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Effectiveness Of Myofascial Release Versus Stretching Exercise On Pain And Foot Function In Females Of Tertiary Health Care Hospital With Plantar Fasciitis.

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ABSTRACT

Background: Plantar fasciitis is a common cause of heel pain that affects daily function and mobility, especially in females engaged in prolonged standing and walking. It involves inflammation of the plantar fascia — a thick connective tissue that supports the arch of the foot. Conservative physiotherapy techniques such as Myofascial Release (MFR) and Stretching Exercises are frequently used to manage pain and restore function, but their comparative effectiveness remains unclear.

Objective: To compare the effectiveness of Myofascial Release and Stretching Exercises on pain reduction and foot function improvement in females with plantar fasciitis in a tertiary health care hospital.

Methodology: A comparative study was conducted with 54 female participants (aged 25–50 years) who were clinically diagnosed with plantar fasciitis. Participants were randomly assigned to two groups of 27 each: Group A received Myofascial Release (MFR) and Group B received Stretching Exercises. Both groups also received a 5-minute therapeutic ultrasound prior to treatment. The interventions were performed over a 2-week period, and outcomes were assessed using the Visual Analogue Scale (VAS) for pain and the Foot Function Index (FFI) for function. Data were analyzed using paired and unpaired t-tests.

Results: Both interventions significantly reduced pain and improved foot function within groups ($p < 0.05$). However, Myofascial Release showed a greater reduction in VAS scores and an improvement in FFI scores compared to Stretching Exercises.

Conclusion: Myofascial Release and Stretching Exercises are both effective in reducing pain and improving foot function in females with plantar fasciitis, but Myofascial Release demonstrated superior results. Hence, MFR can be considered an effective non-invasive treatment option for managing plantar fasciitis in clinical settings. However, the present study concludes that Myofascial Release is more effective than stretching in a 2-week intervention.

Keywords: Foot Function Index, Myofascial Release, Plantar Fasciitis, Stretching Exercises, Visual Analogous Scale.

Introduction

Plantar fasciitis (PF) is classified as a syndrome that results from repeated trauma to the plantar fascia at its origin on the calcaneus. It is a common foot disorder affecting millions of individuals worldwide. It occurs over a wide range and is seen in athletes and individuals who lead a sedentary lifestyle. The precise

cause is unclear, but the most common theory is repetitive partial tearing and chronic inflammation of the plantar fascia at its insertion on the medial tubercle of calcaneus [1]. Plantar fasciitis is an annoying and painful condition that limits function. There is pain and tenderness in the sole of the foot, mostly under the heel, with standing or walking. The pain is often worse when getting up in the morning, with typical hobbling downstairs, or when getting up from a period of sitting, resulting in typical start-up pain and stiffness [2].

It involves inflammation of a thick band of tissue that runs along the bottom of your foot, connecting your heel bone to your toes. Risk factors for plantar fasciitis include obesity, tight calf muscles, and high-arched or flat feet. Plantar fasciitis is more prone to people who run, jump or dance, and people who stand for long periods may cause repetitive stress to the plantar fascia [3]. Three out of four people report foot pain over the course of a lifetime [4].

Diagnosis of plantar fasciitis is based on the patient's history and on the results of the physical examination. Patients typically present with inferior heel pain on weight bearing, and the pain often persists for months or even years. Pain associated with plantar fasciitis may be throbbing, searing, or piercing, especially with the first few steps in the morning or after periods of inactivity [5,6].

The windlass mechanism is a term used to describe the plantar fascia's dynamic role during gait; a windlass is the tightening of a rope or cable. As one's toes are dorsiflexed, the plantar fascia tightens, shortening the distance between the calcaneus and metatarsals and elevating the medial longitudinal arch in the high-arched position. Less tension on the truss (support) is required for arch support than in a low-arched position. In other words, in a high-arched position, there is less tension on the plantar fascia[7].

