

Effectiveness of Myofascial Release and High Load Strength Training in Chronic Plantar Fasciitis: A Randomized Controlled Trial

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ABSTRACT

Background: Plantar fasciitis is one of the most common causes of heel pain, affecting millions of individuals worldwide. It commonly presents with sharp pain in the heel, particularly with the first steps in the morning or after prolonged periods of rest. This study aimed to evaluate the effectiveness of myofascial release (MFR) and high load strength training (HLST) in reducing pain and improving function in individuals with chronic plantar fasciitis.

Materials and Methods: Forty participants were randomly assigned to either the Group A [MFR group (n=20)] or the Group B [HLST group (n=20)]. The protocol consisted of twenty sessions, 5 days a week for four weeks. Outcome measures included the Visual Analog Scale (VAS) for pain assessment and the Foot Function Index (FFI) for functional impairment and the readings were taken on first session (pre-intervention) and on twentieth (post-intervention).

Results: Both interventions were found to significantly reduce pain and improve function compared to baseline ($p < 0.05$). When the mean changes between the groups are compared there is more improvement in Group A in compared to Group B.

Conclusion: From the study, we conclude that both Group A (MFR) and Group B (HLST) when combined with ultrasound therapy are effective interventions for plantar fasciitis, but MFR group showed a superior hand over HLST group.

Keywords: Plantar fasciitis, Myofascial release, High load strength training, pain, function.

INTRODUCTION

Plantar fasciitis is a common cause of heel pain, affecting millions of individuals worldwide. It is a common cause of heel pain, accounts for an estimated 11–15% of all foot complaints requiring professional care in adults ^[1]. It is a prevalent and debilitating condition characterized by degeneration and micro tears in the plantar

fascia, a thick band of tissue that connects the heel bone to the toes.

The cause of plantar fasciitis is multifactorial, but most cases result from overuse stress. The hallmark symptom of plantar fasciitis is sharp, stabbing pain in the heel, particularly upon initial weight-bearing after periods of rest ^[2].

The pathophysiology of plantar fasciitis involves repetitive micro trauma to the

plantar fascia, resulting in degeneration and structural changes. Aside from degenerative changes, histological findings include granulation tissue, micro-tears, collagen disarray, and a notable lack of traditional inflammation. Ultrasound evaluation often reveals calcifications, intra-substance tears, and thickening and heterogeneity of the plantar fascia. These changes, often seen on ultrasound, suggest a non-inflammatory condition and dysfunctional vasculature [3]. Despite numerous treatment options, there is still a need for effective interventions that address both pain and functional impairment associated with this condition. Myofascial therapy can be defined as “the facilitation of mechanical, neural and psychophysiological adaptive potential as interfaced by the myofascial system” [4]. Fascia is located between the skin and the underlying structure of muscle and bone; it is a seamless web of connective tissue that covers and connects the muscles, organs, and skeletal structures in our body. Muscle and fascia are united forming the myofascial system. Myofascial release (MFR) is a form of manual therapy that involves the application of a low load, long duration stretch to the myofascial complex, intended to restore optimal length, decrease pain, and improve function [5]. The purpose of High Load Strength Training (HLST) is to stress a tendon with a high tensile load in order to stimulate collagen production and, ultimately, expedite recovery [6]. High-load strength training has shown promise in treating other degenerative tendon disorders such as Achilles and patellar tendinopathy, and more recently PF [6]. In patients with PF, loading of the Achilles tendon in conjunction with dorsal flexion of the metatarsophalangeal joints (windlass mechanism) can be used to synergistically cause high-load tensile forces across the plantar fascia. The theory behind HLST is that repeated controlled loading of the plantar fascia will enhance tissue healing by stimulating collagen production [8].

Myofascial release (MFR) and high load strength training (HLST) have shown promising results in the management of plantar fasciitis; however, their comparative effectiveness remains unclear. This study aims to compare the effectiveness of MFR and HLST in reducing pain and improving function in individuals with plantar fasciitis.

MATERIALS & METHODS

The study was conducted at the outpatient department of physiotherapy in Excel College of Physiotherapy and Research Centre, Namakkal.

