

"Effectiveness Of Tele-Physiotherapy In Nursing Collegiate With Plantar Fasciitis"

**Dr. Pratyush Ranjan Biswal(PT)^{1*}, Dr. Revati Rajaram Naik(PT)², Dr. Jyoti Ranjan Paltasingh(PT)³,
Mr. Shrutik Chavan⁴, Miss. Nikita Lado Parab⁵**

^{1*}Assistant Professor, Department of Cardio-Pulmonary Physiotherapy, Br Nath Pai College of Physiotherapy, Kudal, Sindhudurg, Maharashtra. MUHS University, Nashik, Maharashtra.

Email- pb0632@srmist.edu.in

ORCID id- <https://orcid.org/0009-0004-4444-8840>

²Department of Physiotherapy, Br Nath Pai College of Physiotherapy, Kudal, Sindhudurg, Maharashtra. MUHS University, Nashik, Maharashtra.

Email- naikrevati0404@gmail.com

³Assistant professor, Department of Physiotherapy, School of Allied and health care sciences, Centurion university of technology and management, Jatni, Odisha

jyotiranj.paltasingh@cutm.ac.in

ORCID ID: 0009-0006-6596-8911

⁴Department of Physiotherapy, Br Nath Pai College of Physiotherapy, Kudal, Sindhudurg, Maharashtra. MUHS University, Nashik, Maharashtra. Email- chavanshrutik2000@gmail.com.

⁵Department of Physiotherapy, Br Nath Pai College of Physiotherapy, Kudal, Sindhudurg, Maharashtra. MUHS University, Nashik, Maharashtra. Email- parabnikita740@gmail.com.

***Corresponding Author:** Dr. Pratyush Ranjan Biswal(PT); pb0632@srmist.edu.in

Abstract

The idea of telehealth first appeared in the Radio news in 1924. Telemedicine was first used in a tele mental health study in Nebraska in 1957. Depending on the goals of the treatment, the elements of tele-physiotherapy may differ greatly. Video-conferencing can be used for one-on-one or virtual group communication between physiotherapists and patients. The introduction of telemonitoring technologies that allow directed rehabilitation in their homes is known as tele physiotherapy. About 8% of musculoskeletal foot and ankle appointments in the United Kingdom were related to plantar fasciitis. 5.9 % of Indians say they have pain in their heels. Total 30 participant were selected according to the inclusion & exclusion Criteria. The participants were separated into two different groups as GROUP A (Experimental group) and GROUP B (control group) website from the internet of reliable source. For the patients in the GROUP A (treatment group), telerehabilitation was performed using the Zoom Meetings application, via video conference simultaneously, accompanied by a physiotherapist. Over the course of 6 weeks, the intervention participants completed a program of tele-rehabilitation foot-ankle exercises based on the ZOOM app video related three times a week, for a total of 18 sessions. Each session lasted roughly 20 to 30 minutes, and them. In the tele-rehab and control group, NPRS and FFI scores decreased from baseline to 6-week post intervention respectively. There was no significant difference between tele-rehab and control groups in any of the studied scales. The mean value indicated changes post treatment and lower values are recorded for post treatment outcome and also the standard deviation shows the consistency with post treatment value which is less to pre value. The findings of the study effect of a 6-week tele physiotherapy program on Pain and physical function with plantar fasciitis amongst nurses which resulted in reduction of pain and increasing functional mobility on foot.

Keywords: Tele physiotherapy, Plantar fasciitis, NPRS, FFI, Functional mobility, Exercises

How to cite this article: Biswal PR, Naik RR, Paltasingh JR, Chavan S, Parab NL. Effectiveness of tele-physiotherapy in nursing collegiate with plantar fasciitis. Int J Drug Deliv Technol. 2026;16(74s): 2312-2322. DOI: 10.25258/ijddt.16.74s.193

Introduction

The use of telemedicine dates back to the 1880s, when some physicians experimented with telecommunication technology following the advent of the telephone in 1876. The phrase "telerehabilitation" is relatively new. In the United States, the idea of telehealth first appeared in

the Radio news in 1924. Telemedicine was first used in a tele mental health study in Nebraska in 1957. Depending on the goals of the treatment, the elements of tele-physiotherapy may differ greatly. (1)

Video-conferencing can be used for one-on-one or virtual group communication between physiotherapists and

