IJPSR (2022), Volume 13, Issue 12 (Research Article)

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 06 April 2022; received in revised form, 16 May 2022; accepted, 06 June 2022; published 01 December 2022

EFFICACY OF PLATELET-RICH PLASMA (PRP) *VS* CORTICOSTEROID INJECTION IN PLANTAR FASCIITIS

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Keywords:

Plantar Fasciitis, PRP, Corticosteroid, AOFAS score

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ABSTRACT: Introduction: Plantar fasciitis is one of the more common causes of pain in the heel, as seen in non-traumatic patients. When the conservative treatments fail, Corticosteroid injection and Autologous Platelet Rich Plasma (PRP) injection will provide good pain relief. The study was performed to compare the functional outcomes following PRP and steroid injection and to identify which modality provides better pain relief. **Materials and Methods:** This was a prospective study of 30 patients. Patients were allocated to 2 groups, Group A(n = 15) and Group B(n=15). PRP injection was given in group A and Corticosteroid injection was given in group B. Visual Analog scale (VAS) and American Orthopaedics Foot and Ankle Society (AOFAS) score were used for assessing the pain and functional outcome. **Results:** In group A: the mean VAS pre-PRP was 6.66, which improved to 1.13 at the 6th-month follow-up. The mean AOFAS score pre-PRP was 62.8 and was improved to 89.20 at the 6th-month follow-up. In group B, the mean VAS pre-steroid injection was 6.8, which improved to 2.86 at the end of the 6th-month follow-up. The mean AOFAS score pre-steroid injection was 63.3 and was improved to 84.1 at the end of the 6th-month follow-up. **Conclusion:** Autologous PRP injections are more efficient than corticosteroid injections in terms of long-term pain relief and improvement of functional outcomes in treating plantar fasciitis.

INTRODUCTION: Plantar fasciitis is one of the more common causes of pain in the heel, as seen in non-traumatic patients [1]. A patient presenting with complaints of pain in the sole, which is worse while taking 1st step on rising in the early morning with medial calcaneal area tenderness and risk factors like obesity, long-standing stretching of the plantar fascia, and poor foot ware usage will lead towards the diagnosis of plantar fasciitis [2].

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.13(12).5018-23

This article can be accessed online on www.ijpsr.com

DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.13(12).5018-23

Pathophysiology is due to prolonged repetitive microtrauma, leading to inflammation of the plantar fascia and local tissue damage. Non-operative management includes ice pack application, splints, shockwave therapy, exercises comprising stretching the plantar fascia, and analgesics [3].

When this conservative management fails, local corticosteroid injections are usually used due to their low cost, easy application, and good pain relief. Still, it has complications like local oedema and infection[4]. Therefore, Platelet Rich Plasma(PRP) is being used for managing plantar fasciitis with successful results as it has Autologous nature with less complications as compared to the steroids [5].

The study was performed to compare the functional outcome and pain relief following PRP and steroid injection using the VAS score and AOFAS score.

MATERIALS AND METHODS: This was a prospective comparative study conducted on 30 patients who came to our medical college and hospital between January 2020 to January 2021 and were diagnosed with Plantar fasciitis after finding history and doing the examination. Ethical committee approval obtained SMC/IEC/2020/11/72. All patients aged >18 years and had had Plantar fasciitis for at least 6 months and had not improved with conservative management were included in the study. Patients with prior surgical management for plantar fasciitis, presence of vascular insufficiency, Diabetes mellitus patients, Hypothyroid patients, and patients who were unwilling to give consent and follow-up were excluded. Patients were randomly allocated to 2 groups using the lottery method, Group A (n = 15) and Group B (n = 15). PRP injection (3ml) was given in group A patients, and Corticosteroid injection (80mg Depomedrol-2ml + 1 ml of lignocaine 0.25%) was given in group B patients.

All the patients in both groups were asked not to use the NSAID's 1 week before the injection. All the patients were checked for random blood sugar levels before the injection.PRP preparation was done using the Centrifugation technique. 20ml of blood was collected from the cubital vein into 6 blood tubes, each containing 3.2% sodium citrate of quantity 0.35ml.

