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# Management of Plantar Fasciitis using Platelet Rich Plasma vs Corticosteroids: A Comparative Study

**M Moeiz Dijoo[1], Ibreez Rakshan[2], Faheem Shafi[3]**

[1,2,3]Post Graduate Department of Orthopaedics, Bone and Joints Hospital Barzullah, Srinagar, India

***Running Title***: PRP Vs steroid in plantar fasciitis

**Abstract:** ***The aim of this study was to compare the effects of PRP injection over Corticosteroid injection in chronic plantar fasciitis. This study being a prospective randomized controlled study included 86 patients with plantar fasciitis. Of these 37 were males and 49 females with age ranging from 18-60 years.42 patients received PRP injection and 44 patients received corticosteroid injections. Improvement in both corticosteroid and PRP groups in terms of AOFAS and VAS scores was observed at 6 weeks and 6 months from the baseline. However, PRP group showed better improvement in scores at 6 months compared to corticosteroid group. This study concluded that PRP is well tolerated and better efficacious that steroids in the management of plantar fasciitis.***

**Keywords:** platelet rich plasma (PRP), plantar fasciitis, corticosteroids

## 1. Introduction

Plantar Fasciitis is an annoying and painful condition that limits function. There is pain and tenderness in the sole of the foot, mostly under the heel, with standing or walking. In fact, it is one of the most common causes of heel pain[1]. The peak age of incidence is between 40-60 years[2]. The incidence of plantar fasciitis varies from 3.8to 10.5/1000 population per year, higher incidence seen in females[3]. The risk factors include excessive foot pronation, high arched foot, leg length discrepancy, high body mass index and prolonged standing [4, 5]. Diagnosis is usually made clinically with patient complaining of sharp pain on the first step, which is relieved or becomes dull ache with gradually increased activity. There is localized tenderness, usually at the medial aspect beneath the heel and sometimes in the midfoot[6, 7]. The condition can take 18−36 months or longer to resolve, but is generally self-limiting[8]. Conservative modalities of treatment include night splinting, orthotics, stretching exercises, extracorporeal shockwave therapy and 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 Plantar fasciitis[9, 10]. No consensus has been reached to make out the most effective modality. Corticosteroid injection has been shown to cause complications like fascial rupture and fat pat atrophy[11, 12]. Platelet- rich plasma contains high concentration of platelets and growth factors. It modulates collagen synthesis, decreases inflammation, promotes tissue healing, and stimulates fibroblast activity [13, 14]. As plantar fasciitis is considered to be caused by repetitive microtrauma, involving a degenerative process rather than inflammation and PRP, having the potential for tissue regeneration, is thus theoretically superior to corticosteroids and NSAIDS[15].

**Aim**

The aim of this study was to compare the effects of PRP injection over Corticosteroid injection inchronic plantar fasciitis.

## 2. Materials and Methods

**Inclusion criteria**:

- Patients aged 18-60 years diagnosed to have plantar fasciitis clinically
- Have received conservative therapy for 6 weeks.
- Pain VAS of greater than 5.

**Exclusion criteria**:

- Patients who do not meet all inclusion criteria.
- Have received local steroid injection within 1 month
- Had undergone previous surgery for plantar fasciitis
- Had history of fractures or other functional limiting disorders of foot
- Had received NSAIDS within 1 week prior to injection
- History of significant cardiovascular, renal or hepatic disease.
- History of uncontrolled diabetes mellitus, bleeding disorder, severe anemia, pregnancy.
- History of gout, rheumatoid arthritis, hypothyroidism.

**Trial Design:**

The study was a prospective, randomized controlled study carried out in accordance with the principles of the Declaration of Helsinki.

**Source:**

All the patients with clinically diagnosed Plantar Fasciitis, who did not improve with 6 weeks of conservative treatment presented to the post graduate department of Orthopaedics, Government medical college, Srinagar, India from October 2020 to September 2021 were included in the study after explaining the procedure with consent.

**Technique:**

After receiving the patients in the outpatient department, they were assigned randomly into one of the two groups. One group received corticosteroid injection and other received PRP injection. Venous sample was drawn from both the groups and according to allotment, which was hidden from the patient, corticosteroid injection or prp injection was given.

**Corticosteroid injection technique:** With a 5cc syringe, 2 mL of Inj. Depo-Medrol 80 mg (methylprednisolone) along with 1 ml of lignocaine (0.25%) is injected into the medial calcaneal tubercle at the point of maximum tenderness using an aseptic technique.

**PRP injection technique:** A 20 ml sample of venous blood was drawn from the patient's cubital vein under sterile aseptic precautions mixed with 3 ml of citrate phosphate dextrose solution (CPDA). The mixture was then divided equally into 4 vacutainers. The sample were then placed in a centrifuge and spun at 3500 rpm for 7 minutes. Using a needle, the buffy coat supernatant layer was removed leaving behind the red and white cell components of the blood. The collected sample was divided equally into two more vacutainers and spun at 3000 rpm for another 5minutes and the buffy coat is aspirated and injected into the medial calcaneal tubercle at the point of maximum tenderness.

Patients were masked by a screen placed so that it obscured their view of the procedure. The administering physician was masked to treatment. Further, separate evaluator who was not present at the time of treatment performed the patient assessment which was documented for every patient prior to the administration, at 6 weeks and 6 months.

