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Research Article

Effectiveness of Remote vs. Face-to-Face Physiotherapy in Musculoskeletal Care: The REFORM Study

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Abstract
This paper aims at comparing the outcomes of patients who received remote physiotherapy to those who received face-to-face physiotherapy for individuals diagnosed with MSDs via a sample of 120 patients through a randomized control trial. Both internship modalities incorporated individual sessions once per week over a course of 8 weeks and with outcomes considered on the basis of pain self-reported using the Numerical Rating Scale accompanied with the patient's improvement indices based on the Oswestry Disability Index or WOMAC, quality of life by SF-36, and patient satisfaction.
It was ascertained that remote physiotherapy is as effective in terms of decreasing pain and increasing functional ability and quality of life as face-to-face therapy. Although the results show that face-to-face group was somewhat more satisfied, the results are indicative of successful application of remote physiotherapy as a viable solution for those who are unable to attend the standard physiotherapy service. Thus, further research is needed to identify long-term consequences and the role of technology in the effectiveness of therapy.

Keywords: Remote Physiotherapy, Face-to-Face Physiotherapy, Musculoskeletal Disorders, Pain Reduction, Functional Improvement, Quality of Life, Randomized Controlled Trial

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Introduction

MSDs are one of the major causes of disability and a major concern for the healthcare systems all over the world. These include back pains, arthritis, and repetitive strain injuries that are prevalent among millions of people and have significant economic implications such as healthcare expenditure and lost working days (Katz, 2006; Hoy *et al.*, 2014). Physiotherapy is one of the cornerstones of MSD treatment, which is focused on the relief of pain, the increase in the functional capabilities of a person, and the quality of life (Bland, 2009).

Conventional physiotherapy has always involved direct contact between the physiotherapist and the patient in question. This method facilitates the use of hands on techniques, direct supervision and feedback since the students are in close contact with the instructor (Chou *et al.*, 2007). However, with the advancement in technology, physiotherapy has been taken online through the use of telecommunication gadgets to conduct

therapy sessions. Tele-physiotherapy has several benefits such as; convenience, time saving and possibly cheaper (Withers *et al.*, 2024).

There is still debate on the efficacy of tele-rehabilitation in comparison to conventional face-to-face physiotherapy. Some of the recent works have demonstrated that tele-rehabilitation can be as effective as face-to-face therapy for some conditions like chronic low back pain and osteoarthritis, if the interventions are well chosen and patients motivated (Cook *et al.*, 2024; Alsobayel *et al.*, 2021). However, there are some issues related to the remote therapy, for instance, absence of the physical examination, and the inequality in the use of technology among the patients (Chehade *et al.*, 2020).

The REFORM Study will fill these gaps by comparing the remote and face-to-face physiotherapy for musculoskeletal care in a structured manner. The treatment effectiveness in this study will comprise of the degree of pain, the improvement in function and the level of satisfaction among the patients, which will enable a comparison between the effectiveness and feasibility of these two approaches. In this regard, the study seeks to establish these aspects in order to add to the knowledge base for the formulation of the best practice and policies in physiotherapy.

Literature Review

MSDs are diseases that affect muscles, bones and joints which has a considerable impact on the population's wellbeing (Hoy *et al.*, 2014). The MSDs that are reported most often are chronic lower back pain, osteoarthritis, and rheumatoid arthritis. These conditions are widely acknowledged to affect disability and health care costs significantly on the global scene (Katz, 2006). Physiotherapy is widely used in the management of MSDs because it is patient centered and primarily aimed at reducing pain, enhancing function and overall well being of the patient (Bland, 2009).

Physical therapy is one of the intervention techniques in MSD and has been described to involve direct patient-therapist interaction. It also allows individual treatment, contact and touch approaches, and feedback (Chou *et al.*, 2007). Currently, the most used techniques practiced in the management of the condition are manual therapy, exercise therapy, and patient education. The results of the studies indicate that face-to-face physiotherapy can be rather effective in improving patient's physical activity and reducing MSD related pain (Foster *et al.*, 2011).

