

Plantar Fasciitis Management with Platelet Rich Plasma versus Steroid Injection - A Comparative Study in North Karnataka Population

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Received: 01-08-2025 Revised: 15-09-2025 / Accepted: 21-10-2025

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Conflict of interest: Nil

Abstract

Background: Plantar fasciitis occurs due to degeneration of plantar fascia by repeated trauma at its origin; such a pathological condition needs to be treated.

Method: Out of 90 (ninety) patients, 45 patients were injected corticosteroid 2ml (8 mg) of corticosteroid along with 0.5 ml of plain 2% xylocaine using a 2 G wide-bore needle. PRP (platelet-rich plasma) was prepared from the blood drawn from the cubital vein with the help of a BD Vacutainer Eclipse in three BD Vacutainer tubes, which are 2.7 ml tubes that contain 0.35 ml of 3.2% sodium citrate as an anticoagulant. Blood was centrifuged twice, the first time at 1200/rpm, second time at 2400 rpm. The platelets were checked randomly by a pathologist using a Neubauer chamber or autoanalyzer. PRP was injected at the tenderness site after injecting 2% of xylocaine with 20 G. Gauze needle and follow-up were done for a week, the 6th week, the 3rd month, and the 6th month, and outcomes of results were noted.

Results: Clinical manifestations were VAS. Baseline score: 7.13 in the PRP group, 7.30 in the steroid group. The baseline AOFAS was 53 (SD $\pm$ 4.7) in the PRP group and 55.2 (SD $\pm$ 3.20) in the steroid group. The VAS score at the 6th week was 2.62 in the PRP group and 1.88 in the steroid group; at the 3rd month, it was 1.90 in the PRP group and 2.80 in the steroid group; and at the 6th month, it was 1.42 in the PRP group and 3.70 in the steroid group. AOFAS scores were highly significant ($p < 0.001$) at 6 weeks, 3 months, and 6 months.

Conclusion: It is concluded that, corticosteroid therapy is more effective for short-duration relief, but PRP therapy is more effective for long-term relief.

Keywords: Platelet rich plasma, Corticosteroids, Plantar Fasciitis, 2% xylocaine, 20 Gauge Needle.

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Introduction

Plantar fasciitis is an important clinical cause of inferomedial heel pain in adults, which occurs due to overuse injury arising due to multiple factors [1]. There is often inflammation at the origin of the plantar fascia and surrounding prefascial structures such as the calcaneal periosteum [2]. Mechanical overload can eventually lead to chronic inflammation and degenerative changes. A combination of treatment modalities is usually recommended over any individual treatment options. Mechanical interventions like foot orthoses, foot taping, footwear, night splints, rest, and walking casts have been thought to reduce the load and stress applied to the inflamed plantar fascia to a tolerable level [3]. Other treatment options include drugs such as NSAIDs (non-steroid anti-inflammatory drugs) to relieve pain and steroid

injections. Night splints, low-dye taping, heel pad cups, and orthoses have also been used with varying success rates [4]. Extracorporeal shock wave therapy has also been used in recent years to treat this disease with lifestyle modifications. Only 5 to 10% of the people need surgical interventions like removal of calcaneal spur, neuroectomy, and plantar fasciotomy, which require prolonged rest and hospital stays; hence, an attempt has been made to compare PRP and corticosteroid therapy so they can lead a normal social life.

Material and Method

90 (ninety) patients aged between 25 to 60 years who visited the orthopedic department of KBN Medical College Hospital, Kalaburagi, Karnataka-585104, were studied.

Inclusive Criteria: The patients diagnosed with plantar fasciitis by clinical and radiological evaluation presenting a complaint of plantar heel pain for more than 6 weeks (>6 weeks) and plantar fascia thickness of > 4 mm at the area of maximum tenderness (USG of heel for plantar fascia). The patients who gave their consent in writing for the study were selected.

Exclusion Criteria: Patients with severe anemia, thrombocytopenia, or immune compromise, and non-cooperative patients were excluded from the study.

