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Research Article

Comparison of supervised physiotherapy and tele-physiotherapy in the rehabilitation of mechanical low back pain

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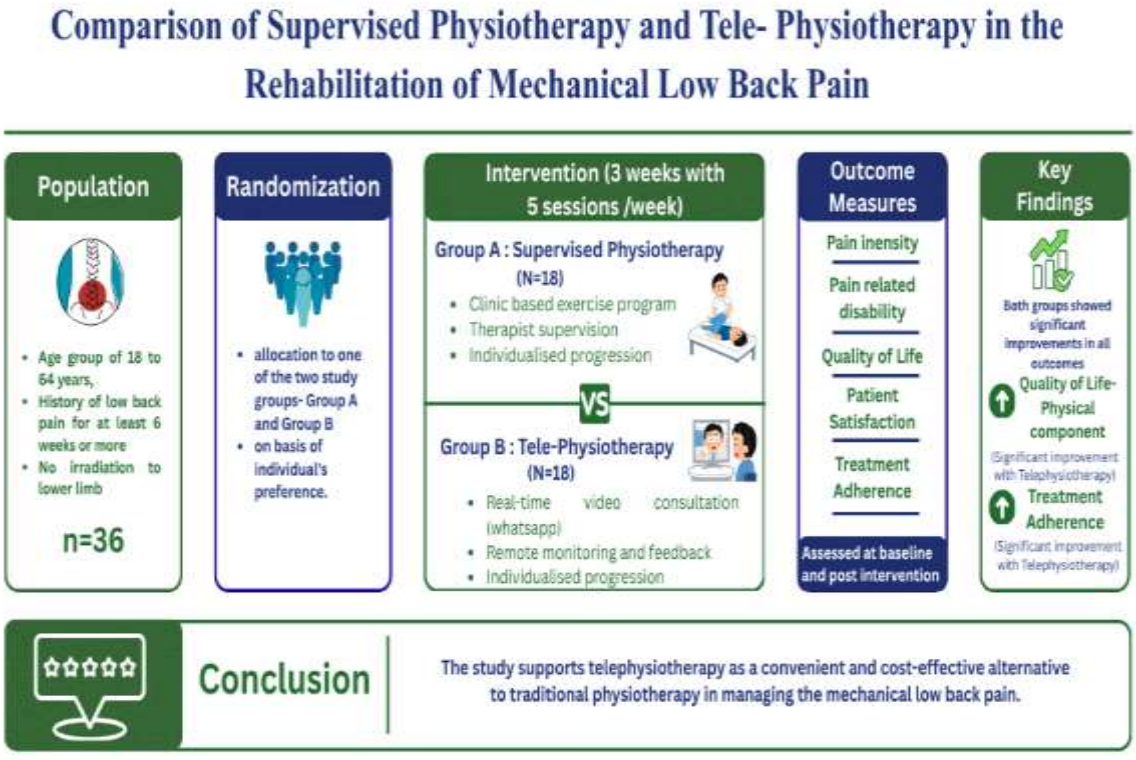
ABSTRACT

Mechanical low back pain because of its chronic and recurrent nature, is the main contributory factor of years lives with disability. This study evaluated the effectiveness of supervised physiotherapy with Telephysiotherapy in the management of mechanical low back pain. 36 consented participants were assigned into two groups -Supervised physiotherapy (Group A) and Telephysiotherapy (Group B) based on their preferred treatment mode. Both groups received 3 weeks intervention program with 5 sessions per week; each of 30-45 minutes. The outcome measures were assessed at the baseline and at post treatment. Results indicated significant effect within groups ($p \leq 0.05$) in all outcome measures. No significant difference observed between the groups except for treatment adherence ($t=3.92$, $p<0.05$) and quality of life-physical component ($t=-2.53$, $p<0.05$). The study supports telephysiotherapy as a convenient and cost-effective alternative to traditional physiotherapy in managing the mechanical low back pain.



Keywords: Mechanical low back pain, Telephysiotherapy, Supervised physiotherapy, Rehabilitation.

INTRODUCTION

Low back pain is defined as pain and discomfort localized between the lower costal margin of the twelfth rib and above the inferior gluteal folds, is most prevalent musculoskeletal condition worldwide. The prevalence ranges between 30 and 80% among the general population and found to be increase with age [1]. The Global Burden of Disease Study 2021, has forecasted a 36.74% increase in total number of cases of low back pain worldwide by 2050 [2].