Treatment for plantar fasciitis is divided into numerous categories: Conservative care (patient education,

orthotics, soft tissue therapy/massage, ice, heat, strengthening exercise, night splint, manual therapy, electric modalities, acupuncture, and taping), Extra-corporeal shock wave therapy, Medication, corticosteroid injection, and surgical intervention [8]. Myofascial release (MFR) is a form of manual therapy that involves applying a low-load, long-duration stretch to the myofascial complex, intended to restore optimal length, reduce pain, and improve function [9]. Myofascial release (MFR) is a soft-tissue mobilisation technique used to treat chronic conditions that cause tightness and restriction in soft tissues. Myofascial release technique changes the viscosity of the ground substance to a more fluid state, thereby reducing the fascia's excessive pressure on the pain-sensitive structure and restoring proper alignment. Hence, this technique is proposed to act as a catalyst in the resolution of PF [10].

Stretching is a general term for any therapeutic manoeuvre designed to increase the extensibility of soft tissues, thereby improving flexibility by elongating shortened structures. It plays an important role in the treatment of plantar fasciitis and can correct the weakness of intrinsic foot muscles [11]. Therapeutic Ultrasound is a method of applying deep heat to connective tissue, which plays an important role in relieving plantar heel pain through both thermal and mechanical effects on the target tissue, thereby increasing local metabolism, circulation, and extensibility of connective tissue, as well as tissue regeneration [12]. All participants were female, and the total number was 100, of whom 66% reported heel pain and 34% had no pain [13].

Females of a tertiary health care hospital are at high risk for developing plantar fasciitis due to prolonged standing, walking barefoot on a hard surface or improper footwear. Effective, non-invasive treatments like myofascial release and stretching exercise could provide significant relief, reduce downtime and improve quality of life. This study aimed to evaluate the effectiveness of these interventions specifically in a population of females in a tertiary health care hospital.

Methodology

A comparative study was conducted in the physiotherapy department of Maharashtra Institute of Physiotherapy, Latur. Ethical clearance was taken from the institutional ethics committee before commencing the study. Participants with plantar fasciitis were selected based on the inclusion and exclusion criteria. The study's aim and objectives were explained to the participants. After obtaining their written informed consent, 54 females with plantar fasciitis, working in a tertiary care hospital, were assigned to groups A and B, with 27 participants in each group, using simple random sampling by an independent collaborator via opaque, sealed envelopes. The participants were included if they met the following criteria: Age group 25 years -50 years, Pain with the first step in the morning, clinically diagnosed with plantar fasciitis, Pain Intensity >= 4 and Windlass Test (Positive). Participants with recent foot surgery, on medications, other foot and ankle pathologies, congenital foot anomalies, and other regional soft tissue injuries were excluded. Baseline data on plantar fasciitis pain were obtained using a visual analogue scale (VAS)[14], and foot function data were obtained using the Foot Function Index (FFI)[15]. The outcome variables were assessed at baseline and at 2 weeks.

Group A: Myofascial Release

Therapeutic ultrasound at 1W/cm2 and 1 MHz for 5 min was administered as a single session to all participants. Participants were placed in a prone position with their feet outside the plinth. Then the part (heel) was cleaned, gel was applied to the involved site, and the transducer head was moved in a slow circular motion for 5 minutes.

For MFR, the participants were asked to lie down prone on a couch with their feet off the couch. They were given a pillow under their feet for support and comfort. The treatment area was cleaned and dried. The therapist evaluated the treatment area. The therapist was standing near the participant's foot. Sustained gentle pressure in the line with the fibres of the plantar fascia from the calcaneus towards the toes, using the thumb, was given. This pressure was held for 30 seconds. This MFR was performed for 15 minutes per session, with a 1-minute rest interval, for 5 days per week for 2 weeks.

Group B: Stretching Exercise:

Therapeutic ultrasound at 1W/cm2 and 1 MHz for 5 min was administered as a single session to all participants. Participants were placed in a prone position with their feet outside the plinth. Then the part was cleaned, gel was applied to the involved site, and the transducer head was moved in a slow circular motion for 5 minutes.

Passive plantar fascia stretching was performed in supine lying by application of force distal to the metatarsophalangeal joints on the affected side, pulling the toes upward towards the shin until a stretch was felt in the sole of the foot. This intervention consisted of 3 sets of 30-second holds, with a 1-minute rest interval between sets. Each set consisted of 3 repetitions and was given 5 days per week for 2 weeks.

