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Comparison of The Effectiveness of Myofacial Release Technique and Stretching Exercise on Plantar Fascitis

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Abstract

Introduction: Planter 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 [1]. Plantar fasciitis 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 more than 2 million individuals in the United States annually [2,3]. 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 [11]. 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 [13].

Aim and Objective: To compare the effects of MFR and Stretching exercise on plantar fasciitis.

Methodology: After assigning into 2 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. And Group B - 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.

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. William P. Hanten September 1994. *et al.* Myofascial release techniques are claimed to cause vasomotor response, increase blood flow to affected areas, increase lymphatic drainage of toxic metabolites, realign fascia 1 planes, influence the proprioception of affected soft tissue, alleviate musculoskeletal pain and dysfunction and restore functional ROM in areas of painful restriction [12]. Kuhar *et al.* showed a significant result that the myofascial release is an effective therapeutic option in the treatment of plantar fasciitis [16].

Conclusion: The present study concluded that Myofascial release (MFR) is better than Stretching exercises in 4 weeks intervention patients with plantar fasciitis.

Keywords: Myofascial release (MFR), Stretching exercises, Foot function index & Visual analogue scale.

Introduction

Planter 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. There may be an associated tightness of the Achilles tendon. The pain is often worst when first getting up in the morning, with typical hobbling downstairs, or when first getting up from a period of sitting-the typical start up pain and stiffness [1].

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Plantar fasciitis 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 more than 2 million individuals in the United States annually [2,3].

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 calcaneous and attaches distally to the metatarsophalangeal joints, forming the medial longitudinal arch [5].

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 [6,7, & 8].

Degeneration of the plantar fascia at its calcaneal origin is termed plantar fasciitis. 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 [3 & 5].

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 [9].

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 [10].

MFR is defined by Upledger et al that it is a softening or letting go when resistance melts and the tissue is felts and elongation. MFR techniques can involve deep superficial or deep 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 [11].

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 [12].

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 [13].

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 [10].

Aim and Objective

To compare the effects of MFR and stretching exercise on pain and flexibility in plantar fasciitis.

Hypothesis

There may be difference in the treatment groups using MFR or Stretching on plantar fasciitis.

Statement of Question

Does myofascial release is more effective than static stretching in plantar fasciitis?

Does static stretching more effective than myofascial release in plantar fasciitis?

Operational Definitions

Plantar Fasciitis

Planter 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. There may be an associated tightness of the Achilles tendon. The pain

is often worst when first getting up in the morning, with typical hobbling downstairs, or when first getting up from a period of sitting-the typical start up pain and stiffness [1].

Myofascial Release

Myofascial Release is a massage technique that utilizes the stretching of the fascia and muscle to help increase Range of Motion or to decrease pain by breaking up these adhesions in the fascia.

Stretching Exercise

It is a technique to elongate the shortened structures and improve the overall function of the structures.

Review of Literature

The plantar fascia is synonymous with the deep fascia of the sole of the foot. The plantar fascia is comprised of pearly white longitudinally organized fibers. It begins at the medial tuberosity of the calcaneus where it is thinner and extends into a thicker center portion. This thicker portion is flanked by thinner lateral and medial portions. The thicker central portion of the plantar fascia then extends into five bands surrounding the digital tendons. Plantar fasciitis classically presents histologically with ''degenerative changes in the plantar fascia, with or without fibro-elastic proliferation and chronic inflammatory changes [14]. It is classified as a syndrome that results from repeated trauma to the plantar fascia at its origin on the calcaneus [2, 5].

Hicks originally described the foot and its ligaments as an arch-like triangular structure or truss. The calcaneus, midtarsal joint, and metatarsals (the medial longitudinal arch) formed the truss's arch. The plantar fascia formed the tie-rod that ran from the calcaneus to the phalanges. Vertical forces from body weight travel downward via the tibia and tend to flatten the medial longitudinal arch. Furthermore, ground reaction forces travel upward on the calcaneus and the metatarsal heads, which can further attenuate the flattening effect because these forces fall both posterior and anterior to the tibia [5].

Authors Statement

William P. Hanten and Sandra D. Chandler *et al.* in their study," Effects of Myofascial Release Leg Pull and Sagittal Plane Isometric Contract-Relax techniques on Passive Straight-Leg Raise Angle" The purpose of this study was to compare the effects of leg pull with those of sagittal plane isometric contract- relax on hip flexion ROM as measured by passive straight-leg raise. The results suggest that while both contract-relax and leg pull techniques can significantly increase hip flexion range of motion in normal subjects, contract-relax treatment was more ffective and efficient than leg pull treatment [12].

