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A comparative study on the effectiveness of tele-physiotherapy program versus home exercise programme in housewives with low back pain

Chaitali Gorakshnath Kopare[1], Samruddhi Murkey[2], Nupoor Kulkarni[3]
[1] Intern, Department of Community Physiotherapy, Rashtrasant Janardhan Swami College of Physiotherapy, Maharashtra University of Health and Sciences, Nashik, Ahilyanagar, Maharashtra, India
[2] Assistant Professor, Department of Community Physiotherapy, Rashtrasant Janardhan Swami College of Physiotherapy Maharashtra University of Health and Sciences, Nashik, Ahilyanagar, Maharashtra, India
[3] Professor, Department of Community Physiotherapy, Marathwada Mitramandal's college of physiotherapy, Pune, Maharashtra, India

Abstract
Background: Low back pain is highly prevalent among Indian housewives, often limiting their daily activities and quality of life. Limited access to physiotherapy in rural areas necessitates alternative models such as tele-physiotherapy.
Objective: To compare the effectiveness of Tele- physiotherapy program and home exercise program on reducing low back pain intensity and increasing quality of life in term of Visual Analog Scale (VAS), Oswestry Disability Index (ODI) and SF–36 Health Survey in housewives with low back pain.
Method: A total 152 housewives aged between 25- 50 years with low back pain were assigned to either a Tele- physiotherapy group (n=76) or a home exercise group (n=76). Both groups participated in the same exercise program for 4 weeks, with three sessions scheduled each week. The Tele- physiotherapy group received supervised exercise session via video conferencing platform such as zoom. In contrast, the home exercise group was provided with printed exercise sheet in local language to guide them through the exercise independently at home
Design: A comparative study.
Result: 152 participants were studied overall (Tele-Physiotherapy group, n=76; Home Exercise group, n=76). From pre- to post-intervention, both groups exhibited notable gains in pain (VAS), impairment (ODI), and quality of life (SF-36) scores (all $p< 0.01$). Between-group studies found that the Tele-Physiotherapy group showed a notably higher decrease in VAS scores (mean % reduction: 64. 55 vs. 29. 64), ODI scores (mean % reduction: 49. 65 vs. 15. 79), and a greater rise in SF-36 scores (mean % increase: 42. 24 vs. 13. 04) than the Home Exercise group (all $p < 0.01$).
Conclusion: Those who participated in Tele- physiotherapy program showed significant reduction than the participant who participated in home exercise group in pain and improvement in quality of life.

Keywords: Low back pain, Tele-physiotherapy, home exercise, video conferencing, quality of life

Introduction

Low back pain is a common musculoskeletal condition among housewives. It may also acute or chronic. Low back pain is localized between below the 12th rib and above gluteal fold. [1] Low back pain restricts the work activities and involvement with family and friends also make it difficult to mobile and it led to disturb quality of life and mental well-being. The nature of low back pain can be dull aching or sharp. It is also radiating into different area of body, mostly in legs. Low back pain plays an important role in individual day to day life such as depressed mood, problem with sleep and grief. [2] Low Back pain is a ubiquitous health issue affecting millions, with the WHO (2003) citing it as a primary reason for work related absences and healthcare visit. The onset of back pain predominately effects adults between 25 – 50 yr old. Back pain was characterized as a calamitous health issue of the 20th century (sparkes,2005). [3] A low back pain causes disability which affect the major public health in societies. [4] A total health care cost of India is 9,04,461crore which was 3.83% of the GDP. [5] The annual health care and social cost for low back pain are estimated to be around $100 to $200 billion globally. [6] In the world approximately 84% of people experiencing lower back pain. This pain effects their physical function and decreased the quality of life. [7] Approximately 83% of rural housewives suffered from low back pain in India. [8] Rural Indian housewives are most prone to low back pain, with weavers and farmer being the next most affected groups (HAQ *et al*….,2008). [3] 81% of women are actively involved in homemaking responsibilities. On average, housewives allocate 16-20 hours to household responsibilities. Research indicates housewives don't having breaks or time off for vacation. Rural area women engage in many activities like farming, animal care, household chorus, child care, family care and other tasks. [1]