Method

Out of 90, 45 patients were given corticosteroid 2 ml (8 mg) and 45 patients PRP. Depomedrol was injected along with 0.5 ml of plain 2% xylocaine using 20 G wide-bore needles into the point of maximum tenderness. Post injection, patients were asked to take a rest for 15 minutes and then allowed to walk.

PRP preparation and administration: For the preparation of PRP, blood was withdrawn from the cubital vein with the help of a BD Vacutainer Eclipse in three BD Vacutainer tubes, which are 2.7 ml tubes that contain 0.35 ml of 3.2% sodium citrate, an anticoagulant, and a volume of approximately 2.35 ml for whole blood. It was prepared using a 2-spin technique; in the 1st low-spin step, blood is centrifuged at 1200 rpm for 10 minutes in a Routine 380 R centrifuge model (Hettich, Zentrifugen). After the formation of three layers (a bottom layer of RBC, an upper layer composed of plasma, platelets, and some WBC, and an intermediate layer, or buffy coat, composed mostly of WBC).

The upper layer just above the Buffy coat was collected with a 10 ml syringe; this collection was performed carefully to avoid disturbing the bottom layer of RBC and the Buffy coat layer. Depending upon the centrifugal force of the spin, the collected volume ranged from 0.75 ml to 1.25 ml in each BD Vacutainer.

Approximately 1 ml of the upper layer of the sample that underwent the first spin step was collected and transferred to one empty tube (approximately 3 ml). The tube was centrifuged again for 10 minutes at 2400 rpm.

The upper half of the plasma volume, platelet-poor plasma (PPP), was removed. The remaining volume of PPRP was used for injection. Platelet count was estimated by the pathologist. The PRP was randomly checked for the number of platelets by Neubauer's chamber or autoanalyzer. Most of the sample had a platelet count more than 1,000,000/ μ l in 5 ml volume; that is 5 times the

baseline. After this, the PRP is shaken by just turning the tube 2 to 3 times to mix the platelets.

PRP injection technique: patients were asked to resume the supine position, and the involved foot was cleaned and prepared with spirit and povidone iodine. The site of maximum tenderness, i.e., the medial aspect of the foot at the origin of the plantar fascia, was marked using a marker. One ml of 2% plain xylocaine was infiltrated into the skin and subcutaneous tissue.

Dry needling, also called peppering, was used to locally "injure" the soft tissue to stimulate the inflammatory response; concomitant delivery of the PRP then modulates (enhances) the healing response. Each masking point of tenderness is penetrated with a 20-gauge needle until the underlying periosteum is touched.

A gristly, crunchy texture is audibly and palpably noted as the needle is advanced. After contacting the periosteum, the needle was gently partially withdrawn and then advanced in a fan-like wheel (peppering) the area 7 to 10 times. Next, 1 ml of the PRP is injected as this peppering maneuver is continued. This process is then carried out at each marked site.

Post-injection care—post-injection patients were asked to rest for 15 minutes and then allowed to walk. As PRP effectively induces an inflammatory response, some patients experienced minimal to moderate discomfort following the injection, which usually lasted for up to 1 week. They are instructed to ice the injected area if needed for pain control and modify activity as tolerated. Acetaminophen was the optimal analgesic, and NSAIDs were avoided. After 48 hours, patients were given a standardized stretching protocol to follow for 2 weeks. Patients were advised to avoid strenuous activities and rest for 2 weeks. No aggressive running or jumping activities were allowed for 2 weeks. After 4 weeks of the procedure, patients were allowed to proceed with normal sporting or recreational activities as tolerated. Any type of foot orthosis was not allowed.

Each patient was assessed functionally using the American Orthopaedic Foot and Ankle Score (AOFAS), visual analogue scale (VAS) scores, and radiologically by ultrasound thickness of plantar fascia. The AOFAS and VAS scores were recorded before treatment and at follow-up visits at 6 weeks, 3 months, and 6 months.

The duration of the study was from June 2024 to June 2025.

Statistical Analysis: clinical manifestations comparison VAS, AOFAS, and pain severity were studied by using a t-test and percentage. The

statistical analysis was done in SPSS software. The ratio of male and female was 2:1.