*Author for Correspondence: pb0632@srmist.edu.in

patients. The introduction of telemonitoring technologies that allow directed rehabilitation in their homes is known as tele physiotherapy According to the American Telemedicine Association (2010), tele- rehabilitation involves professionals such as physical therapists and speech-language pathologists deliver rehabilitation services to adults and children using information and communication technologies. Rehabilitation experts include occupational therapists, audiologists, physicians, nurses, engineers, assistive technology, instructors, psychologists, and nutritionist. Trials in tele-physiotherapy, which usually involve providing treatment from afar, have generally been more effective, yielding results comparable to those of face-to-face interventions. Many physiotherapy approaches, which often include goal setting, exercise prescriptions, and self-management training, do not require physical presence and are well-suited for tele- physiotherapy. (2)

The coronavirus disease 2019 (COVID-19) pandemic has significantly touched all parts of society and modified delivery of physical therapy and other health care services worldwide and in the United States.(3)There is evidence on the benefits and patient acceptance of TR care for patients with a wide range of conditions, including orthopedics (e.g., low back, total joint arthroplasty), 5-8 neurological (e.g., stroke, multiple sclerosis), 9-11 and widespread chronic pain syndromes.(3)Rehabilitation is needed to maximize people's ability to live, work, and learn while maintaining their functionality and quality of life. The consequences extend to the population, the society and economy. (4)

About 8% of musculoskeletal foot and ankle appointments in the United Kingdom were related to plantar fasciitis. 5.9 % of Indians say they have pain in their heels. According to Landorf (2015), plantar fasciitis accounted for approximately 8% of musculoskeletal foot and ankle visits in the UK. 17.4% of adult participants in a large cohort. A study in Australia found that participants experienced foot soreness. According to Getie et al. (2021), 43.7% of Ethiopians suffer from ankle-foot discomfort each year. Pantar fasciitis is a painful inflammation of the fibers band of tissue at the base of the foot that supports the arch, the plantar fascia. Plantar fasciitis occurs by microscopic tears in the fibers of the fascia, especially where it connects to the heel bone, which occur when this band of tissue is overstretched or overworked. (5)

The calcaneus tends to evert, and the tuberosity is pulled away from the plantar fascia's distal attachment while the subtalar joint pronates. During the stance phase of gait, improper (excessive) pronation has the overall effect of raising tension on the plantar fascia and its attachment to the calcaneal tuberosity. This medical condition usually ends in plantar fasciitis, a chronic inflammatory condition. Most of persons with plantar heel discomfort are middle-aged, and many of them are fat Based to certain concepts, plantar fasciitis can be separated from the main heel pad pain by passive metatarsophalangeal joint dorsiflexion. Fascial pain in the area of the medial longitudinal arch was repeated by the tension developed in the fascia. Patients with primary heel pad sensitivity

are likely to feel just pain when the heel pad is directly stretched. (6)

Both extrinsic and intrinsic impacts include things like the use of the kind and intensity of everyday activities, the prevalence of minor or frequent injuries, and the use of subpar footwear have all been suggested as risk factors for the development of plantar fasciitis. (7) Plantar fasciitis is marked by discomfort, swelling, and trouble walking. When taking the first few steps in the morning or after a period, the pain is very intense. of relaxation and typically subsides during a warming up phase. On rare occasions, the discomfort may radiate throughout the entire foot, including the toes. The medial calcaneal tuberosity may become tender, and the pain is more intense when the toes are dorsiflexed while standing on tiptoe. (8)

PF has multiple risk factors, particularly greater body mass index in people of all age, reduced ankle dorsiflexion, and reduced first metatarsal head joint extension. Prolonged standing. Patients with PF have tight posterior leg muscles (calf and hamstrings) and decreased ankle dorsiflexion. According to the APTA's Orthopedic Section standards 5, the following criteria should be applied to diagnose heel pain and plantar fasciitis: medial plantar heel pain appears over the initial steps following Signs may include inactivity, heel pain with weight bearing activities, soreness at the plantar fascia's proximal insertion, and restricted ankle dorsiflexion range of motion (ROM). People with plantar fasciitis may experience intense pain when the medial plantar calcaneal region is palpated, as well as heel pain when they walk for the first time in the morning or after spending a lot of time sitting down. Early in the morning is typically when pain is worst. (9)

