

## COMPARISON ON THE EFFECT OF CORTICOSTEROIDS AND PLATELET-RICH PLASMA (PRP) FOR THE TREATMENT OF PLANTAR FASCIITIS: A PROSPECTIVE STUDY

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### Abstract

**Background:** Plantar fasciitis is a common and painful foot disorder, and treatment options include corticosteroid and platelet-rich plasma (PRP) injections. This prospective study aimed to compare the efficacy of these two treatments. **Materials and Methods:** Sixty patients with plantar fasciitis were divided into two groups: Group 1 received PRP therapy, and Group 2 received corticosteroid therapy. Both groups were assessed using Visual Analog Scale (VAS) scores and American Orthopaedic Foot and Ankle Society (AOFAS) hind-foot scores at multiple time points. **Result:** Both treatment groups showed significant improvement in VAS scores and AOFAS hind-foot scores compared to baseline. Corticosteroid injections provided faster relief, while PRP injections had longer-lasting effects. No complications were observed with corticosteroid injections, but PRP appeared to be a safer option. **Conclusion:** This study demonstrates that both corticosteroid and PRP injections are effective for treating plantar fasciitis. Corticosteroids offer rapid relief, while PRP provides sustained benefits. PRP may be a safer alternative in the long term, considering the potential risks associated with corticosteroid treatment. Further research into the underlying causes of plantar fasciitis is needed to refine treatment approaches, and PRP therapy remains a promising avenue for future investigation.

## INTRODUCTION

Plantar fasciitis is a common and debilitating foot disorder, affecting approximately 15% of the population,<sup>[1]</sup> with a lifetime prevalence of over 10%.<sup>[1-3]</sup> It is characterized by collagen degeneration within the plantar fascia, likely due to repetitive micro-rips, although its precise etiology remains unclear.<sup>[4-6]</sup>

The plantar fascia plays a crucial role in maintaining the foot's medial arch and facilitating the gait cycle.<sup>[4,5]</sup> Patients typically present with sharp, gradually onset pain along the anterior medial edge of the calcaneus, most pronounced in the morning or after periods of inactivity.<sup>[7]</sup>

Treatment options include conservative measures, such as rest and NSAIDs,<sup>[7]</sup> as well as advanced therapies like extracorporeal shock wave therapy and autologous platelet-rich plasma (PRP).<sup>[7,12]</sup> However, corticosteroid use, while common, raises concerns about potential complications, such as plantar fascia rupture.<sup>[1]</sup>

This study aims to compare the efficacy of PRP and corticosteroids in treating plantar fasciitis.

## MATERIALS AND METHODS

The prospective study was carried out at Annapoorana medical college and hospitals in Salem after first receiving consent from the institutional ethical committee. The participants in the trial were split into two groups: Group 1, which received PRP therapy, and Group 2, which received corticosteroid therapy. Each group received 30 samples. Patients who had elevated levels of inflammatory indicators (c-reactive protein and ESR) were prescribed corticosteroids, whereas patients whose inflammatory marker levels were within normal range were given platelet-rich plasma (PRP). There were around 60 patients, of which 30 subjects were receiving PRP therapy while the remaining 30 subjects were receiving corticosteroid therapy. Patients with complaints of plantar heel pain and patients with maximal soreness at the attachment of

the plantar fascia on the medial tubercle of the calcaneum were included in the study. Patients' ages ranged from 20 to 60 years, and they all had to present with these symptoms. Previous surgery for heel pain, accidental or work-related injury, pregnant or breast-feeding females, systemic diseases such as inflammatory or degenerative polyarthritis, diabetes mellitus, local or systemic infection, peripheral vascular diseases, metabolic diseases such as gout, clotting disorder, and anticoagulation therapy patients, any dysfunction of the ankle, knee, or foot, and patients with neuropathic symptoms were excluded from this study due to the inclusion of these exclusion criteria (radiculopathy, tarsal tunnel syndrome, tarsi sinus syndrome).

