with more than 1200 subjects were included in the study. The study concluded that after finishing tele-rehabilitation, the patients' physical functioning improved in a way comparable to those who finished traditional in-person outpatient physical treatment, but with fewer adverse events and resource use. However, the data regarding tele-rehabilitation's impact on physical functioning was rated as inconsistent and of moderate to low quality. Therefore, for patients who have had lower limb joint replacement surgery, tele-rehabilitation is a useful substitute for traditional in-person outpatient physical therapy.[16]

Lívia G. Fernandes et al conducted a study in 2022 from Brazil. The purpose of the study was to find out what Brazilian physical therapists and the general public think about telerehabilitation acceptability, preferences, and requirements. 1107 responses were included. The study concluded that it seemed that both the general public and physical therapists are wary about telerehabilitation. Participants' acceptability, preferences, and requirements may be impacted by poor planning or information. Sarah Ibraheem Albahrouh et al conducted a study from Kuwait University, located in Saudi Arabia, in 2021. The purpose of the study was to find out how Kuwaiti physiotherapists felt about and were willing to utilize telerehabilitation during the COVID-19 epidemic, as well as to look into potential obstacles to telerehabilitation utilization in this industry. About 273 participants were included in the study. The study concluded that Physiotherapists in Kuwait have generally good opinions about telerehabilitation and are eager to use it to help patients receive physiotherapy treatments. There are a number of obstacles to using telerehabilitation. Recommendations are therefore made.[17] Shilpa Tyagi et al conducted a study in 2018 at the National University of Singapore. The purpose of the study was to investigate how stroke patients, families, and rehabilitation therapists in an Asian context view the challenges and enablers of TR. Thirty-seven participants were included in the study. The study demonstrated that patients' hurdles included limited exercise scope and equipment setup issues; teletherapists' barriers included patient evaluations, interface issues, and restricted exercise scope; both groups' barriers shared connectivity issues. Age, the severity of the stroke, the support of the caregiver, and cultural influences changed the patient's perspectives and rehabilitation preferences.[18]

Mark J. Nelson proposed a study in 2017 from Jubilee Hospital, located in Australia. The study aimed to determine if starting a tele-rehabilitation program for total joint replacement patients is feasible. A total of 75 subjects were included in the study. The study concluded that the willingness to engage in tele-rehabilitation was expressed by 65% of participants. A phone call was the preferred mode of contact, and watching movies on a gadget was the preferred approach for a technology-based at-home workout program. In terms of technological choices, attitudes towards it, and accessibility, the results show that tele-rehabilitation in the total joint replacement population is doable [19]

Hélène Moffet et al conducted a randomized controlled trial in 2017 at the University of Laval, located in Canada. The study aimed to assess patients' satisfaction after receiving in-home TR following TKA in comparison to a patient receiving standard direct home visit rehabilitation. A total of 205 subjects were included in the study. The study demonstrated that both groups' satisfaction levels were extremely high (85%) and did not differ. These outcomes clearly validate the implementation of tele-rehabilitation to increase accessibility to rehabilitation programs and the effectiveness of service delivery following total knee arthroscopy. They also verify evidence of clinical efficacy and cost savings seen in the same patient population.[20]

H Shukla et al in 2017 from Capita India Private Limited, located in India. The study aimed to assess the efficiency of tele-rehabilitation at home for patients who have had total knee arthroplasty. A total of 160 studies were included in the study. When utilizing TR exclusively, patients reported high levels of satisfaction. Between the control

group and the home TR group, there was no discernible difference in the change in active knee flexion and extension. Comparisons between the home tele-rehabilitation group and the conventional treatment group's patients' improvements in functional status and physical activity were made.[21]

A randomized control trial was conducted by Moffet et al in 2015 at the University of Laval, located in Canada. The purpose of the study was to ascertain whether, following hospital discharge of patients who have undergone total knee arthroplasty, an in-home tele-rehabilitation program is not medically inferior to a direct home visit method. A total of 205 participants were included in the study. The findings supported the use of in-home tele-rehabilitation as a successful substitute for in-person service delivery following a total knee replacement by demonstrating its non-inferiority.[22] The study on the patient's perspective of in-home tele-rehabilitation physiotherapy services is driven by a growing need to understand and prioritize the experiences of individuals undergoing remote rehabilitation.