Niraj Kumar, (2018) *et al*., The present study concluded that group A (Pneumatic Compression Therapy and Lymphatic Drainage Exercises) showed significant improvement as Group B (Manual lymphatic drainage (MLD) and control group (lymphatic drainage exercises) for upper limb in lymphoedema [20].

Romulo Renan Ordine *et. al*., studied the Effectiveness of Myofascial Trigger Point Manual Therapy Combined with a Self-Stretching Protocol for the Management of Plantar Heel Pain: The study the effects of trigger point (TrP) manual therapy combined with a self-stretching program for the management of patients with plantar heel pain. Sixty patients were included in his study. He concluded that the addition of TrP manual therapies to a self-stretching protocol resulted in superior short-term outcomes as compared to a self-stretching program alone in the treatment of patients with plantar heel pain [21].

Aaron Lebauer *et al.* stated in their study," The effect of myofascial release (MFR) on an adult with idiopathic scoliosis" The purpose of this case study is to measure the effects of MFR as a manual therapy technique in the treatment of idiopathic scoliosis and They concluded that the subject improved in pain levels, trunk rotation, posture, quality of life and pulmonary function. But it suggested that further investigation is needed using MFR as an effective treatment for idiopathic scoliosis [22].

Clark R. Konczak and Rick Ames *et al.,* Treatment consisted of side posture SIJ diversified manipulation and myofascial release to the psoas muscle twice weekly for 2 weeks. The patient was also taught proprioceptive neuromuscular facilitation exercises of the psoas and iliotibial band muscles. He was instructed to substitute swimming instead of running on a daily basis. Reassessment at 3 weeks found the patient without pain in his hip or back and no clicking or popping in his left hip and concluded that Clinicians should consider that runners who present with coexisting SIJD and ISHS may benefit from the combined management of both conditions [25].

Dr Navneet Badoni (2015) *et al*., Sinus tarsi

approach is a less invasive method for fixation of calcaneal fractures. It permits good visualization of the fracture, and allows anatomic reduction of articular surfaces and can also be used to perform subtalar arthrodesis when necessary. This is a valid option of treatment for displaced intra-articular calcaneal fractures in young active adults [26].

Methodology

Sample

This is a experimental study. Total 30 participants residing in around Dehradun were previously diagnosed by orthopedic Physician were included. The subjects were selected on the basis of inclusion criteria- Male and female between age groups 20-50 years, Subjects having pain more than 3 months over the heel, Pain with first steps upon walking (greater than or equal to 3 on a 0 to 10 VAS scale) & Pain that is worse in the morning during the initial steps, but which decreases after walking continue. Subjects were excluded Persons who were undergoing corticosteroids injection, Receiving plantar non steroidal anti- inflammatory medications within the previous 3 week, Any known radiating pain (lower limb), Any other lower extremity injury during the previous 6 months. Currently engaging in any Physical therapy within previous 1 week & Calcaneal fracture. Instrumentation & Outcome measures- Foot function index & Visual analogue scale

Protocol

After assigning into 2 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. And Group B - 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

Thirty (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. 1).

Fig. 1: Myofascial Release

Plantar Fascia Stretching Program

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. 2).

Fig. 2: Stretching for plantar fascia

Data Analysis

Statistics are performed by using SPSS 13 and SIGMASTATE. Results were calculated using 0.05 level of significance. Differences in scores of all outcome measures, obtained by subtracting pre treatment scores from post treatment scores, were analyzed with repeated measures of analysis of variance using SPSS followed by Tukey Post hoc tests.

