

Original Article

EFFECTIVENESS OF MULLIGAN'S MOBILIZATION TECHNIQUES IN THE TREATMENT OF PLANTAR FASCIITIS

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Abstract

Background: Plantar fasciitis is a severe pain in the heel often related to the inflammation of thick band of tissues called plantar fascia. Pain occurs in heel bone limits the daily activities. Pain occurs at the base of foot to the toes. PF occurs because of inflamed tissue which increases whenever the pressure is exerted on the foot. This pressure leads to a typical distribution of the pain from the heel to the toes.

Objectives: To determine the effectiveness of Mulligan's mobilization techniques in the treatment of plantar fasciitis.

Methodology: The sample of 30 patients was design to check the effectiveness of mulligan's mobilization techniques for the treatment of PF for quasi experimental study and the data was collected from the physiotherapy OPD of Al-Nafees Medical College Hospital Islamabad. Written consent was taken from all the patients included in this study. Patients received manual mobilization to improve the dorsiflexion of foot to reduce pain. This data was analyzed by SPSS version 21. Paired sample t-test was used for results interpretation.

Results: the mean age was 36.03±7.56. All domains of foot function index had significant difference after 4 weeks of session, except limit physical activities.

Conclusion: The study concludes that mulligan's mobilization techniques are useful in improving pain in plantar fasciitis. Further study is required to investigate the effect of stretching exercises along with manual mobilization to reduce the pain in PF.

Keywords: Plantar fasciitis, manual mobilizations, stretching exercises

Introduction

Inflammation of thick band of tissue (plantar fascia) connecting the heel bone to the toes is called plantar fasciitis. Three bands are present in plantar aponeurosis or fascia i.e. lateral, medial & central. The central band originates from the medial tubercle of calcaneus plantar surface and runs towards the toes in the form of solid band of tissue dividing just prior to metatarsal heads into five slips. Each of these slip then divides in half to insert on the proximal phalanx of each toe. Plantar fascia is functionally shortened when the toes are extended as it wraps around the each metatarsal head. Pain typically occurs on the bottom of foot in front of heel where fascia is attached to calcaneus, It causes pain & sensitivity along the bottom of foot & towards the toes & also on the sides and back of heel. Achilles tendon pain is common in PF¹.

Pain due to planter fasciitis (PF) can cause limitations in daily activities. Pain is increased by weight bearing after the prolonged period of rest. The tibia turns inward during heel strike in the first half of stance phase of gait cycle, that cause stretch on plantar fascia due to flattening of foot. The arch flattening allows the foot to accommodate the irregularities on walking surface and for shock absorption. Overload or repetitive traction placed on plantar fascia during walking and running because micro-tearing which ultimately induces the inflammatory response that cause pain in the heel. The dorso plantar thickness of a normal plantar fascia is 3 mm; but in plantar fasciitis this can be thickened to 15 mm.²

Many studies demonstrate that the excessive foot motion is not the deterministic of the problems of lower extremity. Difficulties actually result when the foot joints continuously functioning beyond the normal end range, thus leading to greater stress along

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the medial joint capsules and ligamentous structures. The posterior tibialis muscle can also be lengthened and fatigued easily in an attempt to control the excessive motion. These all stresses lead to pain, discomfort and further lengthening. Thus it is concluded that PF results from the duration of motion and not merely from the motion itself. Natural history of the PF has not been established so it is still unclear that how much of the symptoms resolve due to the wide variety of commonly used treatments.³ The nature of pain is throbbing, searing, or piercing, especially with first few steps in morning or after prolonged period of inactivity. The other factors like walking barefoot, on toes, or up stairs can contribute in increasing pain.⁴

Methods

This Quasi experimental study was conducted in OPD of Al-Nafees Hospital Islamabad. Non-probability purposive sampling technique was used. All the patients with PF between the age of 20-50 were included and the sample size was n=30. Pain due to OA, heel spurs, osteoporosis, fracture of calcaneus bone, acute injury to foot, bilateral PF and the patients with neurological & systemic illness were excluded from the study. Foot function index was used as data collection instrument. For this study, section of quality of pain and disability level was taken into account. Data was describe in term of n(%) and mean±SD.

Results

The results of quasi experimental study showed that male female ratio was equal. Mean age value of the patients was 36.03 ± 7.56 . Among the participants 06 (20%) were teachers, 06 (20%) participants were house wives, 07 (23%) participants were students, 11 (37%) participants were workers.

Table 1: Foot Function Index

		Mean	SD	p-value
Morning Pain	Pre	2.37	.669	.000
	Post	1.37	.490	
Walking	Pre	1.57	.626	.000
	Post	1.20	.407	
Standing	Pre	1.93	.640	.000
	Post	1.17	.379	
Evening Pain	Pre	2.00	.695	.000
	Post	1.23	.430	
Pain At Its Worst	Pre	2.40	.675	.000
	Post	1.37	.490	
Walking In Home	Pre	1.73	.583	.000
	Post	1.13	.346	
Walking Outside	Pre	1.97	.615	.000
	Post	1.40	.498	
Walking Four Blocks	Pre	1.83	.648	.000
	Post	1.27	.450	
Climbing Stairs	Pre	1.77	.679	.000
	Post	1.23	.430	
Descending Stairs	Pre	1.70	.651	.000
	Post	1.13	.346	
Standing Tip Toe	Pre	1.87	.629	.000
	Post	1.30	.466	
Getting Up From Chair	Pre	1.63	.765	.000
	Post	1.10	.305	
Climbing Curbs	Pre	1.57	.626	.000
	Post	1.07	.254	
Fast Walking	Pre	1.93	.640	.000
	Post	1.20	.407	
Indoor Walk With Assistance	Pre	.00 ^a	.000	.000
	Post	.00 ^a	.000	
Outdoor Walk With Assistance	Pre	.00 ^a	.000	.000
	Post	.00 ^a	.000	
Limit Physical Activities	Pre	.83	.699	.032
	Post	.60	.498	

All domains of foot function index had significant difference ($p \leq 0.05$) after 4 weeks of session, except limit physical activities ($p > 0.05$). (Table 1)

Discussion

This study was carried out to evaluate the effect of mulligan's mobilization techniques in plantar fasciitis patients. The patients received manual mobilizations 3 times a week for a period of 4 week.

