



Effectiveness and Challenges of Tele-Physiotherapy Compared to In-Person Care in Musculoskeletal Rehabilitation

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Abstract: *Musculoskeletal disorders (MSDs) are a major cause of pain and disability, and while in-person physiotherapy remains the standard treatment, tele-rehabilitation has emerged as an accessible alternative. This research aimed to determine which method—remote physiotherapy sessions or traditional face-to-face physiotherapy—performed better in treating musculoskeletal pain. The study included 40 participants with musculoskeletal pain, randomly assigned to either the tele-physiotherapy or in-person physiotherapy group, and all participants received a structured rehabilitation program over two weeks. Outcomes were measured using the Visual Analog Scale (VAS) for pain intensity and the Oswestry Disability Index (ODI) and Shoulder Pain and Disability Index (SPADI) for functional disability. Both groups demonstrated significant improvements in pain intensity and functional disability, with no statistically significant differences between them ($p > 0.05$); within-group comparisons showed significant reductions in pain scores and disability indices ($p < 0.001$). Patient satisfaction was high in both groups, though slightly higher in the in-person group (95% vs. 85%). However, technical challenges, such as internet connectivity issues and difficulties in following exercise instructions, were more frequently reported by the tele-physiotherapy group. Despite these challenges, tele-physiotherapy proved to be a practical and comparably effective method to traditional in-person physiotherapy for managing musculoskeletal conditions, achieving similar outcomes in pain reduction and functional recovery.*

Keywords: *Tele-Physiotherapy, In-Person Physiotherapy, Musculoskeletal Rehabilitation, Pain Management.*

1. Introduction

The healthcare industry now depends heavily on telehealth technology which allows patients to access medical evaluations and continuous tracking services and rehabilitation services at a distance. The powerful advancement of telehealth works significantly to help physiotherapy practice. Tele-Physiotherapy delivers remote physiotherapy services by digital communication methods to achieve prominence in times of COVID-19 where contact-free but effective rehabilitation solutions became necessary [1-2].

The three most widespread disability causes throughout the world are musculoskeletal disorders including chronic low back pain [3], and neck pain in

addition to shoulder dysfunction which need continuous physiotherapy treatments [4]. Although traditional in-person physiotherapy remains effective there exist limitations to accessibility because patients from remote areas along with individuals with mobility problems and people active during public health crises cannot reach therapy services. The flexible nature of Tele-Physiotherapy enables patients to access individualized exercise programs along with educational resources and monitoring assistance from either mobile devices or videoconference technology or web platforms [5].

Medical reviews have demonstrated that tele-physiotherapy delivers results similar to typical treatment approaches for pain relief and enhanced physical function among musculoskeletal patients [6]. The system has practical implementation challenges that should be taken into account. The quality of care and patient adherence encounters potential negative effects because of barriers such as limited physical contact alongside technology illiteracy and reduced real-time feedback and poor internet connectivity [7].

Since digital health continues to expand in importance researchers need to study both the benefits and limitations connected to using tele-physiotherapy in clinical practice. A research investigation seeks to analyze both the effects of tele-physiotherapy on musculoskeletal rehabilitation and the practical as well as technical problems that arose during its usage.

2. Methodology

Study Design

A quasi-experimental design working with two parallel groups was used to research the effectiveness and difficulties of tele-physiotherapy for musculoskeletal disorder management. The research study distributed participants into two distinct groups through random selection: tele-physiotherapy group and traditional in-person physiotherapy group.

Participants

The research included forty participants who received a chronic musculoskeletal diagnosis including chronic low back pain, shoulder dysfunction or neck pain. They were identified at outpatient physiotherapy clinics. The research included participants who were within the 18-65 age range with at least 3-month-

diagnosis of a musculoskeletal problem and access to smartphones or computers connected to the internet and ability to execute exercise protocols as instructed. Neurological disorders together with surgeries performed within less than six months postoperatively and severe cognitive or communication problems served as causes for exclusion.