These blood tubes were centrifuged for 10mins at 1200rpm. After 10 min, 3 layers were identified in each vacutainer, the bottom layer contains red blood cells, the middle layer contains white blood cells, and the top layer contains white blood cells, platelets, and plasma. Using a 10 ml syringe, the concentrate of the upper layer alone of about 1–1.25ml from each vacutainer was collected carefully. The collected fluid was taken into another vacutainer and was again centrifuged for 10mins at 2400rpm. After 10mins, the upper half volume, which contains plasma, platelet-poor plasma, was removed, and the residual fluid, which contains platelet-rich plasma (PRP) was used for administering to the patient. Under aseptic precautions 3ml of this PRP was administered to the patients of group A over the point of maximum tenderness at the medial tubercle of the calcaneum, using a 20G needle after initial installation of local anaesthesia (1ml of 0.25% lignocaine). In all the patients, flexion and extension of the ankle were performed several times after the injection to see equal distribution of PRP. In Group-B patients, under aseptic precautions, 2ml of Depomedrol-80mg + 1ml of 0.25% lignocaine was injected using a 20G needle over the point of maximum tenderness at the medial tubercle of the calcaneum. In both groups, all the patients were evaluated pre-injection, and regular follow-ups were done at 1st, 2nd and 6th-month using VAS scores ranging from 0, which indicates no pain to 10, which indicated worst pain, and AOFAS functional score. AOFAS consists of a total of 100points and is graded as 40 points for pain, 45 for function, and 15 for alignment. All the patients were sent home with the advice of cold compression for 24hrs, full weight bearing, foot ware modification (MCR foot ware), and oral antibiotics for 3 days and not to use Analgesics. All Statistical data were analyzed using SPSS 11 software. A P value of less than 0.05 was considered to be statistically significant.

RESULTS: A total of 30 patients were included in the study. They were allocated to 2 groups-Group A (n = 15) and B (n = 15). PRP injection was given for Group A patients, and for Group B patients, Steroid injection was given. Out of 30 patients, the lowest age was 35years, and the maximum age was 53 years, with the mean age being 42.7 years **Fig. 1.**

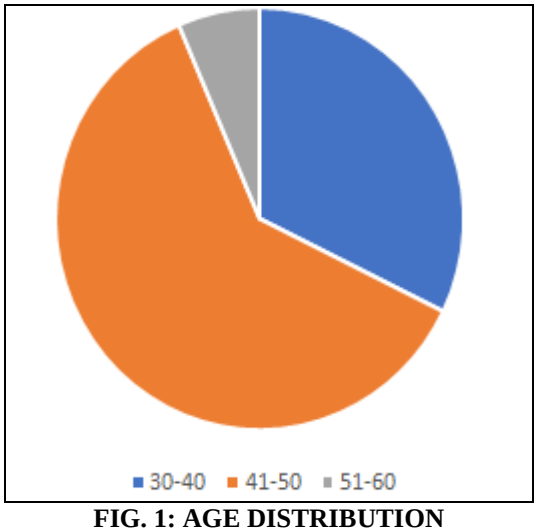

FIG. 1: AGE DISTRIBUTION

There were 17 Females (56.7%) and 13 males (43.3%) in the study **Fig. 2**.

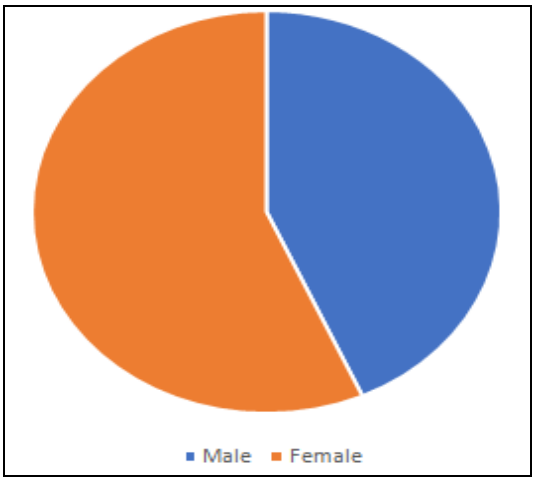

FIG. 2: GENDER DISTRIBUTION

The left heel was involved in 56.7% of patients, while the right heel was involved in 43.3% **Fig 3**. All the patients were followed up at 1month, 2nd and 6th months post-procedure **Table 1.**