Compare to urban area women, there is less access of health to rural women. Rural areas health problem includes limited health care provider, poor health system, lack of health insurance, rely substantially on Medicaid and Medicare, people travel longer distance to receive care and services. This vary from state to state and region to region due to diversity in geography and Indian culture. [9] Population who take physiotherapy is very less because according to survey of word disability (2023) rate is 10% where 80% of them belong to rural area. [10] Past decades there is transformation in health care personnel by 50% increase and 30% rise in primary health centres. Though combined of governmental

and non-governmental organization, advancement in technology and better awareness which eases the quality healthcare services. [11] To improve physical function, quality of life and also people ability to live, rehabilitation plays an important role. When this type of situation occurs physiotherapist, intervention is required to improve physical function and quality of life in patient. [12] Musculoskeletal disorders are major contributor to worldwide disability reaching conventional face to face medical services is often challenging for many people and this issue became widespread during to covid-19 outbreak. [13]

Recognizing the all this condition rate of the lower back pain among housewives and increasing demand of physiotherapy services, one option to minimize scheduling delays in getting physiotherapy treatment is tele-physiotherapy. [14] Tele-physiotherapy is defined as a use of technologies like smartphone, computer and tablet to provide treatment to the individual with cognitive, physical and mental disabilities. Tele-physiotherapy reduces the challenges such as travel, time and unavailability of near physiotherapy clinic particularly in rural area. [15] Tele-physiotherapy gives promising future to population. The study shows tele-physiotherapy is effective in all physiotherapy specialty as traditional in person rehabilitation. It is best economical alternative especially in rural area. Tele-health is great solution for health care professional to work from distance. It is easily adaptable and workable for the physiotherapist. [14] To reach the sound active ageing, regular exercise is a beneficial and important element of physiotherapy treatment for people with musculoskeletal, neurological, cardiopulmonary health condition. Many individuals who face hurdle in exercise, for those in- person tele-physiotherapy is acceptable substitute. Therapeutic exercise, education, counselling, assessment and monitoring are the measure of tele-physiotherapy, which is deliver by Telephone call, videoconferencing, messages and webpages. [16] International physiotherapy association incredibly promote the use of tele-physiotherapy. Many associations like Australian physiotherapy [APA,2020] and Irish society of chartered physiotherapist [ISCP,2020] have already make their policies and guideline on tele-physiotherapy. [17] There are no rule and guideline for use tele-physiotherapy by physiotherapist in India. This point should be highlighted cause tele-physiotherapy is a best and reliable option for physiotherapist to improve the quality of life in patient. [18] As the number of smartphone applications and the advancement of telerehabilitation services continue to grow globally, it is essential for physiotherapists to be aware of the quality and security provided by such software. In the UK, adherence to the Data Protection Act is the minimum requirement to ensure the protection of personal information and individual rights. Frequent patient non-attendance at scheduled appointments contributes to significant financial losses, inefficient use of healthcare resources, and extended waiting time. Research suggests that smartphone applications may offer an effective strategy to minimize appointment cancellations by incorporating automated reminder systems. These applications typically require a recurring fee, which varies depending on the number of physiotherapists or clinics involved in the subscription. Importantly, studies have linked poor adherence to treatment plans with increased emergency care visits, hospital admissions, and elevated overall healthcare costs. Therefore, investing in such digital tools may enhance operational efficiency, reduce missed appointments, and help mitigate future healthcare demands. However, despite their potential, the integration of these technologies into physiotherapy practice is not without challenges. Identifying and understanding these barriers is essential for guiding future research efforts aimed at refining and tailoring digital solutions to better align with the current needs of healthcare systems. [19]