The concept of 'standing environments' includes both 'prolonged standing' and 'prolonged walking'. Anderson, Nester, and Williams define "prolonged standing" as spending at least 5% of occupational

time standing. Stolt and colleagues found that nurses walk an estimated Lesions include plantar fasciitis, muscle fatigue, varicose veins, and edema are common in the nursing profession and are caused by foot-related and lower-limb diseases, which are the most prevalent. Recent narrative literature reviews on lower extremity MSDs in nurses have revealed that there are few studies that solely focus on foot disorders in nurses and that little is known about the kinds of lower- extremity issues that nurses encounter on the job. (10)

Musculoskeletal disorders (MSDs) are a common issue among nurses. Major issue that has a substantial impact on both physical health and work effectiveness, particularly foot and ankle pain. (11) Nursing workers frequently suffer from work-related musculoskeletal diseases, which are health errors brought on by a variety of reasons such repetitive motion and excessive force use. Nurses are constantly on their feet. With every step, our feet can support three times our body weight. The demanding job duties of nursing include running to a code, lifting patients, and moving equipment. Additionally, the majority of the activity entails standing and walking for extended periods of time, and the weight is supported on hard surfaces like concrete stairs and

hospital floors, which do little to improve the shock absorption of footsteps. (12)

The decrease in physical activity would lead to decrease physical fitness among the nursing student and it has high chances of developing heel pain because of the extended period of standing and walking in between the working hours. Telerehabilitation will let the nursing student undertake mobility exercises at their convenience to reduce pain and improve the overall functional ability to perform the activities. Telerehabilitation less time consumer required need less time no particular environment or location can be done anywhere or at any time.

Materials And Methods

Prior to the study, an Institutional Ethics Clearance was taken initial start with demographic data, according to inclusion (Over 18 Years of Age, Report a history of insidious onset pain under the sole of the foot, located at the heel, that has persisted for more than 3 months, Report pain that is most noticeable with initial steps following a period of inactivity, and also worsened with prolonged weight bearing, Report worst first step pain during the previous week of greater than 3/10 on a numerical rating scale (0 = no pain; 10 = worse pain imaginable), Report pain on palpation of the medial calcaneal tubercle or proximal fascia, Radiological findings, Nursing Students Included in Hospital Shift in 8 to 12 h, Have access to internet, smartphones and laptops, Have access and know how to operate ZOOM App video - meetings.) and exclusion criteria (Diabetes or an inflammatory systemic disease Concomitant foot injury or pathology, Previous foot surgery, Fractures in the lower extremity, Patient who already have taken pain medicine not understand if the pain reduction due to exercise or medication) the subject was selected from the hospital / college around the city. The participants were explained about the procedure and the awareness of the study. The informed consent was obtained from the nursing students who was willing to participate in the

study in respect to the criteria of the study. The functional performance of the nursing students was checked prior to and after the intervention using numerical pain rating scale, foot function index which was tested in the individual's foot pain and disability levels respectively. By convenient sampling participants was selected for the study. The participants were separated into two different groups as GROUP A (Experimental group) and GROUP B (control group) website from the internet of reliable source. For the patients in the GROUP A (treatment group), telerehabilitation was performed using the Zoom Meetings application, via video conference simultaneously, accompanied by a physiotherapist. The patients in the GROUP B (control group) were given a brochure showing how to do the exercises and explaining how to do each exercise. (14) Participants were informed about how to download the free Zoom Meetings application where the physical performance test for both groups and treatment for the telerehabilitation group was held. In addition, the meeting identification number and passcode required to attend the Zoom meeting was sent to the participants via message. While the patients in the control group used the Zoom Meetings application only during the evaluation on the baseline and after 6 weeks, the patients in the treatment group used it 18 times in total for telerehabilitation, excluding their evaluations. Additionally, patient education was given to each patient after the evaluation via Zoom Meetings application. (15) Over the course of 6 weeks, the intervention participants completed a program of tele-rehabilitation foot-ankle exercises based on the ZOOM app video related three times a week, for a total of 18 sessions. Each session lasted roughly 20 to 30 minutes, and them. participants may complete them wherever and wherever it was most convenient for ZOOM app video link was scheduled according to their session timings and was shared via WhatsApp and emails to get login to the video sessions and the treatment session was done.

