

# A Competitive Study Between Platelet Rich Plasma (PRP) And Corticosteroid Injection In Chronic Plantar Fasciitis

Dr. Imran Jan (Registrar Orthopaedics, Rajawadi Municipal General Hospital, Mumbai)

Dr. Maryia Shafiki (Resident Pathology, Govt. Medical College, Srinagar)

Dr. Aijaz Ahmad Ganai (Resident Orthopaedics, Teerthankar Mahavir University)

## ABSTRACT

**Introduction:** Plantar fasciitis is the most common cause of heel pain. 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 platelet rich plasma (PRP) and steroid injections in patients of chronic plantar fasciitis.

**Materials and methods:** This prospective study was carried out on 40 patients suffering from chronic Plantar Fasciitis who did not respond to conservative therapies including physical therapy, NSAIDs and heel cushions for a longer period of time. The enrolled patients were distributed in two groups A and B with equal number of patients. All the patients were assessed according to the VAS and the AOFAS score which was taken before the injection and at 3 months, and at 6 months.

**Results:** The mean baseline pain scores were changed to  $3.14 \pm 0.81$  in the group A and  $4.22 \pm 1.04$  in the group B. The mean AOFAS score was improved to  $75.76 \pm 7.18$  in the group A (Steroid group) and  $63.80 \pm 12.04$  in the group B (PRP group) in three months. The plantar fascia thickness between group A (Steroid) and group B (PRP) groups was comparable ( $5.69 \pm 0.88$  mm versus  $5.56 \pm 0.95$  mm) at baseline data which was decreased to  $4.58 \pm 1.02$  mm and  $3.53 \pm 0.81$  mm in six months, respectively.

**Conclusion:** The PRP injection showed better performance than the steroid injection for the treatment of plantar fasciitis in six months. To generate robust evidence comparing the efficacy of PRP to steroid injection for the treatment of plantar fasciitis, larger multi-centre trials with more than six months of follow-up are required.

**Key words:** Heal Pain, Plantar Fasciitis, Conservative management, Corticosteroid, Platelet rich plasma (PRP)

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## I. INTRODUCTION

Plantar fasciitis [1] is a common foot condition that occurs in adults, with prevalence estimates between 4 and 7% [2, 3]. Pain is intensified by prolonged weight bearing, obesity, and gradually increased activity [4, 5]. It is estimated that approximately 1 in 10 people experience heel pain at some point. Although PF occurs at all ages, the highest risk of occurrence of PF is 40 to 60 years of age, with no significant sex bias [6]. The etiology and cause of pain is not well understood and is multifactorial. The risk factors which precipitate include intrinsic and extrinsic factors.

Numerous methods have been advocated for treating Plantar fasciitis including rest, non-steroidal anti-inflammatory drug (NSAID), night splints, foot orthosis, stretching protocols, extra corporeal short wave therapy, steroid injections, and surgical intervention [7]. It is reported that the symptoms will disappear after nonsurgical treatment in more than 80% of patients [8]. In 10% of patients, symptoms do not improve with conservative measures and further develop into chronic diseases [9]. In general, when these conservative treatments fail, injecting steroids is considered an option [10].

Corticosteroids injections have been used to treat plantar fasciitis and are an effective modality for pain relief. Literature has shown evidence of complications associated with corticosteroids injections such as fascial rupture [11, 12]. PRP due to its autologous nature is thought to be a safer alternative with less effect on the biochemical function of the foot [13].

This study will help us in deter which amongst the two treatments is more effective both subjectively and functionally.

## **II. MATERIALS AND METHODS**

Present study was single-center, prospective, comparative study, conducted in the department of Orthopedics, Apollo Hospital Navi Mumbai from March 2019 to February 2020.

### **INCLUSION CRITERIA**

- Age of subject is 20-60 years of both genders.
- Patients with plantar fasciitis for more than 3 months.
- Patients without any deformity.
- Normal random blood sugars and Hb1c.

### **EXCLUSION CRITERIA**

1. Patients with Rheumatoid arthritis.
2. Any fractures or injury around the ankle or knee.
3. Patients with the bone tumor infection.
4. Patients with a history of corticosteroid injection past two months.
5. Patients with Hemorrhagic disorder.
6. Age group for less than 20 years and over 60 years.
7. Any systemic or local infective pathology.

Study was explained to patients and written informed consent was taken for participation. Patients were randomly divided into two groups A (Corticosteroid group) and B (Platelet rich plasma group) with equal number of patients in each group.

### **PROCEDURE**

#### **Group A (Steroid group)**

In the steroid group, 2ml of injection Depo-Medrol 80 mg (Methylprednisolone) along with 1 ml lignocaine (0.25%) were loaded in a 5 cc syringe. Then the cocktail was injected into the medial calcaneal tuberosity at the most tender point using an aseptic technique.