As technology continues to reshape healthcare delivery, particularly in the field of physiotherapy, it becomes essential to explore how patients perceive and engage with these innovative services. This research aims to uncover insights into the convenience, effectiveness, and overall satisfaction of patients receiving in-home tele-rehabilitation in Pakistan. By focusing on the patient's perspective from different cities of the state, the study seeks to identify potential benefits, challenges, and areas for improvement in order to enhance the quality of care provided through telehealth modalities. Ultimately, this investigation serves to inform both practitioners and policymakers, contributing valuable knowledge to optimize in-home tele-rehabilitation services based on the unique needs and preferences of the patients themselves.

METHODOLOGY

This research was designed as a cross-sectional study aimed at exploring the perceptions of individuals regarding in-home tele-rehabilitation physiotherapy services. The study was conducted over a period of six months following the approval and submission of the research synopsis. Data was collected from the general population of Pakistan, with a particular focus on residents of Lahore. A total of 112 participants were enrolled in the study using a non-probability convenience sampling technique.

The inclusion criteria encompassed individuals aged 15 years and above, of either gender, who had experienced any form of physical therapy-related disorder.[10] Participants were excluded if they presented with psychological disorders, chronic systemic illnesses (such as cardiovascular or respiratory conditions), or critical musculoskeletal injuries.[2] Before participation, informed written consent was obtained from all eligible subjects. The data collection tool consisted of a self-administered questionnaire designed to assess participants' perceptions of tele-rehabilitation. This instrument was adapted from a previously validated questionnaire used in a similar research study.[10]

Once participants completed the questionnaire, the collected data were compiled and analyzed using Statistical Package for the Social Sciences (SPSS), version 26. Descriptive statistics were employed to illustrate demographic characteristics and key variables. Age distribution was presented using a histogram, while other categorical variables, such as gender, body mass index (BMI), educational background, city of residence, services received, patient confidence, perceived effectiveness TR, satisfaction levels, difficulties encountered by therapists, technical issues, and overall patient opinions were represented through bar charts. This methodological framework was established to ensure reliable data collection and to gain meaningful insights into patient experiences and satisfaction with in-home tele-rehabilitation services in a post-pandemic healthcare landscape.

RESULTS

Figure 1 shows that the mean age of participants included in the study was 38.48±8.92 years. The eldest members were 55 years old, while the youngest members were 21 years old. Table 1 presents the detailed statistics, 24 (21.4%) participants were male and 88 (78.6%) were female. The statistics show that 49 (43.8%) participants had secondary education, and 63 (56.3%) had graduated or had higher education. The statistics show that 66 (58.9%) participants took MSK or orthopedic services by tele-rehabilitation, 10 (8.9%) participants took pediatric services, 2 (1.8%) took neurology services, and 34 (30.4%) took occupational

services. The statistics show that 62 (55.4%) patients were very confident in the therapist's tele-rehabilitation assessment and treatment, 30 (26.8%) were moderately confident, 10 (8.9%) were less confident, 2 (1.8%) were not at all confident, and 8 (7.1%) did not know.

The statistics show that 65 (58%) participants marked TR as most definitely a good face-to-face assessment method, 14 (12.5%) participants marked that TR was probably a good face-to-face assessment method, 5 (4.5%) participants marked that they were not sure about TR, 15 (13.4%) marked that TR was not a good assessment method, and 13 (11.6%) did not know what to say. The statistics show that 15 (13.4%) marked that the therapist faced difficulty in assessment, while the majority of the participants, 97 (86.6%), marked that the therapist did not face any difficulty in assessment. The statistics show that 78 (69.6%) participants marked that their condition improved after they received treatment through the TR program, while 34 (30.4%) participants marked that their condition did not improve after receiving a TR session. The statistics show that 16 (14.3%) faced a technical problem during TR service, while the majority of the participants, 96 (85.7%), did not face any technical problem during TR service (Figure 2).

DISCUSSION

The study's primary objective was to find the patients' perception of in-home TR physiotherapy services. A significant amount of patients found that using a video conference to discuss the health condition was as effective as a face-to-face conversation (54.5%), 60.7% participants were happy to not attend sessions in the hospital physically, and 67.9% believed that the treatment plan prescribed by the therapist via TR would improve their present health condition. Overall, the participants who received TR during their lifetime demonstrated a positive attitude.

Dahlia Kairy et al conducted a similar study in 2013 to discover the patients' opinion on Telerehabilitation physiotherapy services provided at home after total knee replacement (TKR). According to this study, the majority of the participants' experiences were positive, including their ability to access resources, their interaction with therapists, the exercises they completed, the technology, and the technical team's assistance.[2] This study drew similar results, but it worked on many physiotherapy conditions, including MSK, neurology, pediatrics, and occupational PT, unlike the relevant article that evaluated patients with TKR only.