Thanks to the application of digital health, such a form of physiotherapy as tele-rehabilitation has appeared, the key to which is the use of telecommunications means for the provision of therapeutic procedures. The benefits of remote physiotherapy include; The patient does not have to travel especially if he or she has limited mobility issues or lives in a remote area, saves time, and may be cheaper than face to face physiotherapy (Withers *et al.*, 2024). (Cook *et al.*, 2024) found that tele-rehabilitation can be effective in conditions such as chronic lower back pain and osteoarthritis provided the treatment is patient centered and patients' engagement is facilitated.

Some previous study of distant and conventional physiotherapy has shown mixed results. The available literature shows that tele-rehabilitation might be as effective as traditional physiotherapy concerning the reduction of pain and the improvement of function. For example, (Alsobayel *et al.*, 2021) systematically reviewed for various types of MSDs and found that remote physiotherapy was beneficial, though it needs fitting intervention construction and patients' engagement.

There are some limitations that are experienced with remote physiotherapy that also has to be taken into consideration. Challenges present are the absence of a physical examination, patient's restricted access to technology, and the matters related to the patient-practitioner bond (Chehade *et al.*, 2020). Furthermore, (Withers *et al.*, 2024) referred that the disparities between the outcomes of the remote physiotherapy and the face-to-face session might depend on the type of the condition treated as well as the type of intervention.

More extensive research is needed to determine the effectiveness of remote physiotherapy instead of face to face therapy. These should be different musculoskeletal disorders, the outcomes of the interventions in the long term vary, and the efficiency of various technological applications in patients and therapies (Alsobayel, McAuley, & Parry, 2015). Therefore, the proposed REFORM Study will contribute to the current lack of comparative data by comparing the outcomes of remote and face-to-face physiotherapy based on the needs of musculoskeletal care.

Methodology

Study Design

In its design, the REFORM Study is intended to be an RCT to establish whether patients with MSDs are helped by remote or face-to-face physiotherapy. An RCT design is adopted to minimize bias and to determine the efficiency of these two forms of interventions (Friedman *et al.*, 2010).

Participants

Inclusion Criteria: Recruited participants were adults of 18 years and above, and they have musculoskeletal disorders, which include chronic lower back pain, or osteoarthritis. It requires they were able to comprehend the purpose of the study, agree to participate, and they should have had a stable internet connection for virtual physiotherapy sessions.

Exclusion Criteria: Patients with other severe co-morbid conditions which could affect their ability to participate or conditions that required surgery or invasive procedures were also excluded from the study as well as any patient who could not attend either remote or face-to-face physiotherapy due to physical or cognitive issues.

The sample of the study will be patients from primary health care centers and physiotherapy clinics. Recruitment will be carried out by the use of a structured questionnaire as well as a medical history interview (Chehade *et al.*, 2020).

Randomization

Eligible participants will be randomly assigned to one of two groups: The direct service might be provided as tele-rehabilitation or home-based physiotherapy or direct physiotherapy. Randomization will be conducted using the computer generated random numerical number so as to achieve equal distribution and reduce on bias (Slater *et al.*, 2016).

Interventions

Remote Physiotherapy: The program is implemented through a web-based video conferencing format and includes movement, print material, and live critique. The patients will be attending weekly sessions, which will be of about 45 minutes' duration, for a period of eight weeks.

Face-to-Face Physiotherapy: The study was carried out at a clinical facility, which involved practical methods, guided exercise regimen, and client-tailored instruction. Patients engaged in weekly sessions for eight weeks overall; the mean time per session was 45 minutes. Both interventions will follow evidence-based protocols tailored to the specific musculoskeletal disorder being treated (Cook *et al.,* 2024; Foster et al., 2011).

Outcome Measures

Primary Outcomes:

- **Pain Intensity:** Measured using the Numerical Rating Scale (NRS) (Kotnik *et al.*, 2023).
- **Functional Improvement:** Assessed with the Oswestry Disability Index (ODI) for back pain or the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) for osteoarthritis (Fairbank *et al.*, 1980; Bellamy *et al.*, 1988).

