

Research Article

A Prospective Study of Corticosteroid versus Platelet Rich Plasma Injection (PRP) In Chronic Plantar Fasciitis

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ABSTRACT

Background: Plantar fasciitis is a common cause of chronic heel pain that significantly affects mobility and quality of life. Although corticosteroid injections provide rapid symptomatic relief, their long-term effectiveness is limited. Platelet-rich plasma (PRP) has emerged as a regenerative treatment modality aimed at enhancing tissue healing. This study was conducted to compare the clinical outcomes of corticosteroid and PRP injections in patients with chronic plantar fasciitis.

Methods: A prospective comparative study was conducted involving 110 patients with chronic plantar fasciitis. Participants were divided into two groups of 55 patients each. Group A received corticosteroid injection, while Group B received PRP injection. Clinical outcomes were assessed using the Visual Analog Scale (VAS) for pain and the American Orthopaedic Foot and Ankle Society (AOFAS) score for functional assessment. Outcomes were evaluated at baseline, 4 weeks, 12 weeks, and 24 weeks after intervention. Treatment response, patient satisfaction, and complications were also recorded.

Results: Baseline demographic and clinical characteristics were comparable between both groups. Corticosteroid injection demonstrated greater pain reduction at 4 weeks (VAS: 3.9 ± 1.2 vs 4.5 ± 1.3 ; $p=0.012$). However, PRP showed significantly better pain outcomes at 12 weeks (3.4 ± 1.1 vs 4.3 ± 1.3 ; $p<0.001$) and 24 weeks (2.9 ± 1.2 vs 4.6 ± 1.4 ; $p<0.001$). Functional improvement was significantly higher in the PRP group at 12 and 24 weeks (AOFAS score 82.6 ± 7.9 and 87.4 ± 7.2 , respectively; $p<0.001$). PRP-treated patients demonstrated higher satisfaction (87.3% vs 70.9%; $p=0.041$) and lower requirement for additional injections (3.6% vs 14.5%; $p=0.049$). Complication rates were comparable between groups.

Conclusion: Both corticosteroid and PRP injections are effective for chronic plantar fasciitis; however, PRP provides superior long-term pain relief, functional improvement, and patient satisfaction. PRP may be considered a promising regenerative treatment option for patients with persistent symptoms.

Keywords: Plantar Fasciitis, Platelet-Rich Plasma, Corticosteroid Injection, Heel Pain, Visual Analog Scale, Aofas Score, Regenerative Therapy.

INTRODUCTION

Plantar fasciitis is one of the most common musculoskeletal causes of chronic heel pain, frequently encountered in orthopaedic and sports medicine practice.[1] It is characterized by pain arising from the plantar aspect of the heel, typically localized to the medial calcaneal tubercle, resulting in significant

discomfort, functional impairment, and reduced quality of life.[2] The plantar fascia is a dense fibrous connective tissue structure extending from the medial calcaneal tubercle to the proximal phalanges of the toes. It plays a crucial role in maintaining the medial longitudinal arch of the foot and functions as an important shock absorber during

weight-bearing activities.[3]Although traditionally regarded as an inflammatory condition, current evidence suggests that chronic plantar fasciitis is primarily a degenerative fasciopathy resulting from repetitive mechanical stress and microtrauma.[4] Histopathological changes include collagen disorganization, fibroblast proliferation, myxoid degeneration, and impaired tissue remodeling rather than a predominant inflammatory response. [5]The development of plantar fasciitis is considered multifactorial, with contributing factors including abnormal foot biomechanics, increased body mass index, prolonged standing, repetitive loading, reduced ankle dorsiflexion, tight gastrocnemius–soleus complex, and altered gait mechanics.[6]The clinical presentation commonly includes characteristic first-step pain in the morning, pain following periods of inactivity, and localized tenderness over the medial calcaneal tubercle.[7] While most patients respond to conservative measures such as activity modification, stretching exercises, orthotic support, physical therapy, and analgesic medications, a proportion of patients develop persistent symptoms requiring additional interventions.[8] Local corticosteroid injection has been widely used for patients with chronic plantar fasciitis due to its ability to provide rapid symptomatic relief. Corticosteroids reduce local inflammatory mediators and suppress pain pathways, resulting in short-term improvement. However, their effects may diminish over time, and repeated injections have been associated with potential complications such as plantar fascia rupture, fat pad atrophy, and impairment of collagen synthesis. These limitations have encouraged exploration of alternative regenerative therapies.[9] Platelet-rich plasma (PRP) injection has emerged as a promising biological treatment option for chronic plantar fasciitis. PRP is an autologous blood-derived preparation containing concentrated platelets and various growth factors, including platelet-derived growth factor, transforming growth factor-beta, vascular endothelial growth factor, and insulin-like growth factor.