#### **Group B (PRP group)**

The 30 ml blood of participants was collected into an acid citrate dextrose tube under aseptic conditions and subjected to centrifugation at 2000 rpm (soft spin) through a digital centrifuge machine speed control (REMI, R-8 C PLUS). There were three layers of blood; among them, the supernatant layer and buff coat of plasma were again subjected to centrifuge at 3000 rpm (hard spin). The upper two-thirds of the tube containing platelet-poor plasma was discarded, and the lower one-third of concentrated platelet plasma superficial buffy coat was injected into medial calcaneal tuberosity at the most tender point. The PRP preparation method and the way of injection technique were adapted from the previous study.

After the injection in both groups, the participants were advised not to engage in any rigorous activity with the affected foot for at least two days and then gradually return to their regular activities. All participants were counselled to follow up in the next visit at three months and six months. The midline and end-line data were recorded at three and six months, respectively. The American Orthopaedic Foot & Ankle Society (AOFAS) was used for the evaluation of functional mobility in the clinical setting before intervention (baseline) and after intervention (midline) at three months and (end-line) at six months follow-up. It combined subjective scores of pain and function provided by the patient as well as objective scores evaluated by the orthopaedic surgeon with a physical examination of the participants. They were assessed by sagittal motion, hindfoot motion, ankle-hindfoot stability, and alignment of the ankle-hindfoot. The pain intensity was evaluated at baseline and the midline at three months and end-line at six months with the Visual Analog Scale (VAS).

## **III. RESULTS**

In the present study, a total of 40 patients were enrolled diagnosed with plantar fasciitis were treated with PRP therapy. The mean age study was 43.25 (range 23-59) years. There were 14 (35%) patients in the age group of 41-50 years. In this study there were 29 (72.50 %) female patients and 11 (27.50 %) male patients. Majority of the patients 17 (42.50 %) had right involvement. In this study 31 (77.5 %) of the study population had pain for around 6-8 months (Table 1).

Table 1: Demographic characters of the patients			
Parameters		No. of patients	Percentage
Age group	20-30	5	12.50
	31-40	9	22.50
	41-50	14	35.00
	51-60	12	30.00
Gender	Male	11	27.50
	Female	29	72.50
Side	Right	17	42.50
	Left	14	35.00
	Both	9	22.50
Duration of pain (Months)	3-5	4	10.00
	6-8	31	77.50
	9-12	5	12.50

### Primary outcomes in steroid injection and PRP injection

The mean VAS scores for pain at baseline were  $4.77 \pm 0.95$  and  $5.22 \pm 1.34$  in group A and B respectively. The mean baseline pain scores were changed to  $3.14 \pm 0.81$  in the group A and  $4.22 \pm 1.04$  in the group B.

The baseline pain score was significantly decreased in the group B (PRP group) than the group A (Corticosteroid group) ( $1.97 \pm 1.13$  versus  $2.71 \pm 0.94$ ).

The functional mobility measured with the AOFAS scores were  $58.14 \pm 11.47$  and  $52.53 \pm 14.87$  in group A and B respectively at the baseline study. The mean AOFAS score was improved to  $75.76 \pm 7.18$  in the group A (Steroid group) and  $63.80 \pm 12.04$  in the group B (PRP group) in three months.

Similarly, the AOFAS score was significantly increased in group B (PRP) than group a (Steroid group), ( $86.04 \pm 7.45$  versus  $81.23 \pm 9.60$ ).

### Secondary outcomes

The plantar fascia thickness between group A (Steroid) and group B (PRP) groups was comparable ( $5.69 \pm 0.88$  mm versus  $5.56 \pm 0.95$  mm) at baseline data which was decreased to  $4.58 \pm 1.02$  mm and  $3.53 \pm 0.81$  mm in six months, respectively.

Table 2: Comparison of VAS score, AOFAS score and plantar fascia thickness at baseline, 3 months and 6 months follow-up between two groups.			
Variables		Group A (Steroid)	Group B (PRP)
VAS score	At baseline	$4.77 \pm 0.95$	$5.22 \pm 1.32$
	At 3-months	$3.14 \pm 0.81$	$4.22 \pm 1.04$
	At 6-months	$2.71 \pm 0.94$	$1.97 \pm 1.13$
AOFAS score	At baseline	$58.14 \pm 11.47$	$52.53 \pm 14.87$
	At 3-months	$75.76 \pm 7.18$	$63.80 \pm 12.04$
	At 6-months	$81.23 \pm 9.60$	$86.04 \pm 7.45$
Plantar fascia thickness	At baseline	$5.69 \pm 0.88$	$5.56 \pm 0.95$
	At 6-months	$4.58 \pm 1.02$	$3.53 \pm 0.81$

## IV. DISCUSSION

Plantar fasciitis is a commonly occurring foot complaint that seriously affects the patient's daily activities and quality of life characterized by pain in the heel. While the main cause of condition is not known, several risk factors have been reported, but the most accepted theory is repetitive micro tearing and subsequent chronic inflammation of the plantar fascia at its insertion to the medial calcaneal tubercle.