Farnia Velayati et al conducted a similar study in 2020 to assess the therapeutic benefits of telerehabilitation versus regular rehabilitation treatments for senior citizens. The study concluded that, as an alternative to conventional rehabilitation techniques, tele-rehabilitation services could lower the need for outpatient resources while enhancing quality of life. To find out how beneficial tele-rehabilitation services are for particular illnesses or medical situations, more thorough researches are advised.[23] This study found similar results that TR is effective in managing medical conditions, and a significant number of participants were satisfied.

Figure 1: Age statistics of participants

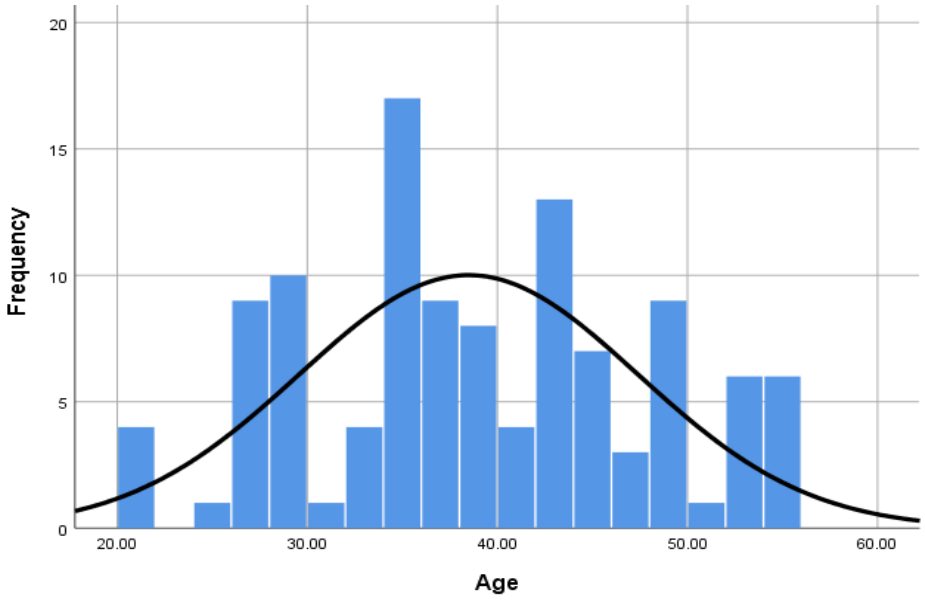
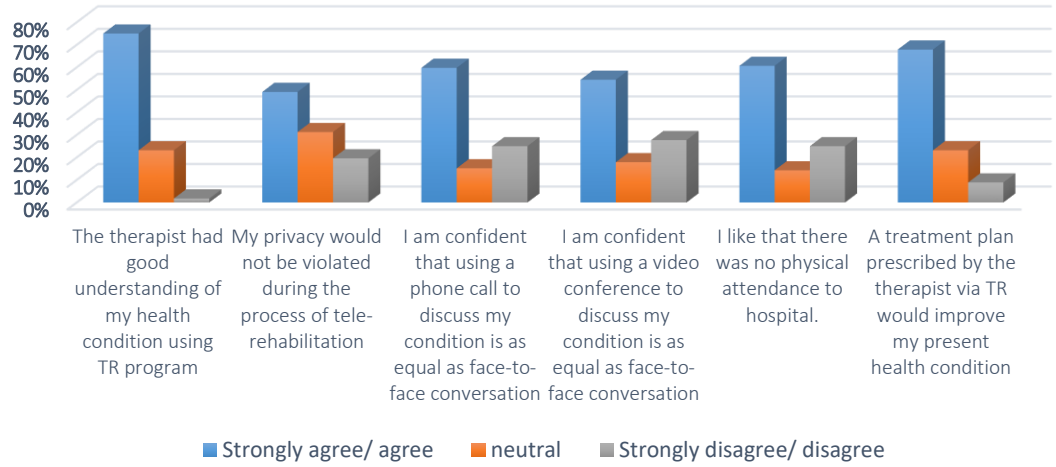