These mediators facilitate tissue repair by promoting fibroblast activity, collagen production, angiogenesis, and extracellular matrix regeneration.[10,11]Although several studies have reported beneficial effects of PRP in reducing pain and improving functional outcomes, its superiority over corticosteroid injection remains inconclusive due to variations in study design, PRP preparation methods, injection techniques, and outcome assessment criteria. Therefore, comparative evaluation of these two commonly used injection therapies is essential to determine their relative efficacy and durability of clinical improvement.[12]Hence, the present prospective study was conducted to compare the clinical outcomes of corticosteroid versus platelet-rich plasma injection in patients with chronic plantar fasciitis, with emphasis on pain relief, functional improvement, and overall treatment effectiveness.

MATERIALS AND METHODS

A prospective comparative observational study was conducted to evaluate and compare the clinical outcomes of corticosteroid injection versus platelet-rich plasma (PRP) injection in patients with chronic plantar fasciitis. The study included patients presenting with persistent plantar heel pain who fulfilled the predefined eligibility criteria. A total of 110 patients were enrolled and were divided into two groups of 55 patients each based on the treatment modality received. Patients in Group A received local corticosteroid injection, whereas patients in Group B received autologous platelet-rich plasma injection. All participants were followed prospectively to assess pain reduction, functional improvement, and treatment response at predefined follow-up intervals. The study was carried out in the Department of Orthopaedics.

Inclusion Criteria

Patients fulfilling the following criteria were included in the study:

1. Patients aged between 18 and 70 years.

2. Patients diagnosed with chronic plantar fasciitis based on clinical evaluation.
3. Presence of plantar heel pain persisting for more than 6 months.
4. Localized tenderness over the medial calcaneal tubercle.
5. Patients with inadequate response to conservative treatment including stretching exercises, activity modification, analgesics, and physiotherapy.
6. Patients willing to participate in the study and provide informed consent.

Exclusion Criteria

Patients were excluded if they had:

1. Previous corticosteroid or PRP injection within the preceding 6 months.
2. History of foot trauma, fracture, or previous foot surgery.
3. Clinical features suggestive of plantar fascia rupture.
4. Associated neurological disorders causing heel pain.
5. Peripheral neuropathy or vascular insufficiency of the lower limb.
6. Systemic inflammatory or connective tissue disorders.
7. Active infection at the injection site.
8. Pregnancy or bleeding disorders.
9. Patients receiving anticoagulant therapy or having platelet abnormalities.

Clinical Evaluation

All enrolled patients underwent detailed clinical assessment, including demographic profile, symptom duration, clinical history, and physical examination. The diagnosis of plantar fasciitis was established clinically based on characteristic heel pain and tenderness at the medial calcaneal tubercle. Baseline assessment was performed before intervention. Pain severity and functional disability were documented using validated clinical outcome measures.

Outcome Assessment

Pain Assessment

Pain intensity was evaluated using the Visual Analog Scale (VAS), ranging from 0 (no pain) to 10 (worst imaginable pain). VAS scores were recorded before injection and during follow-up visits.

Functional Assessment

Functional outcomes were assessed using the American Orthopaedic Foot and Ankle Society (AOFAS) hindfoot score. The score evaluated pain, functional limitation, and alignment to determine improvement following treatment.

Intervention Protocol

Group A: Corticosteroid Injection Group

Patients assigned to Group a received local corticosteroid injection under aseptic precautions. The injection consisted of corticosteroid mixed with local anaesthetic and was administered at the site of maximal tenderness over the medial calcaneal tubercle. The procedure was performed using standard sterile technique.