In our study the maximum patients were found in age group of 41-50 years and mean age was 43.25 years, females predominated and right side was found more involved.

PF is a common ailment, especially among individuals with increased Body Mass Index (BMI) and in those who stand for prolonged periods [4]. It can certainly interfere with the body kinetic chain and quality of life. Its aetiology is not well understood but studies suggest microtrauma as an initiating factor. The histopathological changes include necrosis of collagen, proliferation of fibroblasts and blood vessels, chondroid metaplasia, dystrophic calcification. Although there are many treatment modalities for PF, their clinical

outcomes are not satisfactory. The study aimed to compare the effect of PRP injection with steroid injection for the treatment of plantar fasciitis. This study shows that steroids had better results than PRP in three months, but in six months, PRP decreased the massive pain and had a more improved AOFAS score compared with steroids.

The well-being of the participants, assessed in terms of pain and functional mobility, was found to be better in the steroid group at three months; however, long-lasting relief from pain and higher mobility function was achieved at six months in the PRP group. These findings are consistent with other studies [14, 15]. Different systematic reviews have shown that steroid injection had a quick recovery in reducing the symptoms than PRP, which has a slower improvement but long-term permanent effect [16, 17]. Yang et al., 2017 found that the PRP is better than steroid injection for long-term pain reduction in plantar fasciitis, but there was no noticeable observed field difference between short- and intermediate-term effects [18]. This can be explained by the fact that PRP has growth factors and many other molecules with biological regenerative properties for the healing [19]. About 70% of growth factors are released after 10 min of PRP injection within one hour, which synthesize and secrete further growth factors for about eight days until the platelets die. It needs six to eight weeks for full activities after injection [20]. Steroids lack this property and interrupt the inflammatory and immune cascade, which is short-lived [21]. Ang et al., 2019 found in the context of lateral epicondylitis that corticosteroid relieves acute pain but not in the long term, which may be due to the short half-life of the steroid [22]. It might be the reason that local steroid leads to a quick recovery in patients. So, they resume injurious activity without proper rehabilitation, which may lead to recurrence at a higher rate [23]. Besides these, current knowledge reveals that PF occurs through a degenerative rather than an inflammatory process [24]. Histologically, PF has a small tear of fascia, which is replaced with normal fascia and surrounding tissue by angiofibroblastic hyperplastic tissue during the healing process. It is possible with the presence of anti-inflammatory and pro-inflammatory cytokines and interleukins, such as interleukin [25-27] interferon- $\alpha$ , and tumour necrosis factor- $\alpha$  in PRP. Similarly, plantar fasciitis lacks the different growth factors due to hyper-vascularity and hypo-cellularity, and PRP provides these factors [28].

The findings of this study showed the comparable thickness of the plantar fascia in both PRP and steroid groups ( $5.56 \pm 0.95$  mm versus  $5.69 \pm 0.88$  mm) at baseline which confirmed the plantar fasciitis; the cut-off value of more than 4 mm thickness of plantar fascia is suggested of plantar fasciitis [29]. Our study found an immense reduction of plantar fascia thickness in the PRP group than in the steroid group in six months, which was clinically and statistically significant. Kalia et al., 2021 mention that steroid injection significantly reduces the plantar fascia thickness at one and three months than that of PRP but no difference in six months [30].

This study has a few limitations. As this study was conducted in a specialized orthopaedic hospital, most of the patients had a treatment done earlier in another center which might affect our intervention's outcomes. Also, most of the patients with plantar fasciitis preferred conservative treatment over injection therapy which could not make the larger sample size to generalize the findings in a large population. Similarly, the multivariate analysis could not be applied as we had no confounders of the plantar fasciitis. Besides these, we did not collect data on anthropometric measurements to find out the body mass index, which is associated with the mechanical properties of the plantar fascia and heel pad [31].

## V. CONCLUSION

The PRP injection showed better performance than the steroid injection for the treatment of plantar fasciitis in six months. To generate robust evidence comparing the efficacy of PRP to steroid injection for the treatment of plantar fasciitis, larger multi-centre trials with more than six months of follow-up are required.

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