Observation and Results

Table-1: Study of clinical manifestations

- 26 (57.7%) PRP group, 27 (60%) corticosteroid in Right heel.
- 19 (42.2%) PRP group, 18 (40%) corticosteroid in Left heel.
- VAS Baseline score: 7.13 in PRP group, 7.30 in corticosteroid.
- Baseline of AOFAS: 53 (± 4.2) in PRP group, 55.2 (± 3.20) in corticosteroid group.
- Thickness of plantar fascia (in mm): 5.72 in PRP group, 5.60 in corticosteroid group.

Table-2: Comparative of visual analogue score (VAS) in both group

- Pre-treatment: 7.14 in PRP group, 7.18 in corticosteroid group.
- AT 6th weeks: 2.62 in PRP group, 1.88 in corticosteroid group.
- At 3rd months: 1.90 in PRP group, 2.80 in corticosteroid group.
- At 6th months: 1.42 in PRP group, 3.70 in corticosteroid group.

Table-3: Comparison of pain sensitivity in both groups at different duration of treatment in 6th week, 3rd month and 6th months PRP group has significantly reduced VAS score as compared to corticosteroid group.

Table-4: Comparative study of AOFAS score in both groups at different interval of duration pre-treatment at 6 weeks, 3 months, 6 months has significant p value ($p < 0.001$).

Table 1: Clinical Manifestations of patients with chronic plantar fasciitis (No. of patients: 90)

Sl. No.	Manifestations	PRP group (45)	Corticosteroid Group (45)
1	Right heel	26 (57.7%)	27 (60%)
2	Left heel	19 (42.2%)	18 (40%)
3	VAS Base line score	7.13	7.30
4	Base line of AOFAS	53 (± 4.2)	55.2 (± 3.20)
5	Thickness of plantar fascia (in mm)	5.72	5.60

AOFS = American orthopaedic Foot and ankle score, PRP = Platelet rich plasma, VAS = visual analogue scale