About 90% of the prevalent cases of low back pain are classified as nonspecific or mechanical low back pain because of absence of pathoanatomical abnormalities [3]. Faulty postures, repetitive trauma, overuse are the contributing factors to mechanical low back pain [4].

The chronic and recurrent nature of low back pain presents it as a socio- economic burden both on individual and the healthcare systems [5].

The evaluation of mechanical low back pain is through a thorough clinical assessment including history, physical examination, identification of red and yellow flags and imaging procedures of lumbosacral spine [6-8].

The various treatment guidelines advocated the use of non-pharmacological treatment in addition to implementation of biopsychosocial model. Greater emphasis is laid on the patient education, self-management strategies and active exercise therapy as core components of a comprehensive LBP management [9, 10].

Traditionally, Lower back is managed in primary care set ups or by physiotherapists involving face-to- face interaction between patient and healthcare provider. However, the timely access and effective treatment is often hampered by factors such as geographically remote areas, shortage of medical professionals and a limited access to physical therapy rehabilitation services. To overcome these challenges, telerehabilitation has been proposed as a potential means of bridging the service delivery gap and enhance the accessibility of efficient health care services for LBP [11].

The research on Telerehabilitation has grown exponentially and has shown promising results in the management of various pathologies. However, limited evidence is available regarding its use in management of mechanical LBP, especially focusing on self-management strategies. This created an enormous need to conduct the study. This study tends to evaluate the effectiveness of supervised exercise program in comparison to video assisted exercise program in management of mechanical low back pain in relation to pain related disability as primary outcome [12].

MATERIAL AND METHOD

The presented study is Experimental in its approach and followed a Quasi-experimental design. A convenient sampling was used for assigning the participants to supervised physiotherapy and telephysiotherapy group. The sample size was calculated a priori using the values derived from previously published study by Shetty et al (2022). A total of 36 individuals meeting the selection criteria were included in the study.

Selection Criteria: The individuals between the age group of 18 to 64 years, with history of low back pain for at least 6 weeks or more with no irradiation to lower limb were selected from OPDs at Punjabi University, Patiala on voluntary basis.

Tools of data Collection: The screening tools used in the study include. Roland-Morris Low Back pain and Disability Questionnaire (RMQ) to measure pain-related disability. Back Assessment Form to evaluate the low back pain. Visual Analogue Scale (VAS) to measure pain intensity. Quality of life measured by SF-12 questionnaire. Questionnaire to evaluate patient satisfaction. Exercise Adherence Rating Scale (EARS) scale to assess treatment adherence

Procedure of the study: The sample size of 36 participants was selected. After selection the participants were presented with informed consent forms, necessary explanations were offered and individual's preference for in-person physiotherapy session or session through video-consultation was taken. After consent, initial evaluation was done (clinical presentation and test movements are performed) and participants were allocated to one of the two study groups- Group A and Group B on basis of individual's preference. For each group the treatment session was delivered for 3 weeks with 5 sessions per week. each treatment session was of 30-45 minutes. Outcome measures of pain intensity, pain related disability, quality of life, patient satisfaction and treatment adherence were recorded at baseline and post treatment for each group. Further both groups were compared in relation to the outcome measures.

Intervention: The physiotherapy intervention received by each study group was same. The treatment program was composed of educational component, posture correction, McKenzie exercises.

Figure 1: Telephysiotherapy Session through video call

Figure 2: Supervised Physiotherapy sessions

Statistical analysis

The analysis was done by using Microsoft Excel 2007. Descriptive statistics of mean and standard deviation were derived initially for the required variables. A paired t-test was conducted for analysis of the variables within the group. For the analysis between groups, independent t -test was performed to compare the mean scores of Group A and Group B for the required variables. In order to estimate the magnitude of the intervention's impact on the outcome measures before and after treatment, Cohen's d (effect size) was computed.