Results from this study show that mobilization of calcaneum bone provides decrease in pain in patients with PF. The results confirmed our initial hypothesis that mulligan's mobilization techniques would provide a greater immediate improvement in pain. The results of this study showed that patients with

heel pain receiving manual mobilizations of calcaneum bone showed more improvement because in chronic stage bony structures also effected along with tissue involvement reducing normal range of the foot. In this study manual mobilization of ankle joint was performed to improve the dorsiflexion of the foot because reduced dorsiflexion can be the main cause of reduce foot movement. As dorsiflexion improved also showed significant improvement in morning and evening pain during walking, climbing stairs, descending stairs and daily physical activities. Results of this study show the significance of manual mobilization techniques for the treatment of PF. In MWM a manual force in the form of a joint glide is applied to a motion segment and sustained. The direction of the applied force is typically perpendicular to the plane of movement or impaired action and in some instances it is parallel to the treatment plane.⁵

The limited ankle dorsiflexion is the common finding and apparently acts as a contributing factor for developing PF.⁶ So when dorsiflexion of foot is improved the pain is automatically subsided and full range of foot movement is gained.

A matched case-control study on risk factors of plantar fasciitis was conducted by Riddle DL, PulisicM, Pidcoe P, Johnson RE in 2003. Study showed that, the risk of PF increases with decreased range of ankle dorsiflexion. Study results shows that the decreased ankle dorsiflexion is the most important risk factor of PF.⁷ In this study when patients with reduced dorsiflexion were treated they also showed improvement in their pain and foot position. Thus it proves that reduced dorsiflexion is an important risk factor of PF.

Digiovanni BF et al in 2006 conducted a clinical trial study to find out that either Plantar fascia-specific stretching exercise improve outcomes in patients with chronic PF and the result of this study supported that tissue-specific plantar fascia-stretching exercises are significant in improving the condition of patients with chronic PF. Descriptive analysis of the data in this study showed that 92% (61) of the 66 patients were satisfied with this treatment. 51 patients (77%) reported no limitation in their recreational activities, and 62 (94%) were satisfied with a decrease in their pain. Only 16 of the 66 patients reported the need of further treatment.⁸ In this study stretching exercises also taught to the patients for their pain improvement along with mobilizations. In 2007 Flanigan RM, Nawoczenski DA, ChenL, WuH, Digiovani BF studied the outcomes of plantar fascia stretching in many clinical trials in patients with PF. A significant increase was produced by ankle and MTP joint dorsiflexion (14.91%) in stretch compared to the ankle dorsiflexion alone

(9.31% increase, $p < 0.001$) or MTP dorsiflexion alone (7.33% increase, $p < 0.01$).⁹ In this study dorsiflexion of the foot was improved in the patients to improve their pain and ROM.

A randomized controlled trial on the effect of additional ankle and midfoot mobilizations on PF was conducted in 2015 by Shashua A et al. The sample size of 50 patients with age group between 23-73 years, were randomly assigned to intervention or control group. Interventional group received mobilization of ankle and midfoot joints. Both the groups showed significant improvement in dorsiflexion ROM.⁶

Cleland et al conducted randomized clinical trial in 2009 on effectiveness of manual physical therapy and exercise vs. electro physical agents and exercise in the management of plantar heel pain and the results showed that MTEX is a superior management approach over an EPAX at both the short- and long-term follow-ups¹⁰. In this study manual mobilization techniques were applied to the patients and they showed significant improvement.

Radford JA et al. (2007) carried a randomized trial on effectiveness of calf muscle stretching for the short-term treatment of plantar fasciitis. In the stretching group the mean improvement for 'first-step' pain (0–100 mm) was -19.8 mm and in control group it was -13.2 mm. The improvement in stretching group was 16.2 points in foot function (0–100 scale), and 8.3 points were improved in control group¹¹. In this study manual mobilizations were applied to the patients to improve the foot range and dorsiflexion along with stretching exercises and it showed significant improvement in pain.

In this study Foot Function Index questionnaire was used for the assessment of the pain and disability. The present study showed a significant decrease in pain in patients receiving mobilizations to improve dorsiflexion and mobility of foot. In this study an intervention program aiming to mobilize joint was done and its efficacy was tested. These techniques proved to be useful as compared to manual muscle stretching in reducing pain and disability in patients with chronic pain. Further research with larger group size and more treatment options like stretching & strengthening exercises of calf muscles is required in order to find the best treatment option for this condition.

Conclusion

Findings from this study indicate that manual mobilization interventions improve foot function in plantar fasciitis patients. Mobilizations are better option in relieving pain and improving disability in patients with PF. PF cause limitation in daily activities and it

results in decreased foot ROM, joint mobilization techniques will be helpful to improve the foot position and ROM.

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Authors' contributions:

Sonia Munir: Conception and design of the work, the acquisition, analysis, interpretation of data, drafting the work and revising it for final approval. Responsible for data integrity.

Muhammad Naveed Babur: Revising article critically for important intellectual content for final approval. Responsible for data.

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