

# Functional Outcome of Plantar Fascia Specific Exercise Versus Corticosteroid Injection In Chronic Plantar Fasciitis

Umar Zia Khan,<sup>1\*</sup> Wali Muhammad,<sup>1</sup> Mian Amjad Ali,<sup>1</sup> Faaiz Ali Shah<sup>1</sup>

## ABSTRACT

**Objective** To compare the effectiveness of plantar fascia specific stretching exercise with steroid injection in chronic plantar fasciitis.

**Study design** Experimental study.

**Place & Duration of study** Department of Orthopaedic Surgery Lady Reading Hospital Peshawar, From December 2016 to October 2017.

**Methodology** Patients with symptoms of plantar fasciitis for minimum of ten months were randomly allocated to one of the two treatment groups. Group A were treated with plantar fascia specific stretching exercise while Group B received corticosteroid injection. Pain subscale of the Foot Function Index was completed for all patients and they were reevaluated at 2 and 6 months.

**Results** Fifty patients were included in this study. The pain subscale score of the Foot Function Index and pain with first steps in morning showed significant improvement in Group A in comparison to Group B at six months ( $p < 0.00001$  and  $p = 0.0004$  respectively).

**Conclusion** Plantar fascia specific stretching exercise yielded better outcome in comparison with corticosteroid injection in treatment of chronic plantar fasciitis.

**Key words** Chronic plantar fasciitis, Plantar fascia specific stretching exercise, Corticosteroid injection, Foot Function Index score.

## INTRODUCTION:

Plantar fasciitis is common cause of inferior heel pain in adults. It is an inflammatory condition that is due to oversteering of plantar fascia. Although etiology is not very clear, most commonly suggested theory is repetitive micro trauma and chronic inflammation of the plantar aponeurosis at its origin on the medial calcaneal tubercle.<sup>1,2</sup> This condition accounts for approximately 10% of the population, commonly affecting middle aged women and young male runners.<sup>3-5</sup>

In 20-30% of those with clinical diagnosis of plantar fasciitis symptoms occur bilaterally.<sup>6</sup> It is usually sharp heel pain which is more intense upon first steps in morning often when getting out of bed, increase at end of day after prolonged standing.<sup>7</sup> Majority of these patients can be treated successfully non-operatively where resolution of symptoms is expected in 90 % of patients within ten months.<sup>8</sup>

Several different non operative options are used in current clinical practice which include nonsteroidal anti-inflammatory drugs (NSAIDs), shoe modifications, prefabricated shoe inserts, custom made orthotics, stretching exercise, physical therapy, corticosteroid injection, extracorporeal shock wave therapy (ESWT), and ultrasound therapy.<sup>9-11</sup>

The plantar fascia stretching exercise is aimed to maintain tension through a controlled stretch of the plantar aponeurosis by recreation of windlass

<sup>1</sup> Department of Orthopaedic Surgery Lady Reading Hospital Peshawar

## Correspondence:

Dr. Umar Zia Khan <sup>1\*</sup>

Department of Orthopaedic Surgery  
Lady Reading Hospital, Peshawar  
E mail: umarzia@doctors.org.uk

mechanism which is metatarsophalangeal joint dorsiflexion and ankle dorsiflexion. The aim of this study was to compare the effectiveness of plantar fascia specific stretching exercise with that of corticosteroid injection for relief of pain in plantar fasciitis.

#### METHODOLOGY:

This was a randomized controlled study undertaken in the Orthopaedic Surgery Department of Lady Reading Hospital Medical Training Institute Peshawar, from December 2016 to October 2017. We hypothesised that those patients, with symptoms of chronic plantar fasciitis, who were treated with plantar fascia specific exercise protocol had better functional outcome in comparison to those managed with steroid injection.

Total of 50 patients (20 men, 30 women) who had sharp heel pain for at least ten months with focal tenderness to palpation at medial tuberosity of calcaneus were included in the study. Those patients with history of systemic disease, previous heel surgery and calcaneal fracture were excluded from our study.