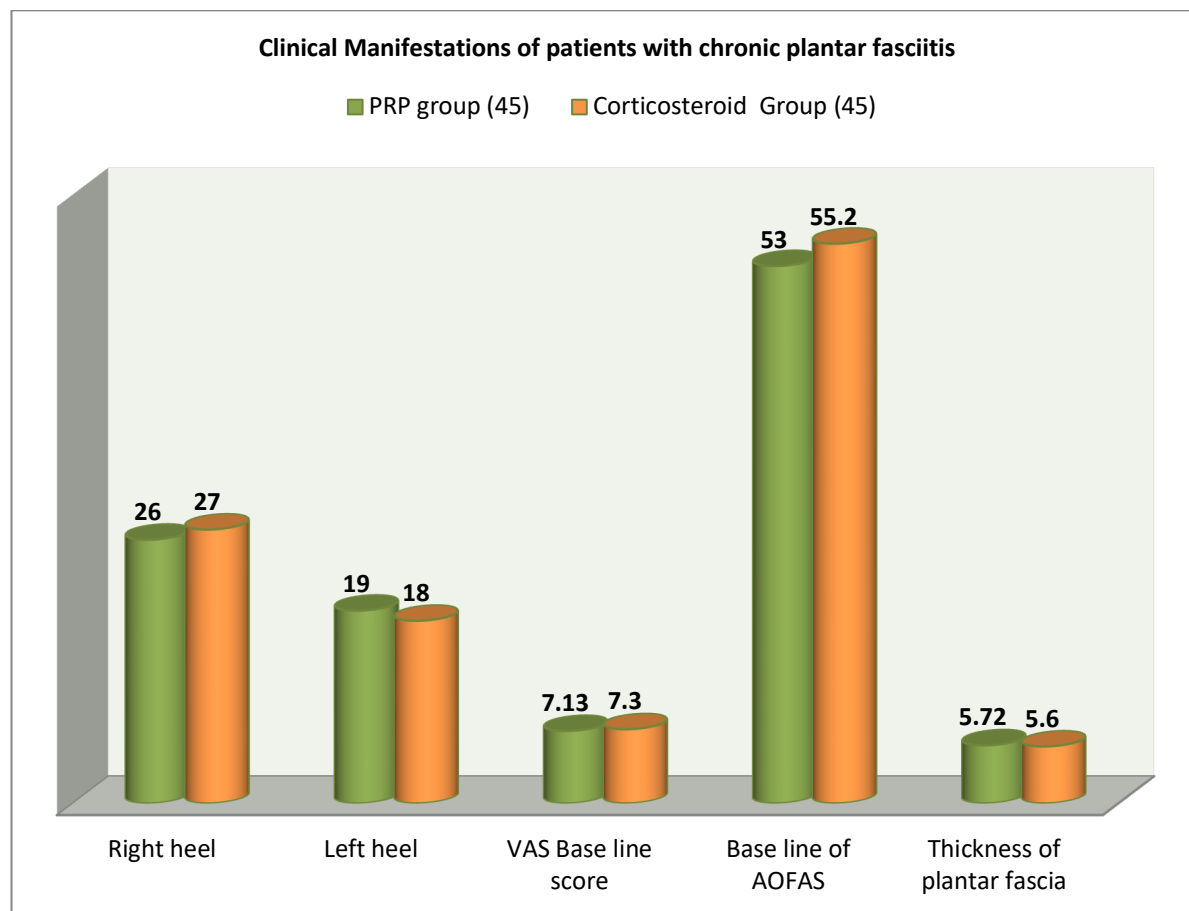
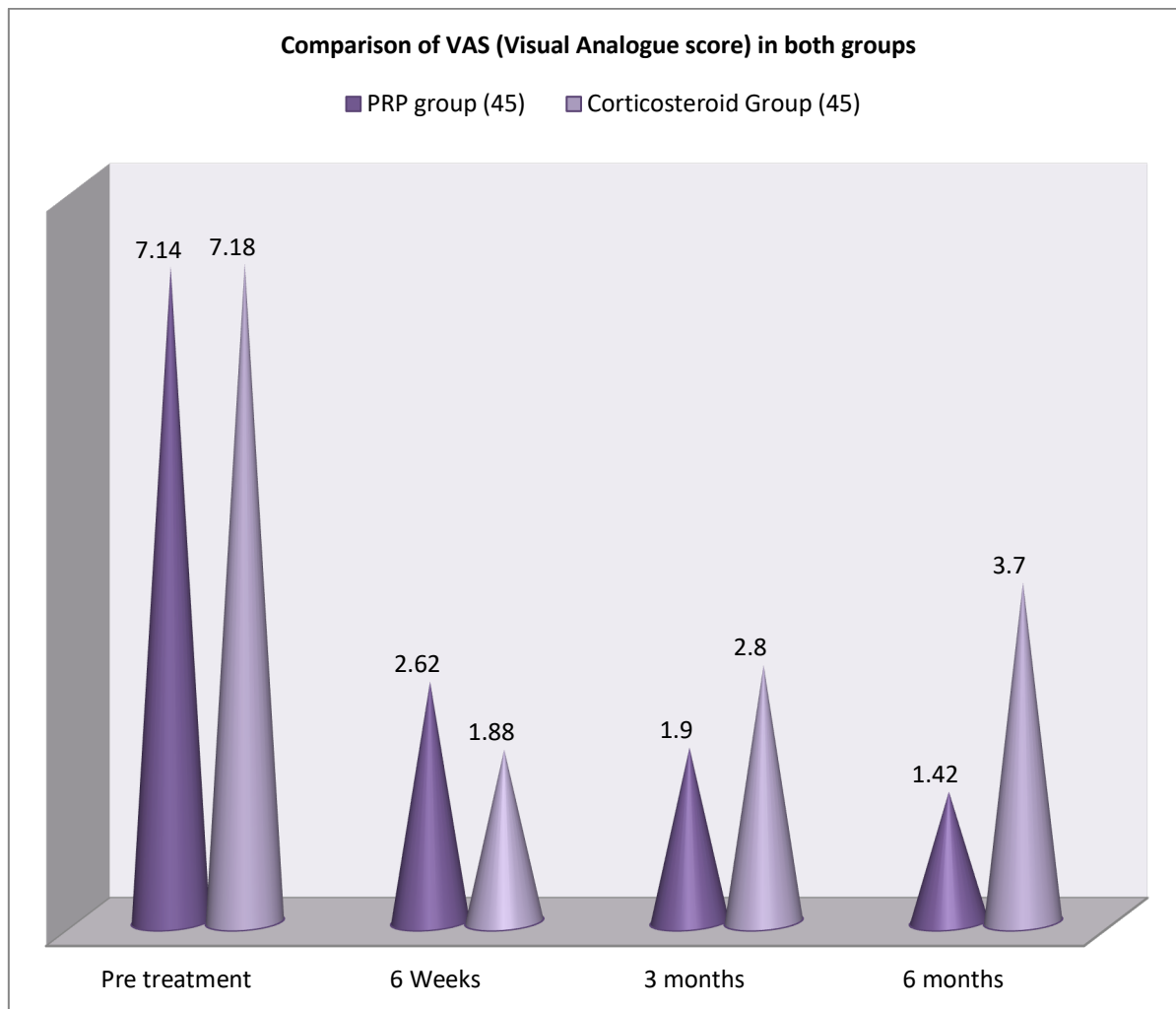