Group B: Platelet-Rich Plasma Injection Group

Patients in Group B underwent autologous PRP preparation and injection. Approximately 15–20 ml of peripheral venous blood was collected under sterile conditions and processed using centrifugation to obtain platelet-rich plasma. The prepared PRP was injected into the affected plantar fascia at the point of maximal tenderness using aseptic precautions. Patients were advised relative rest following the procedure and were gradually returned to normal activities according to symptom improvement.

Follow-up and Assessment Schedule

All patients were followed up at regular intervals after injection.

Clinical assessments were performed at:

- Baseline (pre-injection)
- 4 weeks
- 12 weeks
- 24 weeks

At each follow-up visit, VAS score, functional outcome scores, clinical improvement, and any procedure-related complications were recorded.

Statistical Analysis

Data collected during the study were entered into a structured database and analyzed statistically using SPSS 21. Continuous variables were expressed as mean $\pm$ standard deviation (SD) or median with interquartile range,

depending on data distribution. Categorical variables were presented as frequencies and percentages. The comparison between the two groups was performed using the independent sample t-test or Mann-Whitney U test for continuous variables and the Chi-square test or Fisher's exact test for categorical variables. Changes in outcome scores over follow-up periods were analyzed using appropriate repeated-measures statistical tests. A p-value <0.05 was considered statistically significant.

RESULT

A total of 110 patients with chronic plantar fasciitis were included in the study, with 55 patients receiving corticosteroid injection and 55 patients receiving platelet-rich plasma (PRP) injection. The baseline demographic and clinical characteristics were comparable between the two groups. The mean age was 48.6 ± 9.2 years in the corticosteroid group and 47.9 ± 8.8 years in the PRP group, with no statistically significant difference ($t=0.41$, $p=0.682$). Age distribution was also similar between groups, with the majority of participants belonging to the 41–60 years age category (61.8% vs 60.0%, $\chi^2=0.284$, $p=0.868$). The gender distribution was comparable, with males constituting 54.5% of the corticosteroid group and 52.7% of the PRP group ($\chi^2=0.036$, $p=0.849$). Similarly, no significant differences were observed in mean BMI (28.1 ± 3.4 vs 28.5 ± 3.6 kg/m², $p=0.551$), duration of symptoms (11.4 ± 3.8 vs 11.7 ± 4.1 months, $p=0.697$), or bilateral involvement (25.5% vs 27.3%, $p=0.829$). These findings indicate that both groups were well matched at baseline, minimizing potential confounding effects during outcome comparison (Table 1). The baseline VAS pain scores were similar between the corticosteroid and PRP groups (7.8 ± 0.9 vs 7.9 ± 1.0 ; $t=0.56$, $p=0.577$), demonstrating comparable initial pain severity. At 4 weeks, the corticosteroid group showed significantly lower pain scores compared with the PRP group (3.9 ± 1.2 vs 4.5 ± 1.3 ; $t=2.55$, $p=0.012$). However, at subsequent follow-up intervals, PRP demonstrated superior pain reduction.

At 12 weeks, patients receiving PRP had significantly lower VAS scores compared with corticosteroid therapy (3.4 ± 1.1 vs 4.3 ± 1.3 ; $t=3.92$, $p<0.001$). This difference became more pronounced at 24 weeks, with the PRP group showing markedly reduced pain scores (2.9 ± 1.2 vs 4.6 ± 1.4 ; $t=6.87$, $p<0.001$). The progressive reduction in pain scores over time in both groups, with sustained improvement in the PRP group, is depicted in Figure 1, while detailed statistical comparison is presented in Table 2. Functional outcomes assessed using the AOFAS score showed similar baseline values between the two groups (54.6 ± 8.3 in corticosteroid group vs 55.1 ± 8.6 in PRP group; $t=0.31$, $p=0.756$). At 4 weeks, both groups demonstrated improvement; however, the difference was not statistically significant (72.8 ± 9.4 vs 70.5 ± 9.1 ; $t=1.32$, $p=0.190$). At 12 weeks, the PRP group achieved significantly higher AOFAS scores compared with the corticosteroid group (82.6 ± 7.9 vs 76.4 ± 8.7 ; $t=3.96$, $p<0.001$). This functional advantage persisted at 24 weeks, where PRP-treated patients had significantly better functional outcomes (87.4 ± 7.2 vs 78.1 ± 8.5 ; $t=6.18$, $p<0.001$). The comparative improvement pattern in AOFAS scores between both groups is illustrated in Figure 2, with corresponding statistical analysis provided in Table 3. At 24 weeks, treatment response analysis demonstrated a significantly higher proportion of patients achieving excellent improvement (>75% reduction in pain) in the PRP group compared with the corticosteroid group (49.1% vs 21.8%). Good improvement (50–75% reduction) was observed in 38.2% of PRP-treated patients and 36.4% of corticosteroid-treated patients. However, moderate improvement was more frequent in the corticosteroid group (32.7% vs 10.9%), and poor response (<25% reduction) was observed in 9.1% of corticosteroid patients compared with only 1.8% of PRP patients. Overall, the difference in treatment response distribution between the two groups was statistically significant ($\chi^2=10.42$, $p=0.015$), indicating superior clinical effectiveness of PRP therapy (Table 4). Patient-reported outcomes showed higher

