

Effectiveness of Myofacial Release and Exercises Versus Stretching and Exercises on Plantar Fasciitis-A Comparative Study

Prof (Dr). Mohammed Aslam¹, Dr. Sonia Gupta², Dr. Tripti³

¹MPT (Neurology), MIAP, Principal, Paramedical, Guru Nanak College of Paramedical Sciences and Hospital, Jhajra, Dehradun

²PhD Scholar, Physiotherapy, TMU, Moradabad

³Assistant Professor, DBUU, Dehradun

Abstract: Total 30 participants residing in around Dehradun were previously diagnosed by orthopedic Physician were included on the basis of Inclusion criteria. The 30 Subjects were divided in to two groups. Group A – Subjects were received for MFR therapy and exercises for plantar fascia. 10 second MFR technique applied by knuckle on sole. The intervention was followed for 2 times / week for 4 weeks. Group B – Subjects were received static stretching and exercises of the plantar fascia, hold for 30 seconds with 5 repetition. This intervention was followed 3 sets for 30 seconds per session and 1 session per week i.e., 4 sessions 4 weeks. Each subjects were examined before and after intervention on Foot Function Index and Visual Analogue Scale. At the end of stipulated treatment period results of improvement achieved in plantar fasciitis symptoms were studied and results reviewed and analyzed on selected parameters viz. Visual Analogue Scale and Foot Function Index using prevailing statistical techniques Comparison of outcome measures of improvement between the group of both the groups on Foot Function Index and Visual Analogue Scale shows that group A, who was treated by imparting Myofascial Release technique by comparing showed significant improvement in plantar fasciitis in comparison to group B who was subjected to Stretching exercises. Both myofascial release and stretching exercises are effective in treating patients with plantar fasciitis, however MFR is better than stretching in 4 weeks intervention.

Key Words: Foot function index, Static stretching, MFR technique, Plantar fasciitis.

INTRODUCTION

Plantar fasciitis is classified as a syndrome that results from repeated trauma to the plantar fascia at its origin

on the calcaneus.²⁵ It is a common foot disorder affecting more than 2 million individuals in the United States annually.²⁹ It occurs over a wide age range and is seen in both sedentary and athletic individuals. Although its precise cause remains unclear, the most common theory is repetitive partial tearing and chronic inflammation of the plantar fascia at its insertion on the medial tubercle of the calcaneus.⁴ The plantar fascia is a thick fibrous sheet of connective tissue that originates from the medial tubercle of the calcaneus and attaches distally to the metatarsophalangeal joints, forming the medial longitudinal arch.²³ It stabilizes the medial longitudinal arch dynamically, it restores the arch and aids in reconfiguring the foot for efficient toe-off and it provide static support of longitudinal arch and dynamic shock absorption.^{24,17,11}

Degeneration of the plantar fascia at its calcaneal origin is termed plantar fasciitis.²⁹ Researchers have also reported that faulty biomechanics and plantar fasciitis in subjects with a higher-arched foot. A higher-arched foot lacks the mobility needed to assist in absorbing ground reaction forces. Consequently, its inability to dissipate the forces from heel strike to midstance increases the load applied to the plantar fascia, much like a stretch on a bowstring.²³ A previous literature reveals that a person displaying either a lower- or higher-arched foot can experience plantar fasciitis. Patients with lower arches have conditions resulting from too much motion, whereas patients with higher arches have conditions resulting from too little motion. Therefore, people with different foot types experience plantar fascia pain resulting from different biomechanical stresses.²³ The plantar fascia shortening caused by changes in the collagen matrix of the plantar

fascia is the pathophysiological basis of this condition, which evolves to include pain and functional changes of gait. Shortening of the plantar fascia leads to chronic bone traction in the heel and formation of heel spurs.²⁰ Earlier studies have grouped all forms of non-surgical therapy together. It is, therefore, difficult to determine if one type of treatment is more effective compared with another.²⁵ Treatment for plantar fasciitis can be divided into numerous categories as Conservative care (chiropractic therapy, electric modalities, patient education, soft tissue therapy massage, acupuncture, taping, night splints, stretching, ice, heat, strengthening, and orthotics) Extra-corporeal shock wave therapy, Injections and medication.²⁸ The preferred treatment for plantar fasciitis is physiotherapy, with the aim of suppressing pain and restoring the mechanical function of the plantar fascia for gait improvement. The use of ultrasound to promote analgesia associated with stretching of the plantar fascia and the posterior leg muscles is one of the most commonly indicated therapeutic alternative and also using focal and radial shockwaves has shown good results with regard to pain reduction and improved function using only a small number of applications.²⁰ Myofascial release (MFR) is a system of therapy that combines principles and practice from soft tissue technique, MET and inherent force cranio-sacral technique. It includes a highly subjective transfer of energy from the therapist to the patient.³⁸ MFR is defined by Upledger et al that it is a softening or letting go when resistance melts and the tissue is felt and elongation. MFR techniques can involve deep superficial or deep pressure at the point of restriction or low- load prolonged gentle distraction of restricted tissues.³⁹ Stretching is a general term used to describe any therapeutic maneuver designed to increase the extensibility of soft tissues, thereby improving flexibility by elongating (lengthening) structures that have adaptively shortened and have become hypo mobile over time. Stretching exercises are also thought to be an important element of fitness and conditioning programs designed to promote wellness and reduce the risk of injury and reinjury. When soft tissue is stretched, elastic, viscoelastic, or plastic changes occur. Elasticity is the ability of soft tissue to return to its pre-stretch resting length directly after a short-duration stretch force has been removed. Viscoelasticity is a time-dependent property of soft tissue that initially resists deformation, such as a