Figure 1: Clinical Manifestations of patients with chronic plantar fasciitis

Table 2: Comparison of VAS (Visual Analogue score) in both groups

Visual score	PRP Group (45)	Corticosteroid Group (45)
Pre treatment	7.14	7.18
6 Weeks	2.62	1.88
3 months	1.90	2.80
6 months	1.42	3.70

**Figure 2: Comparison of VAS (Visual Analogue score) in both groups****Table 3: Comparison of pain severity in both groups**

VAS	Pre treatment		6 th week		3 rd month		6 th month	
	Steroid (%)	PRP (%)	Steroid (%)	PRP (%)	Steroid (%)	PRP (%)	PRP	Steroid
No pain VAS-0	0	0	0	0	0	0	7 (17.5%)	0
Mild pain VAS 1, 2 3	0	0	22 (48.8%)	37 (82.2%)	31 (68.8%)	17 (37.7%)	29 (64.4%)	9 (20%)
Moderate pain VAS 4, 5 6	13 (28.8%)	9 (20%)	24 (53.3%)	8 (17.7%)	8 (17.7%)	28 (62.2%)	7 (15.5%)	35 (77.7%)
Severe pain VAS- 7 8, 9	28 (62.2%)	35 (77.7%)	0	0	0	0	0	0
Worst pain VAS – 10	0	0	0	0	0	0	0	0

