

# Plantar fasciitis management: A comparative study between plantar fascia stretching exercises versus local corticosteroid injection

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## Abstract

**Background:** Plantar fasciitis is one of the common causes of heel pain. Various modalities of treatment have been described in literature are plantar fascia stretching exercises, local corticosteroid injection, extracorporeal shock wave therapy, Platelet rich plasma injection at site of insertion and operative management. Our study was conducted to compare treatment between stretching exercises and local corticosteroid injection in rural population of patients with plantar fasciitis.

**Materials and Methods:** Our study included 60 patients diagnosed with plantar fasciitis. We divided randomly into two groups. Group 1 included 30 patients treated with stretching exercises, non-steroidal anti-inflammatory medications, microcellular (MCR) footwear and other group 2 includes 30 patients with analgesics, microcellular (MCR) footwear and local corticosteroid injection. Patients were assessed after 2 weeks, 4 weeks, 8 weeks and 12 weeks from start of treatment with regard to pain and function. Pain was assessed using visual analogue scale.

**Results:** We analyzed our data using Visual Analogue Scale (VAS) where score 0 is no pain and score 10 severe pain. The VAS scores were calculated at 2nd 4th 8th and 12th week. In our study obtained results showed pain severity in group 2 was significantly reduced after 2nd week and 4th week from start of the treatment when compared to group 1. However on subsequent follow up 8th week and 12th week pain severity was reduced in both the group and was almost similar. All the data from the study was evaluated by Student t test and ANOVA test with P value calculated in 2nd week, 4th week, 8th week and 12th week and out of which it was found to be statistically significant difference at end of 2nd, 4th and 8th week in both group, whereas at the end of 12th week there was not much statistically significant difference in both groups pain score.

**Conclusion:** In patients with plantar fasciitis, corticosteroid injection at site of maximal tenderness will relieve pain significantly but results are good for short duration pain relief that is up to 4 weeks after the injection. Whereas in patients who continue to do stretching exercises are symptomatically better at end of 8th and 12th week of therapy. At end of 12th week both local steroid injection and Plantar fascia stretching exercise showed similar results in terms of pain relief

**Keywords:** plantar fasciitis, corticosteroid injection, stretching exercises.

## Introduction

Plantar fasciitis is most common cause of heel pain[1]. Most of the times it is self limiting condition it might take 6 to 18 months to resolve[2]. Various modalities of treatment have been described in literature for the management of plantar

fasciitis like rest, heat application, ice pack, non-steroidal anti-inflammatory drugs, night splints, walking cast, plantar fascia stretching exercises, ultrasound, local corticosteroid injection, extracorporeal shock wave therapy, Platelet rich plasma injection at site of insertion, pulsed radio frequency electromagnetic field therapy and operative management.

Stretching exercises can be in calf or plantar region[1,3,4]. Studies shown that stretching exercises is

one of treatment modalities in plantar fasciitis. Night splints are designed to keep patient ankle in neutral position overnight, so that it passively stretches plantar fascia, gives rest and allows the fascia to heal[5,6]. Local corticosteroid injection has been suggested when other conservative management is unsuccessful. Injecting deep to plantar fascia ensures adequate spread of corticosteroid and reduces chances of fat pad necrosis[7]. Studies has shown that corticosteroid injection has short term

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**Figure 1:** Gastrocnemius stretching.



**Figure 2:** Plantar fascia-specific stretching.

benefit, and effectiveness of treatment not maintained beyond six months[8]. Extra-corporeal shock wave therapy has been suggested when other conservative line of management fails and it can be considered before any surgical intervention. It has been claimed that deep tissue cavitations effect causes micro rupture of capillaries, leakage of chemical mediators resulting in neovascularization of damaged tissue[9]. Local injection of Autologous Platelet rich plasma (PRP) has been shown some good results in plantar fasciitis management[10,11], local PRP injection can stimulate reparative process thereby helps in healing of plantar fascia[10]. Resistant cases where symptoms persists for more than 8-12 months, after all methods of conservative management is unsuccessful then might

consider for operative management [3], operative management can be open or endoscopic plantar fascia release. According to Porter et al [12] calf stretching exercises duration can be three minutes at a time, three times a day or five 20-s intervals, twice daily as both have same effect. The continuity of connective tissue between tendoachilles and plantar fascia and fact reduced dorsiflexion of ankle joint is risk factor for development of plantar fasciitis, thereby provides some justification for stretching of calf muscles[12]. According to DiGiovanni et al[13] tissue specific plantar fascia stretching exercises is more effective then calf stretching in a randomized clinical trial.