RESULT

The intra group comparison of supervised physiotherapy group(Group A) , comparing the effect size and outcome measures (variables) in their pre and post exercise scores highlighted that there is very high significant difference($p \leq 0.05$) in pain related disability, significant difference ($p \leq 0.05$) in pain intensity (on rest) and (on activity), quality of life (SF-12 physical), quality of life (SF-12 mental). The magnitude of the effect size is reported as larger for pain related disability, pain intensity (on rest), pain intensity (on activity) but medium for quality of life (physical and mental component). (Table 1 and Figure 3)

The intra group comparison of telephysiotherapy group (Group B) ,comparing the effect size and outcome measures (variables) in their pre and post exercise scores revealed that the pain related disability, pain intensity (on activity), quality of life (SF- 12 physical) show very high significant difference($p \leq 0.05$) while a significant difference is observed for pain intensity(on rest), quality of life (SF-12 mental).For all the outcome measures the effect size is reported larger. (Table 2 and Figure 4)

The inter group comparison of supervised physiotherapy group and telephysiotherapy group indicated a significant difference ($p \leq 0.05$) for treatment adherence and quality of life (SF-12 physical) while no significant difference is observed for the outcome measures of pain related disability, pain intensity (on rest), pain intensity (on activity), quality of life (SF-12 mental) and patient satisfaction. (Table 3 and Fig.5) [10-16].

Table1: Summary of the comparison of the magnitude of effect size and the score of various outcome measures in the Group A (Supervised physiotherapy group)

Group → / Variables ↓	Group A (Supervised Physiotherapy) N=18					
	Pre		Post		t*	d
	Mean	SD	Mean	SD		
Pain related disability	10.33	2.86	5.22	1.47	8.30	2.23
Pain Intensity (On rest)	20.27	22.28	8.61	15.12	3.99	0.61
Pain Intensity (On activity)	64.16	11.21	43.38	13.05	6.35	1.70
Quality of life (SF-12 physical)	33.70	7.73	37.41	7.43	-2.91	-0.48
Quality of life (SF-12 mental)	53.52	8.35	56.98	4.95	-2.33	-0.50

$p \leq 0.05$ $^{**}p \leq 0.01$ $^{***}p \leq 0.001$

$t_{(17,0.05)} = 2.10$ SD = Standard deviation d= Effect size (Cohen's d)

Figure 3: Comparison of the magnitude of effect size and the scores of various outcome measures in the Group A (Supervised physiotherapy group)

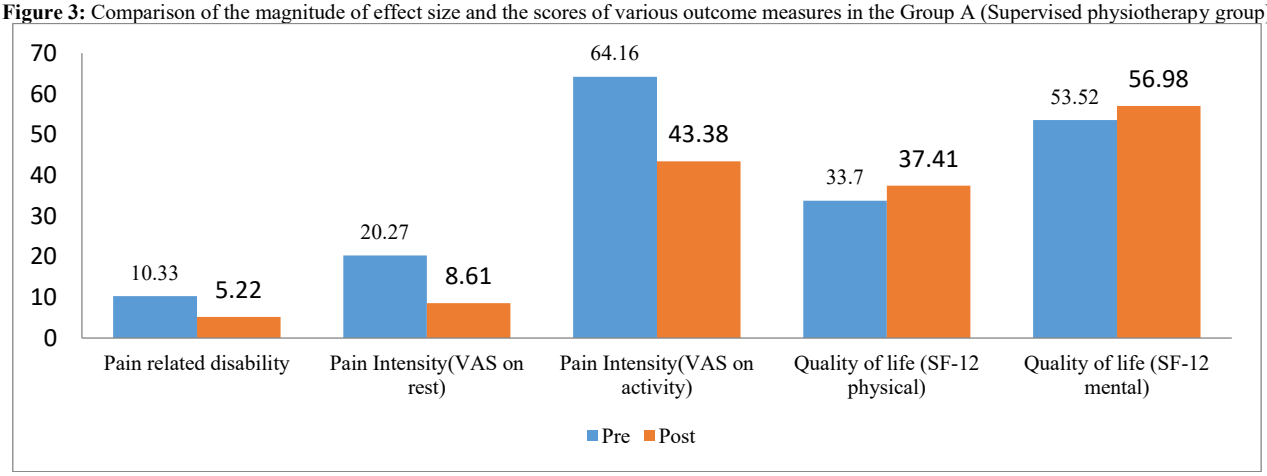


Table 2: Summary of the comparison of the magnitude of effect size and scores of different outcome measures in the Group B (Telephysiotherapy group)

Group → / Variables ↓	Group B (Telephysiotherapy N=18					
	Pre		Post		t*	d
	Mean	SD	Mean	SD		
Pain related disability	11.1	2.81	5.83	1.88	13.46	2.20
Pain Intensity (On rest)	18	17.5	4.33	5.57	4.34	1.05
Pain Intensity (On activity)	67.5	8.73	38.72	15.50	10.17	2.28
Quality of life (SF-12 physical)	26.69	6.60	37.05	6.25	-10.93	-1.61
Quality of life (SF-12 mental)	55.72	8.14	59.54	3.42	-2.71	-0.61