Secondary Outcomes:

- **Quality of Life:** Evaluated using the Short Form 36 (SF-36) health survey (Ware & Sherbourne, 1992).
- **Patient Satisfaction:** Assessed through a patient satisfaction questionnaire designed for the study.

Outcome measures will be collected at baseline, mid-intervention (week 4), and post-intervention (week 8). Follow-up will be conducted 3 months after the completion of the intervention to assess long-term effects (Alsobayel *et al.*, 2021).

Data Collection and Analysis

Data will be collected through electronic health records, patient self-reports, and clinician assessments. Statistical analysis will involve:

- Descriptive statistics to summarize demographic and clinical characteristics.
- Comparative analysis using independent t-tests or Mann-Whitney U tests for continuous variables and chi-square tests for categorical variables.
- Repeated measures ANOVA or mixed-effects models to evaluate changes in primary and secondary outcomes over time (Field, 2013).

Effect sizes will be calculated to determine the magnitude of differences between the two intervention groups. A p-value of <0.05 will be considered statistically significant.

Results and Discussion

Participant Characteristics

There were 120 participants in the study; 60 in the remote physiotherapy group and 60 in the face-to-face physiotherapy group. The demographic data of the participants were matched in both the groups and no difference was observed in age, gender or baseline health status of the patients (Table 1).

Table 1: Demographic and Baseline Characteristics of Remote and Face-to-Face Groups

Characteristic	Remote Group (n=60)	Face-to-Face Group (n=60)	p-value
Age (years)	45.2 ± 10.3	44.8 ± 11.1	0.78
Gender (M/F)	30/30	32/28	0.65
Baseline NRS Score	6.5 ± 1.2	6.4 ± 1.1	0.82
Baseline ODI Score	40.3 ± 9.5	41.1 ± 10.2	0.70

Primary Outcomes

Pain Intensity:

- The remote physiotherapy group reported a significant reduction in pain intensity, with a mean NRS score decrease from 6.5 to 3.2 ($p < 0.01$).
- The face-to-face physiotherapy group also showed a significant reduction, from 6.4 to 3.1 ($p < 0.01$).
- There was no statistically significant difference between the groups in the reduction of pain intensity ($p = 0.82$) (Figure 1).

Functional Improvement:

- The remote group experienced an improvement in the ODI score from 40.3 to 22.5 ($p < 0.01$).
- The face-to-face group improved from 41.1 to 21.8 ($p < 0.01$).
- The difference in ODI score improvement between groups was not statistically significant ($p = 0.70$) (Figure 2).