Group A (n = 15): Patients Treated with PRP Injection: Patients between 36 to 53 years were included with a mean age of 42.8 years. There were 9 females (60%) and 6 males (40%). The left heel was involved in 56.7% of patients, while the right heel was involved in 43.3% **Fig. 3**.

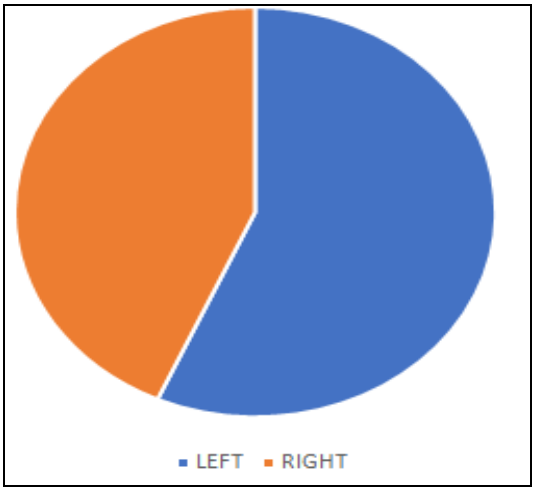

FIG. 3: SIDE AFFECTED

The mean Visual Analog Score (VAS) pre-PRP was 6.66, which improved to 2.06, 1.86, and 1.13 at the 1st-month follow-up 2ndand 6th-month follow-up, respectively post PRP, which was of statistical significance with P less than 0.05 **Fig. 4, Table 1**. The average American Orthopaedics foot and ankle society (AOFAS) score pre-PRP was 62.8 and was improved to 83.46,85.33,89.20 at the 1st month follow up, 2nd and 6th month follow up, respectively post PRP indicating statistically significant with P less than 0.05 **Fig. 5**. One patient had complications of pain and skin bruising after injecting PRP, which resolved spontaneously after 3 days.

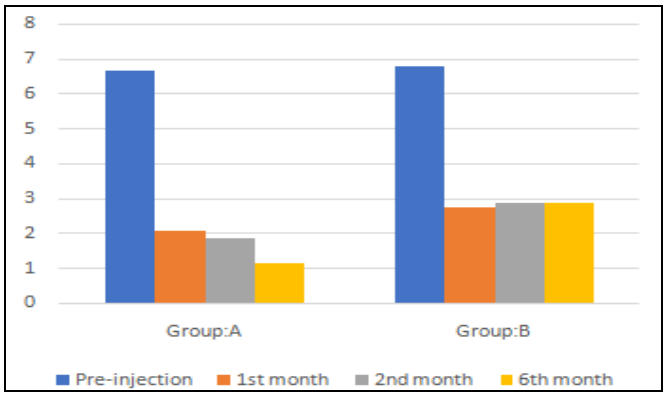

FIG. 4: MEAN VAS SCORE

Group B (n = 15): Patients Treated with Steroid Injection: Patients between 35 to 51 years were included with a mean age of 42.6 years. There were 8 females (53.3%) and 7 males (46.7%). The left heel was involved in 60%, while the right heel was involved in 40%. The mean Visual Analog Score (VAS) pre-steroid injection was 6.8, which improved to 2.73, 2.86, and 2.86 at the1st month follow-up, 2nd and 6th-month follow-up, respectively post steroid injection, which was of statistical significance with P less than 0.05 **Fig. 4**, **Table 1**. The average American Orthopaedics foot and ankle society (AOFAS) score pre-steroid injection was 63.3 and was improved to 81.46, 82.13, 84.1 at the end of 1st-month follow-up, 2nd and 6th month follow up respectively post steroid injection indicating statistically significant with P less than 0.05 **Fig. 5, Table 2.**