Diagnosis was made after detailed history taking and physical examination. Patients who satisfied inclusion criteria were randomly allocated into one of the two treatment groups. The randomization sequence was concealed till treatment modality was assigned. Patients were prescribed non-steroidal anti-inflammatory medication and advised to stop all other ongoing treatment, which they were having for their heel pain. All baseline data including age, gender, weight, height, duration of symptoms and hours spent standing during day, were recorded. Subscale of Foot Function Index was completed for patients in both groups.

Those patients who were randomly assigned to

treatment group A, received house exercise program for plantar fascia stretching. This group received instruction to cross affected foot over contralateral leg and to hold the base of toes and dorsiflex until a stretch in plantar arch is felt. They were advised to palpate the tension in plantar aponeurosis with their contralateral hand. This plantar fascia stretch was held for 10 seconds and then repeated. Three sets of 10 repetitions were advised to be performed daily. First stretch was to be performed before start of weight bearing in the morning. Those patients who were randomly assigned to Group B received a dose of corticosteroid (40mg Depomedrol and Lidocaine), injected directly around medial calcaneal tubercle under complete aseptic measures.

First follow up was arranged at two months where base line data and pain subscale of Foot Function Index (FFI) was completed. Final review was arranged at six months to carry out full assessment. Independent Student t test was used to analyze the data obtained from FFI. All statistical test were two sided where an over all significance level was set at 0.05.

#### RESULTS:

Total of 50 patients were included, 25 in each group. The age range was 17-56 year. Females predominated (60 %) in this series. The analyses of baseline characteristic of the two groups were similar in terms of age, weight and duration for standing each day (table I). Pain subscale (1-9) in Foot Function Index was recorded as baseline at 2 months and 6 months whereas Item number 2 which is pain with first steps in morning, was analyzed separately as its one of significant and disease defining symptom.

There was an improvement from the baseline mean of all items in pain subscales of FFI including pain in first steps in morning, item number 2 at two months

**Table I: Baseline Measurements**

Measurement	Group A (n = 25)	Group B (n=25)
Age (Year)	37.3 (19-55)	41.6 (17-56)
Gender (M/F)	11/14	9/16
No. of hours standing	5.5 (1.0-9)	6 (1.0-11)
<b>Chronicity of symptoms</b>		
10-12 months	10	13
12-18 months	11	10
19-24 months	2	1
>24 months	2	1

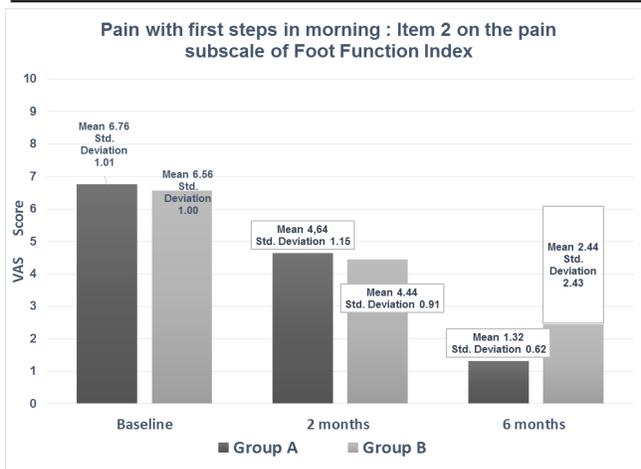


Fig I: Pain with first steps in morning: Significant improvement in Group A at 6 months which was managed with plantar fascia stretching exercise compared with Corticosteroid Injection Group B (P=0.0004). No significant difference was found between two groups at 2 months (p=0.499)