#### PRP preparation and injection

A bench-top centrifuge is utilized to concentrate platelets from autologous whole blood. Two milliliters of PRP is acquired utilizing a single step centrifugation process. Ten milliliters of blood is taken from the Median Cubital Vein of the patient and gathered in the EDTA Bulb. Platelet tally is checked in that sample and afterward it is spun at 1800 rpm for 8 minutes in two centrifuge tubes. The base one milliliter of the plasma from each of the tubes – the platelet-rich plasma (PRP) – is reaped from each tube abstaining from contamination by the buffy coat and red cell layers, for infusion into the patient. The arranged PRP infusion is then given into the most delicately touchy purpose of the heel. Under antiseptic precautions, patients in Group A are given one milliliter of 2% Lignocaine at the restorative side of the calcaneum into the purpose of most extreme delicacy, at that point it is infiltrated with an infusion of two milliliters of autologous PRP. Comparably, Group B patients are infiltrated with two milliliters of DepoMedrol (40 mg methyl-prednisolone acetate) blended.

#### Post-procedure Protocol

After the treatment, the patients were given the instructions to apply ice and to wear shoes that were comfortable. They were cautioned against engaging in high-impact activities like sprinting, jumping, and others. Analgesics such as paracetamol were approved as an additional medication during the trial; however, they could only be taken for one or two days at a time to alleviate the pain caused by the injection. After receiving a PRP injection, using NSAIDS was not recommended.

**Follow-up assessment:** The patients in the study were evaluated for pain using a Visual Analog Scale on the day of presentation as well as following therapy at two weeks, four weeks, three months, and six months. Additionally, an AOFAS hind-foot Score was obtained at the six-month follow-up.

#### Statistical analysis

For continuous variables, descriptive statistics were presented as the mean accompanied by the standard deviation, and for categorical variables, frequencies were reported alongside percentages. Both the Chi square test and the independent t test were utilized in order to determine the degree of connection between the categorical variables and the continuous variables. IBM SPSS Statistics for Windows, Version 26.0, developed by IBM Corp. and based in Chicago, Illinois, was used to do statistical analysis on the collected data.

## RESULTS

The patients' ages ranged from between 35 to 85 years, with a mean of  $56.70 \pm 12.98$  years. Patients had a mean body mass index of  $25.20 \pm 8.43$  kg/m<sup>2</sup>, according to the calculations. The duration of symptoms was determined to be  $3.14 \pm 2.08$  months on average across all of the groups. There was no significant difference between groups with respect to mean age, presence of smoking status, presence of alcohol intake status, comorbidities, history of injuries and activities [Table 1].

When compared to the scores obtained before to treatment, the average VAS score was significantly lower in both the corticosteroid and the PRP-injected groups ( $P = 0.001$  for both comparisons). The mean VAS heel pain score that were measured 6 months after treatment were 1.93 in the steroid group and 1.83 in the PRP group, and the scores in both groups were significantly lowered when compared with the levels that were experienced before to receiving therapy (9.53 in the steroid group and 8.77 in the PRP group) [Table 2].

The AOFAS hind-foot scores that were measured at six months after treatment were 7.28 in the steroid group and 8.81 in the PRP group; the scores in both groups were significantly lower when compared with the values that were obtained before treatment (5.41 in the steroid group and 5.10 in the PRP group) [Table 3].

**Table 1: Distribution of baseline characteristic of study participants (N=60)**

Sl.no	Variable	PRP	Corticosteroid	p
1	Age	54.38±13.44	58.87±12.36	0.18
2	Gender			
	Male	18 (60)	16 (53.3)	
	Female	12 (40)	14 (46.7)	
2	Height	158.93±5.80	161.81±5.73	0.05
3	Weight	59.03±6.35	65.42±8.76	0.002
4	BMI	23.27±1.51	30.79±15.71	0.01
5	Presence of smoking	11 (37.9)	9 (29)	0.58
6	Presence of Alcohol intake	18 (62.1)	14 (45.2)	0.21
7	Co morbidities			
	Diabetes	8 (26.7)	8 (26.7)	