The excessive stress applied on lumbo-pelvic region causes the low back pain, but some short-term specific exercise which help in reducing those stress and pain in patient. [20] Factors that influence adherence to a home exercise program include both patient education and the exercises themselves, which are key components of a home exercise prescription, a commonly used approach among rehabilitation professionals. Although following prescribed home exercises is crucial for achieving successful outcomes, research indicates that patients frequently struggle with maintaining consistent adherence. [21] Rehabilitation through exercise is commonly suggested as the primary treatment, however the public health sector faces limited access to therapy centres. Since the home is easily accessible, home exercise may be especially beneficial for addressing back pain. [22] Exercise remains one of the few interventions with strong empirical support for managing non-specific chronic low back pain (LBP), and it is widely recognized as a primary treatment approach for individuals with subacute and chronic symptoms. Regular physical activity plays a critical role in both the prevention and recurrence of LBP. The effectiveness of any exercise-based intervention is closely tied to how well patients adhere to the prescribed regimen and how accurately they perform the exercises. Patient adherence—defined as the extent to which individual behaviour aligns with healthcare provider recommendations—is regarded as a key determinant of successful outcomes in exercise therapy. Various factors, including individual patient characteristics, program-related elements, and the nature of the patient-provider relationship, have been shown to influence adherence levels. [23]

"Tele-physiotherapy and home exercise programs each have their own benefits. Tele-physiotherapy, in particular, is a rapidly growing field worldwide, offering patients convenient and affordable access to care. Similarly, home exercise programs are designed for easy implementation and accessibility. The purpose of this study is to compare the effects of tele-physiotherapy and home exercise programs in housewives experiencing low back pain.

Material and Methods

1. Study design and sample size

A comparative study was conducted to evaluate interventions in housewives aged 25 to 50 years experiencing low back pain in a rural region of Maharashtra, India. The sample size was determined using Raosoft software at a 90% confidence level with a 5% margin of error, resulting in 152 participants. These participants were recruited through non-probability convenience sampling and equally divided into two groups: Group A (n=76) and Group B (n=76). Considering the rural setting and logistical constraints, convenience sampling was chosen for feasibility. The study spanned over six months, during which the effects of the interventions were systematically assessed.

2. Procedure

Ethical approval was obtained from the relevant institutional review board prior to the initiation of the study. Informed consent was secured from all participants after a thorough explanation of the study's purpose, procedures, potential risks, and benefits. Participants were selected according to predefined inclusion and exclusion criteria to ensure their suitability and safety for the study. Eligible participants were then randomly assigned to one of two groups: Group A, which received a tele-physiotherapy program, and Group B, which followed a structured home exercise program. Both groups were provided with the same physiotherapy exercises, and the interventions were implemented over a four-week period.

Group A: Tele-physiotherapy program

The tele-physiotherapy sessions for Group A were conducted using video conferencing platforms such as Zoom to facilitate accessibility and enable remote supervision. Participants followed a structured exercise program over four weeks, attending three sessions per week. Progress monitoring and feedback collection were managed through an assessment sheet shared via a Google Form. Assessments were conducted both before the start of the program (pre-intervention) and after its completion (post-intervention) to evaluate the effectiveness of the intervention. Each session lasted approximately one hour and adhered to a standardized format, beginning with a 10-minute warm-up, followed by 30 minutes of targeted physiotherapy exercises, a 10-minute cool-down, and concluding with a 10-minute counselling or discussion segment aimed at addressing participant concerns, providing motivation, and encouraging adherence.

Group B: Home exercise program

Participants in Group B were provided with a home exercise program sheet that guided them through the intervention. To ensure clarity, understanding, and better compliance, exercise instructions were given in the local language. Assessments for Group B were conducted through home visits, allowing for accurate evaluation and personal interaction. Similar to Group A, participants were assessed both before (pre-intervention) and after (post-intervention) the four-week program to measure progress and improvements. All participants received thorough education on performing each exercise correctly to maximize benefits and reduce the risk of injury. Additionally, ergonomic advice was offered during the home visits to promote improved posture, enhance movement efficiency, and help avoid strain while performing everyday task.