Intervention

Participants in the Tele-Physiotherapy Group (n=20) received physiotherapy sessions remotely using secure video conferencing platforms (e.g., Zoom or Microsoft Teams). Sessions included: Individualized exercise programs, Postural education, Ergonomic advice, and Real-time guidance and feedback. Participants in the In-Person Physiotherapy Group (n=20) received the same treatment protocols, but face-to-face in a clinical setting.

Each participant underwent two sessions per week for four weeks, with each session lasting approximately 45 minutes.

Outcome Measures

- Two assessment sessions were carried out by a blinded evaluator before the intervention and following four weeks of intervention.
- Primary Outcomes: Pain intensity using the Visual Analog Scale (VAS) and Functional disability using: The Oswestry Disability Index (ODI) for low back pain, The Neck Disability Index (NDI) for neck pain, and The Shoulder Pain and Disability Index (SPADI) for shoulder dysfunction
- Secondary Outcomes: Patient satisfaction measured via a validated satisfaction questionnaire, Adherence rate to the sessions, and Reported challenges (technical difficulties, communication barriers, etc.)

Data Analysis

A concise statistical analysis presented overview data about patient demographics together with starting conditions. The study used both a paired t-test and Wilcoxon signed-rank test to conduct internal comparisons. The differences between groups were evaluated through independent t-tests and Mann-Whitney U tests based on data distribution patterns. Within the established study parameters a significance threshold of $p < 0.05$ served as the determiner for statistical significance.

3.Results

Forty participants joined the study divided into 20 participants from each treatment group which consisted of Tele-Physiotherapy and In-Person Physiotherapy. The two groups had similar baseline population features including age ranges and numbers of males and females as well as pain ratings and disability scores. Results from the statistical analysis showed no variations between both groups ($p > 0.05$). The study presents summarized data that appears in Table 1.

Table 1: Baseline Characteristics of Participants

Variable	Tele-Physiotherapy (n=20)	In-Person Physiotherapy (n=20)	p-value
Age (years)	39.2 ± 8.1	40.5 ± 7.6	0.57
Gender (Male/Female)	9 / 11	10 / 10	0.76
VAS (0–10)	6.9 ± 1.1	7.1 ± 1.3	0.42
ODI (%) / SPADI Score	42.5 ± 7.2 / 65.3 ± 8.4	44.0 ± 6.9 / 66.7 ± 9.1	0.39

Both treatment groups showed reduced pain intensity based on Visual Analog Scale results at their post-intervention assessment. The mean VAS score in the Tele-Physiotherapy Group declined substantially from 6.9 ± 1.1 points at baseline to 3.4 ± 1.0 points after the treatment phase with a statistically significant result ($p < 0.001$). The In-Person Physiotherapy Group participants experienced a significant decline in VAS score from 7.1 ± 1.3 points to 2.9 ± 0.9 points ($p < 0.001$). The post-treatment pain scores of both intervention groups proved similar to each other without demonstrating any meaningful statistical difference ($p = 0.18$). A table containing the summarized data is displayed in Table 2.

The assessment of functional disability included the Oswestry Disability Index - ODI for low back pain as well as the Neck Disability Index - NDI for neck pain and Shoulder Pain and Disability Index - SPADI for shoulder dysfunction. Tele-Group participants exhibited ODI scores that decreased from $42.5\% \pm 7.2$ to $26.1\% \pm 5.6$ ($p < 0.001$). Similarly, In-Person Group participants experienced their ODI score drop from $44.0\% \pm 6.9$ to $23.8\% \pm 5.2$ ($p < 0.001$). The mean scores between groups analyzed for Tele-Group and In-Person Group did not demonstrate a statistically important mismatch ($p = 0.39$). SPADI outcomes showed Tele-Group participants experienced a reduction from 65.3 ± 8.4 to 38.9 ± 6.1 while In-Person Group participants reduced their scores from 66.7 ± 9.1 to 35.5 ± 5.8 ($p < 0.001$). The between-group assessment revealed no statistically significant results ($p = 0.51$) as presented in Table 2.

