

Original Article

EFFECT OF MANUAL THERAPY VERSUS CONVENTIONAL THERAPY IN PATIENTS WITH PLANTAR FASCIITIS – A COMPARATIVE STUDY

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ABSTRACT

Objective: To compare the effectiveness of manual therapy with conventional therapy on pain and disability in patients with plantar fasciitis.

Background: There is limited evidence available which support that manual therapy can be used as an intervention in the management of plantar fasciitis.

Study Design: experimental study and different subject design

Methods: Patients diagnosed with plantar fasciitis underwent a standard evaluation and completed a self-report questionnaire including the Foot Function Index (FFI), and the Numeric Pain Rating Scale (NPRS).

30 patients were randomly divided in two groups, to be treated with either Conventional therapy or Manual therapy approach. Outcomes of treatment were captured on the 1st day and 21st day of the treatment session.

Results: The data was analysed using unpaired 't' tests. NPRS was mean 6.53 versus 6.80 for pre-treatment in group A and group B respectively; $t_{28}=0.50$, $p=0.62$ and mean 2.27 versus 1.00 for post-treatment in group A and group B respectively; $t_{28}=2.62$, $p=0.01$

FFI was mean 41.01 versus 42.67 for pre-treatment in group A and group B respectively; $t_{28}=0.77$, $p=0.49$ and mean 6.20 versus 4.16 for post-treatment in group A and group B respectively; $t_{28}=2.68$, $p=0.01$

Conclusion: The results of this study provide evidence that manual therapy is a superior approach in improving pain and disability in individuals with plantar fasciitis and can be incorporated in the regular treatment regime of the same.

KEYWORDS: Plantar fasciitis; Manual therapy; Conventional therapy; Numeric Pain Rating Scale (NPRS); Foot Function Index (FFI).

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INTRODUCTION

Plantar fasciitis is a non-inflammatory degenerative syndrome of the plantar fascia resulting from repeated trauma at its origin on the calcaneus.¹ To date, there is evidence that this condition may not be characterized by inflammation but, rather by non-inflammatory degenerative changes in the plantar fascia.²

Plantar fasciitis is the most common cause of heel pain.^{3,4} It has been estimated that it affects as much as 10% of the general population over the course of a lifetime.⁵ The condition is bilateral

in up to one-third of cases. Incidence reportedly peaks in people between the age of 40 to 60 years in general population.⁶ The condition is thought to be multi-factorial in origin with factors such as obesity, decreased ankle joint range of motion, prolonged weight bearing and increase in age are suggested to be commonly involved.^{7,8} Buchbinder et al⁶ in his study observed that risk of plantar fasciitis increases as the range of ankle dorsiflexion decreases. Individuals with less than 10° of ankle dorsiflexion had an odds ratio of at least 2:1 for plantar fasciitis and the ratio increased dramati-

cally as the range of dorsiflexion decreased.⁵ Patients typically report an insidious onset of pain which is usually burning, stabbing, dull-aching or sharp in nature and is localised under the plantar surface of the heel.⁹ It is commonly experienced upon weight bearing after a period of rest. This pain is most noticeable in morning with the first few step and is often described as 'first-step pain'.¹⁰ In some cases, the pain is so severe that it results in an antalgic gait. However it lessens with increased activity but tends to worsen towards the end of the day or prolonged weight-bearing. Patient usually reveals a history of barefoot standing/walking or jobs which require prolonged weight-bearing.¹¹ Sometimes recent history of increased activity or even sudden weight gain is also present.