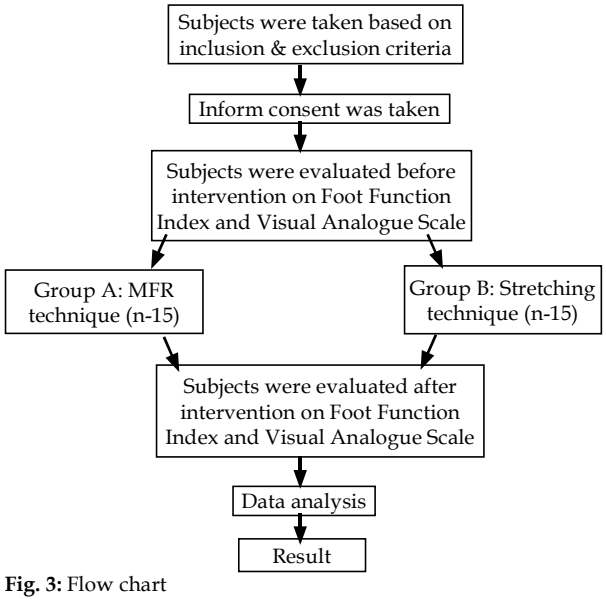


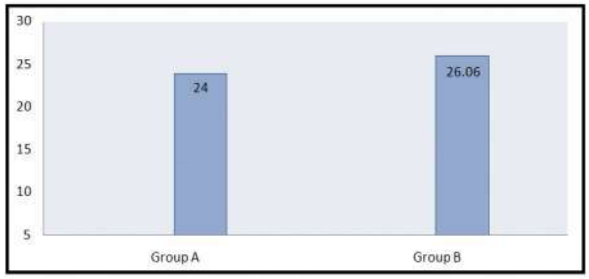
Fig. 3: Flow chart

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 1 & Graph 1.

Table 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



Graph 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

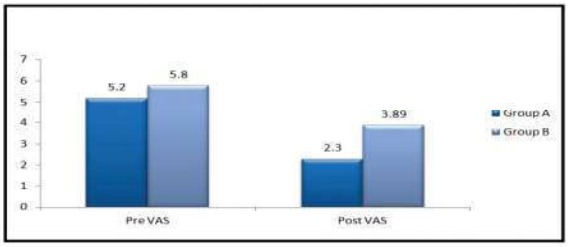
The results of treatment imparted to group A and group B for were measured and collected data was analyzed using Visual Analogue Scale and Foot Function Index for comparison of improvement within the group members of each group.

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 & Graph 2.

Table 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

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)



Graph 2: Comparison of mean values of pre VAS and post VAS between Group A and Group B

Comparison of Results Between the Group

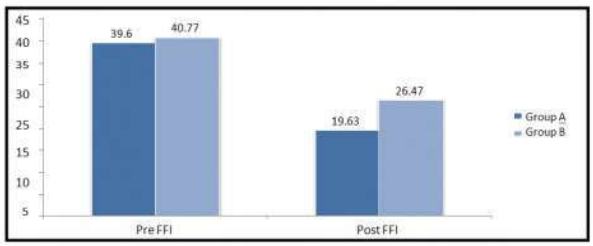
Paired t- Test analyzed the results of treatment imparted to members of each group for comparison in improvement between the groups in symptoms of Plantar Fasciitis Comparison of outcome measures of improvement between the group of both the groups

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 Graph 3.

Table 3: Comparison of mean values between Pre FFI and Post FFI within Group A and Group

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

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)



Graph 3: Comparison of mean Values of Pre FFI and Post FFI between Group A and Group B

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.

Benedict F. Digiovanni *et al*., The major goals of the plantar fascia-stretching protocol were to recreate the windlass mechanism and to limit repetitive microtrauma 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].

Joahua Dubin, (March 2007) *et. al*. 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 [7].

Suman Kuhar, Khatri Subhash (2007) *et al.* showed a significant result that the myofascial release is an effective therapeutic option in the treatment of plantar fasciitis [16].

William P. Hanten September (1994) *et al.* Myofascial release techniques are claimed to cause vasomotor response, increase blood flow to affected areas, increase lymphatic drainage of toxic metabolites, realign fascia1 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 [12].

Anders Henricson, Annika (1983) 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 [17].

Neeraj Kumar, (2016) *et al.* In the present study, there was significant difference between the McKenzie treatment, Isometric strengthening exercise and Hot Pack treatment for neck pain. The McKenzie protocol has been found to be more beneficial that the Isometric Strengthening exercise and Hot Pack [18].

Jari Ylinen (2002) *et al.* 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 [19].

Shatrudhan Das, Niraj Kumar *et al.* In present study we found that both type of exercise protocols either close kinematic chain or open kinematic chain exercise are equally effective. However,

various factors such position of lower extremity, type of exercise, directly or indirectly will affect the prognosis of certain conditions involving lower limb [24].

Niraj Kumar (2019) *et al.* The present study concluded that group A (Pneumatic Compression Therapy and Lymphatic Drainage Exercises) showed significant improvement as Group B (Manual lymphatic drainage (MLD) and control group (lymphatic drainage exercises) for lower limb in lymphoedema [27].

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

1. Small sample size
2. No Follow Up

Future Research

1. Large sample size can be included
2. Other techniques can be used
3. Follow up study should be carried ou

Conclusion

The present study concluded that Myofascial release (MFR) is better than Stretching exercises in 4 weeks intervention patients with plantar fasciitis.

Clinical Significance

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

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