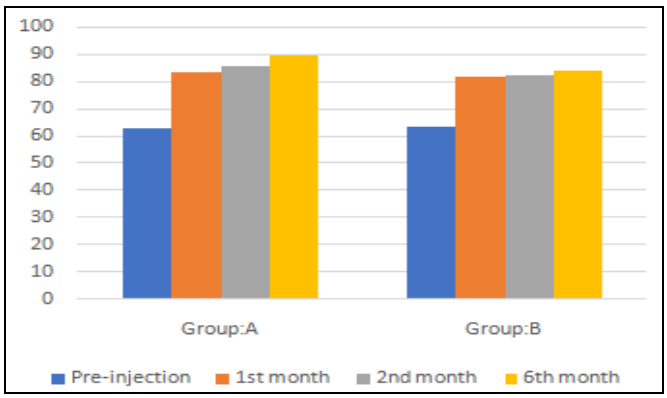

FIG. 5: MEAN AOFAS SCORE

TABLE 1: PATIENTS DEMOGRAPHICS AND DATA

S. no.	Age	Gender	Side	Procedure performed		Vas score				A of as ankle and hind foot score			
				PRP	Steroid	Pre-injection	Post-injection (months)			Pre-injection	Post injection (months)		
							1	2	6		1	2	6
1	44	F	RIGHT	✓	×	5	2	2	1	60	82	86	92
2	49	F	LEFT	✓	×	7	2	2	1	64	86	86	90
3	42	M	LEFT	✓	×	6	2	2	1	60	82	84	88
4	38	F	RIGHT	✓	×	7	1	1	1	64	84	86	94
5	45	F	RIGHT	✓	×	6	2	2	1	58	82	84	88
6	40	F	LEFT	✓	×	7	3	2	1	62	88	88	90
7	53	M	RIGHT	✓	×	8	3	2	2	68	80	84	88
8	41	F	RIGHT	✓	×	5	1	1	1	62	82	84	88
9	44	M	LEFT	✓	×	7	2	1	1	66	86	86	90
10	45	M	LEFT	✓	×	6	2	2	1	60	82	84	88
11	36	F	LEFT	✓	×	8	2	2	1	68	84	86	86
12	41	M	RIGHT	✓	×	7	2	2	1	62	86	88	88
13	44	F	RIGHT	✓	×	8	3	3	2	66	82	86	90
14	38	F	LEFT	✓	×	6	2	2	1	58	82	84	90
15	42	M	LEFT	×	✓	7	3	3	1	64	84	84	88
16	45	M	LEFT	×	✓	8	3	3	3	68	82	84	88
17	41	M	LEFT	×	✓	6	2	3	3	64	80	82	82
18	49	F	LEFT	×	✓	7	3	3	3	64	84	84	88
19	37	F	RIGHT	×	✓	7	3	3	3	62	80	82	82
20	44	M	RIGHT	×	✓	8	4	3	3	62	82	84	84
21	40	F	LEFT	×	✓	5	2	2	2	58	80	82	84
22	46	M	LEFT	×	✓	6	2	2	2	62	84	84	86
23	35	M	LEFT	×	✓	7	3	3	3	64	84	84	88
24	44	M	RIGHT	×	✓	7	2	3	3	62	82	82	84
25	41	F	LEFT	×	✓	8	4	4	4	64	80	80	84
26	49	F	RIGHT	×	✓	5	2	2	2	60	80	80	80
27	51	M	RIGHT	×	✓	7	3	3	3	66	82	82	84
28	42	F	RIGHT	×	✓	6	2	3	3	62	80	80	82
29	39	F	LEFT	×	✓	7	3	3	3	64	82	82	84
30	37	F	LEFT			8	3	3	3	68	80	80	82

M – Male, F – Female.