$^{*}p \leq 0.05$ $^{**}p \leq 0.01$ $^{***}p \leq 0.001$

$t_{(17,0.05)} = 2.10$ SD= Standard deviation d= Effect size (Cohen's d)

Figure 4: Comparison of the magnitude of effect size and scores of different outcome measures in the Group B (Telephysiotherapy group)

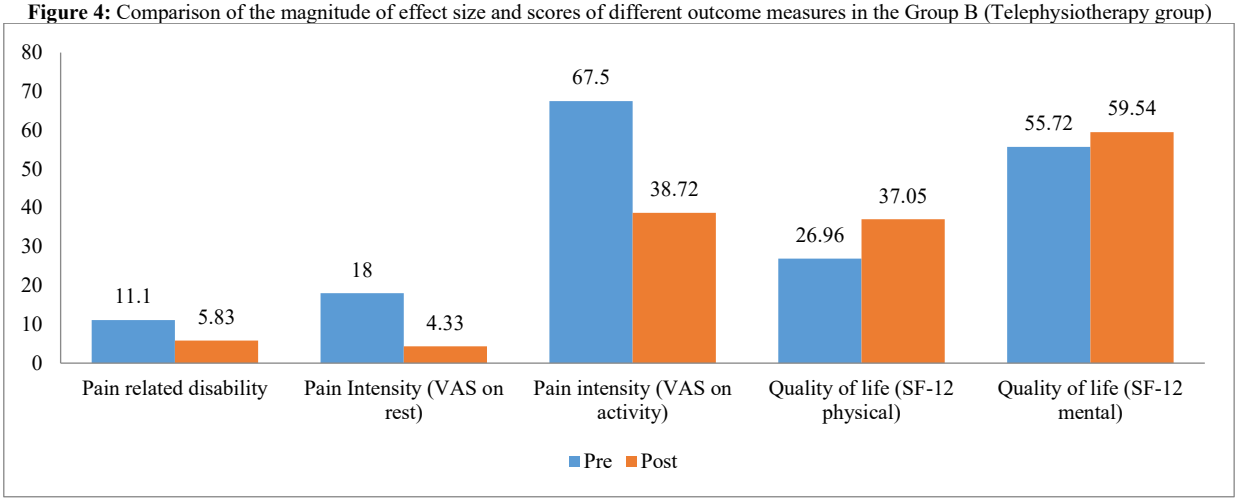
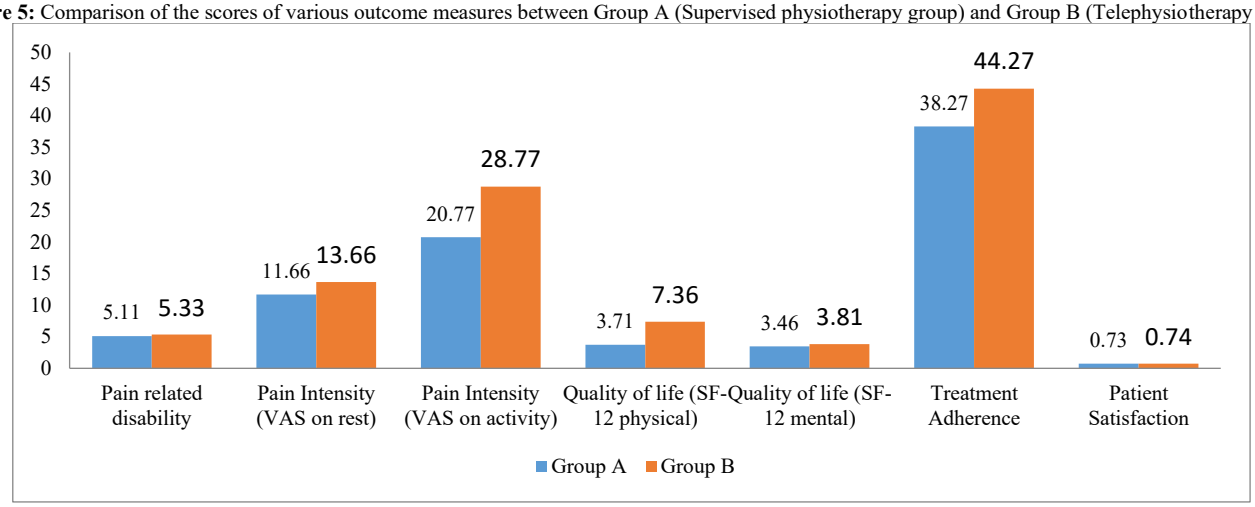