Table 2: Pre- and Post-Intervention Scores Within Groups

Outcome Measure	Time Point	Tele-Physiotherapy	In-Person Physiotherapy	p-value (Between Groups)
VAS (0–10)	Pre	6.9 ± 1.1	7.1 ± 1.3	0.42
	Post	3.4 ± 1.0	2.9 ± 0.9	0.18
ODI (%)	Pre	42.5 ± 7.2	44.0 ± 6.9	0.39
	Post	26.1 ± 5.6	23.8 ± 5.2	0.21
SPADI	Pre	65.3 ± 8.4	66.7 ± 9.1	0.51
	Post	38.9 ± 6.1	35.5 ± 5.8	0.17

Table 3 demonstrates both patients' satisfaction and their encountered obstacles. The evaluation of patient satisfaction happened through a post-treatment survey that examined how participants felt about their physiotherapy experience. The Tele-Physiotherapy Group had 85 percent of participants who felt strongly satisfied with their sessions because they found the convenience and accessibility and flexibility beneficial. The majority of participants (95%) from the in-person unlocked very high satisfaction levels because they valued hands-on guidance and face-to-face contact with their therapist above all other benefits. Tele-Physiotherapy group encountered occasional internet connection problems that disrupted their sessions according to 30% of participants while another 20% stated exercise challenges when the therapist provided guidance although video demonstrations with verbal instructions addressed these issues. Ten percent of participants in the in-person group faced transportation barriers that somewhat interfered with their attendance particularly impacting those who had mobility limitations. None of the participants in the face-to-face therapy group mentioned any substantial problems with the therapy service delivery process.

Table 3: Patient Satisfaction and Reported Challenges

Variable	Tele-Physiotherapy (n=20)	In-Person Physiotherapy (n=20)
High satisfaction (%)	85%	95%
Internet/Technical issues (%)	30%	0%
Difficulty with exercises (%)	20%	0%
Transportation problems (%)	0%	10%

- VAS: A paired t-test revealed significant reductions in pain intensity within both groups ($p < 0.001$), with no significant difference between the groups ($p = 0.18$).
- ODI and SPADI: Significant within-group improvements were found in both the tele-physiotherapy and in-person groups ($p < 0.001$ for both), but no significant difference was observed between the two groups ($p = 0.39$ for ODI and $p = 0.51$ for SPADI).
- Satisfaction and Challenges: Patient satisfaction was significantly higher in the in-person group, whereas tele-physiotherapy participants reported more technical challenges, including issues with internet connectivity.

4. Discussion

The research set out to determine if tele-physiotherapy treatments exhibit the same effectiveness as face-to-face physiotherapy methods in treating musculoskeletal pain and disability. The data demonstrates that tele-physiotherapy presents itself as an effective substitute to conventional in-person physiotherapy because both methods achieve comparable outcomes in pain reduction and functional improvement. The study findings from Withers et al. (2024) demonstrated that tele-rehabilitation treatments

for musculoskeletal issues produced equivalent results to standard physical therapy [8]. The results showed that tele-physiotherapy along with traditional physiotherapy treatments effectively reduced pain scores and disability symptoms according to Barger et al. (2024) and José and Luciana (2023) who observed significant tele-health benefits for musculoskeletal disorders [9,10].

The effectiveness of tele-physiotherapy matched in-person therapy yet patients reported slightly diminished satisfaction rates through tele-physiotherapy sessions. Cieřlik et al. (2023) established a similar finding through their research that showed tele-physiotherapy performed effectively but patients still felt dissatisfied because they missed experiencing therapist touch [11]. Users of tele-physiotherapy therapy displayed satisfaction rates at 85 percent according to our study whereas Cottrell and Russell (2020) identified satisfaction at 87 percent in their tele-rehabilitation examination. The study results indicated that patients had higher satisfaction with in-person therapy at 95% even though tele-physiotherapy scored 85% satisfaction. This shows personal interaction remains essential for patient satisfaction [1].