Protocol

Experimental Group-A

Exercises	Sets	Repetition
•Foot and toe movement (Toe spread, great toe extension, lesser toe extension)	1-3 sets	8-12 reps
•Seated heel raise (seated, resistance)	1-3 sets	8-12 reps
•Long toe push (seated, standing, squat)	1-3 sets	8-12 reps
•Standing heel raise(two leg standing, single leg standing)	1-3 sets	8-12 reps



Figure 1. Telerehabilitation

The programs consisted of the gastrocnemius, soleus, and plantar fascia stretching exercise. Duration for each stretching exercise will be 20-30 sec, resting between exercises for 10 sec, and stretching each exercise for 10 sets (16)



Fig 2. Gastrocnemius stretching



fig 3. Plantar fascia stretching

Control Group B

The patients in the GROUP B (control group) will be given a brochure showing how to do the exercises and explaining how to do each exercise.



Fig 4 toe spread 10 reps



Fig 5. great toe extension



Fig 6. Lesser toe



Two Leg Standing 8-12 Rep



Single Leg Standing 8-12 Reps



Seated Heel Raise 8-12 Reps

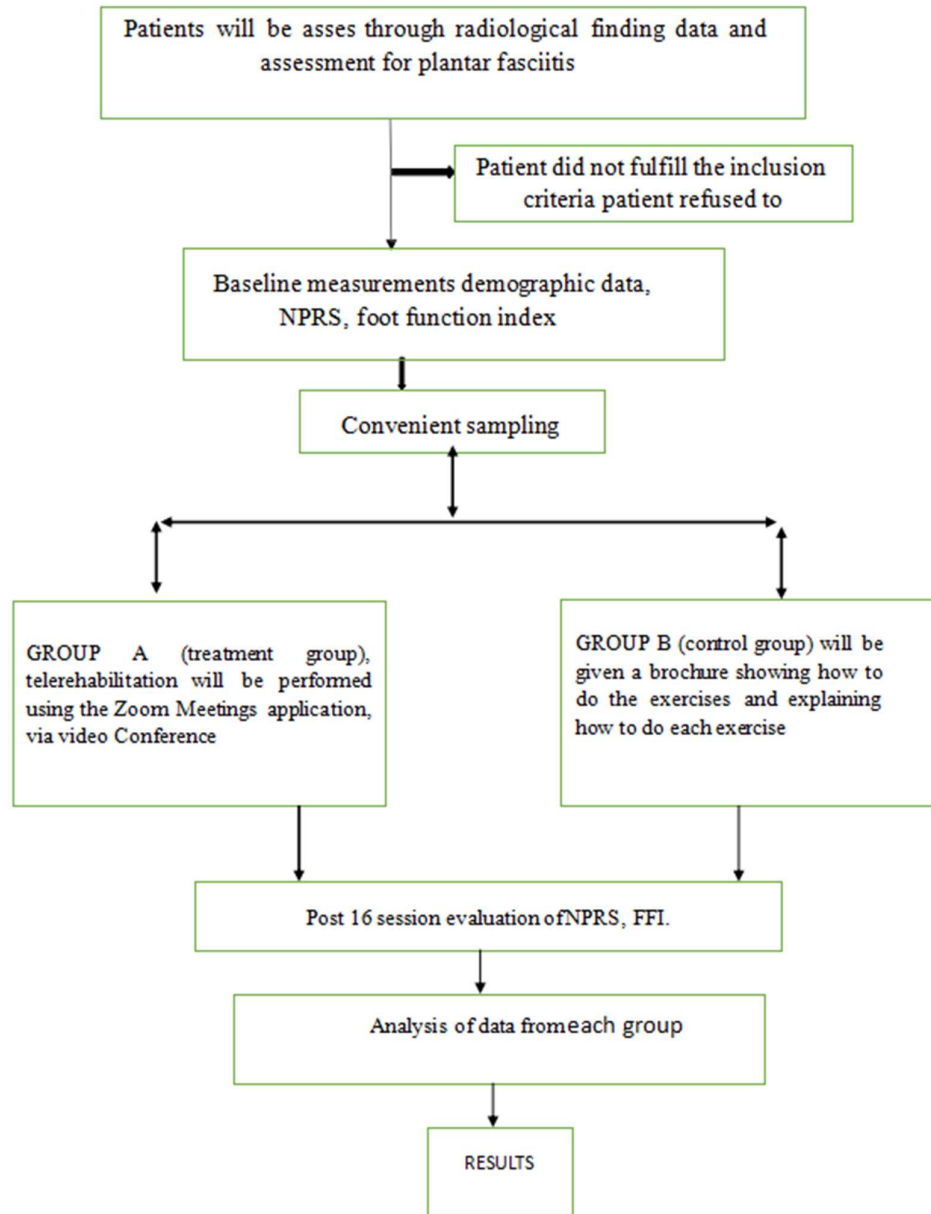


Two leg squat 8-10 reps 1-8 sets



single leg squats 8-10 reps 1-8 sets

Flow Chart



Statistical Analysis

The collected data entered in Microsoft Excel and analyzed using IBM SPSS version 26.0. The mean and standard deviation were calculated. Various statistical measures such as mean, standard deviation and test of significance such as paired test was used.