Multiple dose of local corticosteroid injections has shown complications like plantar fascia rupture, fat pad atrophy,

lateral plantar nerve injury secondary to injection, calcaneum osteomyelitis [14,15]. Our study compared the effectiveness of stretching exercises vs single dose Steroid injection on pain management in plantar fasciitis and these are common treatment methods used in treating plantar fasciitis, these methods can be used on out-patient basis, also to know any complications associated with these methods.

#### Materials and methods

Study was conducted in tertiary referral hospital. This was prospective study which was conducted between April 2018 to April 2019. Total 60 patients who met the inclusion criteria were included in the study and were divided randomly into two groups. Patients history and clinical findings was recorded. In group 1, 30 patients were treated by stretching exercises, non-steroidal anti-inflammatory medications, microcellular (MCR) footwear and other group 2 includes 30 patients with analgesics (non-steroidal anti-inflammatory medications), microcellular (MCR) footwear and local corticosteroid injection. In group 1 stretching exercises of the foot and tendoachilles were taught to patients i.e. patient should stand on his toes with heel off the ground and hold it for 10 seconds, and in sitting position with involved heel over other knee like figure of four patient should do dorsiflexion of involved ankle joint and hold it for 10 seconds and other exercises



**Figure 3:** Stair stretch for Achilles tendon



**Figure 4:** Stair stretch for Plantar fascia



**Figure 5:** Wall pushups or stretch for Achilles tendon(Right)

shown in figure to stretch tendoachilles and plantar fascia. Patients should do these exercises three times a day and each exercise 20 repetitions at a single time. In group 2 received a single dose of corticosteroid injection 1ml of 40 mg/ml of Depo-Medrol (Methylprednisolone acetate) with 1ml of 1% lignocaine directly over site of maximal tenderness of heel under proper aseptic sterile precaution. Patients were assessed after 2 weeks, 4 weeks, 8 weeks and 12 weeks from start of treatment with regard to pain. Pain was assessed using visual analogue scale. All the data from the study was evaluated by Student t test and ANOVA test with P value <0.05 using software SPSS version 22 IBM.

#### Inclusion criteria:

1. Patient with heel pain more than 3 months.

#### Exclusion criteria:

1. Bilateral heel pain with systemic disease like rheumatoid arthritis, ankylosing spondylitis, Reiter syndrome.
2. Previous surgeries involving heel
3. Previous history of calcaneum fractures
4. Infections/abscess around heel

#### Results

Out of 60 patients 23 were males, 37 were females. There was female preponderance in our study. Youngest age of patient was 26 years old and oldest age was 70 years old. And average age in group 1 was 45.73 years and in group 2

was 48.63 years.

We analyzed our data using Visual Analogue Scale (VAS) where score 0 is no pain and score 10 severe pain. The VAS scores were calculated at 2nd 4th 8th and 12th week are shown in Table 2A. In our study obtained results showed pain severity in group 2 was significantly reduced after 2nd week and 4th week from start of the treatment when compared to group 1. However on subsequent follow up 8th week and 12th week pain severity was reduced in both the group and was almost similar.

#### Statistical analysis

T test

All the data from the study was evaluated

by Student t test and ANOVA test with P value calculated in 2nd week 4th week 8th week and 12th week. Out of which it was found to be statistically significant difference for 2nd, 4th and 8th week (P value < 0.05) in both groups where local steroid injection group results were superior to stretching exercise groups in 2nd and 4th week and at the end of 8th week stretching exercises group results were better compared to local steroid injection group. At the end of 12th week (P value > 0.05) there was not statistically significant difference of VAS score in both groups.

#### Repeated measures ANOVA

One way repeated measures ANOVA was conducted to evaluate VAS scores. The results of ANOVA indicated a significant time effect, with Wilks Lambda= 0.26, p value less than 0.001 in exercise group and Wilks Lambda =0.06, p value less than 0.001 in corticosteroid group (as shown in table 2B) suggests that both methods are effective modality of treatment in management of plantar fasciitis as in both group p value was 0.001 (p value < 0.05).

