Original Research Article

# Comparative study of platelet rich plasma and local corticosteroid injection in treatment of chronic plantar fasciitis

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## Abstract

**Background:** Plantar fasciitis is a very common degenerative disease which affects the hindfoot. Traditionally, local injection of steroid was used widely for chronic plantar fasciitis treatment. In recent years, platelet-rich plasma (PRP) is being used successfully for the treatment of chronic plantar fasciitis. Present study was aimed to evaluate and compare the effectiveness of single injection of autologous platelet rich plasma (PRP) and steroid injections in patients of chronic planter fasciitis. **Material and Methods:** Present study was single-center, prospective, comparative study, conducted in patients 19-60 years of age, of either gender, with heel pain felt maximally over the planter aspect for > 6 months continuously. Patients were randomly divided into two groups, as group PRP to be administered PRP injection and group steroids to be administered 2 mL methylprednisolone along with 1 mL local anaesthetic. **Results:** In present study, 100 patients were randomly divided into group PRP (n=50) and group steroid (n=50). Majority were from 41-50 years age group and were female. Age and sex were comparable among both groups and difference was not significant statistically. VAS score was calculated at baseline, at 1,3 and 6 months among both groups. Baseline VAS scores were comparable and difference was not significant statistically. VAS scores were better in PRP group at 1,3 and 6 months as compared to steroid group and difference was significant statistically ($p<0.05$). Mean AOFAS score were comparable at baseline, at 1 months among both groups and difference was not significant statistically ($p>0.05$). Mean AOFAS score were better in PRP group at 3 and 6 months as compared to steroid group and difference was significant statistically ($p<0.05$). **Conclusion:** For the treatment of PF, platelet rich plasma (PRP) is more effective as compared to corticosteroid injection at achieving symptom relief at 3 and 6 months after first injection.

**Keywords:** chronic planter fasciitis, platelet rich plasma (PRP), corticosteroid, VAS for heel pain.

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## INTRODUCTION

Plantar fasciitis is a very common degenerative disease which affects the hindfoot constituting 11-15% of the foot symptoms in adults.[1] It is characterized by chronic inflammation and the degenerative process of the plantar aponeuroses. The predisposing factors of plantar fasciitis are prolonged standing, obesity, female gender, increasing age, high arched foot, leg length discrepancy, uncomfortable shoes, excessive foot pronation, and foot deformities such as pes planus/pes cavus, and a shortened Achilles tendon.[2] The goal of treatment is to decrease pain, promote healing, restore normal range of motion and flexibility of foot, support tissues, correct any biomechanical abnormalities, and institute correct training methods.[3] Conservative therapies are usually the first line of treatment includes ice, rest and avoidance of potentially strenuous activities, physical therapies, orthotics, arch supports, tapping and splinting.[4] Traditionally, local injection of steroid was used widely for chronic plantar fasciitis treatment.[4] In recent years, platelet-rich plasma

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(PRP) is being used successfully for the treatment of various chronic tendinitis, including chronic plantar fasciitis.[5] Present study was aimed to evaluate and compare the effectiveness of single injection of autologous platelet rich plasma (PRP) and steroid injections in patients of chronic planter fasciitis.

## MATERIAL AND METHODS

Present study was single-center, prospective, comparative study, conducted in Department of Orthopaedic, Sai Sanjeevni Hospital, Kothapeth Hyderabad, Telangana, INDIA. Study duration was of 1 years (January 2021 to December 2021). Study was approved by institutional ethical committee.

**Inclusion criteria:** Patients 19-60 years of age, of either gender, with heel pain felt maximally over the planter aspect for > 6 months continuously.