satisfaction rates among patients receiving PRP injection. A significantly greater proportion of patients in the PRP group reported satisfaction with treatment compared with the corticosteroid group (87.3% vs 70.9%; $\chi^2=4.18$, $p=0.041$). Requirement for additional injection therapy was significantly higher among corticosteroid-treated patients (14.5%) compared with PRP-treated patients (3.6%), with Fisher's exact test showing statistical significance ($p=0.049$). Although return to normal activity within 3 months was higher in the PRP group (85.5% vs 72.7%), this difference did not reach statistical significance ($\chi^2=2.73$, $p=0.098$). These findings are summarized in Table 5 and graphically represented in Figure 3. The overall incidence of complications following

injection therapy was similar between the two groups, with complications occurring in 21.8% of patients in both groups ($p=1.000$). Injection site pain was reported in 10.9% of corticosteroid-treated patients and 14.5% of PRP-treated patients ($p=0.568$). Local swelling occurred in 5.5% and 7.3% of patients, respectively ($p=1.000$). Skin/fat pad changes were observed only in the corticosteroid group (3.6%), although the difference was not statistically significant ($p=0.495$). One case of plantar fascia rupture was reported in the corticosteroid group, whereas no cases occurred in the PRP group ($p=1.000$). No infection was reported in either group. Overall, both interventions demonstrated comparable safety profiles, with no significant difference in complication rates (Table 6).

Table 1: Baseline Demographic and Clinical Characteristics of Study Participants

Parameters	Corticosteroid Group (n=55)	PRP Group (n=55)	Test statistic	p-value
Mean age (years)	48.6 $\pm$ 9.2	47.9 $\pm$ 8.8	t=0.41	0.682
Age group (years), n (%)			$\chi^2=0.284$	0.868
18–40	12 (21.8%)	13 (23.6%)		
41–60	34 (61.8%)	33 (60.0%)		
>60	9 (16.4%)	9 (16.4%)		
Male, n (%)	30 (54.5%)	29 (52.7%)	$\chi^2=0.036$	0.849
Female, n (%)	25 (45.5%)	26 (47.3%)		
Mean BMI (kg/m ²)	28.1 $\pm$ 3.4	28.5 $\pm$ 3.6	t=0.60	0.551
Duration of symptoms (months)	11.4 $\pm$ 3.8	11.7 $\pm$ 4.1	t=0.39	0.697
Bilateral involvement, n (%)	14 (25.5%)	15 (27.3%)	$\chi^2=0.047$	0.829

Table 2: Comparison of Visual Analog Scale (VAS) Pain Scores between Corticosteroid and PRP Groups

Follow-up period	Corticosteroid Group (n=55) Mean $\pm$ SD	PRP Group (n=55) Mean $\pm$ SD	Test statistic	p-value
Baseline	7.8 $\pm$ 0.9	7.9 $\pm$ 1.0	t=0.56	0.577

4 weeks	3.9 ± 1.2	4.5 ± 1.3	t=2.55	0.012*
12 weeks	4.3 ± 1.3	3.4 ± 1.1	t=3.92	<0.001*
24 weeks	4.6 ± 1.4	2.9 ± 1.2	t=6.87	<0.001*

