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## A comparative analysis of functional outcome in patients with plantar fasciitis treated by corticosteroid injection vs plantar fascia stretching exercises

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### Abstract

**Introduction:** Plantar fasciitis is the most common cause of foot pain. There is no current standard of care and the existing management protocols are mainly from expert opinion-derived practice guidelines. The step-ladder approach is the most widely accepted approach. Both corticosteroid injections and Stretching exercises are widely used by orthopedicians worldwide. Hence, the present study.

**Methodology:** This study was done as a prospective study. There were 80 patients who presented to us from May 2014 to March 2015 were enrolled in the study. 40 patients were enrolled in the Corticosteroid group and 40 patients were enrolled in the Plantar fascia stretching exercises group. Patients were assessed at 2<sup>nd</sup> and 8<sup>th</sup> week.

**Results:** Both the pain and Functional outcome improved significantly in the 2<sup>nd</sup> week in the steroid injection group. But at the end of eighth week the improvement was almost comparable in both the groups.

**Conclusion:** Though immediate improvement in pain and functional outcome is noted in the injection group as early as 2<sup>nd</sup> week, Long term outcome in both groups is similar.

**Keywords:** Heel pain, Plantar fasciitis, Steroid injection, Stretching exercises.

### 1. Introduction

Plantar fasciitis is the most common cause of foot pain and accounts for up to 15% of all foot symptoms requiring professional care among adults <sup>[1]</sup>. The incidence peaks between the ages of 40 and 60 years, but younger in people who are avid runners <sup>[1]</sup>. However, the condition can occur in both active and sedentary adults of all ages <sup>[2]</sup>. Despite the ease of clinical diagnosis, both the aetiology and treatment of plantar fasciitis remain controversial and poorly understood <sup>[3]</sup>.

Plantar fasciitis or calcaneal spur is a degenerative syndrome of plantar fascia and in 50% of cases accompanies calcium precipitation at the attachment site to the heel bone (calcaneous), hence it is called heel spur. According to most authors, partial rupture of this fascia and chronic inflammation at the attachment site to the bone leads to the emergence of symptoms <sup>[4, 5]</sup>. However, other etiologies have been proposed such as being overweight, specific occupations, anatomic variations in the foot, biomechanic problem in the foot, and wearing inappropriate shoes. This disease is most commonly reported among females between 40-60 years old <sup>[6]</sup>, and has no significant association with socioeconomic status. Patients experience annoying symptoms and make them refer to clinics frequently. Specific and defined symptoms of this syndrome includes plantar pain, specially in the medial and inferior parts of the heel which exists during standing up from a chair or bed in the first few steps and then decreases. The diagnosis of this disease is based on history taking and physical examination and laboratory measures and diagnostic imaging is applied to exclude other causes such as a tumor or infection. In 30% of cases, the pain is bilateral and in these bilateral cases, rheumatoid arthritis, ankylosing spondylitis, and Reiter's syndrome should be considered. On physical examination, the patient feels pain with deep palpation of medial and lateral parts of the heel and the pain increases with raising big toe and fingers with the other hand. This condition is self-limited, but its course may last 6-18 months. Therefore, patients seek medical attention to relieve pain <sup>[7]</sup> in most cases, resting with no weight bearing on the foot causes pain alleviation <sup>[8]</sup> and in some cases changing shoes decreases the symptoms.

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There is no current standard of care and the existing management protocols are mainly from expert opinion-derived practice guidelines. The step-ladder approach is the most widely accepted approach. The use of steroid injections remains controversial as it has no clear improved outcome over other conservative treatments and importantly, significant possible underappreciated side effects.

## 2. Materials and Methods

This study was done as a prospective study. There were 80 patients who presented to us from May 2014 to March 2015 were enrolled in the study. 40 patients were enrolled in the Corticosteroid group and 40 patients were enrolled in the Plantar fascia stretching exercises group. All the patients had a minimum history of 4 months of heel pain.

The patients did not respond to simple treatments and NSAIDs for three weeks and other causes of heel pain were excluded. Exclusion criteria were chronic systemic diseases, history of surgery or severe trauma to the heel or fracture of the heel, and heel pain due to causes other than plantar fasciitis.

For exclusion of other causes of heel pain blood sugar level, complete blood count, serum levels of calcium, phosphorus, alkaline phosphatase along with erythrocyte sedimentation rate and C-reactive protein were evaluated. Antero-posterior and lateral radiographies of the foot were also taken. Then the patients were divided into two groups after a written consent.

In corticosteroid group, local injection of 40 mg of triamcinolone acetonide was done at the site of maximal pain at the palm of the foot with an 18G needle under strict aseptic precautions and then the patient was resting for 24 hours. In weeks 2 and 8, physical examination in terms of pain and

function was done.

In other group, stretching of plantar fascia was done and similar to the first group, before intervention and in weeks 2 and 8 pain assessment was done. For pain assessment, a visual analogue scale was applied. Functional assessment was based on need to walking aid and ability to carry out daily activities.