PRP = Platelet Rich Plasma, VAS = Visual Analogue Scale

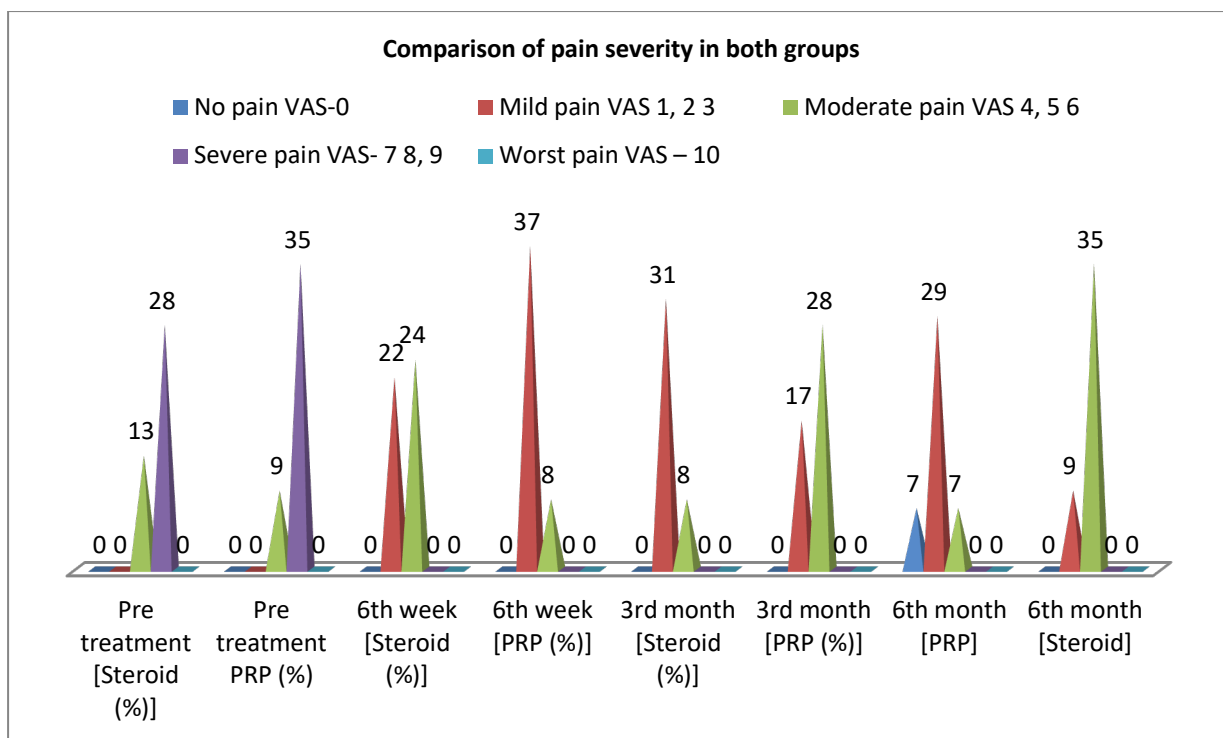


Figure 3: Comparison of pain severity in both groups

Table 4: Comparison of AOFAS score in both groups

AOFAS score	PRP Group (45)	Corticosteroid Group (45)	t test	p value
Pre-treatment	53 (SD±4.70)	56.4 (SD±3.16)	4.02	P<0.001
At 6 Weeks	78.4 (SD±2.30)	84.6 (SD±1.50)	15.1	P<0.001
At 3 Months	85.6 (SD±2.11)	78.40 (SD±1.82)	17.3	P<0.001
At 6 Months	86.8 (SD±3.10)	70.64 (SD±3.6)	22.8	P<0.001

AOFAS = American Orthopaedic Foot and Ankle Society Score, PRP = Platelets Rich Plasma, P<0.001 = p value is highly significant