Plantar fasciitis is considered as a self limiting condition. However the typical resolution time is anywhere from 6-18 months or sometimes longer.¹² Conservative management is reportedly very successful.^{6,12,13} Cryotherapy, therapeutic ultrasound with or without phonophoresis, electrical stimulation, whirlpool and administration of NSAID through iontophoresis are said to be effective.^{14,15} Recently published clinical practice guidelines reported that although weak, but there are evidences which support that manual therapy is effective in the management of heel pain.¹⁶

METHODOLOGY

The study design was experimental study and different subject design. It was conducted in the Out-patient Department of Physiotherapy, Sri Aurobindo Institute of Medical Sciences, Indore. 30 subjects who fulfilled the inclusion and exclusion criteria were equally divided into two groups by random sampling method. The total duration of study was 3 weeks. An informed consent was taken from each subject prior to participation. Then they were evaluated for pain and disability using Numeric Pain Rating Scale (NPRS) and Foot Function Index (FFI) before and at the end of the study. Foot Function Index (FFI): It is a self-report questionnaire with three subscales for pain, disability and activity-limitation. This scale consist a total of 23 questions. High scores indicate greater disability or decreased function. The test-retest reliability of FFI total and sub-

scale scores is 0.87-0.69.¹⁷

Numeric Pain Rating Scale (NPRS): An 11-point NPRS (0, no pain; 10, worst imaginable pain) was used to measure pain intensity. Numeric pain scales have been shown to be reliable and valid.^{18,19, 20}

Inclusion Criteria:

1. Age group 40-55 years
2. Both sex groups
3. Experienced symptoms for at least 4 weeks or more
4. NPRS score of more than or equal to 4

Exclusion Criteria:

1. Radiological evidence showing calcaneal spur
2. Any acute inflammation in ankle-foot region
3. Red flags to manual therapy (i.e. tumor, fracture, osteoporosis)
4. Prior surgery to distal tibia, fibula, ankle joint or rear foot region
5. Prior physiotherapy treatment

Group A (Conventional therapy): subjects were treated with

1. Ultrasound with an output of 1.5 w/cm² for 7 minutes using a continuous mode with a frequency of 3MHz.
2. Stretching : calf muscles
3. Stretching : plantar fascia
4. Strengthening exercises for intrinsic foot muscles:
 - Standing toe curls
 - Towel toe curls
5. Ice pack for 10 minutes.

Group B (Manual therapy): subjects were treated with

1. Mobilization : Ankle-foot complex
 - Talocrural joint posterior glides
 - Subtalar joint lateral glides
 - Subtalar joint distraction manipulations
 - 1st Tarsometatarsal joint Ant/Post glides
2. Stretching : calf muscles
3. Stretching : plantar fascia
4. Strengthening exercises for intrinsic foot muscles:
 - Standing toe curls
 - Towel toe curls

Patients of both groups were instructed to follow a home-exercise program including strengthening exercises for intrinsic foot muscles and self-stretching of plantar fascia and calf muscles. They were also advised to use soft-heel footwear, avoid prolonged standing, walking barefoot and not to take any other treatment or medications.

RESULTS AND TABLES

The dependent variables were NPRS and FFI. Pre-treatment scores for pain and disability were recorded on the first day. Then treatment was given to both groups and their post-treatment scores were recorded on the last day.

Unpaired t-test was used to examine changes in the dependent variables.

p-value < 0.05 is taken up for statistical significance at $n_1 + n_2 - 2$ degree of freedom.

Table 1: Pre and Post treatment comparison of both the groups in terms of pain (NPRS).

Parameters	Pre		Post	
	Group A	Group B	Group A	Group B
Mean ± SD	6.53±1.68	6.80±1.68	2.27±1.53	1.00±1.07
p value	0.62		0.01	
t value	0.5		2.62	

Mean ± SD for pain at pre-treatment was 6.53 ± 1.68 and 6.80 ± 1.68 for group A and group B respectively and 't' calculated value was 0.50 at $n_1 + n_2 - 2$ degree of freedom. Data analysis demonstrated no statistically significant difference between the two groups.

Whereas, mean ± SD for pain at post-treatment was 2.27 ± 1.53 and 1.00 ± 1.07 for group A and group B respectively and 't' calculated value was 2.62 at $n_1 + n_2 - 2$ degree of freedom. Data analysis demonstrated statistically significant difference between the two groups.

Table 2: Pre and Post treatment comparison between both the groups in terms of disability (FFI).