Table 3: Summary of the comparison of the scores of various outcome measures between Group A (Supervised physiotherapy group) and Group B (Telephysiotherapy group)

Groups → / Variables ↓		Group A (Supervised Physiotherapy) N=18		Group B (Telephysiotherapy) N=18		t
		Mean difference	SD	Mean difference	SD	
Pain related disability		5.11	2.60	5.33	1.68	0.76
Pain Intensity	On rest	11.66	12.38	13.66	13.35	0.465
	On activity	20.77	13.87	28.77	12.002	1.84
Quality of life (SF-12 physical)		-3.71	5.39	-7.36	2.85	-2.53*
Quality of life (SF-12 mental)		-3.46	6.28	-3.81	5.96	-0.17
Treatment Adherence		38.27	5.35	44.27	3.65	3.92*
Patient Satisfaction		0.73	0.064	0.74	0.080	0.56

*$t_{(34,0.05)} = 2.03$ SD= Standard deviation df = degrees of freedom

Figure 5: Comparison of the scores of various outcome measures between Group A (Supervised physiotherapy group) and Group B (Telephysiotherapy group)



DISCUSSION

The present study was designed to compare the effectiveness of supervised physiotherapy with telephysiotherapy in the management of mechanical low back pain.

The findings of the study suggested significant improvement within the telephysiotherapy group across the outcomes of pain related disability by 52.5%, pain intensity at rest by 24.05%, pain intensity on activity by 57.3%, Quality of life - physical component by 72.03% and mental component by 93.5%. Similarly, the supervised physiotherapy group demonstrated significant improvement in pain related disability by 50.5%, pain intensity at rest by 42.4%, pain intensity on activity by 67.6%, Quality of life - physical component by 90.8% and mental component by 93.9%. However, inter group comparison revealed no statistically significant difference in pain related disability ($t=0.303$, $p<0.05$), pain intensity at rest ($t=0.465$, $p<0.05$), pain intensity on activity ($t=1.84$, $p<0.05$), quality of life-physical component ($t=-2.53$, $p<0.05$) and mental component ($t=-0.17$, $p<0.05$) and patient satisfaction ($t=0.56$, $p<0.05$). Notably, a statistically significant difference was observed for treatment adherence ($t=3.92$, $p<0.05$), with the telephysiotherapy group showing a high rate of adherence.

These findings suggest that telephysiotherapy is as effective as supervised physiotherapy in improving the clinical outcomes among the mechanical low back patients with additional advantage of adherence to treatment.

For pain related disability, the intervention showed a significant within-group reduction in pain-related disability (RMQ) with a large effect size although no significant between group differences were observed. These results are in line with prior studies which found that telerehabilitation and clinic-based physiotherapy were equally effective [13-15]. However, another study found that e-health interventions were more effective, in this study, the e-health program group and home rehabilitation group received the treatment intervention for 8 weeks comprised of TENS and McKenzie exercises [16]. Contrastingly, a study conducted by Shetty

et al (2022) demonstrated better improvement in RMQ score through supervised physiotherapy rather than video assisted physiotherapy, their intervention was limited to 2 weeks and included thermotherapy, hamstring and back muscles stretching and core stability exercises. This indicates that the variation in intervention duration, nature of treatment and level of supervision influence the relative efficacy.

Further for the analysis for pain intensity, the results demonstrated reduction in the pain intensity at rest when compared between the groups with large effect size to the offered intervention while no important change is seen on comparison between the groups ($t=0.465$, $p<0.05$). Similar finding is seen for the pain intensity on activity ($t=1.84$, $p<0.05$). The findings are consistent with evidences by Chabbra et al (2018), Mbada et al (2019) which reported no significant difference in reduction of pain intensity between telephysiotherapy and conventional physiotherapy [16, 17]. On the other hand, the studies by Ozden et al (2022), Lara Palomo et al (2022), Weise et al (2022) and Piccoli et al (2019) highlighted that the reduction in pain intensity was significantly better with digital rehab than standard care for low back pain [18-20]. Conversely, Shetty et al. (2022) shown that supervised physiotherapy was more effective than telephysiotherapy at reducing the pain intensity. This implies that the differences in treatment duration, protocol, patient population and various delivery platforms across the studied literature may influence the outcome of pain intensity.