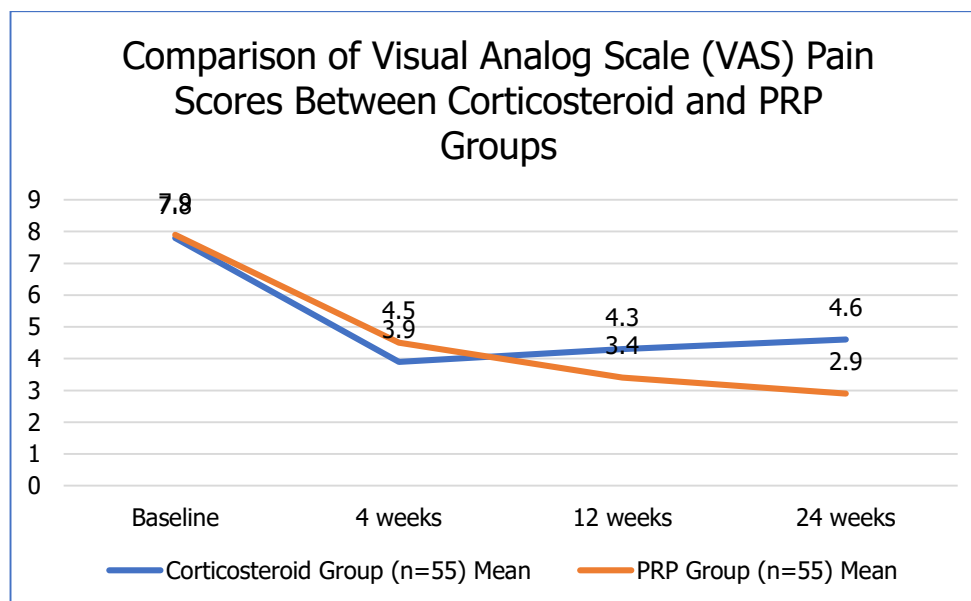


Figure 1 Comparison of Visual Analog Scale (VAS) Pain Scores Between Corticosteroid and PRP Groups

Table 3: Comparison of Functional Outcome (AOFAS Score) between Both Groups

Follow-up period	Corticosteroid Group Mean ± SD	PRP Group Mean ± SD	Test statistic	p-value
Baseline	54.6 ± 8.3	55.1 ± 8.6	t=0.31	0.756
4 weeks	72.8 ± 9.4	70.5 ± 9.1	t=1.32	0.190
12 weeks	76.4 ± 8.7	82.6 ± 7.9	t=3.96	<0.001*
24 weeks	78.1 ± 8.5	87.4 ± 7.2	t=6.18	<0.001*

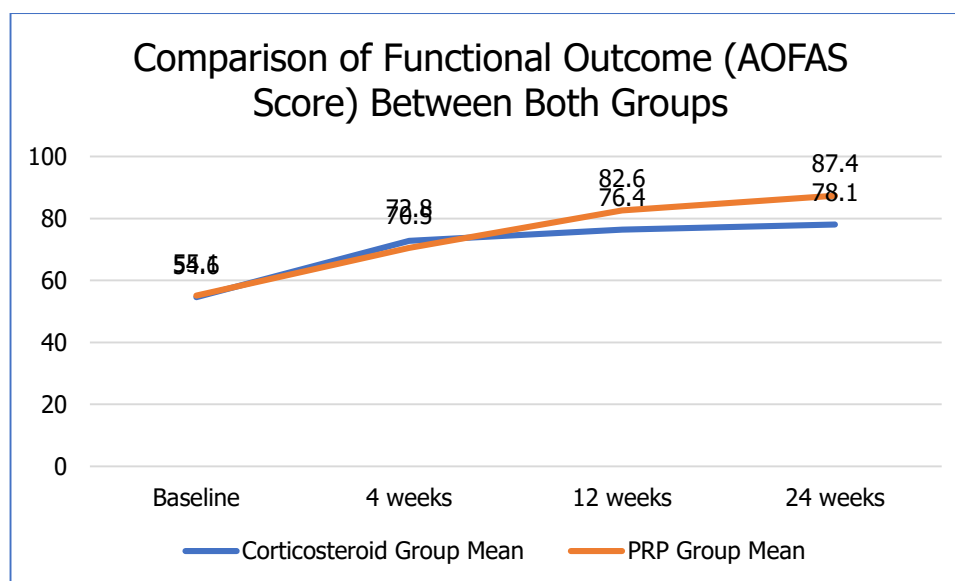


Figure 2 Comparison of Functional Outcome (AOFAS Score) between Both Groups

Table 4: Comparison of Treatment Response According To Improvement in Vas Score at 24 Weeks