Table 1: Descriptive statistics

Variables		Frequency (f)	Percentage (%)
Gender	Male	24	21.4
	Female	88	78.6
	Total	112	100.0
Educational level	Secondary level	49	43.8
	Graduate or higher	63	56.3
Current service provided	Msk or orthopedic	66	58.9
	Pediatric	10	8.9
	Neurology	2	1.8
	Occupational	34	30.4
Perception about TR	Yes, most definitely	65	58.0
	Probably	14	12.5
	Not sure	5	4.5
	No	15	13.4
	I don't know	13	11.6
Patient's confidence in TR assessment and treatment	Very confident	62	55.4
	Moderately confident	30	26.8
	Less confident	10	8.9
	Not at all	2	1.8
	I don't know	8	7.1
Difficulties faced by therapists	Yes	15	13.4
	No	97	86.6
Improvement in condition	Yes	78	69.6
	No	34	30.4
Satisfaction with TR service	Highly satisfied	60	53.6
	Neither satisfied nor dissatisfied	27	24.1
	Somewhat not satisfied	19	17.0
	Not satisfied	6	5.4
Technical problem	Yes	16	14.3
	No	96	85.7
Total		112	100.0

The limitation of this study was also fulfilled as the study worked on different aspects of medical conditions and found that TR was equally effective in a wide range of physical therapy conditions. Ali Jasem Buabbas et al conducted a study in 2022 to investigate patient satisfaction and attitudes about the application of online rehabilitation amid the COVID-19 epidemic and to provide information on PTs' experiences using tele-rehabilitation. The study concluded that, in general, both the patients and the physical therapists expressed satisfaction with their tele-rehabilitation treatments. In Kuwait, tele-rehabilitation was recommended as a post-pandemic and adjunctive approach.[24] This study also concluded that TR is an effective method Other descriptive statistics of the study show that

Figure 2: Patient opinion with respect to TR experience



was 38.48±8.92 years. 21.4% of the participants were males, and 78.6% were females.

On evaluating the educational level, 43.8% participants had secondary education, and 56.3% had graduated or had higher education. of online treatment that can be used to effectively manage physical therapy conditions at home. The study included participants from 10 different cities in Pakistan. The maximum number of participants was included from Lahore (33%) and Islamabad (25%). 58.9% participants took MSK or orthopedic services by tele-rehabilitation, 10 (8.9%) participants took pediatric services, 2 (1.8%) took neurology services, and 34 (30.4%) took occupational services.

The effectiveness and acceptance of in-home tele-rehabilitation may be influenced by patients' access to technology and their level of technological literacy. The study included participants with high levels of education, which may impact the overall findings and reduce the generalizability of the results to low or uneducated people. The study relies heavily on self-reported data, which could be subject to recall bias or social desirability bias. Patients might provide responses that they perceive as more socially acceptable or desirable, hence reducing the validity of the results.

Ensure a diverse and representative sample by recruiting participants across various demographics, including age, gender, socioeconomic status, and cultural backgrounds. This will enhance the generalizability of findings. Conduct longitudinal studies to capture changes in patients' perceptions over time. This could provide insights into the long-term effectiveness, acceptance, and challenges associated with in-home tele-rehabilitation.

CONCLUSION

The findings of this study indicate that in-home tele-rehabilitation physiotherapy services are generally well-received by patients, with a majority expressing satisfaction across multiple dimensions of the experience. Specifically, 53.6% of participants reported high levels of satisfaction with TR, while 75% felt that their therapist understood their condition effectively. Furthermore, 69.6% of participants noted an improvement in their medical condition following tele-rehabilitation, and 67.9% believed that the prescribed exercise programs were beneficial. Technical aspects of the service were also positively received, with 85.7% of participants reporting no technical difficulties, highlighting the role of reliable technology and adequate support in the success of TR programs.

Importantly, more than half of the participants (54.5%) perceived tele-rehabilitation to be as effective as traditional face-to-face therapy, supporting its potential as a viable alternative, particularly for patients with access barriers to in-person care. Overall, the study demonstrates that tele-rehabilitation is not only a feasible approach for managing a broad range of physical therapy conditions but also one that is effective, accessible, and well-accepted by patients. These findings support the integration of TR into routine physiotherapy practice, especially as a complementary or substitute service in contexts where in-person visits are limited or impractical.

DECLARATIONS

Consent to participate: Written consent had been obtained from patients. All methods were performed following the relevant guidelines and regulations.
Availability of Data and Materials: Data will be made available upon request. The corresponding author will submit all dataset files.
Competing interests: None
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Authors' contributions: All authors had read and approved the final manuscript.

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