Normality of pre and post scores was done by using T-Test. To find out the effect within the group, paired sample T-Test was used. Probability values <0.05 were considered minimal statistically significant and values < 0.01 and 0.001 were considered highly significant and very highly significant respectively.

Within group Pre and post test

Comparison of pre-test and post-test scores by paired sample T-Test or dependent test.

The independent t Test was used to compare each dependent variable (Pain and physical function between the two-treatment group (group A tele physiotherapy and group B control). The mean value indicated changes post treatment and lower values are recorded for post treatment outcome and also the standard deviation shows the consistency with post treatment value which is less to pre value. Based on the results of the test analysis at 5% significance level, there is a significant statistical reliable difference between the pre & post treatment values with p-value is less than the 5% significance level (i.e. $0.001 < 0.05$) in the study and therefore it justifies the improvements in health outcome post intervention.

Table no. 2 (mean and std deviation)

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	GR A NPRS pre	5.33	30	1.061	.194
	GR A NPRS post	1.63	30	.928	.169
Pair 2	GR A FFI pre	63.77	30	6.224	1.136
	GR A FFI post	27.77	30	3.971	.725
Pair 3	GR B NPRS pre	5.77	30	.898	.164
	GR B NPRS post	2.53	30	.776	.142
Pair 4	GR B FFI pre	61.73	30	5.878	1.073
	GR B FFI post	37.67	30	7.004	1.279

Table no. 3 (statistically significant)

		Paired Differences	t	df	Sig. (2- tailed)
		95% Confidence Interval of the Difference			
		Upper			
Pair 1	GRA NPRS pre GRA NPRS post	4.027	23.11 0	29	.000
Pair 2	GR A FFI pre GR A FFI post	38.219	33.18 3	29	.000
Pair 3	GRB NPRS pre GRB NPRS post	3.467	28.28 7	29	.000
Pair 4	GR B FFI pre GR B FFI post	27.018	16.67 7	29	.000

Results

Participant Demographic

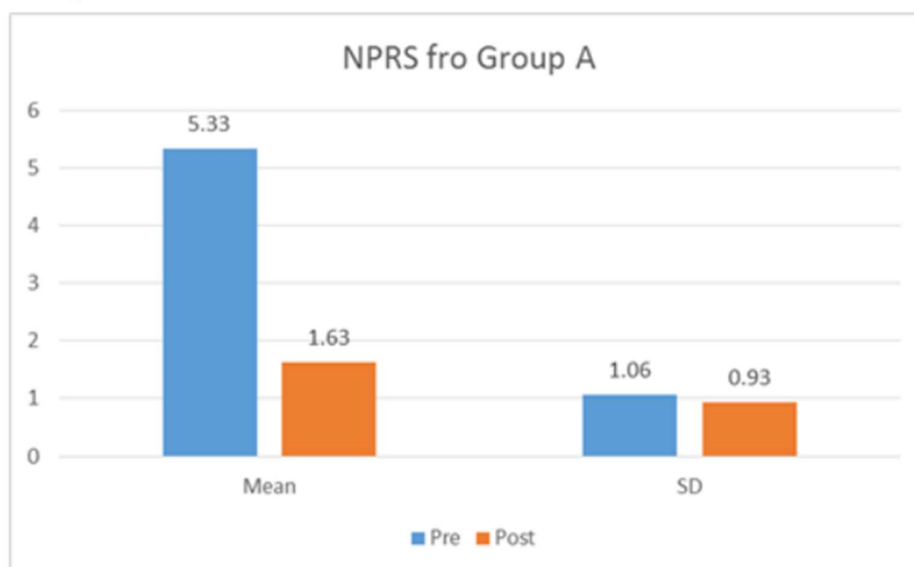
Sixty patients with plantar fasciitis (60 female)