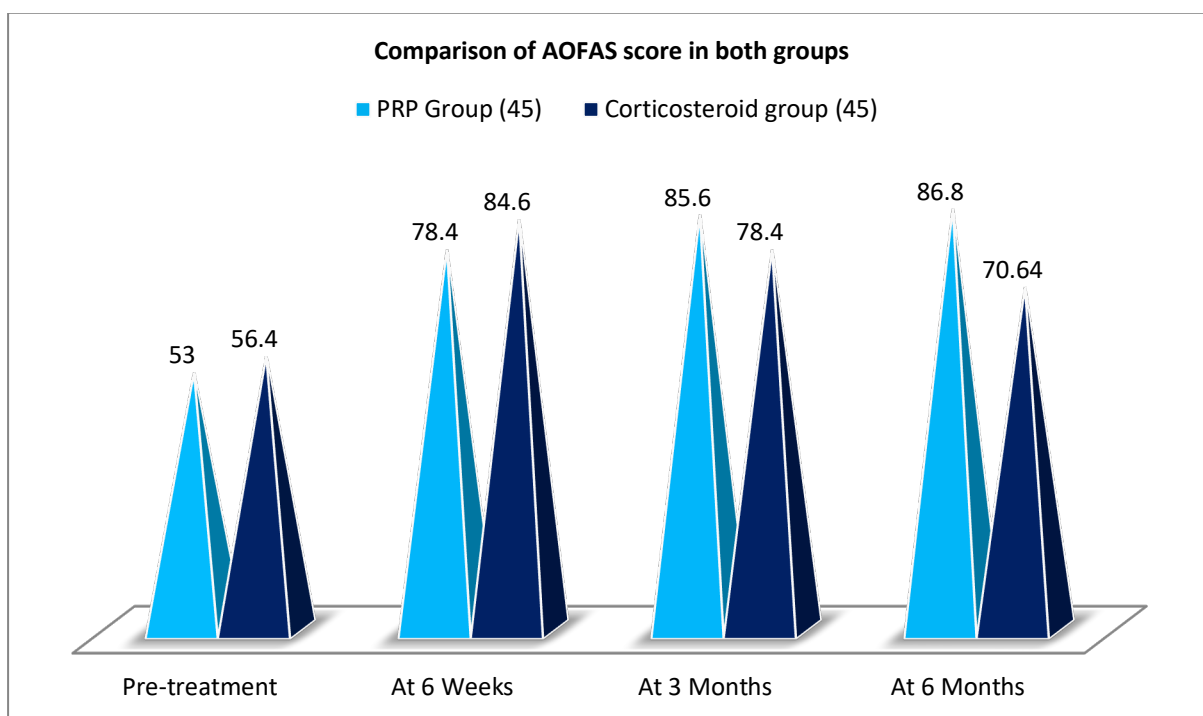


Figure 4: Comparison of AOFAS score in both groups

Discussion

In the present comparative study of the efficacy of corticosteroid versus analogue PRP injection in the management of clinical manifestations of patients with chronic plantar fasciitis: Right heel: 26 (57.7%) PRP, 27 (60%) steroid; left heel: 19 (42.2%) by PRP group, 18 (40%) in steroid. VAS Baseline 7.13 in the PRP group, 7.30 in the corticosteroid group, a baseline of AOFAS 53 (± 4.2) in the PRP group, and 55.2 (± 3.20) in the steroid group.

Thickness of plantar fascia (mm): 5.72 in the PRP group, 5.60 in the steroid group (Table 1). In a comparison of VAS in both groups, pre-treatment was 7.14 in PRP and 7.18 in steroids. At 6 weeks, 2.62 in the PRP group and 1.88 in the steroid group. At the 3rd month, 1.90 in the PRP group and 2.80 in the steroid group.

At 6 months, 1.42 in the PRP group and 3.70 in the steroid group (Table 2). VAS was higher in the PRP group than in the steroid group (Table 3). Comparison of AOFAS scores in both groups at different intervals of duration had a significant p-value ($p < 0.001$) (Table 4). These findings are more or less in agreement with previous studies [5,6,7].

Plantar fasciitis is considered an overuse injury, and such a patient's history will typically reveal some combination of either intrinsic or extrinsic factors that contribute to the development of the injury. Extrinsic factors are due to unyielding surfaces during exercise (movement) and improper and excessively worn footwear [8].

Intrinsic factors include obesity, foot structure, reduced plantar flexion strength, reduced flexibility of the plantar flexor muscles, and tensional malalignment of the lower extremity [9]. The most common cause of plantar fasciitis is excessive pronation (inversion) of the foot. Increased tension placed on the arch lowering during standing and walking.

The non-surgical management principles for the treatment of the symptoms associated with plantar fasciitis are (1) reducing pain and inflammation, (2) reducing stress to a tolerable level, and (3) restoring muscle strength and flexibility in involved tissue. Corticosteroid local injection gives sudden relief of symptoms but PRP is proved to be efficient because it enables cell proliferation, angiogenesis, and cell migration, resulting in tissue regeneration. Platelets secrete antimicrobial peptides, suggesting an antibiotic effect [10]. Moreover, PRP has anti-inflammatory and analgesic effects also. It is also reported that PRP is superior to hyaluronic acid viscosupplementation because PRP is a biological product [11]. Hence, PRP is a multi-potential application in orthopedics,

sports medicine, and repetitive surgery. While corticosteroids have many side effects with prolonged usage, like osteoporosis and loss of immunity, even addiction to steroids has also been recorded.

Summary and Conclusion

The present comparative study of PRP and corticosteroids in the management of chronic fasciitis confirmed that PRP injection is an efficient and safe therapeutic option for the treatment of chronic plantar fasciitis, but long-duration treatment has to be the protocol to get satisfactory results. But this study demands further histopathological, nutritional, genetic, and musculoskeletal study. Because the exact pathophysiology of plantar fasciitis is still unclear.

Limitation of study: Owing to small sample size of study groups, we have limited finding and results.

The research paper was approved by Ethical committee of Faculty of Medical Sciences, Khaja Banda Nawaz University, Kalaburgi, and Karnataka-585104.

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