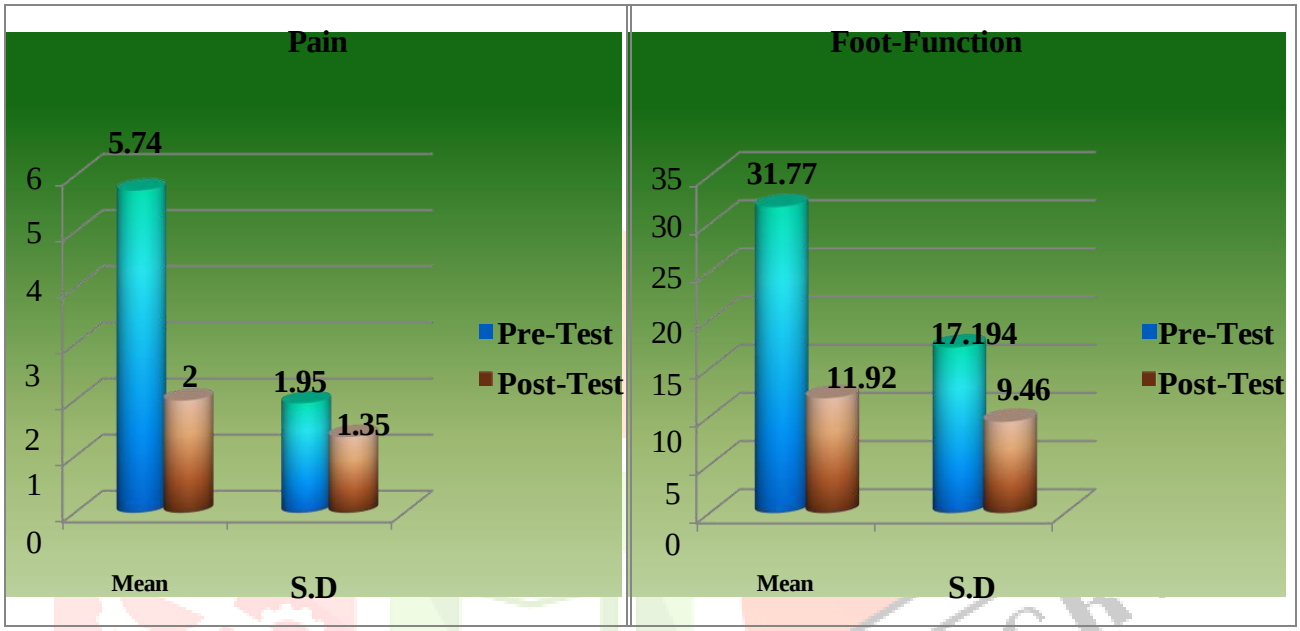
The data was collected and analysed using Microsoft Excel. Intragroup comparisons of the study parameter in each group before and after the intervention were performed using a paired t-test. Intergroup comparison of study parameters between the two groups was performed using an unpaired t-test.

Statistical analysis

Table 1: Description of Mean Pain and Foot Function before and after Myofascial release (Group A).

Pain				Foot Function			
Pre –test		Post-Test		Pre –test		Post-Test	
Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
05.74	±01.95	02	± 01.35	31.77	±17.194	11.92	±09.46

Figure 1: Mean and Standard Deviations of Samples patients before and after Intervention (Group A).