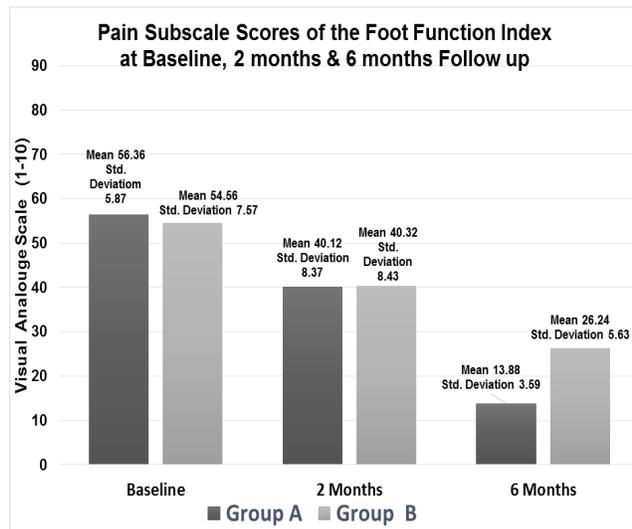


Fig II : Pain Subscale scores of Foot Function Index : No significant difference was found between two groups at 2 months (p=0.933 ) Significant improvement at 6 months in Plantar fascia stretching protocol i.e. Group A (p<0.00001)

in both the groups, however this trend of improvement was observed only in Group A at six months (Figure I & II).

There was improvement in symptoms at 2 months in both groups, however the difference between two groups in pain with first few steps in morning (p = 0.499) and total score of pain subscale of Foot Function Index (p=0.933) was not statically significant, however there was significant improvement in symptoms in Group A at six months and the difference between two groups was statically

significant (pain with first steps in morning p=0.0004, and total score of pain subscale of Foot Function Index p<0.00001).

**DISCUSSION:**

Plantar fasciitis can be successfully managed in approximately 85% to 90% of patients without any need for surgical intervention.<sup>1</sup> Multiple treatment strategies have been used in treatment of plantar fasciitis with positive effect in outcome, however there is no general agreement as to which treatment modality or combination of modalities is most effective in its management.<sup>12,13</sup>

Evidence from two systematic reviews suggests that stretching of the ankle and foot provides short-term clinical benefit for individuals with heel pain/plantar fasciitis.<sup>13,14</sup> Landorf published that no studies could be found that compared the outcome of stretching versus no stretching in patients with plantar heel pain.<sup>14</sup> The addition of heel pad to plantar fascia and gastrocsoleus complex stretching exercises could improve outcome, and plantar aponeurosis stretching could be more beneficial than Achilles stretching exercises.<sup>15</sup>

Digiovani et al reported statistically significant difference in outcome after plantar fascia specific stretching exercises in comparison to Achilles tendon stretching exercises for management of chronic plantar fasciitis<sup>17</sup> McMillan et al supported the safety and efficacy of single ultrasound guided steroid injection where it provided greater symptoms relief in comparison to placebo at four weeks with minimal abnormal swelling of the heel for up to three months.<sup>18</sup>

Tsai WC et al published about efficacy of sonographic guided steroid injection with lower rate of recurrence in plantar fasciitis.<sup>19</sup> However in our study steroid injections were not as effective as plantar fascia stretch exercises.

We chose pain subscale of the Foot Function Index as it has been validated and agreed to be reliable instrument to measure impact of foot pathologies on function.<sup>20</sup> Mostly in clinical scenario patient commonly presents with severe pain and pain with first step in morning. This symptom is believed to be clinically most significant to patient complaint so we chose to independently analyze this along with pain subscale of the Foot Function Index first nine items. There was improvement noticed in pain and Visual Analogue Score in both groups at two months from the baseline symptoms; however the group managed with plantar fascia specific stretching program showed superior results at six months.

The strength of this study is prospective and randomized design and only patients who had persistent symptoms beyond ten months were included. Limitation of this study is its short follow up. An additional limitation in our study could be that agreed method and optimal position to achieve effective plantar fascia stretching is not yet known.

#### CONCLUSIONS:

The study protocol was noninvasive, cost effective and resulted in improvement of symptoms that exceeded the response to more conventional method of steroid injection in patients with chronic plantar fasciitis.