	Hypertension	11 (36.7)	13 (43.3)	
	Dyslipidemia	4 (13.3)	1 (3.3)	
	Thyroid	1 (3.3)	2 (6.7)	
	Peripheral vascular disease	1 (3.3)	0 (0)	
8	Duration of pain from foot to heel	2.44±1.87	3.83±2.06	0.008
9	History of incidents			
	Fall	3 (10)	3 (10)	
	Trauma	5 (16.7)	3 (10)	0.05
	Osteoporosis	4 (13.3)	7 (23.3)	
	Rheumatoid arthritis	4 (13.3)	3 (10)	
10	History of Injuries			
	Yes	18 (60)	16 (53.3)	
	No	12 (40)	14 (46.7)	0.61
11	Activities			
	Dancing	7 (23.3)	7 (23.3)	
	Running	3 (10)	4 (13.3)	0.50
	Exercise	11 (36.7)	6 (20)	

**Table 2: Distribution of Visual analogue scores among the study participants (N=60)**

Sl.no	Group	VAS Scores				
		Baseline	2nd week	4th week	3rd month	6th month
1	PRP	8.77±0.85	7.97±0.76	5.40±0.49	3.93±.83	1.83±0.98
2	Corticosteroid	9.53±0.51	8.50±0.51	6.67±0.48	5.03±0.81	1.93±0.83
p value		<0.001	<0.001	<0.001	<0.001	0.672

**Table 3: Distribution of AOFAS hind-foot Score among the study participants (N=60)**

Slno	Group	AOFAS hind-foot Score				
		Baseline	2nd week	4th week	3rd month	6th month
1	PRP	5.10±0.93	3.90±0.71	5.66±1.03	6.19±1.13	8.81±1.61
2	Corticosteroid	5.41±0.98	3.02±0.55	4.63±0.84	4.23±0.77	7.28±1.33
p value		<0.001	<0.001	<0.001	<0.001	<0.001

## DISCUSSION

In this study, we examine the effectiveness of treating individuals with chronic plantar fasciitis with corticosteroid injections versus platelet-rich plasma injections. When conservative management is not helpful in treating plantar fasciitis, an effective treatment for plantar fasciitis is an injection of steroids into the affected area.<sup>[12-14]</sup> Steroids, in addition to improving clinical parameters, are said to alter the ultrasound look of plantar fasciitis by lowering the plantar fascia thickness and lowering the occurrence of hypoechoic tissue. Steroids do this by reducing the thickness of the plantar fascia.<sup>[12]</sup> Although some writers come to the conclusion that steroid injections can provide relief in the short term,<sup>[15]</sup> there are other studies that demonstrate good effects of local steroid injection for plantar fasciitis in the long run. At the 12-month follow-up, both Porter and Shadbolt,<sup>[14]</sup> stated that the steroid injection treatment had shown satisfactory results. The technique used to administer the corticosteroid injection is the second concern that must be addressed throughout treatment. Although ultrasound-guided injection was proposed in certain studies,<sup>[12,13,17]</sup> Kane et al,<sup>[18]</sup> showed that there was no significant difference in the outcome between ultrasound-guided injection and palpation-guided injection approaches. Scintigraphy was given as a tool that can aid to detect possible responders in yet another study that was conducted by Frater and colleagues.<sup>[19]</sup> The author mentioned that the blood-pool phase can accurately predict the response. A high success rate can be achieved by the use of steroid

injections when treating focal calcaneal hyperemia. The success rate for patients whose hyperemia extended into the proximal soft tissues was only fifty percent, and there was no response to steroid injection in individuals whose hyperemia was diffuse.

It would appear that the outcomes of plantar fasciitis treatment are influenced by a number of different elements. Some examples include the severity of the sickness and the technique used for injecting the drug. Research into the pathogenesis of plantar fasciitis is another topic of controversy in the medical literature, and it is likely that these findings may lead to adjustments in the treatment approaches. In a similar manner, the histologic evaluation of surgical biopsy specimens revealed collagen necrosis, angiofibroblastic hyperplasia, chondroid metaplasia, and matrix calcification, as shown in a study that was conducted by Snider and colleagues.<sup>[20]</sup> Once more, there is no cellular evidence to support the claim that there was an inflammatory reaction.