TABLE 2: MEAN VALUES OF THE PATIENTS

S. no.	Scores	Group: A				Group: B			
		Pre-injection	Post-injection(months)			Pre-injection	Post-injection(months)		
			1st	2nd	6th		1st	2nd	6th
1	VAS Score	6.66	2.06	1.86	1.13	6.8	2.73	2.86	2.86
2	AOFAS Score	62.8	83.46	85.33	89.20	63.3	81.46	82.13	84.1

Two patients had complications, 1 patient had the complication of pain till 2nd day, which resolved spontaneously and the other had pain and infection, which resolved after 5 days of analgesics and oral antibiotics. There were only minor complications in both the groups and no major complications have been noted. No patients have lost to follow-up.

DISCUSSION: Plantar fasciitis is a soft tissue disorder that is a common cause of heel pain. In chronic plantar fasciitis patients, fascia will be replaced by angiofibroblastic tissue [6]. On histology chondroid metaplasia, collagen necrosis, and calcification will be found, suggesting degenerative condition. For plantar fasciitis many studies have suggested different beneficial modes of treatment, but till today, no ideal treatment has been determined [7]. It is a condition that is self-limiting and conservative management is enough and gives good results. Few patients alone will have chronic plantar fasciitis with persisting pain. Out of the present treatment options, corticosteroid injections are widely used for relieving pain [8]. Fibroblast proliferation inhibition and ground substance proteins expression by corticosteroids is the reason

for relieving pain and providing good outcome [9]. PRP injections are also used as an effective model in managing plantar fasciitis. PRP is plasma volume containing a platelet level concentration higher than that of normal blood. It promotes cellular chemotaxis and brings about tissue healing, differentiation, proliferation, and removal of debris from the tissues [10]. PRP causes release of various growth factors (GF) as follows:

- PDGF (platelet-derived GF) - promotes angiogenesis and epithelialization.
- EGF (Epidermal GF) - promote cell differentiation and re-epithelialization.
- FGF (Fibroblast GF) - promotes the proliferation of fibroblasts and endothelial cells.
- TGF (Transforming GF) - promotes the formation of the extracellular matrix.

These factors will be found at lesser concentrations in this condition due to hypocellularity and hypervascularity. Delivering PRP will cause the release of these factors, promoting angiogenesis and fiber repair [11].

This study compared corticosteroid injection vs. PRP injection of patients who presented with chronic plantar fasciitis symptoms and observed both VAS score and AOFAS scores are improved in both groups at the 1st-month follow-up and further improved at 2nd-month follow-up. The AOFAS score at the 6th-month follow-up had improved in both the groups, while VAS score remained constant after 2nd-month follow-up in the corticosteroid group.

There were only minor complications in both groups. Monto *et al*. showed that PRP injection gave good functional outcomes with better pain relief and beneficial effects sustained for long periods compared to the patients who were given the corticosteroid injection [12]. A study done by Kumar *et al.* showed that PRP injection gives better pain relief than corticosteroid injection at the end of follow-up at 6 months [13]. Our results are similar to the above studies. In contrast, a study done by Lee *et al*. showed that patients who had been given corticosteroid injections had lower VAS scores than PRP injections [14] and a study done by Jain *et al.* found that there is no significant difference in functional outcomes between the PRP and corticosteroid group sat the end of 6 months [15]. Limitations of the study are the relatively small study sample with short follow-up and the absence of diagnostic tools like MRI or USG for confirming the diagnosis of the disease and checking the position of injection and its effects post-procedure. The difference in platelet concentration among different patients. Further studies are necessary to evaluate the good treatment modality for plantar fasciitis, which gives better pain relief and good functional outcomes in the long term with less complications.

CONCLUSION: In our study, corticosteroid injections and PRP have given better pain relief in managing plantar fasciitis, but Autologous PRP injections are more efficient than corticosteroid injections in terms of long-term relief of pain and improvement in functional outcome in treating plantar fasciitis.

ACKNOWLEDGEMENT: None

CONFLICTS OF INTEREST: None to declare

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How to cite this article:
Sandeep PK, Ramkumar MSV, Ravi A and Kumar A: Eefficacy of platelet rich plasma (PRP) *vs* corticosteroid injection in plantar fasciitis. Int J Pharm Sci & Res 2022; 13(12): 5018-23. doi: 10.13040/IJPSR.0975-8232.13(12).5018-23.