#### REFERENCES:

1. Schepesis AA, Leach RE, Gorzyca J. Plantar fasciitis. Etiology, treatment, surgical results, and review of the literature. *Clin Orthop Relat Res.* 1991; 266:185-96.
2. Furey JG. Plantar fasciitis. The painful heel syndrome. *J Bone Joint Surg Am.* 1975; 57:672-3.
3. Singh D, Angel J, Bentley G, Trevino SG. Fortnightly review. plantar fasciitis. *BMJ.* 1997;315:172-175.
4. DeMaio M, Paine R, Mangine RE, Drez D Jr. Plantar fasciitis. *Orthopedics.* 1993;16:1153-63.
5. Pyasta RT, Panush RS. Common painful foot syndromes. *Bull Rheum Dis.* 1999;48: 1-4.
6. Charles LM. Plantar fasciitis. *Lippincotts Prim Care Pract.* 1999;3:404-7.
7. Miller MD. *Review of Orthopaedics*, 4th ed. Philadelphia, WB Saunders 2004;pp.339.
8. Digiovanni BF, Nawoczenski DA, Lintal M, et al: Tissuespecific Plantar Fascia – stretching exercise enhances outcomes in patients with chronic heel pain. A prospective randomized study. *J Bone Joint Surg Am.* 2003;85:1270-7.
9. Martin RL, Irrgang JJ, Conti SF. Outcome study of subjects with insertional plantar fasciitis. *Foot Ankle Int.* 1998;19:803-11
10. Powell M, Post WR, Keener J, WeardenS. Effective treatment of chronic plantar fasciitis with dorsiflexion night splints: a crossover prospective randomized outcome study. *Foot Ankle Int.* 1998;19:10-8.
11. Pfeffer G, Bacchetti P, Deland J, et al. Comparison of custom and prefabricated orthoses in the initial treatment of proximal plantar fasciitis. *Foot Ankle Int.* 1999;20:214-21.
12. Buchbinder R. Clinical practice. plantar fasciitis. *N Engl J Med.* 2004;350:2159-66.
13. Crawford F, Thomson C. Interventions for treating plantar heel pain. *Cochrane Database of Systematic Reviews.* 2003;(3):CD000416.
14. Landorf KB, Menz HB. Plantar heel pain and fasciitis. *BMJ Clin Evid.* 2008;2008. pii: 1111.
15. Sweeting D, Parish B, Hooper L, Chester R. The effectiveness of manual stretching in the treatment of plantar heel pain: a systematic review. *J Foot Ankle Res.* 2011;4:19. doi: 10.1186/1757-1146-4-19.
16. Pfeffer G, Bacchetti P, Deland J, et al. Comparison of custom and prefabricated orthoses in the initial treatment of proximal plantar fasciitis. *Foot Ankle Int.* 1999;20:214-21.
17. Digiovanni BF, Nawoczenski DA, Malay DP, Graci PA, Williams TT, Wilding GE, et al. Plantar fascia-specific stretching exercise improves outcomes in patients with chronic plantar fasciitis. A prospective clinical trial with two-year follow-up. *J Bone Joint Surg Am.* 2006;88:1775-81.
18. McMillan AM, Landorf KB, Gilheany MF, Bird AR, Morrow AD, Menz HB. Ultrasound guided corticosteroid injection for plantar fasciitis: randomised controlled trial. *BMJ.* 2012;344:e3260. doi:10.1136/bmj.e3260.
19. Tsai WC, Hsu CC, Chen CP, Chen MJ, Yu TY, Chen YJ. Plantar fasciitis treated with local steroid injection: Comparison between sonographic and palpation guidance. *J Clin Ultrasound.* 2006;34:12-6.

20. Budiman-Mak E, Conrad KJ, Roach KE. The Foot Function Index: a measure of foot pain and disability. *J Clin Epidemiol.* 1991; 44:561-70.

Received for publication: 10-10-2017

Accepted after revision: 15-01-2018

Author's Contributions:

Umar Zia Khan: Manuscript writing, editing and data collection.

Wali Muhammad: Data collection.

Mian Amjad Ali: Final proof reading.

Faaz Ali Shah: Final proof reading.

Conflict of Interest:

The authors declare that they have no conflict of interest.

Source of Funding:

None

How to cite this article:

Khan UZ, Muhammad W, Ali MA, Shah FA. Functional outcome of plantar fascia specific exercise versus corticosteroid injection in chronic plantar fasciitis. *J Surg Pakistan.* 2018;23(1):30-34.

Doi:<http://dx.doi.org/10.21699/jsp.23.1.8>.