Treatment response	Corticosteroid Group (n=55)	PRP Group (n=55)	χ^2 value	p-value
Excellent improvement (>75% pain reduction)	12 (21.8%)	27 (49.1%)		
Good improvement (50–75% reduction)	20 (36.4%)	21 (38.2%)		
Moderate improvement (25–50% reduction)	18 (32.7%)	6 (10.9%)		
Poor response (<25% reduction)	5 (9.1%)	1 (1.8%)	10.42	0.015*

Table 5: Comparison of Patient Satisfaction and Requirement of Additional Treatment

Parameters	Corticosteroid Group (n=55)	PRP Group (n=55)	Test statistic	p-value
Satisfied with treatment, n (%)	39 (70.9%)	48 (87.3%)	$\chi^2=4.18$	0.041*
Required additional injection, n (%)	8 (14.5%)	2 (3.6%)	Fisher's exact test	0.049*
Return to normal activity within 3 months, n (%)	40 (72.7%)	47 (85.5%)	$\chi^2=2.73$	0.098

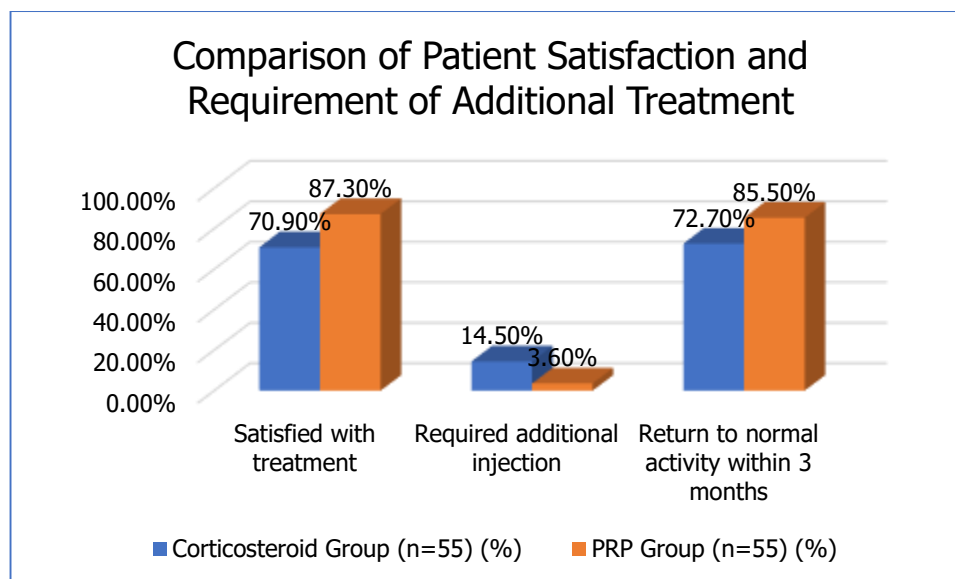


Figure 3 Comparison of Patient Satisfaction and Requirement of Additional Treatment

Table 6: Comparison of Complications Following Injection Therapy

Complications	Corticosteroid Group (n=55)	PRP Group (n=55)	p-value
Injection site pain	6 (10.9%)	8 (14.5%)	0.568
Local swelling	3 (5.5%)	4 (7.3%)	1.000
Skin/fat pad changes	2 (3.6%)	0 (0%)	0.495
Plantar fascia rupture	1 (1.8%)	0 (0%)	1.000
Infection	0 (0%)	0 (0%)	—
Overall complications	12 (21.8%)	12 (21.8%)	1.000