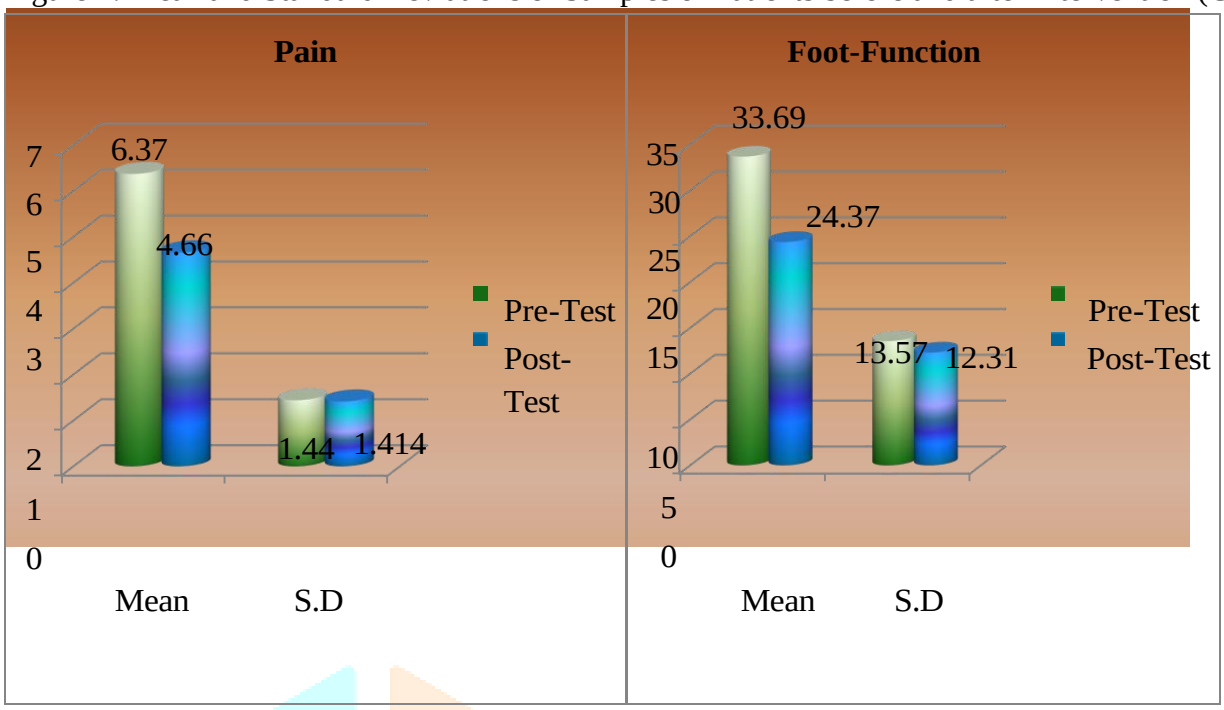


The data presented in Table 1 and Figure 1 reveal that the mean pre-test and Post-test scores of female patients suffering from plantar fasciitis, in the case of pain, the mean Pain scores during pre-test were 3.74 with a standard deviation +01.95, while at post-test, the mean was 02 with a standard deviation +01.35. In case of Foot-Function during pre-test the mean was 31.77 with standard deviation +17.19 while at post-test the mean was 11.92 with standard deviation +09.46.

Table 2: Description of Mean Pain and Foot Function before and after Passive stretching (Group B).

Pain				Foot Function			
Pre –test		Post-Test		Pre –test		Post-Test	
Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
06.37	±01.44	04.66	± 01.414	33.69	±13.57	24.37	±12.31

Figure 2: Mean and Standard Deviations of Samples of Patients before and after Intervention (Group B).



The data presented in Table 2 and Figure 2 show the mean pre-test and Post-test scores of female patients with plantar fasciitis. In the case of pain, the mean Pain scores during pre-test were 6.37 with a standard deviation +01.44, while at post-test, the mean was 04.66 with a standard deviation +01.414. In case of Foot-Function during pre-test the mean was 31.59 with standard deviation +13.57 while at post-test the mean was 24.37 with standard deviation +12.31.

Table 3: Findings related to the effect of Myofascial release on Pain and Foot function among Females suffering from Plantar Fasciitis (Group A).

Myofascial release (Group A)	**Mean**	**Std.Deviation**	**Std. Error Mean**	**t**	**df**	**P-Value**
Pre-test – Post-Test on Pain	**03.740**	**±01.095**	**0.2107**	**17.74**	**26**	**0.00**
Pre-test – Post-test on Foot-Functioning	**19.851**	**±09.449**	**1.818**	**10.917**	**26**	**0.00**

't'(27) = 2.056, P<0.05

In table 3, the Mean Pain score was 03.740 with standard deviation +01.095 and standard error of 0.2107, paired t-test was computed in order to find significant difference in mean scores before and after intervention, the calculated 't' was 17.74 which was higher than the table value (t(26) =2.056) and the P-value was lower than 0.05 indicating Myofascial release was successful in reducing pain among the samples suffering from plantar fasciitis.