Participants were given the following interventions

Sr.no	Week	Exercise	Parameter
1	1st week	Warm up: - 5 -10 min 1. Static back 2. Cobra stretches 3. Cat and camel stretch 4. Pelvic bridging 5. Straight leg raises 6. Bird pose Cool down: -5-10 min	10sec hold x 10 rep x 1 set
2	2nd week	Warm up: -5-10 min 1. Static back 2. Cobra stretches 3. Cat and camel stretch 4. Pelvic bridging 5. Straight leg raises 6. Bird pose Cool down: -5-10 min	15sec hold x 10 rep x 2 set
3	3rd week	Warm up: -5-10min 1. Cobra stretches 2. Cat and camel stretch 3. Knee to chest stretch 4. Pelvic bridging 5. Superman poses Cool down: -5-10min	30sec hold x 10 rep x 2 set
4	4th week	Warm up: - 5-10min 1. Cobra stretches 2. Cat and camel stretch 3. Knee to chest stretch 4. Pelvic bridging 5. Superman poses Cool down: -5-10min	30sec hold x 10 rep x3 set

3. Consent and Ethical approval

Ethical approval for the study was taken by the Institutional Ethical Committee of RJS College of Physiotherapy, Kopargaon (approval number: RJS/IEC/2024/09). Prior to enrolment, all participants gave their written informed consent in accordance with the established inclusion and exclusion criteria.

4. Selection criteria

The study included housewives aged 25 to 50 years who had been experiencing chronic low back pain for more than three months. Eligible participants were those not currently undergoing physiotherapy treatment, possessed access to a smartphone or other internet-enabled device, and were in good health were eligible. Additionally, participants facing

environmental barriers such as limited transportation options or living far from physiotherapy clinics were considered for inclusion. Exclusion criteria comprised individuals with severe medical conditions including recent fractures, unstable angina, or neurological disorders, those who had undergone recent spinal surgery, pregnant women, and females unable to comprehend the questionnaire or use technology. Participants without reliable internet access or those already receiving other treatments for low back pain were also excluded from the study.

5. Outcome Measure

The outcome measures used in the study included the Visual Analog Scale (VAS) for pain intensity, the Oswestry Disability Index (ODI) to assess functional disability related to low back pain, and the Short Form-36 (SF-36) questionnaire to evaluate participants' overall health-related quality of life. These standardized tools were administered pre- and post-intervention to determine the effectiveness of the physiotherapy programs.

Results

A total of 152 housewives with low back pain participated in the study, equally divided into two groups: Tele-physiotherapy (Tele PT, n=76) and Home Exercise (Home EX, n=76). T

Pain intensity (VAS): Both groups showed significant reductions in pain scores post-intervention ($p < 0.01$). The Tele PT group's mean VAS score decreased from 5.74 ± 1.05 to 2.08 ± 0.96, while the Home EX group's score decreased from 5.91 ± 1.02 to 4.20 ± 1.10. The percentage reduction in VAS was significantly greater in the Tele PT group (64.55%) compared to the Home EX group (29.64%) ($p < 0.01$).

Functional disability (ODI): Significant improvement was observed in both groups ($p < 0.01$). The Tele PT group showed a reduction in ODI from 45.18 ± 7.26 to 22.38 ± 6.16, whereas the Home EX group had a reduction from 44.37 ± 7.42 to 37.36 ± 7.13. The Tele PT group demonstrated a significantly higher percentage reduction in ODI (49.65%) compared to Home EX (15.79%) ($p < 0.01$).

Quality of life (SF 36): Both groups experienced significant improvement in SF-36 scores ($p < 0.01$). The Tele PT group's scores improved from 56.13 ± 10.50 to 77.97 ± 5.70, and the Home EX group from 56.47 ± 9.38 to 63.43 ± 8.38. The percentage increase was significantly greater in the Tele PT group (42.24%) compared to Home EX (13.04%) ($p < 0.01$).

Overall, the Tele-physiotherapy program was more effective than the home exercise program in reducing pain and disability while enhancing quality of life among housewives with low back pain.