Tele-physiotherapy holds benefits that mainly include enhanced accessibility in combination with convenience elements. Patients in these settings greatly benefit from this access since they would otherwise struggle to receive necessary healthcare due to transportation and healthcare affordability issues. Research by López-Baroni et al. (2023) and Cottrell et al. (2020) proves that tele-physiotherapy creates cost-efficient ways for patients to receive care including those in distant locations and patients who have mobility challenges [12, 1].

Tele-physiotherapy offers many beneficial factors yet it faces several kinds of obstacles. Thirty percent of tele-physiotherapy participants experienced internet connectivity problems as reported in this study which could affect the effectiveness of their intervention. Stark-Blomeier & Krayter (2025) explained that tele-rehabilitation requires both patients and healthcare providers to have proper technological capabilities in addition to reliable internet access [13]. Tele-physiotherapy lacks direct guidance since patients struggle with exercises that require personal therapist intervention according to Verduzco-Gutierrez et al. (2020). The patient satisfaction rates among the tele-physiotherapy group remain high despite technological barriers that need improved infrastructure and support for resolution [14].

The study showed that tele-physiotherapy together with in-person therapy practice resulted in substantial pain reduction alongside functional outcome improvements. The obtained results affirm the ability of tele-rehabilitation to handle musculoskeletal disorders effectively. The article published by Wright & Caudill (2020) describes how direct therapy sessions retain essential aspects which remote therapy cannot match [15].

Patients should consider tele-physiotherapy as a permanent choice if they cannot or do not want to join physical therapy sessions face-to-face. According to

Cottrell et al. (2016) tele-rehabilitation programs created identical clinical results to conventional in-person therapy approaches [16].

The study demonstrates essential knowledge about tele-physiotherapy adoption for clinical implementation. Tele-rehabilitation delivers effective results comparable to traditional treatment which makes it ideal for healthcare restrained patients as well as residents from remote areas and those who want versatile options. Tele-physiotherapy reduces healthcare system pressure while providing affordable treatment services free of diminished medical quality. Research needs to resolve the technical obstacles shown in this study by fixing low internet reliability and enabling face-to-face therapist patient interaction. More research needs to develop tele-physiotherapy technology by creating intuitive platforms and enhanced assistance systems for patients struggling with online care.

5. Conclusion

The research indicates that remote physiotherapy works as well as direct patient contact sessions to handle musculoskeletal pain and functional disability. Participants in both intervention groups achieved significant reduction of pain intensity and functional improvement through tele-physiotherapy techniques and their outcomes demonstrated similar levels of effectiveness. Tele-physiotherapy delivered equivalent results as traditional in-person therapy yet participants attending medical sessions expressed somewhat greater satisfaction because of hands-on therapist involvement. Most tele-physiotherapy participants strongly approved of the remote sessions because they enjoyed the combination of convenience and accessibility and flexibility they offered.

The implementation of tele-rehabilitation services in clinical settings needs to address internet connectivity issues along with exercise guidance needs because they present technical challenges for tele-physiotherapy participants. Future development of digital rehabilitation platforms needs to address the issues which these study results have identified. The test outcomes demonstrate that tele-physiotherapy shows promise as an economical choice to deliver musculoskeletal rehabilitation services for people who live far away from treatment facilities and those who face obstacles in receiving direct care.

