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Research Article

Comparative Evaluation of Platelet-Rich Plasma and Corticosteroid Injection in the Management of Chronic Plantar Fasciitis: A Prospective Comparative Study

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Abstract: ***Introduction**:* Plantar fasciitis is one of the most common causes of chronic heel pain and can significantly impair daily activities and quality of life. Corticosteroid injections are widely used for short-term pain relief, whereas platelet-rich plasma (PRP) has emerged as a biological treatment aimed at promoting tissue healing.**Aim:**To compare the clinical and radiological outcomes of platelet-rich plasma and corticosteroid injections in patients with plantar fasciitis.**Materials and Methods:**A prospective comparative study was conducted on 52 patients diagnosed with plantar fasciitis. Patients were allocated into two groups: PRP (n=26) and corticosteroid (n=26). Clinical outcomes were assessed using the Visual Analogue Scale (VAS) and Foot and Ankle Disability Index (FADI). Ultrasonographic plantar fascia thickness was measured at baseline and follow-up. Statistical analysis was performed using paired and independent t-tests, with $p<0.05$ considered statistically significant.**Results:**Baseline demographic and disease characteristics were comparable between groups. Both treatment modalities produced significant improvement in VAS and FADI scores during follow-up. At 2 weeks, corticosteroid injection demonstrated superior pain reduction (VAS 1.96±0.66 vs 2.46±0.76; p=0.015). However, at 6 months, PRP showed significantly better pain relief (VAS 1.40±0.65 vs 2.64±0.57; p<0.001). Functional outcomes measured by FADI improved significantly in both groups without significant intergroup differences. Ultrasonographic plantar fascia thickness decreased in both groups, although differences were not statistically significant.**Conclusion:**Both PRP and corticosteroid injections were effective in improving pain and functional status in plantar fasciitis. Corticosteroid provided superior short-term pain relief, whereas PRP demonstrated better long-term clinical outcomes.

Keywords: Plantar fasciitis; Platelet-rich plasma; Corticosteroid injection; Heel pain; Foot and Ankle Disability Index

INTRODUCTION

Plantar fasciitis is among the most frequent causes of inferior heel pain encountered in orthopaedic practice and accounts for a substantial proportion of foot-related outpatient consultations. The condition results from repetitive microtrauma and degenerative changes occurring at the origin of the plantar fascia, leading to pain, stiffness, and functional limitation [1,2]. Epidemiological studies indicate that plantar fasciitis affects both sedentary and physically active populations and is particularly common among middle-aged adults, athletes, individuals with obesity, and those exposed to prolonged standing occupations [3].

The pathophysiology of plantar fasciitis has evolved from the traditional inflammatory concept to a predominantly degenerative process characterized by collagen disorganization, fibroblast proliferation, and fascial degeneration. Histopathological studies have demonstrated features consistent with fasciosis rather than active inflammation, suggesting that regenerative treatment approaches may provide superior long-term outcomes [4,5].

Clinically, patients present with characteristic heel pain that is most severe during the first few steps after waking or following prolonged periods of rest. Persistent symptoms can substantially affect mobility, occupational performance, recreational activities, and overall quality of life [6]. Diagnosis is primarily clinical, although ultrasonography serves as a valuable adjunct for assessing plantar fascia thickness and monitoring therapeutic response [7].

Several treatment modalities have been proposed, including activity modification, stretching exercises, orthoses, non-steroidal anti-inflammatory drugs, physiotherapy, extracorporeal shockwave therapy, corticosteroid injections, and surgical intervention in refractory cases [8]. Corticosteroid injections remain widely utilized because of their rapid analgesic effect. However, concerns persist regarding symptom recurrence and potential complications following repeated administration [9].

Platelet-rich plasma has emerged as a biological treatment strategy that delivers a concentrated source of growth factors capable of promoting tissue repair and regeneration. Recent randomized trials and meta-analyses have reported encouraging outcomes with PRP, particularly for long-term pain relief and functional recovery [10–13]. Nevertheless, conflicting evidence continues to exist regarding the relative superiority of PRP and corticosteroid injections.

Given the increasing use of PRP and the continuing uncertainty regarding its comparative effectiveness, this study was undertaken to evaluate and compare the clinical and radiological outcomes of PRP and corticosteroid injections in patients with plantar fasciitis.
Aim of the Study
To compare the efficacy of platelet-rich plasma and corticosteroid injections in the management of plantar fasciitis using clinical and ultrasonographic outcome measures.

Materials and Methods

Study Design
This prospective comparative study was conducted in the Department of Orthopaedics, Pt. Jawahar Lal Nehru Memorial Medical College and Associated Dr. Bhim Rao Ambedkar Memorial Hospital, Raipur, Chhattisgarh.