A total of 60 patients entered the final analysis, with 30 in each group

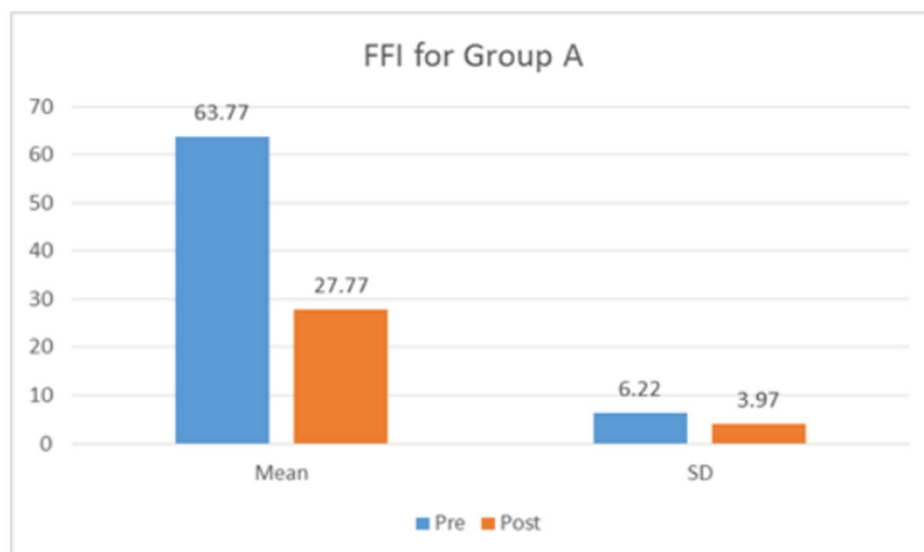
In the tele-rehab and control group, NPRS and FFI scores decreased from baseline to 6-week post intervention respectively. There was no significant difference between tele-rehab and control groups in any of the studied scales. The mean value indicated changes post treatment and lower values are recorded for post treatment outcome and also the standard deviation shows the consistency with post treatment value which is less to pre value. Based on the results of the

test analysis at 5% significance level, there is a significant statistical reliable difference between the pre & post treatment values with p-value is less than the 5% significance level (i.e. $0.001 < 0.05$) in the study and therefore it justifies the improvements in health outcome post intervention.