change in length, of the tissue when a stretch force is first applied.⁸

DiGiovanni et al. assessed the role of Achilles tendon stretching versus plantar fascia stretching in a randomized study of 101 patients. Both Achilles stretching groups and plantar fascia stretching groups appreciated a decrease in pain.^{4, 21} The Foot Function Index (FFI) Questionnaire was used to assess pain and disability associated with each subject's plantar fasciitis. The FFI is a functional outcome measure that consists of three subsections: pain, disability and activity.²⁸ The efficacy of soft tissue mobilization (myofascial release and stretching) on plantar fasciitis is well documented in the literature. However, there is lack of literature stating which amongst the two is more beneficial; thus this study has been proposed.

METHODOLOGY

Total 30 participants residing in around Dehradun were previously diagnosed by orthopedic Physician were included.

Study Design: Experimental study

Inclusion Criteria:

1. Male and female between age groups 20 - 50 years
2. Subjects having pain more than 3 months over the heel.
3. Pain with first steps upon walking greater than or equal to 3 on a 0-to-10 VAS scale)
4. Pain that is worse in the morning during the initial steps, but which decreases after walking continue.

Exclusion Criteria:

1. Persons who were undergoing corticosteroids injection.
2. Receiving plantar non-steroidal anti- inflammatory medications within the previous 3 week.
3. Any known radiating pain (lower limb).
4. Any other lower extremity injury during the previous 6 months
5. Currently engaging in any Physical therapy within previous 1 week.
6. Calcaneal fracture.

Instrumentation & Outcome measures:

Foot function index

Visual analogue scale

Protocol:

After assigning into 2 groups

Group A – MFR and Exercises

Subjects were received for MFR therapy and exercises for plantar fascia. 10 second MFR technique applied by knuckle on sole. The intervention was followed for 2 times / week for 4 weeks.

Group B -Static Stretching techniques and Exercises

Subject receives static stretching and exercises of the plantar fascia, hold for 30 seconds with 5 repetition. This intervention was followed 3 sets for 30 seconds per session and 1 session per week i.e., 4 sessions 4 weeks

Procedure

30 Subjects were assigned according to inclusion and exclusion criteria. Subjects were divided into 2 groups by simple randomization using lottery method. Each subjects received static stretching, myofascial release therapy of the plantar fasciitis. Each subjects were examined before and after intervention on Foot Function Index and Visual Analogue Scale.

Myofascial Release technique:

Position of subject was prone lying with feet off the end of the table to allow for easy dorsiflexion. Therapist position was sitting on a stool at the end of the table. Technique is using the knuckles, soft fist or elbow to engage the soft tissue just anterior of the calcaneus. Take up a line of tension in an anterior direction. Work progressively through to the ball of the foot as well as into deeper layers in subsequent passes. Instruct the subject to lift their toes, with direction – Lengthen the bottom of your foot by taking your toes up under the table towards your knee cap’. Dorsiflexion can also be used in conjunction with this.



Fig. 3.1: Myofascial Release

Plantar Fascia Stretching Program:

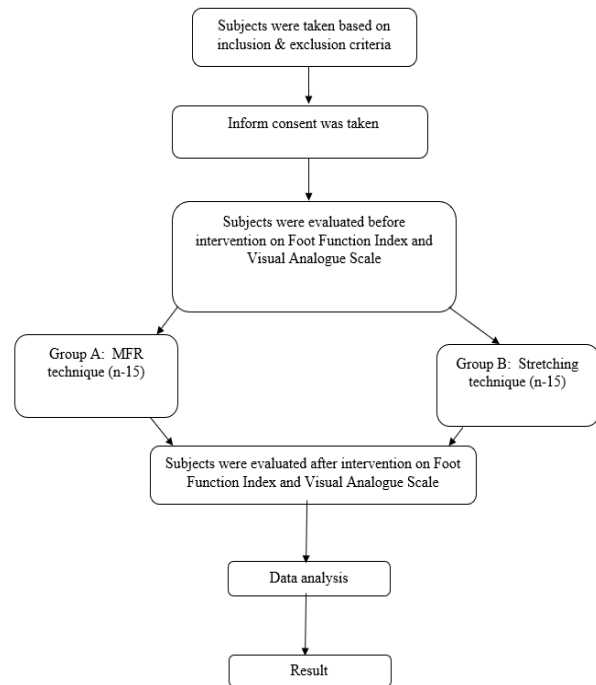
Position of the subject was sitting with affected leg cross over the contralateral leg. Technique is while using the hand on the affected side, they were to place

the fingers across the base of the toes on the bottom of the foot and pull the toes back toward the shin until they felt a stretch in the arch of the foot. They were to confirm that the stretching was correct by palpating the tension in the plantar fascia with the contralateral hand while performing the stretching.¹⁹



Fig.3.2: Stretching for plantar fascia

Fig 3.3: Flow chart



RESULTS:

Group A-15 Subjects having mean age 24.00 years.
 Group B- 15 Subjects having mean age 26.06 years.
 Data on age are tabulated below in table no.1

Table 5.1: shows Comparison of mean values of Age between Group A and Group B

Demographic	Group A		Group B	
	Mean	SD	Mean	SD
Age (Yrs)	24.00	3.11	26.06	5.7

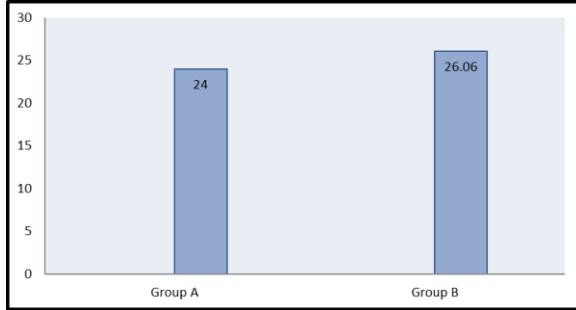


Fig.5.1: Comparison of mean values of Age between Group A and Group B

At the end of stipulated treatment period results of improvement achieved in plantar fasciitis symptoms were studied and results reviewed and analyzed on selected parameters viz. Visual Analogue Scale and Foot Function Index using prevailing statistical techniques. The results are briefly detailed below;

Comparison within the group

The results of treatment imparted to group A and group B for were measured and collected data was analyzed using Visual Analogue Scale and Foot Function Index for comparison of improvement within the group members of each group.

Analysis of mean and standard deviation values of improvement within the group of group A, which was treated by imparting Myofascial Release Techniques, results when viewed on Visual Analogue Scale and Foot Function Index shows significant improvement in the plantar fasciitis symptoms in comparison to group B who was subjected to Stretching exercise, While analysis of mean and standard deviation values within the two groups, Group A showed significant increase in VAS compare to group B. The results are tabulated in Table 2 to 4.

Table5. 2: Mean and SD of Pre VAS and Post VAS for Group A and Group B

Session	Group A		Group B	
	Mean	SD	Mean	SD
Pre VAS	5.2	1.03	5.8	1.42
Post VAS	2.3	0.72	3.89	1.01

Fig. 5.2: comparison of mean values of pre VAS and post VAS between Group A and Group B

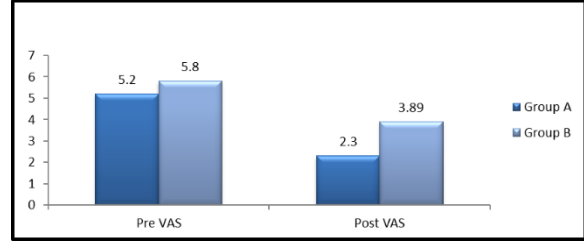


Table5. 3: Comparison of mean values between Pre VAS and Post VAS within Group A and Group B

Session	Group A		Group B	
	t value	P value	t value	P value
Pre –VAS VS Post – VAS	12.85	P = 0.000 (P<0.05)	10.247	P= 0.000 (P < 0.05)