Study design: Randomized study design.

Sample size: 40 (20 subjects in each group)

Sample design: Simple random sampling.

The following was the inclusion criteria:

1. Clinically diagnosed as chronic plantar fasciitis patients.
2. Age group 25-60 years.
3. Both Sexes.
4. Voluntary participation of patients

And the exclusion criteria were as follows:

1. Subjects with clinical disorders such as infective conditions of foot, tumor, calcaneal fracture, metal implant where MFR is contraindicated.
2. History of systemic disease.
3. Skin disease.
4. History of any major trauma or surgery in and around ankle joint and foot.
5. Subjects with impaired circulation to lower extremity.
6. Subjects with referred pain due to sciatica and other neurological disorders.
7. Foot deformities.
8. Arthritis.
9. Corticosteroid injections in heel preceding 3 months.

Group A: - 20 subjects in this group were given Myofascial release followed by Ultrasound therapy. For MFR, the patients were asked to lie down prone on a couch with their feet out of the couch. They were given a pillow under their feet for support

and comfort. The area of treatment was cleaned and dried. The therapist evaluated the area of treatment. The therapist was standing near the foot end of the patient. Sustained gentle pressure in the line with the fibres of plantar fascia from calcaneus towards the toes, using the thumb was given [7]. This pressure was held for 90 seconds. This MFR was given for 15 minutes per session with 1 min of rest interval, 1 session per day for 5 days per week with the total treatment period of 4 weeks.

Group B: - 20 subjects in this group were given High load strength training followed by Ultrasound therapy. The HLST consists of progressive single leg heel-raises with a thin towel or a t-shirt rolled up under the toes to produce the windlass effect and maximally load the plantar fascia. It consists of concentric phase of heel raise for 5 seconds followed by Hold on top for 3 seconds and by Eccentric phase of heel down for 5 seconds. The goal is to perform just one set of 10 slow single leg calf raises and gradually increase the load by putting on heavy backpack filled with books. If single calf raises are not possible due pain or weakness then you can go up with both feet but come down with one.

Week 1 and 2: One set of 10 repetitions or less based on ability

Week 3 and 4: One set of 10 repetitions with a back pack made progressively heavier with books

The patient was educated on “good” versus “bad” pain. If pain is reproduced or increased during the exercise and stays worse for the rest of the day but is no worse the next day, then that is considered as “good” pain. If the pain is still worse the following day then that is considered as “bad” pain which means that the load or the repetitions must be reduced [8].

Both the groups received Ultrasound therapy. Ultrasound therapy (machine calibrated to deliver a dose of ultrasound at

0.8 w/cm², 3 MHz, pulsed 1:4), for eight minutes. The ultrasound therapy was given for 1 session per day for 5 days per week with the total treatment period of 4 weeks.

The subjects in both the groups were advised not to stand and not to run for a long time and not to walk bare foot. Also the subjects were advised not to indulge in any other treatment for their plantar fasciitis. Baseline measurements of pain intensity and foot function were assessed using VAS and FFI and the readings was taken on first session (pre-intervention) and on twentieth (post-intervention).

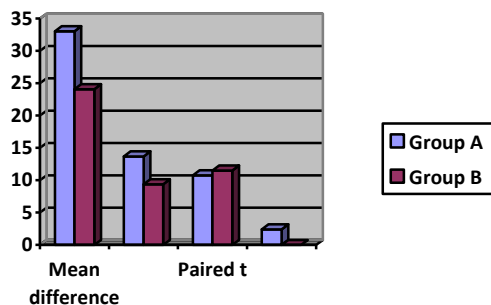
STATISTICAL ANALYSIS

The statistical methods for collection presentation and analysis of the results were used according to the following: (1) Data was summarized using mean and standard deviation. (2) Comparison within the groups was performed using paired t-test and between groups comparison was performed using unpaired t-test (3) P-values less than 0.05 were considered statistically significant.