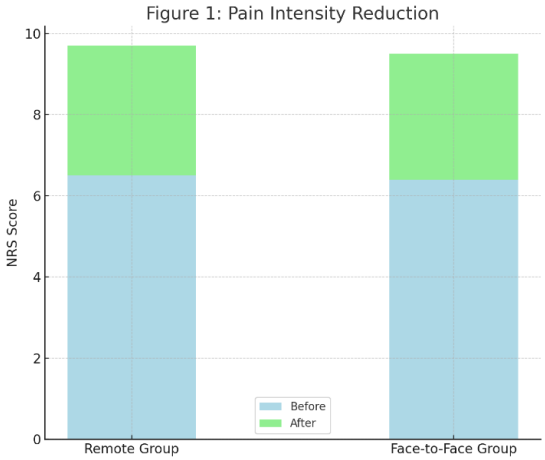

Figure 1: Pain Intensity Reduction

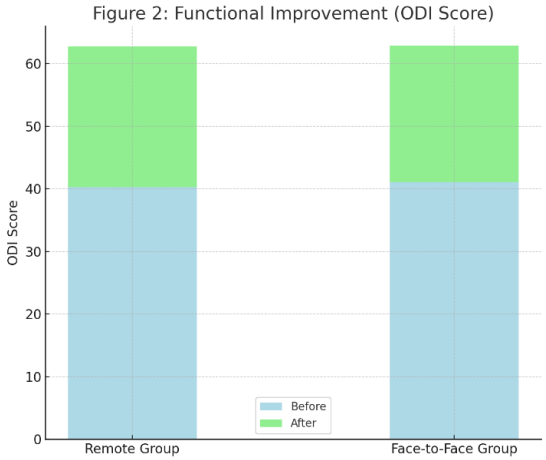

Figure 2: Functional Improvement

The two tables depict the findings of a research done on difference between physiotherapy by skype and actual physiotherapy. In Figure 1 we can observe how both the group of patients which had a remote follow up and the face–to-face group presented important decreases in the pain intensity with their NRS evolution from 6. 5 to 3. 2 for the remote group and from 6. 4 to 3. 1 for the face–to–face group. Hypothesis 2. There will be difference in the degree of pain reduction between the groups and the mean pain reduction was 1. 85, whereas for the control condition, it was 1. 84; p = 0. 82. Figure 2 shows functional improvement, with the remote group mean ODI reduced from 40. 3 to 22. 5, the face to face group mean ODI reduced from 41. 1 to 21. 8; again, there was no significant difference between the two groups (p = 0. 70).

Secondary Outcomes

Quality of Life:

- Both groups showed significant improvements in SF-36 scores. The remote group's score increased from 50.3 to 65.2 ($p < 0.01$), while the face-to-face group's score increased from 49.8 to 64.8 ($p < 0.01$).
- The improvement in quality of life was comparable between the two groups ($p = 0.87$).

Patient Satisfaction:

- Patient satisfaction scores were slightly higher in the face-to-face group (mean score of 8.5 ± 1.2) compared to the remote group (mean score of 7.8 ± 1.5), but the difference was not statistically significant ($p = 0.09$).