Table 1: comparison of tele- physiotherapy and home exercise group.

Outcome	Tele-PT (Pre)	Tele-PT (Post)	Home Ex (Pre)	Home Ex (Post)	Between-Group Result
VAS (Pain)	5.74	2.08	5.91	4.20	Tele-PT > Home-Ex
ODI (Disability %)	45.18	22.38	44.37	37.36	Tele-PT > Home-Ex
SF-36 (QoL)	56.13	77.97	56.47	63.43	Tele-PT > Home-Ex
% Change (Pain)	64.55	-	29.64	-	-
% Change (Disability)	49.65	-	15.79	-	-
% Change (QoL)	42.24	-	13.04	-	-

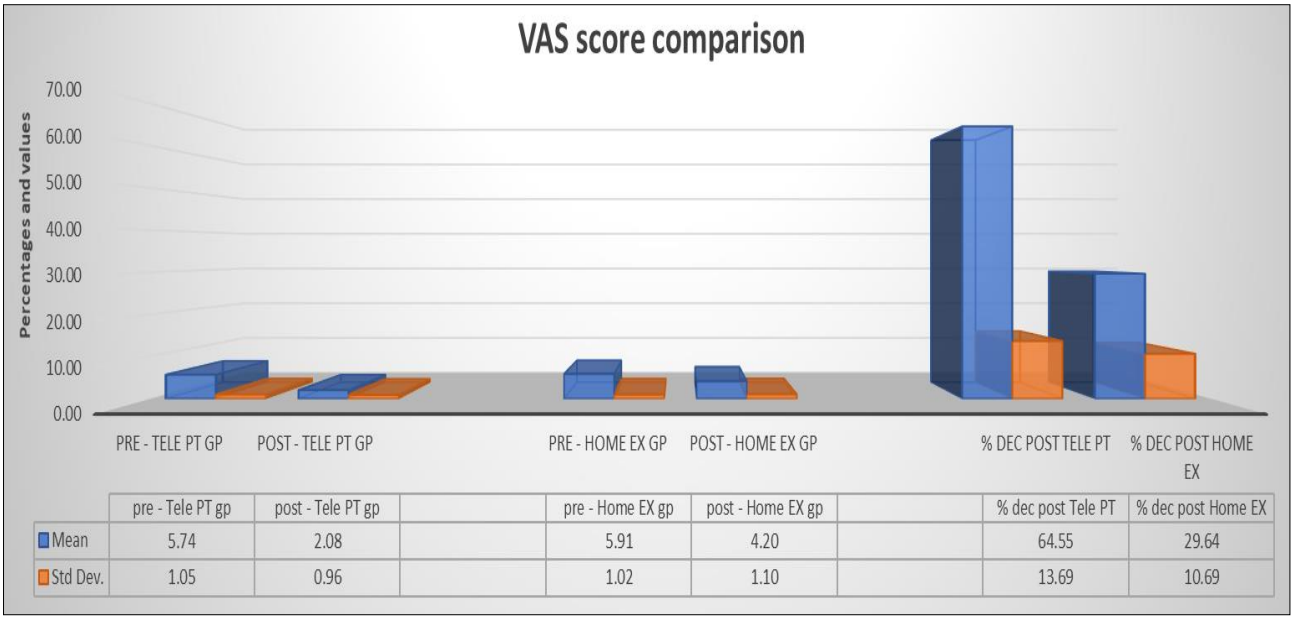
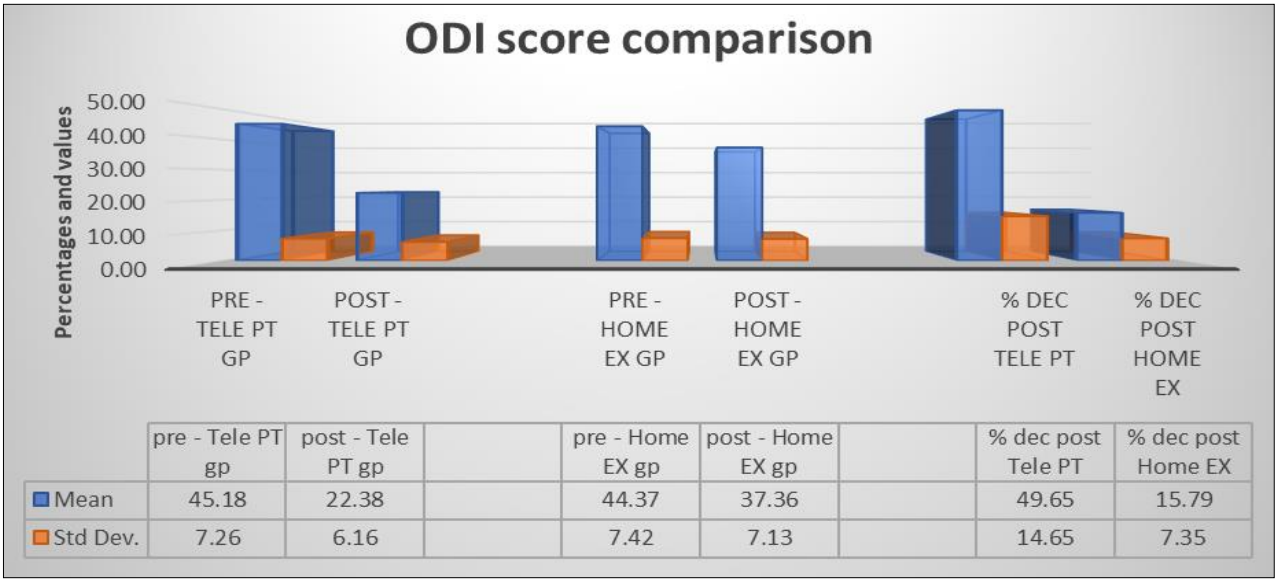
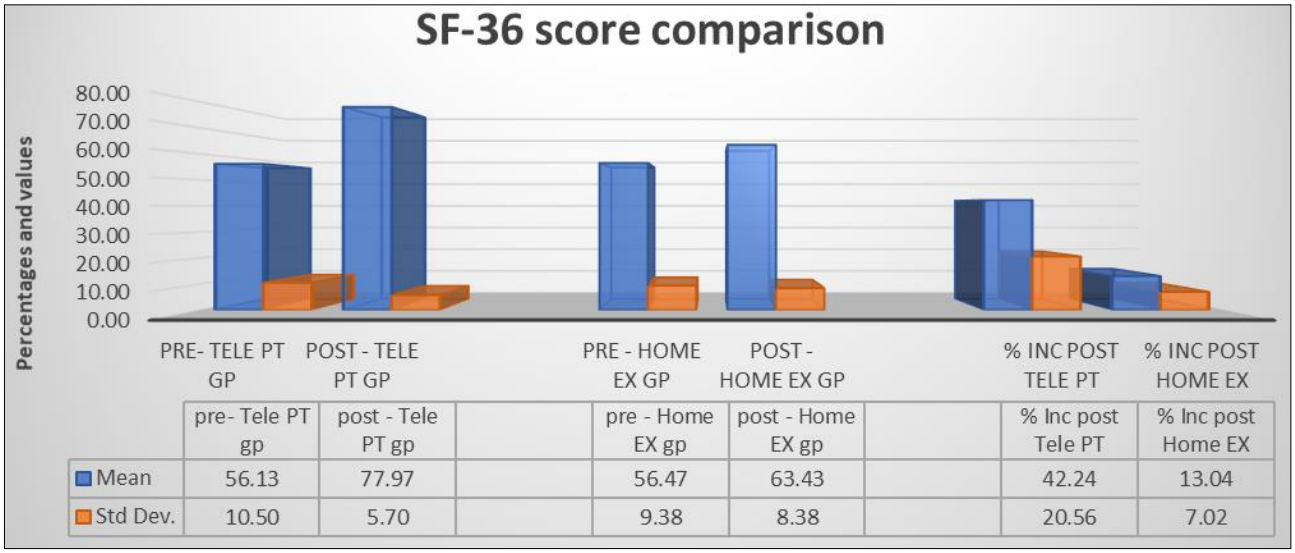