Table 1: Demographic details of patient			
	Patients treated with stretching exercises	Patients treated with local steroid injection	P value
Number of patients	30	30	
Gender (male:female)	11:19	12:18	0.75
Age (Mean)	45.73	48.63	0.31

  

Table 2 A: Pain assessment in both groups				
	2 <sup>nd</sup> week	4 <sup>th</sup> week	8 <sup>th</sup> week	12 <sup>th</sup> week
Mean VAS score in stretching exercise group	6.5± 1.1	6.1± 1.0	4.7± 1.0	3.5± 1.1
Mean VAS score in corticosteroid group	4.6 ± 1.7	5.0 ± 0.7	5.3± 0.9	3.6± 0.8
P value	0.001	0.001	0.002	0.74

  

Table 2 B: Pain assessment before and after treatment in both groups						
	Before intervention	2 <sup>nd</sup> week	4 <sup>th</sup> week	8 <sup>th</sup> week	12 <sup>th</sup> week	p value
Mean VAS score in stretching exercise group	7.9	6.5±1.1	6.1±1.0	4.7±1.0	3.5±1.1	0.001
Mean VAS score in corticosteroid group	8.1	4.6±1.7	5.0±0.7	5.3±0.9	3.6±0.8	0.001

## Discussion

The results of our study demonstrated that local corticosteroid injection group achieved significant improvements in pain score at end of 2nd and 4th week follow-up, Where as in group with stretching exercises there was minimal improvement in pain score at end of 2nd and 4th week, however there was significant improvement in pain score in stretching exercises group at the end of 8th and 12th week. However, the superiority of steroid injection was not maintained at the end of 8th week follow-up, as a significant difference was no longer found for this effect. These results support that steroid injection provides remarkable short duration (4 weeks) pain relief. Further decrease in pain score in group 2 patients at end of 12th week may be due to continued effects of analgesics and foot wear modifications (MCR footwear) which was common treatment methods in both the groups.

One of the comprehensive study to date was performed by Cleland et al [16], used manual physical therapy and exercises versus electro physical agents and exercises and showed results with manual physical therapy and exercises are superior compared to electro physical agents in treating plantar heel pain.

Our short-term results revealed that the stretching exercise group was not

superior to the steroid injection group based on VAS scoring and that the both groups were not significantly different at end of 12 weeks follow-up. The effects of steroid injection on pain management due to anti-inflammatory effect and local anesthesia combined results in rapid reduction of pain score, this effect encourages its frequent use by clinicians in treating plantar fasciitis, particularly in professional athletes who must quickly return to their livelihood.

However, current scientific evidence indicates that multiple dose of local steroid injection should not be used to treat plantar fasciitis in athletes because of its greater risk of causing spontaneous rupture [17]. In addition, steroid injection may lead to complications, such as injection site pain, plantar fascia rupture, fat pad atrophy, lateral plantar nerve injury, skin changes and/or infection, and calcaneum osteomyelitis [18,19], although the single dose of steroid injection group did not show any of these complications in our study.

In our study mean age group of patient was 47.18 years when compared with DiGiovanni B F et al. study [13] in 2003 showed mean age group of 46 years. DiGiovanni BF et al. study [20] in 2006 showed that tissue-specific plantar fascia stretching exercises in plantar fasciitis patients is more effective modality of

treatment than other methods. Our study results showed that at the end of 12th weeks stretching exercises group and patients who received local steroid injection group demonstrated similar results and there was no statistically significant difference in both group. Frater et al. study [21] in 2006 showed that local corticosteroid injection showed better results in plantar fasciitis patient with short term results. Our study results also proved that group who received single dose of local corticosteroid injection pain relief was better for short duration (4 weeks).

## Conclusion

In patients with plantar fasciitis, Our study shows corticosteroid injection at site of maximal tenderness will relieve pain for shorter duration till the end of 4 weeks and pain score remained almost same at end of 8 weeks, further drop in pain score may be due to effects of analgesics and footwear modification. Further long term follow-up study is required to comment effects of local corticosteroid injection. Stretching exercises initially there was not much of pain relief, exercises results were good at end of 8th and 12th week. At end of 12th week both local corticosteroid injection and Plantar fascia stretching showed similar results in terms of pain relief.

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