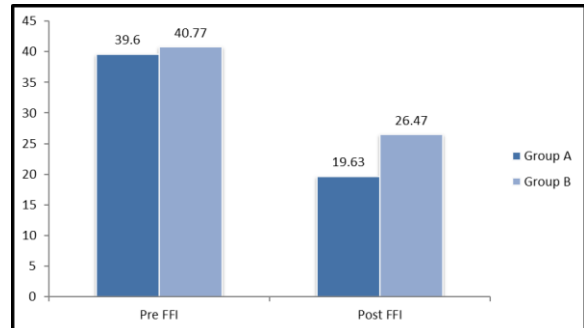
Table 5. 4: Mean and SD of Pre FFI and Post FFI for Group A and Group B

FFI	Group A		Group B	
	Mean	SD	Mean	SD
Pre FFI	39.6	8.50	40.77	13.96
Post FFI	19.63	6.24	26.47	7.3

Table 5.5: Comparison of mean values between Pre FFI and Post FFI within Group A and Group B

FFI	Group A		Group B	
	t value	P value	t value	P value
Pre –FFI VS Post – FFI	12.101	P = 0.000 (P<0.05)	4.95	P= 0.000 (P < 0.05)

Fig. 5.3: Comparison of mean Values of Pre FFI and Post FFI between Group A and Group B



Comparison of results between the group

Paired t- Test was analysed the results of treatment imparted to members of each group for comparison in improvement between the groups in symptoms of Plantar Fasciitis

Comparison of outcome measures of improvement between the group of both the groups on Foot Function Index and Visual Analogue Scale shows that group A, who was treated by imparting Myofascial Release technique by comparing showed significant improvement in plantar fasciitis in comparison to group B who was subjected to Stretching exercises. The results are tabulated in Table-3 and 4.

DISCUSSION

The results were showed that both group A, and group B were effective in the treatment of plantar fasciitis but after comparison group A shown better results than group B. In favor with present study Kuhar et. al showed a significant result that the myofascial release is an effective therapeutic option in the treatment of plantar fasciitis³⁶ also Shea explained a piezoelectric effect produced when pressure is applied to the molecular crystalline lattices that he maintains are in myofascial tissue. Ground substance in extracellular space becomes gelled when injured fascia shortens and dehydrates. But with pressure or stretch, the piezoelectric effect can increase the electrical potential of this tissue to rehydrate the ground substance (Shea). This ground substance, or proteoglycan, provides lubrication for connective tissue and maintains distance between fibers. The idea that applying pressure or stretch to injured tissue can create an environment for connective tissue to move without restriction is implied. Myofascial techniques have been shown to stimulate fibroblast proliferation, leading to collagen synthesis that may promote healing of plantar fasciitis by replacing degenerative tissue with a stronger and more functional tissue.¹⁷ Myofascial release techniques are claimed to cause vasomotor response, increase blood flow to affected areas, increase lymphatic drainage of toxic metabolites, realign fascial planes, influence the proprioception of affected soft tissue, alleviate musculoskeletal pain and dysfunction and restore functional ROM in areas of painful restriction. Considering that myofascial release is thought to hydrate dehydrated ground substance of injured tissue and restore functional ROM to areas of painful restriction, perhaps optimal ROM effects can only be expected on subjects with pathologic tissue.³⁹ Stretching, regardless of how it is performed, causes a lengthening of the muscles or an increased range of

motion in joints involved, even if methods utilizing contractions-relaxation or reciprocal inhibition appear to yield better results,³ and the Stretching exercises aim to relax the neuromuscular system in general. An increase in muscle tone will often lead to pain caused by the irritation of nerve endings or the increase in pressure in and between muscles, which causes slowing of the metabolism.¹⁵ The major goals of the plantar fascia-stretching protocol were to recreate the windlass mechanism and to limit repetitive micro trauma and associated chronic inflammation by performing the exercises prior to the first steps in the morning or after any prolonged sitting or inactivity. This protocol provides a nonoperative treatment option that resulted in a rate of improvement of symptoms that surpassed the responses to more traditional treatment methods for patients with chronic, disabling proximal plantar fasciitis.⁴ MFR is given in a quiet environment and with a slow stretch by the physiotherapist, so it will not elicit stretch reflex, thus while MFR treatment patients is felt more comfortable. Stretching was given passively and then patient was asked to perform as Home based Program as self-stretching hence it hinders the study results.

LIMITATIONS AND FUTURE RESEARCH

Limitation of Study

- Small sample size
- No Follow Up

Future Research

- Large sample size can be included.
- Other techniques can be used
- Follow up study should be carried out

CONCLUSION AND CLINICAL SIGNIFICANCE

Conclusion: Both myofascial release and stretching exercises are effective in treating patients with plantar fasciitis; however MFR is better than stretching in 4 weeks intervention.

Clinical Relevance: MFR should be recommended in plantar fasciitis subjects for pain relief and functional improvement.

Conflict of Interest: No conflict of interest

Ethical Clearance; The complete work is done by me.

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