**Exclusion criteria:** Diabetic patients, Patients with previous surgery for plantar fasciitis, active bilateral plantar fasciitis, presence of vascular insufficiency or neuropathy associated with heel pain, Patients not willing to give consent,

Study was explained to patients and written informed consent was taken for participation. Patients were randomly divided into two groups,

1. group PRP to be administered PRP injection - PRP injection was prepared in our blood bank using centrifugation technique after withdrawing 40 mL blood from antecubital site of the patient. Blood was anticoagulated with citrate phosphate dextrose adenine (CPDA) with a ratio 1:6 to the blood. After ten minutes of centrifugation at 2,000 rpm, the blood got layered in three basic components: red blood cell, platelets, and platelet poor plasma (PPP). Supernatant, including platelets and plasma, were drawn from the tube, and again centrifuged, but at 2,600 rpm for 10 minutes. After centrifugation, two layers were formed in which the supernatant was PRP while the lower layer was concentrated platelets (approximately 4 mL) was drawn into a syringe.
2. group steroids to be administered 2 mL methylprednisolone along with 1 mL local anaesthetic

Injection technique- Affected foot was exposed and after proper cleaning and draping, the foot was approached through medial site using 20 G disposable steel needle. After injection, needle was removed and aseptic dressing was done. Patient was instructed to flex and extend the ankle several times to allow equal distribution of PRP throughout. Patient was discharged from OPD with advice of cold compresses of foot for 24 hours, full weight bearing, oral antibiotics (tablet levofloxacin 750 mg OD) for three days and not to use analgesics for treatment. Patients were given 3 doses of injection, at 0, 1, 2, and 6 month interval. On each follow-up, assessment was conducted with the visual analog scale (VAS) for pain and the American Orthopedic Foot and Ankle Society (AOFAS) score for function. Adverse effects if any were also recorded. Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Difference of proportions between qualitative variables were tested using chi- square test or Fisher exact test as applicable. P value less than 0.5 was considered as statistically significant.

## RESULTS

In present study, 100 patients were randomly divided into group PRP (n=50) and group steroid (n=50). Majority were from 41-50 years age group and were female. Age and sex were comparable among both groups and difference was not significant statistically.

**Table 1:** Age and sex distribution

| Characteristics | Group PRP | Group Steroid | P value |
|---|---|---|---|
| Age (years) | | | 0.84 |
| 19-30 | 4 (8 %) | 3 (6 %) | |
| 31-40 | 11 (22 %) | 10 (20 %) | |
| 41-50 | 21 (42 %) | 23 (46 %) | |
| 51-60 | 12 (24 %) | 13 (26 %) | |
| > 60 | 2 (4 %) | 1 (2 %) | |
| Sex | | | 0.92 |
| Female | 31 (62 %) | 29 (58 %) | |
| Male | 19 (38 %) | 21 (42 %) | |

VAS score was calculated at baseline, at 1,3 and 6 months among both groups. Baseline VAS scores were comparable and difference was not significant statistically. VAS scores were better in PRP group at 1,3 and 6 months as compared to steroid group and difference was significant statistically ($p<0.05$).

**Table 2:** VAS score

| Timeline | Group PRP (Mean ± SD) | Group Steroid (Mean ± SD) | p value |
|---|---|---|---|
| Baseline | 7.67 ± 1.53 | 7.32 ± 1.23 | 0.68 |
| Baseline | 5.22 ± 0.91 | 4.46 ± 1.42 | 0.03 |
| At 1 month | 2.06 ± 0.56 | 3.46 ± 0.45 | <0.001 |
| At 3 month | 1.41 ± 0.45 | 2.91 ± 0.61 | <0.001 |

Mean AOFAS score were comparable at baseline, at 1 months among both groups and difference was not significant statistically (p>0.05). Mean AOFAS score were better in PRP group at 3 and 6 months as compared to steroid group and difference was significant statistically (p<0.05).

**Table 3:** Mean AOFAS score

| Timeline | PRP (Mean ± SD) | Steroid (Mean ± SD) | P value |
|---|---|---|---|
| Baseline | 44.9 ± 11.7 | 45.6 ± 10.7 | 0.81 |
| At 1 month | 71.7 ± 6.4 | 68.4 ± 8.9 | 0.33 |
| At 3 month | 83.1 ± 8.3 | 74.5 ± 8.6 | <0.001 |
| At 6 month | 94.2 ± 4.4 | 65.8 ± 11.0 | <0.001 |