In case of Foot functioning, the mean foot function was 19.851 with standard deviation +09.449 and standard error of 1.818, Paired t-test was computed in order to find significant difference in mean scores before and after intervention, the calculated 't' was 10.917 which was higher than the table value (t(26)

=2.056) and the P-value is lower than 0.05 indicating Myofascial release was successful in improving foot function of samples suffering from plantar fasciitis.

Table 4: Findings related to the effect of Passive stretching on Pain and Foot function among Females suffering from Plantar Fasciitis (Group B).

Passive Stretching (Group B)	Mean	Std. Deviation	Std. Error Mean	t	df	P-Value
Pre-test – Post-Test on Pain	**01.703**	**±0.608**	**0.117**	**14.54**	**26**	**0.00**
Pre-test – Post-test on Foot-Functioning	**09.296**	**±04.9210**	**1.9470**	**9.816**	**26**	**0.00**

't' (27) = 2.056, P<0.05

The data presented in Table No. 4 show the Mean Pain and Foot function of Female patients with plantar fasciitis before and after Myofascial release. The mean pain score was 01.703 with a standard deviation +0.608 and a standard error of 0.117. A paired t-test was computed in order to find a significant difference in mean scores before and after intervention; the calculated 't' was 14.54, which was higher than the table value (t (26) =2.056), and the P-value was lower than 0.05, indicating Passive Stretching was successful in reducing pain among the samples suffering from plantar fasciitis.

In the case of Foot functioning, the mean foot function was 09.296 with a standard deviation +04.9210 and standard error of 1.9470. A paired t-test was conducted to determine whether there was a significant difference in mean scores before and after the intervention. The calculated 't' was 09.816, which was higher than the table value (t (27) =2.056), and the P-value is lower than 0.05, indicating Passive stretching was successful in improving the foot function of the samples suffering from plantar fasciitis.

Table 5: Comparison between Myofascial release and Passive stretching on Pain among Female patients suffering from Plantar Fasciitis.

Pain	Mean	Mean difference	Standard Error Difference	Independent't' test	P-Value
Myofascial release	**02**	**2.66**	**0.377**	**07.065**	**0.02**
Passive stretching	**4.66**				

The data presented in table.no – 5 shows the Mean difference between Myofascial release and Passive stretching is 2.66, To find significant Mean difference for reduced pain, Independent `t`-test was computed and obtained `t'$_{(52)}$ = 07.065 is found to be significant at 0.05 level of significance, as computed `t` value is higher than table Value (2.04) indicating Null Hypothesis is rejected implying there is significant difference between two interventions. Since the Visual Analogue scale and Foot Function Index are negatively graded, higher scores indicate more severe pain. The mean for Myofascial release is higher than that for Passive stretching; hence, Myofascial release has a more pronounced effect than Passive stretching in reducing pain among Females suffering from Plantar Fasciitis.

Table 6: Comparison between Myofascial release and Passive stretching on Foot Function among Female patients suffering from Plantar Fasciitis.

Foot Function	Mean	Mean difference	Standard Error Difference	Independent't' test	P-Value
Myofascial release	11.92	12.44	02.988	04.165	0.00
Passive stretching	24.370				

The data presented in table.no – 6 shows the Mean difference between Myofascial release and Passive stretching is 12.44, To find significant Mean difference for enhanced Foot function, Independent `t`-test was computed and obtained `t`(52)= 04.165 is found to be significant at 0.05 level of significance, as computed `t` value is higher than table Value (2.04) indicating Null Hypothesis is rejected implying there is significant difference between two interventions. Since the Visual Analogue scale and Foot Function Index are negatively graded, higher scores indicate more severe pain. The mean for Myofascial release is higher than that for Passive stretching; hence, Myofascial release has a more pronounced effect than Passive stretching in reducing pain among Females suffering from Plantar Fasciitis.