The clinical assessment included the following criteria:

- VAS Scoring System
  - Scale from 0 to 10 based on pain scale.
- AOFAS Scoring System
  - In this scoring system the pain, function and alignment are graded on a total score of 100 with pain (40points), function (45 points), alignment (15 points).

The clinical data, AOFAS score, and VAS were obtained on the day of injection, at 6 weeks and 6 months.

## 3. Results

A total of 86 patients (37 men; 49 women) fulfilled the inclusion criteria and consented to take part in this study. Of this 42 (17 men and 25 women) received PRP and 44 received corticosteroid (20 men and 24 women). The average age was documented as 40 years (range 23–59).

**Table 1:** Demographic characteristics

| | PRP (n=42) | Steroid (n=44) | Total (n=86) |
|---|---|---|---|
| Sex (%) | | | |
| Male | 17 (40) | 20 (45) | 37 (43) |
| Female | 25 (60) | 24 (55) | 49 (57) |
| Age (yrs) * | 41±1 | 39±1 | 40±1 |
| Side | | | |
| Right | 22 (52) | 25 (57) | 47 (55) |
| Left | 20 (46) | 19 (43) | 39 (45) |
| *Values expressed as mean± SEM | | | |

**Table 2:** Comparison between Baseline, First and Second Follow-Up Regarding AOFAS and VAS in Both Groups

| Score | Modality | N | Baseline | At 6 weeks | At 6 months | P value |
|---|---|---|---|---|---|---|
| AOFAS | PRP | 42 | 66.3 | 83.4 | 94.8 | <0.001 |
| | CS | 44 | 67.6 | 84.6 | 86.2 | <0.001 |
| VAS | PRP | 42 | 7.2 | 5.6 | 1.4 | <0.001 |
| | CS | 44 | 7.5 | 4.2 | 3.8 | <0.001 |

**Table 3:** Comparison between Groups Regarding Improvement in Outcome Parameters at the End of the Study

| | Corticosteroids (N=44) | PRP (N=42) | P value |
|---|---|---|---|
| AOFAS change (%) | 42 | 68 | 0.025 |
| VAS change (%) | 20 | 62 | 0.003 |

There was a statistically significant improvement in both corticosteroid and PRP groups regarding AOFAS and VAS scores from baseline at6 weeks, and 6 months follow up as presented table 2.

Both groups were then compared to assess the superiority of PRP over corticosteroids. Table 3 presents the percent change of outcome parameters calculated between the initial assessment and the final one. Percent change in AOFAS score was significantly higher in the PRP group than in the steroid group. Percent change in VAS score of pain was also significantly higher in the PRP group than in the steroid group at 6 months.

## 4. Discussion

In our study of 86 patients, with 42 patients receiving PRP injection and 44 receiving steroid injection, we found that both in the Corticosteroid and PRP group there was a significant decrease in the pain and increase in the function as time progressed from the first visit and their consecutive visits at 6 weeks and 6 months. This was observed by the decreasing VAS Score and increasing AOFAS score in both the groups which was statistically significant $P < 0.001$.

At 6 weeks VAS scores showed slightly better improvement in the corticosteroid group compared to the PRP group. AOFAS score in both the groups was similar at 6 weeks.

However, at 6 months follow up PRP group showed statistically better improvement in both AOFAS and VAS scores.

Most of our patients were satisfied with the treatment outcome having unlimited walking without pain. There was no major complication reported in any group.

Our study results on the sustained effects of PRP over Corticosteroid is supported by other studies[16, 17, 18, 19, 20]. Ling and Wangin their meta-analysis of 10 randomized control trials also concluded that PRP had better effects than steroids and its effect was durable in the long term[21].

On the contrary, de Vos et al. randomly studied the effect of injection of platelet-rich plasma in chronic tendinopathy. They concluded that among the patients with chronic tendinopathy, a PRP injection compared with a saline injection did not result in a greater improvement in pain and activity. Therefore, they did not recommend this treatment in chronic tendinopathies including plantar fasciitis[22]. Sheth et al. studied the efficacy of autologous PRP use for orthopedic indications. They concluded that there was uncertainty about the evidence to support the increasing clinical use of PRP as a treatment modality for orthopedic bone and soft tissue injuries. This could be explained by a lack of standardization of study protocol, platelet separation techniques, and outcome measures[23]. Meta-analysis by Singh *et al.* and Babatunde *et al* reported no difference in pain or functional score at long- term follow- up between PRP and steroid groups[24, 10]. Despite extensive research on various modalities of treatment for PF, controversial results continue to emerge.

## 5. Limitations

The study was mainly based on clinical observations. USG and MRI documentation was not used in our study. As such quantitative improvement of the facial thickness and facial healing was not documented. Long term effects were not observed as the duration of study was limited to 6 months. Compliance with the home rehabilitation program and its impact on results was not measured.

## 6. Conclusion

From our study, we conclude that early results of both corticosteroids and PRP therapy are promising. PRP, however, shows better pain and functional improvements over 6 months period. Further, large studies are however needed to evaluate the long-term effects of PRP and the number of doses needed to achieve the desired result.

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