Study Population
A total of 52 patients diagnosed with plantar fasciitis were included in the study. Twenty-six patients received platelet-rich plasma injections and twenty-six patients received corticosteroid injections.

Methodology
Eligible patients underwent detailed clinical assessment and baseline evaluation. Demographic characteristics, duration of symptoms, side involvement, and clinical findings were recorded before intervention. Patients were treated with either platelet-rich plasma injection or corticosteroid injection according to the study protocol.

Outcome Assessment
Clinical outcomes were assessed using:
1. Visual Analogue Scale (VAS) for pain assessment.
2. Foot and Ankle Disability Index (FADI) for functional evaluation.
3. Ultrasonographic measurement of plantar fascia thickness.

VAS and FADI assessments were performed at baseline, 2 weeks, 3 months, and 6 months. Ultrasonographic evaluation was performed at baseline and 6 months.

Statistical Analysis
Data were entered and analysed using standard statistical methods. Continuous variables were expressed as mean ± standard deviation. Paired t-tests were used to compare changes within groups over time. Independent t-tests were applied for intergroup comparisons. Statistical significance was considered at a p-value less than 0.05.

Outcome Measures
Primary Outcome:
• Change in pain intensity measured using VAS score.
Secondary Outcomes:
• Functional improvement measured using FADI score.
• Changes in plantar fascia thickness on ultrasonography.
• Comparative effectiveness of PRP and corticosteroid injections during follow-up.

Results

A total of 52 patients with plantar fasciitis were included in the study. Twenty-six patients received corticosteroid injections and twenty-six received platelet-rich plasma (PRP) injections. Baseline demographic and disease characteristics were comparable between the treatment groups, indicating an appropriate comparison between interventions.

Table 1 summarizes the baseline characteristics of the study population. The mean age was 40.85 ± 10.32 years in the corticosteroid group and 35.77 ± 9.67 years in the PRP group. Females constituted a slight majority of the overall cohort. The duration of symptoms and side involvement were comparable between groups, with no statistically significant differences observed.

Table 1. Baseline Characteristics of Study Participants

Variable	Corticosteroid (n=26)	PRP (n=26)	p-value
Mean Age (years)	40.85 ± 10.32	35.77 ± 9.67	0.073
Female, n (%)	15 (57.7)	12 (46.2)	NS
Male, n (%)	11 (42.3)	14 (53.8)	NS
Left Side, n (%)	14 (53.8)	11 (42.3)	NS
Right Side, n (%)	12 (46.2)	15 (57.7)	NS
Duration of Symptoms	8.62 ± 2.35	8.96 ± 1.84	0.557

Interpretation

The two groups demonstrated comparable baseline characteristics with respect to age, gender distribution, side involvement, and symptom duration. The absence of statistically significant baseline differences suggests that subsequent outcome comparisons were unlikely to be influenced by demographic imbalance.

Pain Outcomes (VAS Score)

Both treatment modalities produced substantial reductions in pain scores throughout the follow-up period. Corticosteroid injection provided a more rapid reduction in pain during the early post-treatment period, whereas PRP demonstrated superior sustained improvement at six months.

Table 2. Comparison of VAS Scores During Follow-up

Follow-up	Corticosteroid	PRP	p-value
Baseline	6.85 ± 0.61	7.15 ± 0.73	0.106
2 Weeks	1.96 ± 0.66	2.46 ± 0.76	0.015
3 Months	2.16 ± 0.85	2.08 ± 0.70	0.718
6 Months	2.64 ± 0.57	1.40 ± 0.65	<0.001

Interpretation

Baseline pain scores were comparable between groups. Corticosteroid injection achieved significantly lower pain scores at two weeks, suggesting superior short-term analgesic efficacy. However, by six months, the PRP group demonstrated significantly lower pain scores, indicating a more durable therapeutic effect and superior long-term pain control.

Functional Outcome (FADI Score)

Functional recovery improved significantly in both treatment groups throughout the study period. However, no significant intergroup differences were observed at any follow-up interval.

Table 3. Comparison of FADI Scores During Follow-up

Follow-up	Corticosteroid	PRP	p-value
Baseline	82.77 ± 6.71	82.81 ± 5.58	0.982
2 Weeks	95.88 ± 2.63	95.27 ± 2.84	0.421
3 Months	96.48 ± 1.98	95.60 ± 2.61	0.186
6 Months	96.60 ± 1.96	96.20 ± 1.98	0.476

Interpretation

Both groups demonstrated marked functional improvement from baseline. FADI scores increased significantly following treatment and remained stable throughout follow-up. The absence of significant intergroup differences suggests that both PRP and corticosteroid injections were similarly effective in restoring foot and ankle function.