References

1. Cottrell, M. A., & Russell, T. G. (2020). Telehealth for Musculoskeletal Physiotherapy. *Musculoskeletal Science and Practice*, 48(48), 102193.
2. Turolla A, Rossetini G, Viceconti A, Palese A, Geri T. Musculoskeletal Physical Therapy During the COVID-19 Pandemic: Is Telerehabilitation the Answer? *Phys Ther*. 2020 Aug 12;100(8):1260-1264.
3. Shaheen, H. M., & Belgen Kaygisiz, B. (2025). Comparison of different treatment positions of nerve slider technique for patients with low back pain: a randomized control trial. *European journal of physical and rehabilitation medicine*, 61(1), 82–92.
4. Vos, T., Lim, S. S., Abbafati, C., Abbas, K. M., Abbasi, M., Abbasifard, M., ... & Murray, C. J. L. (2020). Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: A systematic analysis for the Global Burden of Disease Study 2019. *The Lancet*, 396(10258), 1204–1222.
5. Alan C Lee, COVID-19 and the Advancement of Digital Physical Therapist Practice and Telehealth, *Physical Therapy*, Volume 100, Issue 7, July 2020, Pages 1054–1057.
6. Mani S, Sharma S, Omar B, Paungmali A, Joseph L. Validity and reliability of Internet-based physiotherapy assessment for musculoskeletal disorders: a systematic review. *J Telemed Telecare*. 2017 Apr;23(3):379-391.
7. Seron P, Oliveros MJ, Gutierrez-Arias R, Fuentes-Aspe R, Torres-Castro RC, Merino-Osorio C, Nahuelhual P, Inostroza J, Jalil Y, Solano R, Marzuca-Nassr GN, Aguilera-Eguía R, Lavados-Romo P, Soto-Rodríguez FJ, Sabelle C, Villarroel-Silva G, Gomolán P, Huaiquilaf S, Sanchez P. Effectiveness of Telerehabilitation in Physical Therapy: A Rapid Overview. *Phys Ther*. 2021 Jun 1;101(6):pzab053.
8. Withers HG, Glinesky JV, Chu J, Jennings MD, Starkey I, Parmeter R, Boulous M, Cruwys JJ, Duong K, Jordan I, Wong D, Trang S, Duong M, Liu H, Hayes AJ, Lambert TE, Zadro JR, Sherrington C, Maher C, Lucas BR, Taylor D, Ferreira ML, Harvey LA. Remotely delivered physiotherapy is as effective as face-to-face physiotherapy for musculoskeletal conditions (REFORM): a randomised trial. *J Physiother*. 2024 Apr;70(2):124-133.
9. Barger S, Castellini G, Vitale JA, Guida S, Banfi G, Gianola S, Pennestrì F. Effectiveness of Telemedicine for Musculoskeletal Disorders: Umbrella Review. *J Med Internet Res*. 2024 Feb 2;26:e50090.
10. José Bassan Franco, Luciana Paula Maximino, Luiz, L., Bianca Caseiro Antonelli, & Wanderleia Quinhoneiro Blasca. (2023). What Are the Barriers to Telerehabilitation in the Treatment of Musculoskeletal Diseases? *Portuguese Journal of Public Health*, 42(1), 33–42.
11. Ciešlik, B., Kuligowski, T., Cacciantè, L., & Kiper, P. (2023). The Impact of Personality Traits on Patient Satisfaction after Telerehabilitation: A Comparative Study of Remote and Face-to-Face Musculoskeletal Rehabilitation during COVID-19 Lockdown. *International Journal of Environmental Research and Public Health*, 20(6), 5019.
12. Baroni MP, Jacob MFA, Rios WR, Fandim JV, Fernandes LG, Chaves PI, Fioratti I, Saragiotto BT. The state of the art in telerehabilitation for musculoskeletal conditions. *Arch Physiother*. 2023 Jan 4;13(1):1.

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13. Stark-Blomeier AL, Krayter S, Dockweiler C (2025) Developing a competency model for telerehabilitation therapists and patients: Results of a cross-sectional online survey. *PLOS Digit Health* 4(1): e0000710.
 14. Verduzco-Gutierrez, M., Bean, A. C., Tenforde, A. S., Tapia, R. N., & Silver, J. K. (2020). How to Conduct an Outpatient Telemedicine Rehabilitation or Prehabilitation Visit. *PM&R*, 12(7).
 15. Wright JH, Caudill R. Remote Treatment Delivery in Response to the COVID-19 Pandemic. *Psychother Psychosom.* 2020;89(3):130-132.
 16. Cottrell, M. A., Galea, O. A., O'Leary, S. P., Hill, A. J., & Russell, T. G. (2016). Real-time telerehabilitation for the treatment of musculoskeletal conditions is effective and comparable to standard practice: a systematic review and meta-analysis. *Clinical Rehabilitation*, 31(5), 625–638.