## DISCUSSION

Several terminologies were used to describe pain at the plantar surface of the heel, which includes policeman's heel, heel spur syndrome, joggers heel, sub-calcaneal pain, plantar heel pain, plantar fasciopathy, plantar fasciitis (PF), and plantar fasciosis.[6] In chronic cases, due to cumulative trauma, the micro-tears at its attachment cannot heal, leading to collagen denaturation. A degenerative mechanism in PF is established with histological findings such as collagen necrosis, chondroid metaplasia, and calcification.[7] Medical managements such as nonsteroidal anti-inflammatory drugs (NSAID), local corticosteroid (CS) injection, platelet-rich plasma (PRP) injection, and prolotherapy are used for the treatment of PF.[8] Hypovascularity of plantar fascia prevents accessibility to a high concentration of platelet and other growth factors for natural repair. Injection of PRP directly delivers platelets into the lesion, which releases, platelet-derived growth factor, transforming growth factor beta, endothelial growth factors, that accelerate tissue healing.[9,10] In study by Upadhyay S *et al.*,[11] among140 heels with follow up duration of 6 months. The score on VAS scale and AOFAS improved from base line for both group but the patients received PRP therapy had a statistically significant (p<0.05) reduction in pain and improved AOFAS score at last follow up. The result of present study showed that the PRP therapy has potential to reduce pain and improve the functional outcome in cases of chronic planter fasciitis. It was found to be more effective and significantly better than corticosteroid injection. Similar findings were noted in present study. In a similar study, Sahoo PK *et al.*,[12] noted that corticosteroids (CSs) had an early effect, reducing pain to a moderate level in 82.4% of patients compared to PRP (P = 0.000). However, the effect was not sustainable over a long period. On the other hand, PRP was found to have better pain relief over 3 months and 6 months follow-up with a mean VAS score of 2.0 ± 0.9 and 0.8 ± 0.8, respectively. There was a significant improvement of FFI and RM score as well as at 6 months follow-up (P = 0.000). Therefore, PRP can be advised for sustained and prolonged improvement in PF. Similar findings were noted in present study. In study by Tank G *et al.*,[13] platelet-rich plasma and corticosteroid injection groups at the initial visit had VAS score of 8.44 and 8.38 respectively which was reduced to 1.46 and 3.02 at the end of 6 months. The PRP and corticosteroid injection groups at the initial visit had FAAM score of 29.9 and 31.6 respectively which increased to 83.4 and 69.1 at the end of 6 months. After injection, the PRP group had significant reduction (35.90%) in the thickness of plantar fascia as compared to corticosteroid group (28.67%). Treatment of PF with PRP extract reduces pain and significantly increases function, exceeding the effect of steroid on long-term follow-up. Multiple steroid injections are required for effective and long-term pain relief but they can cause rupture of fascia and atrophy of the fat pad.[14] Fascial rupture interferes with the foot windlass mechanism and promotes inflammation in the neighboring tissue. Atrophy of the plantar fat pad reduces the subcalcaneal cushioning, making it more susceptible to trauma and pain.[15] Conventionally, depot steroid injections delivered close to plantar fascia insertion at the calcaneum are considered as an effective early intervention. A recent Cochrane review however concluded that local steroid injections, in comparison to placebo or no treatment, may slightly reduce heel pain but only up to 1 month and not subsequently. Tendon rupture, collagen necrosis, plantar fascia rupture, plantar fat pad atrophy, plantar nerve injury, calcaneal osteomyelitis, and skin necrosis are some of the reported side effects of local steroid injections.[16,17] PRP is promoted as an ideal autologous biological blood-derived product, which can be exogenously applied to various tissues where it releases high concentrations of platelet derived growth factors that enhance wound healing, bone healing and also tendon

healing. In addition PRP possesses antimicrobial properties that may contribute to the prevention of infections.[18,19]

## CONCLUSION

For the treatment of PF, platelet rich plasma (PRP) is more effective as compared to corticosteroid injection at achieving symptom relief at 3 and 6 months after first injection. The short-term results of PRP injections shows clinical and statistically significant improvements in VAS for heel pain, functional outcome scores. Thus, PRP injection is better for long-term pain relief in planter fasciitis.

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