Ultrasonographic Assessment

Ultrasonographic evaluation revealed a reduction in plantar fascia thickness in both groups over six months. However, neither within-group nor between-group differences reached statistical significance.

Table 4. Ultrasonographic Plantar Fascia Thickness

Time Point	Corticosteroid (mm)	PRP (mm)	p-value
Baseline	4.64 ± 1.08	4.60 ± 0.98	0.778
6 Months	4.34 ± 0.97	4.22 ± 0.91	0.822

Interpretation

Both interventions were associated with modest reductions in plantar fascia thickness. Although clinical improvement was evident, ultrasonographic changes remained statistically non-significant. These findings suggest that symptomatic improvement may occur earlier than measurable structural remodeling.

Within-Group Clinical Improvement

Analysis of longitudinal changes demonstrated statistically significant improvement in pain and functional outcomes within both treatment groups.

Table 5. Summary of Within-Group Clinical Improvement

Outcome	Corticosteroid	PRP
Significant VAS improvement from baseline	Yes (p<0.001)	Yes (p<0.001)

Significant FADI improvement from baseline	Yes (p<0.001)	Yes (p<0.001)
Significant USG improvement	No	No

Interpretation

Both treatment modalities resulted in substantial clinical benefit. Pain and function improved significantly from baseline in both groups. However, radiological improvement lagged behind clinical recovery, highlighting the complex relationship between symptoms and structural changes.

Final Outcome Comparison

Table 6. Summary of Principal Outcomes at Six Months

Outcome Measure	Better Group
Pain Relief (VAS)	PRP
Functional Outcome (FADI)	Comparable
Plantar Fascia Thickness	Comparable
Early Pain Relief (2 Weeks)	Corticosteroid
Long-Term Clinical Benefit	PRP

Interpretation

Corticosteroid injection provided superior early symptomatic relief, whereas PRP produced superior long-term pain reduction. Functional improvement and ultrasonographic outcomes were similar between the two interventions. Overall, PRP demonstrated greater durability of therapeutic effect at six months.

DISCUSSION

Comparison of Demographic Characteristics

The present prospective comparative study evaluated the efficacy of platelet-rich plasma (PRP) and corticosteroid injections in the management of plantar fasciitis. A total of 52 patients were included, with 26 patients in each treatment arm. The mean age of participants was 40.85 ± 10.32 years in the corticosteroid group and 35.77 ± 9.67 years in the PRP group, with no statistically significant difference between groups (p = 0.073). Most patients belonged to the middle-aged population, which is consistent with the epidemiological profile of plantar fasciitis reported in the literature.

Buchbinder described plantar fasciitis as a condition predominantly affecting adults between 40 and 60 years of age, with occupational and biomechanical factors contributing significantly to disease occurrence [1]. Riddle et al. also demonstrated that increasing age, obesity, and prolonged standing were important risk factors associated with plantar fasciitis [2]. Similar age distributions have been reported in comparative studies evaluating PRP and corticosteroid injections [3,4].

Females constituted a slight majority in the present study. Comparable findings were reported by Palomo-López et al., who observed a higher burden of plantar fasciitis among women and documented significant impairment in quality of life among affected individuals [5]. The nearly equal gender distribution observed in the current study suggests that both sexes remain vulnerable to the condition.

The duration of symptoms was comparable between groups (8.62 ± 2.35 months vs. 8.96 ± 1.84 months; p = 0.557), indicating homogeneity of baseline disease severity and supporting the validity of subsequent outcome comparisons.

Comparison of Pain Outcomes

Pain reduction constituted the primary outcome of the study and was assessed using the Visual Analogue Scale (VAS). Both treatment modalities produced statistically significant reductions in pain compared with baseline.

In the corticosteroid group, mean VAS scores decreased from 6.85 ± 0.61 at baseline to 1.96 ± 0.66 at two weeks, demonstrating rapid symptomatic improvement. This finding is consistent with the established anti-inflammatory action of corticosteroids and aligns with reports by Ang and Wee, who demonstrated significant short-term pain relief following corticosteroid injection [6].

Interestingly, corticosteroid treatment exhibited superior pain reduction at two weeks compared with PRP (1.96 ± 0.66 vs. 2.46 ± 0.76; p = 0.015). Similar observations were reported by Acosta-Olivo et al., who found that corticosteroids often provide earlier symptomatic benefit during the initial post-injection period [7].

However, the long-term findings favored PRP. At six months, mean VAS scores were significantly lower in the PRP group than in the corticosteroid group (1.40 ± 0.65 vs. 2.64 ± 0.57; p < 0.001). This suggests a more durable therapeutic effect of PRP. Comparable findings have been reported by Yang et al. in their meta-analysis of randomized controlled trials, where PRP demonstrated superior long-term pain reduction compared with corticosteroids [8].