Fig 1: VAS scale pre and post intervention score in Tele PT and Home EX group



	pre - Tele PT gp	post - Tele PT gp		pre - Home EX gp	post - Home EX gp		% dec post Tele PT	% dec post Home EX
Mean	45.18	22.38		44.37	37.36		49.65	15.79
Std Dev.	7.26	6.16		7.42	7.13		14.65	7.35

Fig. 2 ODI scale pre and post intervention score in Tele PT and Home EX group



	pre- Tele PT gp	post - Tele PT gp		pre - Home EX gp	post - Home EX gp		% Inc post Tele PT	% Inc post Home EX
Mean	56.13	77.97		56.47	63.43		42.24	13.04
Std Dev.	10.50	5.70		9.38	8.38		20.56	7.02

Fig. 3 SF-36 scale pre and post intervention score in Tele PT and Home EX group

Discussion

This study provides valuable insights into the comparative effectiveness of Tele-physiotherapy (Tele PT) and Home Exercise (Home EX) programs in housewives suffering from chronic low back pain. Both intervention groups demonstrated statistically significant improvements in pain intensity (VAS), functional disability (ODI), and health-related quality of life (SF-36) ($p < 0.01$). However, the Tele PT group consistently exhibited greater improvements across all outcome measures compared to the Home EX group. Specifically, the Tele PT group experienced a larger reduction in pain levels (64.55% vs. 29.64%), a more pronounced decrease in disability scores (49.65% vs. 15.79%), and a higher increase in quality-of-life scores (42.24% vs. 13.04%).

These findings align with previous research. For instance, Lara-Paloma *et al*. (2022) conducted a double-blind randomized controlled trial comparing a home rehabilitation program with an e-Health program incorporating McKenzie exercises and electroanalgesia, reporting superior pain relief and functional outcomes in the e-Health group.[24] Likewise, Mehendale *et al*. (2023) detailed a case study demonstrating significant benefits of telerehabilitation in reducing pain and disability in a patient with chronic low back pain, emphasizing the potential of remote physiotherapy interventions.[15]

The overall SF-36 score was chosen as the primary outcome measure in this study to provide a clear, comprehensive indicator of participants' quality of life and to simplify data interpretation. While this approach enhances clinical relevance and reduces the risk of type I error from multiple comparisons, further studies with larger sample sizes are recommended to analyze domain-specific impacts of such interventions.

Tele-physiotherapy offers several unique advantages over unsupervised home exercise programs. It facilitates real-time professional supervision and personalized adjustments, improving exercise technique and safety. The interactive nature of tele-physiotherapy fosters better patient motivation and adherence, which are crucial for successful rehabilitation. Moreover, it overcomes geographical and mobility barriers, making effective physiotherapy accessible to rural populations or those with limited ability to travel.

Additionally, tele-physiotherapy reduces exposure risk during pandemics or other health emergencies, ensuring continuity of care. These combined benefits likely contribute to the superior clinical outcomes observed in the Tele PT group in this study.

Conclusion

In conclusion, the study's findings show that people meeting the inclusion criteria experience significant improvements in pain (VAS), impairment (ODI), and quality of life (SF-36) with both telehealth physiotherapy and home exercise treatments. Despite this, telephysiotherapy consistently produced better outcomes than home exercise across all of the assessed variables. The telephysiotherapy group experienced a larger percentage drop in VAS and ODI ratings than the home exercise group, as well as a greater improvement in SF-36 scores, indicating that their pain and disability were reduced more. The results indicate that supervised interactive telephysiotherapy enhances patient adherence, motivation, and results, making it a more successful approach for treating pain, impairment, and quality of life in this patient group.

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