Discussion

The results of the present study showed that both Group A and Group B were effective in treating plantar fasciitis; however, Group A showed better results than Group B.

The present study compared the effects of Myofascial Release (MFR) and Stretching Exercises in females with plantar fasciitis. The results indicated that both interventions significantly reduced pain and improved foot function, consistent with findings from Satish C. Pant et al.[1] and Niraj Kumar et al.[2], who concluded that MFR is more effective than stretching in improving symptoms of plantar fasciitis.

MFR works by applying gentle, sustained pressure to the fascia, which helps release fascial restrictions, improve blood flow, and reduce mechanical stress on pain-sensitive structures. This biomechanical and neurophysiological effect restores normal alignment and reduces tension in the plantar fascia. On the other hand, stretching exercises primarily target the flexibility of the plantar fascia and calf muscles, reducing stiffness and promoting improved range of motion.

The superior outcomes of the MFR group in this study may be due to its direct effect on myofascial adhesions and local circulation, leading to quicker pain relief and improved tissue mobility. These findings align with the systematic review by Ajimsha et al.[9], which highlighted the growing evidence supporting MFR as an effective approach in musculoskeletal pain management.

On the other hand, stretching, regardless of how it is performed, causes a lengthening of the muscle, even if methods utilising contraction-relaxation or reciprocal inhibition appear to yield better results (Anders Henricson)[16]. Stretching relaxes the neuromuscular system in general. The primary goal of stretching is to recreate the windlass mechanism and minimise repetitive microtrauma associated with chronic inflammation by performing the exercises before the first step in the morning or after prolonged sitting or inactivity. This protocol provides a conservative treatment option that resulted in a rate of improvement of symptoms (Benedict)[17]

Plantar Fasciitis is one of the most common causes of heel pain. It involves inflammation of a thick band of tissue that runs along the bottom of your foot, connecting your heel bone to your toes. Risk factors for plantar fasciitis include obesity, tight calf muscles, and high-arched or flat feet. Plantar fasciitis is more common in people who run, jump, or dance, and in those who stand for long periods, which can cause repetitive stress on the plantar fascia. 199% of cases of plantar fasciitis are treated by conservative management in a period of time. Only 1% of people require surgery.[3]

Despite the positive results, the study's duration of only two weeks limits the ability to assess long-term

effects. Still, the short-term benefits emphasise MFR's role as an effective conservative physiotherapy technique for managing plantar fasciitis, particularly among females with occupational strain or prolonged standing.

Conclusion

Myofascial Release and Stretching Exercises are both effective in reducing pain and improving foot function in females with plantar fasciitis, but Myofascial Release demonstrated superior results. Hence, MFR can be considered an effective non-invasive treatment option for managing plantar fasciitis in clinical settings. However, the present study concludes that Myofascial Release is more effective than stretching over a 2-week intervention.

Limitations

1. The study included a relatively small sample of only 54 participants, which may limit the generalisability of the findings to the larger population with plantar fasciitis.
2. Only female participants from a tertiary healthcare hospital were included; therefore, the results cannot be generalised to males, athletes, or other occupational groups.
3. The intervention was limited to two weeks, making it difficult to determine the long-term effectiveness and sustainability of the treatment outcomes.
4. Both groups received therapeutic ultrasound alongside the primary intervention, which may have influenced the results and made it difficult to identify the isolated effect of Myofascial Release or of Stretching Exercises.

Suggestions for Future Research

1. Future studies should use a larger sample size to improve the external validity and reliability of the findings.
2. Similar studies can be conducted with male participants, athletes, older adults, and different occupational groups to compare outcomes across populations.
3. Long-term follow-up studies are recommended to assess the sustained effects of Myofascial Release and Stretching Exercises for plantar fasciitis.
4. Future research may compare Myofascial Release with other physiotherapy interventions, including taping, dry needling, extracorporeal shock wave therapy, strengthening exercises, and orthotic support.
5. Studies incorporating objective outcome measures, such as gait analysis, plantar pressure assessment, muscle flexibility, and functional performance tests, are recommended.

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