Experimental Group A

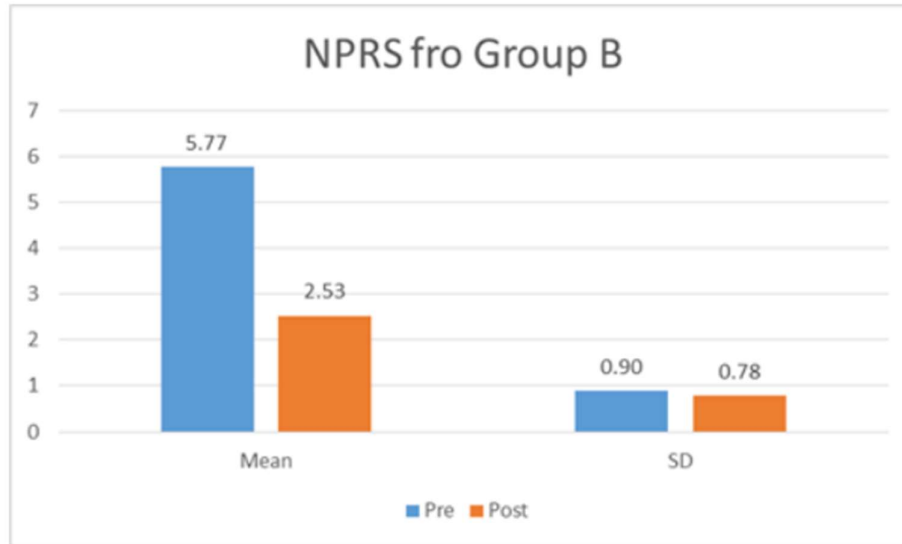


Graph 1. Comparison of pre- test and post scores of NPRS

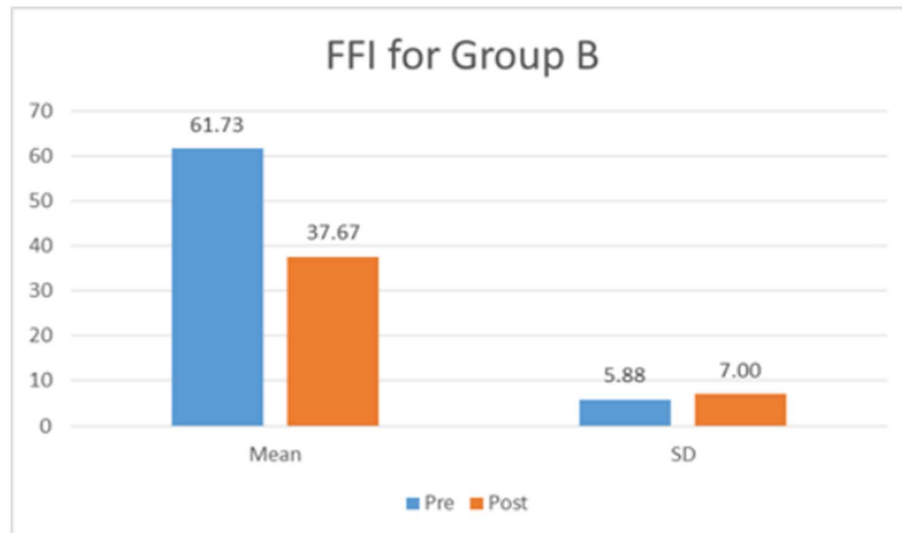


Graph 2. Comparison of pre-test and post-test scores of FFI

Control Group B



Graph 3. Comparison of pre- test and post scores of NPRS



Graph 4. Comparison of pre-test and post-test scores of FFI

Discussion

The purpose of this study was to gain the effect of a 6-week tele physiotherapy program on pain and physical function with plantar fasciitis amongst nurses. The result of the study shows reduced pain and improved function of the foot.

However, the duration of treatment is frequently prolonged, and many patients struggle to adhere to therapy due to the high time and financial demands, resulting in recurring ankle injuries. With the growing use of mobile internet and the development of telemedicine ideas, remote rehabilitation technology is now widely used in the treatment of musculoskeletal ailments. Tele-rehabilitation is more convenient, time-saving, and cost-effective than typical outpatient rehabilitation, and it can help increase patient compliance and satisfaction with treatment (Cottrell et al., 2017). (19)

Scherr et al. (2009) examined the impact of mobile phone-based home-based telemonitoring on heart failure patients' outcomes following an acute decompensation event in 108 patients (79 males and 29 females; ages ranging from 18 to 80). For a period of six months, patients were randomized to receive either pharmacological treatment (control group) or pharmacological treatment plus telemedical monitoring (tele group). Patients in the tele group were instructed to take vital signs (body weight, blood pressure, and heart rate) at the same time every day, typically in the morning after urinating and before changing and taking medicine. Patients were then instructed to enter these values, as well as their heart failure medicine dosage, into the mobile phone's Internet browser and transmit them to the monitoring center. The study indicated that telemonitoring with mobile phones as patient terminals has the potential to minimize the frequency and duration

of heart failure hospitalizations. Our study, like this one, found positive ($p < 0.05$) benefits of employing telehealth technologies for patient care.

Russell (2011) included 65 patients who undergone total knee replacement (TKR) and randomly assigned them to six weeks of standard outpatient rehabilitation or Internet-based outpatient rehabilitation (tele-rehab). Patients in the telerehabilitation group got rehabilitation exercises (open and closed kinetic loop active exercises) via an Internet-based system with a physical therapist interacting in real time (live video and voice). Therapy sessions lasted 45 minutes. The study found that participants in the tele-rehab group had equivalent outcomes to those in the conventional rehabilitation group. This finding is consistent with our study's findings of equal pain and physical function outcomes among individuals with knee OA in the tele-physiotherapy and clinic groups. Summarily, our study shows that the outcomes of pain and physical function in patients with plantar fasciitis under tele-physiotherapy treatment (self-administered with supervision foot specific exercises and telephone monitoring) are comparable to those in the control group (physiotherapist self-administered without supervision foot specific exercises given a brochure) following six weeks of intervention.

Additionally, there were significant improvement in pain and physical function in patients with plantar fasciitis 6-week of tele-physiotherapy intervention.

Conclusion

The findings of the study effect of a 6-week tele physiotherapy program on Pain and physical function with plantar fasciitis amongst nurses which resulted in reduction of pain and increasing functional mobility on foot.

Limitations

Number of subjects can be increased.

objects having other medical conditions were excluded.

The short follow-up period made it difficult for us to evaluate the long-term sustainability for the TR benefit.

Future Scope Of Study

The study can be conducted including in male.