Similarly, Ling and Wang reported that PRP produced significantly better pain outcomes at extended follow-up intervals due to its regenerative properties and ability to stimulate tissue healing rather than merely suppress symptoms [9]. The current findings therefore support the growing body of evidence favoring PRP for sustained symptom control.

Comparison of Functional Outcomes

Functional recovery was assessed using the Foot and Ankle Disability Index (FADI). Both groups demonstrated marked improvement following treatment. The corticosteroid group improved from a baseline FADI score of 82.77 ± 6.71 to 96.60 ± 1.96 at six months, while the PRP group improved from 82.81 ± 5.58 to 96.20 ± 1.98. No statistically significant difference was observed between groups at any follow-up interval.

These findings indicate that both interventions successfully restored foot function and improved activity levels. Similar observations were reported by Martinelli et al., who documented substantial functional improvement following PRP administration in chronic plantar fasciitis patients [10].

Verma et al. also reported that both PRP and corticosteroid injections resulted in significant improvement in pain and functional outcomes, with differences becoming more evident for pain rather than disability measures [11]. The absence of significant intergroup differences in FADI scores in the present study suggests that both treatment modalities can effectively restore functional performance despite differences in long-term pain control.

The rapid increase in FADI scores observed by two weeks in both groups suggests that early symptom relief translates into prompt improvement in weight-bearing capacity, gait efficiency, and daily activity participation.

Ultrasonographic Outcomes and Structural Changes

Ultrasonographic assessment revealed a reduction in plantar fascia thickness in both groups during follow-up. However, these changes did not achieve statistical significance.

In the corticosteroid group, plantar fascia thickness decreased from 4.64 ± 1.08 mm to 4.34 ± 0.97 mm. Similarly, the PRP group demonstrated a reduction from 4.60 ± 0.98 mm to 4.22 ± 0.91 mm. Intergroup differences remained non-significant.

These findings are consistent with previous observations that clinical improvement often precedes measurable radiological remodeling. Wearing et al. reported that pain severity and plantar fascia thickness do not always correlate directly, suggesting that structural changes alone may not adequately reflect therapeutic success [12].

McNally and Shetty emphasized that ultrasonographic improvement may require prolonged follow-up periods and that symptom relief can occur despite persistent fascial thickening [13]. Similar conclusions were reached by Walther et al., who noted variability in imaging responses despite significant clinical benefit [14].

The present findings therefore support the concept that patient-reported outcomes remain more clinically relevant than isolated radiological measurements when evaluating treatment success.

Clinical Implications, Strengths and Limitations

The findings of this study have important clinical implications. Corticosteroid injections provide rapid and effective short-term pain relief and may be particularly useful in patients seeking immediate symptomatic improvement. However, the gradual increase in pain scores observed after the initial response suggests a reduction in durability of benefit.

Conversely, PRP demonstrated a progressive reduction in pain over time and significantly superior outcomes at six months. This finding supports the regenerative rationale behind PRP therapy and suggests that it may represent a preferable option for long-term disease management [16-20].

A major strength of the study was the prospective comparative design with uniform outcome assessment using validated clinical and radiological measures. Evaluation of both pain and functional outcomes allowed comprehensive assessment of treatment efficacy.

The study was limited by its relatively small sample size and six-month follow-up duration. Longer follow-up may better demonstrate differences in structural remodeling and durability of therapeutic response. Future multicenter randomized studies with larger populations are warranted to confirm these findings and establish standardized PRP protocols.

Overall, the results suggest that while both modalities are effective, PRP offers superior long-term pain relief with comparable functional recovery, making it an attractive biological treatment option for chronic plantar fasciitis.

CONCLUSION

Both platelet-rich plasma and corticosteroid injections were effective treatment modalities for plantar fasciitis, resulting in significant improvements in pain and functional outcomes. Corticosteroid injection demonstrated superior short-term analgesic efficacy, producing faster pain reduction during the early post-treatment period. However, this advantage diminished over time.

Platelet-rich plasma exhibited a sustained therapeutic effect, with progressive improvement throughout follow-up and significantly lower pain scores at six months. Functional recovery assessed using the Foot and Ankle Disability Index improved substantially in both groups without significant intergroup differences. Ultrasonographic plantar fascia thickness decreased in both treatment arms, although radiological changes were not statistically significant.

The findings indicate that corticosteroid injection remains a useful option when rapid symptom relief is

desired, whereas PRP appears to provide superior long-term clinical benefit. Based on the present results, PRP may be considered a promising regenerative treatment strategy for chronic plantar fasciitis, particularly in patients seeking durable symptom control and functional improvement.

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