Platelet rich plasma, or PRP, is a concentration of platelets obtained from the plasma component of autologous blood that has been spun and filtered. High concentrations of growth factors such as platelet-derived growth factors (PDGF), epidermal growth factor (EGF), vascular endothelial growth factor (VEGF), and transforming growth factor beta (TGF-) are present in it.<sup>[21]</sup> When utilised in chronic tendon healing, the injection of platelet-rich plasma (PRP) into the damaged tissue has the effect of re-starting the body's natural healing process.<sup>[7]</sup> PRP has been shown to be effective in the treatment of wounds, ligamentous injuries, cartilage injuries,

muscle injuries, and bone augmentation, with encouraging outcomes being recorded. When applied to chronic wounds, platelet-rich plasma (PRP) therapy kickstarts the inflammatory response, which ordinarily stops in the aftermath of unsuccessful conservative treatment, so transforming the chronic wound into a fresh acute injury. The second beneficial impact of platelet-rich plasma therapy in chronic conditions is that the addition of autologous quantities of platelets can, in theory, speed up the body's natural ability to repair. There are not many research that have been done comparing the efficacy of steroid injections to that of PRP injections in the treatment of chronic tendon disorders or plantar fasciitis.<sup>[22]</sup> A beneficial effect of injection of platelet-rich plasma (PRP) at the common extension origin for lateral epicondylitis was seen in a recent study conducted by Peerbooms et al.<sup>[7]</sup> In this article, a comparison was made for the first time between platelet-rich plasma (PRP) injections and corticosteroid injections as a treatment for lateral epicondylitis in patients who had not responded to non-operative treatment. According to the findings of their study, a single injection of concentrated autologous platelets is superior than a corticosteroid injection in terms of its ability to alleviate pain and increase function.

Plantar fasciitis was successfully treated with injectable PRP, according to a study that was conducted by Barrett et al.<sup>[6]</sup> They hypothesised that the illness was not an inflammatory entity but rather a degenerative disorder of the fascia rather than the inflammation that is traditionally associated with it. Plantar fasciography was the name given to the procedure that involved injecting platelet-rich plasma (PRP) into a plantar fascia that was bothersome and resistant to treatment in the hopes of producing a reparative impact that would result in the disappearance of the symptoms. They demonstrated that there was a significant decrease in the thickness of the plantar fascia using ultrasound measurements before and after the injection. In their prospective, randomised, and controlled research, Lee et al,<sup>[23]</sup> compared the effectiveness of autologous blood injection versus steroid injection in the treatment of plantar fasciitis. They came to the conclusion that intralesional autologous blood injection is effective in reducing pain and tenderness in chronic plantar fasciitis; nevertheless, corticosteroid is superior in terms of speed of improvement and the likely extent to which it will improve the condition. PRP is obtained from the plasma component of autologous blood using centrifugation or filtration, making it the most powerful form of autologous blood in terms of the amount of growth factors and the concentration of platelets. This is because PRP has a higher number of platelets. Regarding the use of autologous blood, our findings did not support our hypothesis, despite the fact that we anticipated that PRP would have a more potent effect in the treatment of plantar fasciitis.

## CONCLUSION

In conclusion, this prospective study showed that both corticosteroid injections and PRP injections are effective in the treatment of plantar fasciitis. Corticosteroids had a quicker onset of relief but the effects were shorter-term than PRP, which had slower onset but longer lasting effects. Both approaches were beneficial in alleviating the pain and discomfort associated with plantar fasciitis. Although we did not observe any complications related to steroid injection, when the potential risks of corticosteroid treatment are taken into consideration, such as fat pad atrophy, osteomyelitis of the calcaneus, and iatrogenic rupture of the plantar fascia, PRP injection appears to be safer while being just as effective in the treatment of plantar fasciitis. In the present investigation, clinical evaluation strategies were utilised to investigate how the corticosteroid and PRP injections affected the symptoms of plantar fasciitis in individuals. Because plantar fasciitis is thought to be a regenerative process rather than an inflammatory reaction, the results of the PRP injection group were expected to be more satisfactory in cases of plantar fasciitis. Taking into consideration the possible regenerative effect of PRP was necessary in order to arrive at this conclusion. There is a possibility that more research into the aetiology of plantar fasciitis will assist us in better comprehending our findings.

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