The method of stretching exercise was as follows: the patient sits on a chair and puts his/her painful foot on the contralateral knee and pushes back big toe and other fingers with the ipsilateral hand. The patient must put his contralateral hand on the palm of the foot and feels its stretching and stiffness during passive dorsiflexion of fingers. At this time, the patient should stretch plantar fascia for 10 seconds. This exercise was done three times a day and the patient repeated the aforementioned exercise for 10 times.

The results of the two groups were compared using t test and chi-square tests. Significance level was set at P value < 0.05.

## 3. Results

All the eighty patients remained till the end of the study. According to the obtained results, mean age of the two groups was similar and was 53.6 and 54.1 years in corticosteroid and stretching exercise groups, respectively.

According to the obtained results which are presented in Table 1, the pain severity before any intervention was similar in both groups. However, on a second visit in the second week of the study the pain in corticosteroid group showed significant decrease compared to the group which received stretching exercises. After 8 weeks, the pain severity decreased in both groups, however was similar between them.

**Table 1:** Pain severity before intervention and after 2 and 8 weeks following intervention.

	Mean pain severity in corticosteroid group	Mean pain severity with stretching exercise	P Value
Before Intervention	6.9	7.2	0.7
After 2 weeks	2.8	4.2	0.0
After 8 weeks	2.8	2.3	0.23

In Table 2 the results of interventions regarding the function of the patients in weeks 2 and 8 are shown. As observed, the functional level of the patients was similar before the interventions, but in week 2 after intervention functional level of patients who were treated with corticosteroid improved

significantly in comparison to stretching exercises group. After 8 weeks, although functional level improved in both groups, however was similar between them.

We did not encounter any complication with corticosteroid injections.

**Table 2:** Patient functional level before intervention and after 2 and 8 weeks following intervention.

	Functional level in corticosteroid group	Functional level in Exercise group	P Value
Before Intervention	76	79	0.6
After 2 weeks	92	84	0.004
After 8 weeks	93	92	0.7

## 4. Discussion

Since plantar fasciitis is the most common cause of pain in the inferior parts of the foot and due to malfunction which it produces and its high prevalence in all age groups and in both genders and in any socioeconomic group, this condition and its treatments are always important for clinicians and several studies have been done about it. Access to the most useful treatment with the least complication and a decrease in expenses is the objective of most studies.

In a study by Benedict *et al.* in 2003 in the US, 101 patients with chronic plantar fasciitis with a mean age of 46 years were studied. They reported that most patients completed supportive techniques with satisfaction and only a limited number of patients required other treatment modalities [9].

Benedict *et al.* in 2006 in the US studied 66 patients in a

clinical trial with a 2-year follow-up. They reported that stretching the Achilles tendon is more effective than other methods. Their results showed that 92% of all patients were satisfied of this treatment and 77% did not have any problem or limitation in performing stretching techniques. The authors concluded that stretching of plantar fascia is more effective and less expensive in comparison with other treatments [10].

Frater *et al.* in 2006 in the UK studied the effects of corticosteroid injection in patients with plantar fasciitis. They used bone scan to diagnose heel pain syndrome and follow-up of patients. They used primary phase changes for prediction of corticosteroid injection effects. Twenty-four patients, among them 8 had bilateral involvement (overall 32 feet) were enrolled. After injection, the pain was alleviated completely or nearly completely in 20 feet. The remaining 12 feet showed

short term or no pain alleviation <sup>[11]</sup>.

In a study by Crawford *et al.*, short-term effects of corticosteroid injection were evaluated. The effect of corticosteroid injection in patient group was compared with the effect of local anesthetic in control group in the treatment of heel spur. In addition, the effect of anesthesia was also assessed. The study population consisted of 106 patients and the results were evaluated using VAS after 1, 3, and 6 months. They noted that corticosteroid injection alleviates pain in short-term interval time, but heel anesthesia before corticosteroid injection has no effect on treatment <sup>[12]</sup>.

There is no study regarding the therapeutic effects and complications of corticosteroid injection versus stretching exercise. This study was designed to compare the therapeutic effects and complications of corticosteroid injection versus stretching exercises.

The rate of responsiveness to treatment was evaluated with two methods in our study. The first was pain scale and the patient scales his/ her pain in a page from 1 to 10. The second was function score which was based on the need to walking aid to start movement.

According to our findings, pain responded dramatically to local corticosteroid injection. The patients who received local corticosteroid had better pain scale and function score after two weeks than those who did not receive corticosteroid. This difference was statistically significant. But after 8 weeks both groups had decreased pain and better function prior to treatment with a significant difference. The difference between the two groups after 8 weeks with respect to pain and function was not different.

### 5. Conclusion

In conclusion, regarding no difference between corticosteroid injection and stretching exercises in plantar fasciitis in long-term follow-up, and considering this fact that complications such as weakness and sometimes rupture of plantar fascia and fat pad atrophy are attributed to frequent corticosteroid injection, long-term injection of corticosteroid is not recommended for plantar fasciitis. For the long term management of this condition, it seems that stretching exercises are more safe and appropriate methods. However, according to the culture of our society and the expectations of the patients, combining different treatments is more affective in achieving a better outcome.

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