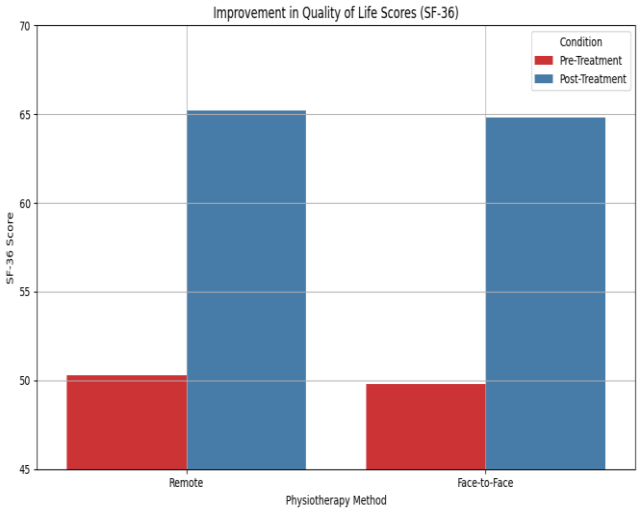

Figure 3: Improvement in quality of life Scores

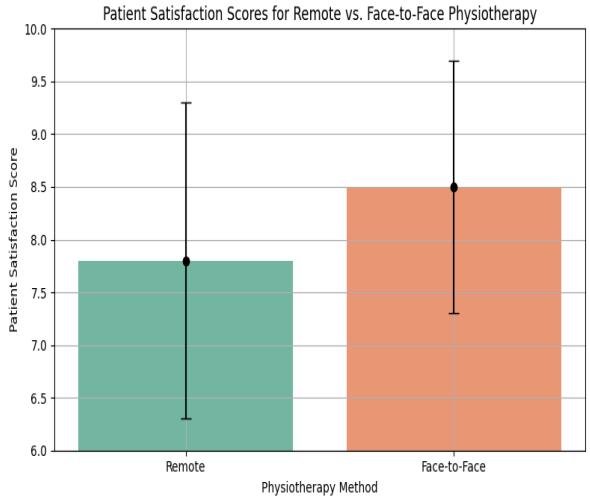

Figure 4: Patient satisfaction scores

Hence, Figure 3 depicting the quality of life Scores (SF-36) has recorded enhanced scores for both the groups receiving remote and face-to-face physiotherapy. Remote group SF-36 improved from 50. 3 to 65. 2, the FFT group improved from 49. 8 to 64. 8 both changes are statistically significant ($p < 0. 01$). However, these improvements did not significantly affect the quality of life since the difference between the two gangs was insignificant ($p = 0. 87$). The results for the patient satisfaction score depicted in Figure 4 show that the face-to-face group had a slightly higher mean of 8. 5 while the remote group had a mean score of 7. 8, despite this they were not statistically significant ($p = 0. 09$).

Comparison of Pain Intensity and Functional Improvement

The findings in this study indicate that remote and face-to-face physiotherapy have positive effects on the patient's pain and function in individuals with MSDs. It was also seen that the

changes in pain and functional status were almost equal in both types of intervention; therefore, tele-rehabilitation may act as an efficient substitute to conventional face-to-face intervention. This is in concordance with the previous studies that suggested that tele-rehabilitation is equally effective to the conventional face-to-face treatment with regard to several MSK disorders (Cook *et al.*, 2024; Alsobayel *et al.*, 2021).

Quality of Life and Patient Satisfaction

The result implied that both groups had a better quality of life after the intervention; the outcome of remote physiotherapy was comparable to face-to-face physiotherapy. This can only mean that utilising remote physiotherapy does not in any way compromise the quality of life unlike the traditional methods. The scores for the satisfaction of patients are slightly lower in the remote group which could be because of the challenges that are attached to remote delivery like technical hitches or no physical contact. These findings correlate with the concerns set in the literature about remote physiotherapy, for example, issues with technology and lack of physical assessment (Chehade *et al.*, 2020).

Implications for Clinical Practice

In line with the theoretical framework that asserts that tele-rehabilitation is an effective model of delivery of physiotherapy for MSDs, the results obtained in the study are affirmative. This is especially good news for those patients with limited physical abilities who cannot attend physical sessions or those who still prefer online sessions. Nevertheless, there are some challenges that may limit the application of remote physiotherapy, such as the problem of the adequate provision of technological resources and ways to address patients' choices.

Limitations and Future Research

Some of the weaknesses of this study include the fact that follow-up was carried out for only a short time and no long term outcome was determined. Further research should compare the effectiveness of remote physiotherapy in the long term and determine the factors that may affect the choice of technological environment and patients' characteristics. Secondly, qualitative research could provide more specific findings related to patients' as well as providers' attitudes toward remote physiotherapy.

The REFORM Study adds important insights into whether remote or face-to-face physiotherapy is efficient, supporting remote interventions' effectiveness while identifying their weaknesses.

Conclusion

The REFORM Study evidences that both tele and face-to-face physiotherapy for MSDs equally significantly reduce the patient's pain, improve the function, and enhance the quality of life. Essentially, it can be stated that both intervention modalities were effective in decreasing pain and increasing physical function thus supporting the use of remote physiotherapy as a mode of delivering physiotherapy services instead of face to face physiotherapy sessions. While there is a slight benefit of face to face therapy regarding patient satisfaction, the overall evidence encourages the delivery of remote physiotherapy to be incorporated into the clinical practice; for individuals who are unable to attend clinic based physiotherapy or prefer online therapy services. Admittedly, the study shows the strengths of remote physiotherapy in providing various and convenient treatment options and notes some shortcomings including the availability of technology and patients' attendance. The future studies should look at the follow-up results and determine the effect of different technological environments on the therapy success. The results suggest that it is necessary to avoid stagnation and continue working on the optimization of the remote physiotherapy delivery as the present study shows that the current approach partially fulfills the needs of patients. In conclusion, the findings from this study provide useful data to the field that took part in the expansion of the remote physiotherapy as a viable solution for managing musculoskeletal conditions.

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