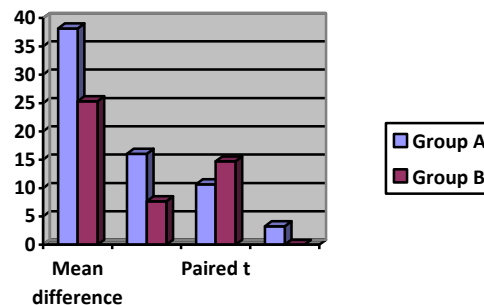
RESULT

The study sample comprised of 40 patients, of which 20 in Group A and 20 in Group B. The mean age of subjects was 25-60 years. Among 40 subjects, 20 were treated with Myofascial release and 20 were treated with High load strength training. The pre and post-test values were assessed by Visual Analogue Scale (VAS) and Foot Function Index (FFI) in group A and Group B. The mean difference for VAS is 33.05 and 24.1 and FFI is 38.17 and 25.30 respectively. The standard deviation values for VAS are 13.71 and 9.36 and FFI is 16.05 and 7.69 respectively. The paired ‘t’ test values for VAS is 10.78 and 11.51 and FFI is 10.64 and 14.71 respectively. The unpaired ‘t’ test values for VAS are 2.413 and FFI is 3.237 respectively.

	Visual Analogue Scale (VAS)				Foot Function Index (FFI)			
	Mean difference	SD	Paired 't' test	Unpaired 't' test	Mean difference	SD	Paired 't' test	Unpaired 't' test
Group A	33.05	13.71	10.78	2.413	38.17	16.05	10.64	3.237
Group B	24.1	9.36	11.51		25.30	7.69	14.71	



Visual Analogue Scale



Foot Function Index

The results obtained from statistical analysis indicate that there was statistically significant difference ($p < 0.05$) between two groups in showing improvement in pain and foot function in chronic plantar fasciitis patients. The increase in pain and foot function was seen in all subjects received irrespective of the techniques Myofascial Release and High Load strength training. By analyzing the mean values, the result showed the subjects who received Myofascial Release are found to be more effective in improving the pain and foot function than High Load strength training. Through the results, alternate hypothesis is accepted and also there is a significant difference between Myofascial Release and High Load strength training in improving pain and foot function in chronic plantar fasciitis patients.

DISCUSSION

The chief objective of this study was to compare the effectiveness of MFR and HLST in patients with chronic plantar fasciitis in reducing the pain intensity and improving the foot function assessed by VAS and FFI respectively. The study was detailed and tailored to find which mode of treatment was better in the two groups after 4 weeks of treatment.

Pre treatment values of pain intensity using VAS and foot function using FFI and the

readings was taken on first session (pre-intervention) and on twentieth (post-intervention). The statistical analysis done for both the groups showed reduction in pain intensity and improvements in foot function. It also showed that subjects from group A (MFR) showed more improvements in foot function and pain reduction from baseline to post intervention. than group B (HLST). Hence, group A treated with MFR showed higher significance than group B treated with HLST. Based on this data we accept the alternate hypothesis and reject the null hypothesis.

These results were significant at $P < 0.05$ and it strongly supports the earlier findings of M S Ajimsha (2014) who took 66 subjects and separated them into 2 groups. One group received MFR and other group is a control group. The outcome was assessed in terms of foot function index. It concluded that MFR is an effective therapeutic option in treatment of plantar fasciitis [9].

The results of this study also have got strong evidences from the study done by Barnes Jf (1990) who said that myofascial release technique is based in the idea that poor posture physical injury, illness and emotional stress can cause the fascia to become fat and constricted throughout the body (fascia links every organ and tissue in the body with every other part); the skilful

and dexterous use of hands is said to free up or release disruptions in these fascial network. Pressure on the bones, muscles, joints and nerves is released in the process and balance is restored [10].

CONCLUSION

This study can be concluded by stating that both MFR and HLST have got beneficial effect in reducing the pain intensity and improving the foot function in patients with chronic plantar fasciitis. Both the treatments showed significance in reducing the pain levels and improving the foot function from baseline to post intervention.

When both the treatment regimens were taken into consideration for significance, the MFR and HLST showed effectiveness in reducing the pain intensity and increasing the foot function but MFR showed superior hand over HLST.

Declaration by Authors

Ethical Approval: Approved

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Conflict of Interest: The authors declare no conflict of interest.

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