Discussion

The present prospective comparative study evaluated the clinical outcomes of corticosteroid versus platelet-rich plasma (PRP) injection in 110 patients with chronic plantar fasciitis (55 in each group) over a 24-week follow-up period. Outcomes were assessed using pain reduction (VAS), functional improvement (AOFAS score), treatment response, satisfaction, and complications. Baseline demographic and clinical characteristics were comparable between groups. The mean age was 48.6 ± 9.2 years in the corticosteroid group and 47.9 ± 8.8 years in the PRP group ($p=0.682$), with most patients belonging to the 41–60 year age group. Gender distribution, BMI, duration of symptoms, and bilateral involvement were also similar, minimizing confounding effects. Similar baseline comparability was reported by Jain et al. (2015)[13] and Sharma et al. (2023)[14], supporting reliable comparison of

treatment outcomes. Pain assessment showed comparable baseline VAS scores (7.8 ± 0.9 vs 7.9 ± 1.0 ; $p=0.577$). Corticosteroid injection produced superior early pain relief at 4 weeks (3.9 ± 1.2 vs 4.5 ± 1.3 ; $p=0.012$), likely due to rapid suppression of inflammatory mediators. However, PRP demonstrated significantly better pain reduction at later follow-ups, with lower VAS scores at 12 weeks (3.4 ± 1.1 vs 4.3 ± 1.3 ; $p<0.001$) and 24 weeks (2.9 ± 1.2 vs 4.6 ± 1.4 ; $p<0.001$). These findings indicate that corticosteroids provide rapid but temporary relief, whereas PRP offers sustained improvement. Similar long-term superiority of PRP was reported by Jain et al. (2015)[13], Sharma et al. (2023)[14], and Hurley et al. (2020)[15], who demonstrated better pain outcomes with PRP compared with corticosteroids. Functional outcomes assessed by AOFAS scores showed a similar pattern. Baseline scores were

comparable (54.6 ± 8.3 vs 55.1 ± 8.6 ; $p=0.756$). Corticosteroids showed slightly better early improvement at 4 weeks (72.8 ± 9.4 vs 70.5 ± 9.1 ; $p=0.190$); however, PRP achieved significantly higher functional scores at 12 weeks (82.6 ± 7.9 vs 76.4 ± 8.7 ; $p<0.001$) and 24 weeks (87.4 ± 7.2 vs 78.1 ± 8.5 ; $p<0.001$). The regenerative effects of PRP, including collagen synthesis, fibroblast proliferation, and tissue remodeling, may explain these superior functional outcomes. Similar findings were reported by Sharma et al. (2023)[14] and Khurana et al. (2021)[16].

At 24 weeks, PRP demonstrated significantly better treatment response, with excellent improvement observed in 49.1% of patients compared with 21.8% in the corticosteroid group ($p=0.015$). Poor response was less frequent with PRP (1.8% vs 9.1%). Patient satisfaction was also significantly higher following PRP injection (87.3% vs 70.9%, $p=0.041$), with fewer patients requiring repeat injections (3.6% vs 14.5%, $p=0.049$). The sustained biological effect of PRP may account for improved patient-reported outcomes. Similar long-term benefits of PRP were demonstrated by Monto (2014)[17]. Both treatments showed favorable safety profiles, with comparable overall complications (21.8% each). Injection site pain was slightly more common after PRP, whereas skin/fat pad changes occurred only after corticosteroid injection, highlighting concerns regarding repeated steroid use. Khurana et al. (2021)[16] also reported good safety outcomes with PRP and corticosteroid therapy.

Conclusion

In the present study, both corticosteroid and platelet-rich plasma (PRP) injections were effective in reducing pain and improving functional outcomes in patients with chronic plantar fasciitis. Corticosteroid injection provided faster short-term pain relief, whereas PRP demonstrated superior and sustained improvement in pain scores, functional outcomes, and patient satisfaction during long-term follow-up. PRP was associated with a lower requirement for additional treatment and comparable safety profile.

Therefore, PRP may be considered a promising regenerative treatment option for patients with chronic plantar fasciitis who fail conservative management.

Limitations

The study was limited by the relatively small sample size and single-center design, which may restrict the generalizability of the findings. The follow-up period was limited to 24 weeks, preventing assessment of long-term outcomes and recurrence rates. Variations in PRP preparation protocols and absence of blinding may have influenced treatment response assessment. Further multicentric randomized studies with larger sample sizes and longer follow-up are required to validate these findings.

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