In the current study, the result presented improvement in quality of life in both groups, Group A demonstrated a moderate effect size while Group B presented with large effect size. The intergroup comparison highlighted that both groups responded equally to the intervention in improving the quality of life. The results are aligned with the findings of a similar designed study conducted by Fatoye et al (2020) Lopez Marcos et al (2024), Piccoli et al (2019) and Munoz-Tomas et al (2023). In contrast, evidence by Lopez Marcos et al (2024) and Nagel et al (2024) evaluated improvement in quality of life when the treatment was delivered through an app with face-to-face supervision [21, 22].

The findings of the study showed that the both modes of treatment are equally effective in enhancing the quality of life in persons with low back pain. Despite the absence of significant difference in inter group comparison, telephysiotherapy group demonstrated slightly larger effect size which implies that patient outcomes depend more on the quality and consistency of treatment program rather than mode of delivery.

A majority of the participants in the study responded affirmatively on the recommendation of telephysiotherapy to the other patients. The results have been supported by Lopez Marcos et al (2024), Borges et al (2024) and Bailey et al (2020) which similarly reported high level of satisfaction with telerehabilitation. Furthermore, a systematic review by Mehendale et al (2023) and Munoz-Tomas et al (2023) revealed that the telerehabilitation has shown feasibility as well as comparable effectiveness in managing low back pain in terms of patient satisfaction.

The present study demonstrated high adherence to the intervention delivered through the telematic mode. A Similar finding was reported by Borges et al (2024), Mehendale et al (2023) and Munoz-Tomas et al (2023), in their studies on evaluating the effectiveness of telephysiotherapy in low back conditions highlighted the high levels of consistency and adherence to telematic mode of exercise which was comparable to conventional mode of rehabilitation. Although the current study did not include any measure to evaluate the economic impact of either mode of delivery of the intervention, cost effectiveness is considered to be an imperative reason for the adherence to telephysiotherapy in addition to the other factors such as ease of access to the treatment within comfort of home, reduction in travel time and cost, flexibility in scheduling the therapy sessions. Contrasting evidence was presented by Weise et al (2022) in their interventional study which reported an adherence rate of 89.9% in digital exercise program group and 97.3% in standard care of treatment for low back pain.

The strength of the study includes its methodological strength by following a statistical procedure to determine the sample size, therapist monitoring and participant diversity while the limitations comprise of lack of control group, absence of cost-effective analysis, socio-demographic analysis and short follow up period.

The present study claimed that the telephysiotherapy is as effective as supervised physiotherapy in the management of mechanical low back pain. This implies telephysiotherapy can be utilized as a viable alternative treatment method to clinic-based physiotherapy in mechanical low back pain., may help to bridge the gap in the non-availability of clinical therapeutic set ups and also has the potential to reduce geographical barriers, cut the travel time and cost, limit the clinical waiting which make the treatment more accessible and convenient. Although the current study does not evaluate economic influence of the treatment approach but the fact of reduction in travel cost associated with telephysiotherapy relative to in-person visits, make it a viable treatment option with same clinical effectiveness. This could explain the rationale behind the finding of high adherence with telephysiotherapy in the present study. The integration of telephysiotherapy in the healthcare system can revolutionize physiotherapy delivery services provided the practice to be regulated by concerned regulatory body to ensure standardization, quality and safety in physiotherapy protocol delivered though telematic mode.

Future recommendations

Future studies can be conducted on larger sample size

Further studies can be conducted for longer follow ups

Future studies can explore other delivery modes including apps, websites, AI driven models.

In future research, cost-effectiveness can be examined for both the therapeutic approaches [23-25].

CONCLUSION

The findings of the study support the use of telephysiotherapy as a convenient and cost-effective alternative to traditional clinic-based physiotherapy for the management of mechanical low back pain.

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Conflict of interest

The authors declare there is no conflict of interest related to this study.

Source of funding

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Ethical approval

The study was approved by the Institutional Ethical Committee, Punjabi University, Patiala. The ethical Ref No. 12/2IEC/PUP/2024 was obtained.

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