Parameters	Pre		Post	
	Group A	Group B	Group A	Group B
Mean ± SD	41.01±5.85	42.67±5.90	6.20±1.96	4.16±2.20
p value	0.49		0.01	
t value	0.77		2.68	

Mean ± SD for disability at pre-treatment was 41.01 ± 5.85 and 42.67 ± 5.90 for group A and group B respectively and 't' calculated value was 0.77 at $n_1 + n_2 - 2$ degree of freedom. Data analysis demonstrated no statistically significant difference between the two groups.

Whereas, mean ± SD for disability at post-treatment was 6.20 ± 1.96 and 4.16 ± 2.20 for group A and group B respectively and 't' calculated value was 2.68 at $n_1 + n_2 - 2$ degree of freedom. Data analysis demonstrated statistically significant difference between the two groups.

DISCUSSION

The results of the present study showed that manual therapy is more effective in improving pain and disability in patients with plantar fasciitis. This is in accordance with the previous studies done by Cleland JA et al²¹ and Young B et al²² who support the use of manual physical therapy as superior approach in the management of plantar heel pain. Young B et al concluded in his study that patients of heel pain who were managed with manual physical therapy reported clinically meaningful reduction in pain and dysfunction.²²

In plantar fasciitis, the fascia undergoes degeneration and becomes tight thereby leading to hypomobility within the ankle-foot complex, especially talocrural, subtalar and 1st tarsometatarsal joints. Limitation of talocrural joint dorsiflexion, would require compensatory movements at more distal joints to allow forward progression of leg over the foot during stance phase of the gait. This could theoretically decrease the height of medial longitudinal arch, therefore potentially increase tensile stress through the plantar fascia. Although talus has no direct muscle attachments, many muscles cross the talus and can influence the mechanics of talocrural, subtalar and 1st TMT joint. Both triceps surae and plantar fascia attach to the calcaneus and cross these joints. Likewise capsular restrictions in the talocrural and subtalar joint may also affect talar mechanics and have an influence on ankle dorsiflexion. Thus it is assumed that improvement in Talocrural, 1st TMT and subtalar joint mobility may contribute to normal joint mechanics and pain-free movement.

It has been argued that manipulative procedures play a major part in regaining the range of movement or function of the joint.²³ Lantz contends that 'the importance of passive mobilisation and manipulation lies in the restoration of gross movements and accessory movements, which cannot be gained by patients through exercises alone, and certainly not by rest.' The biomechanical basis of foot manipulation as outlined by Mennell predominantly focuses on the use of Foot Mobilisation Techniques to improve range of motion in hypomobile joints.²⁴ This approach is also favoured by Michaud.²⁵

Strengthening plays an important role in the treatment of plantar fasciitis and correct functional risk factors such as weakness of intrinsic foot muscles. Plantar fasciitis is often attributable to poor intrinsic muscles strength and poor force attenuation. Boyd HS et al (1992) in his study found that strengthening exercises for intrinsic foot muscles were cited as one of the most helpful treatment in heel pain. Strong intrinsic muscles thereby help in supporting the arches of the foot.

Digiovanni BF et al supported the use of plantar fascia specific stretching as a key component of treatment for plantar fasciitis.²⁶

Stretching reduces the tension in the fascia, which becomes tight during plantar fasciitis. Thereby it recreates the windlass mechanism²⁷ by optimizing the tissue tension. Thus, it allows the toes to dorsiflex, the calcaneus to rotate inwards (into varus) and the medial arch to elevate properly, in the later part of the stance phase.

Michelsson O et al²⁸ concluded that, calf stretching is effective in improving function in plantar fasciitis and should be one of the treatments incorporated into the management program for patients with plantar fasciitis.

The rationale behind using calf stretching in plantar fasciitis is to improve dorsiflexion range of motion and thereby releasing the stress on plantar fascia during push-off phase of gait cycle.

Limitations of the study

- The study was done on a small sample size
- study was conducted over a short period of time

·No follow-up could be done to see the long term effects

CONCLUSION

Thus, the present study concludes that manual therapy approach is superior to conventional therapy in improving pain and disability, in individuals with plantar fasciitis.

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ETHICAL CLEARANCE: We certify that this study involving human subjects is in accordance with Helsinki declaration of 1975 and has been approved by the relevant ethical committee.

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