Further study with larger sample size can be conducted.

Study can conducted specific degree of nurses.

References

1. Jiandani, Sheth, Pandya, Rangey physiotherapy in cardiopulmonary conditions Editor Sheth, Pandya, Rangey JAYPEE BROTHERS MEDICAL PUBLISHERS New Delhi /London 2022
2. Soni KM, Khatri SM. Use of Tele-physiotherapy as a treatment tool by physiotherapists in North Gujarat: A
3. Werneke MW, Deutscher D, Grigsby D, Tucker CA, Mioduski JE, Hayes D. Telerehabilitation during the COVID-19 pandemic in outpatient rehabilitation settings: a descriptive study. *Physical therapy*. 2021 Jul 1;101(7): pzab110.
4. 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. Effectiveness of telerehabilitation in physical therapy: a rapid overview. *Physical therapy*. 2021 Jun 1;101(6): pzab053.
5. Shrestha M, Reshma KC, Shrestha C, Shakya S. Knowledge and Prevalence of Plantar Fasciitis among Nurses of Selected Hospital of Kathmandu, Nepal. *Academia Research Journal*. 2024 Jun 28;3(2):45-60.
6. Kosmahl EM, Kosmahl HE. Painful plantar heel, plantar fasciitis, and calcaneal spur: etiology and treatment. *Journal of Orthopaedic & Sports Physical Therapy*. 1987 Jul;9(1):17-24.
7. League AC. Current concepts review: plantar fasciitis. *Foot & ankle international*. 2008 Mar;29(3):358-66.
8. Puttaswamaiah R, Chandran P. Degenerative plantar fasciitis: A review of current concepts. *The foot*. 2007 Mar 1;17(1):3-9.
9. Grieve R, Palmer S. Physiotherapy for plantar fasciitis: a UK-wide survey of current practice. *Physiotherapy*. 2017 Jun 1;103(2):193-200
10. Bernardes RA, Parreira P, Sousa LB, Stolt M, Apóstolo J, Cruz A. Foot disorders in nursing standing environments: a scoping review protocol. *Nursing Reports*. 2021 Jul 21;11(3):584-9.
11. Bernardes R, Caldeira S, Stolt M, Correia N, Cruz A. Foot health and quality of life of nursing students: an exploratory multimethod study. *Millenium: Journal of Education, Technologies, and Health*. 2025 Apr 23(27):e39905.
12. Bhoir KS, VV G. Prevalence of Plantar Fasciitis Among Nurses at a Tertiary Care Centre in a Rural Area: A Cross-Sectional Study. *Int J Physiotherapy Res*. 2021;9(4):3900-06.
13. Bernardes R, Caldeira S, Stolt M, Correia N, Cruz A. Foot health and quality of life of nursing students: an exploratory multimethod study. *Millenium: Journal of Education, Technologies, and Health*. 2025 Apr 23(27): e39905.
14. Tore NG, Oskay D, Haznedaroglu S. The quality of physiotherapy and rehabilitation program and the effect of telerehabilitation on patients with knee osteoarthritis. *Clinical rheumatology*. 2023 Mar;42(3):903- 15.
15. Odole AC, Ojo OD. A telephone-based physiotherapy intervention for patients with osteoarthritis of the knee. *International Journal of Telerehabilitation*. 2013 Dec 19;5(2):11.
16. Boonchum H, Bovonsunthonchai S, Sinsurin K, Kunanusornchai W. Effect of a home-based stretching exercise on multi-segmental foot motion and clinical outcomes in patients with plantar fasciitis. *Journal of Musculoskeletal & Neuronal Interactions*. 2020;20(3):411.

17. Ferraz MB, Quaresma MR, Aquino LR, Atra E, Tugwell P, Goldsmith C. Reliability of pain scales in the assessment of literate and illiterate patients with rheumatoid arthritis. *The Journal of rheumatology*. 1990 Aug 1;17(8):1022-4.
18. Budiman-Mak E, Conrad KJ, Roach KE. The Foot Function Index: a measure of foot pain and disability. *Journal of clinical epidemiology*. 1991 Jan 1;44(6):561-70.
19. Yang Z, Yu S, Meng W, Ma X, Yang L. The effect of tele-rehabilitation under a comprehensive exercise program on the function of patients with chronic ankle instability: A randomized controlled trial. *Musculoskeletal Science and Practice*. 2025 Aug 1; 78:103327