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# Comparative Efficacy of Autologous Platelet-Rich Plasma versus Corticosteroid Injections in Chronic Plantar Fasciitis: A Prospective Randomized Study

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## ABSTRACT

**Background**: Plantar fasciitis remains one of the most common causes of heel pain, often interfering with daily activities and gradually reducing both quality of life and functional capacity. Although corticosteroid injections have traditionally been used as the standard approach for patients who do not respond to conservative care, platelet-rich plasma has increasingly been viewed as a possible regenerative alternative. It is thought to address underlying tissue changes rather than provide short-term relief alone. Still, studies that directly compare the effectiveness of PRP and corticosteroids are relatively few, which makes clear conclusions difficult.

**Objective**: This study sought to compare long-term clinical outcomes between autologous PRP and corticosteroid injections among patients with chronic plantar fasciitis during a 24-week follow-up period

**Methods**: A prospective, interventional, comparative study was carried out at a tertiary care center between April 2023 and September 2024. During this period, 120 patients with chronic plantar fasciitis were enrolled and randomly assigned to receive either an autologous PRP injection (Group A, n = 60) or a corticosteroid injection (Group B, n = 60). Pain and functional outcomes were treated as the primary endpoints and were assessed using the Visual Analogue Scale (VAS) and the American Orthopaedic Foot and Ankle Society (AOFAS) score. These measures were recorded at baseline and then followed at 6, 12, and 24 weeks after the intervention, which may offer a clearer picture of how treatment effects evolve over time rather than at a single snapshot.

**Results**: Both treatment groups improved meaningfully from baseline, indicating that each approach offered some degree of benefit. Corticosteroid injections appeared to work faster, showing stronger pain relief and functional gains at the 6-week mark (VAS: 1.50 ± 0.73 vs 4.80 ± 0.93; AOFAS: 87.4 ± 2.44 vs 64.7 ± 2.93; $p < 0.001$). This early advantage, however, seemed to taper with time. By 24 weeks, patients treated with PRP showed more sustained improvement, with lower pain scores (VAS: 1.43 ± 0.57 vs 3.23 ± 1.01; $p < 0.001$) and better functional outcomes (AOFAS: 86.3 ± 2.12 vs 80.9 ± 3.53; $p < 0.001$). Taken together, these findings may suggest that while corticosteroids are useful for rapid symptom relief, PRP is more likely to support longer-term pain reduction and functional recovery.

**Conclusions**: Corticosteroid injections tend to deliver quicker symptom relief, particularly in the early weeks, but their effects appear to diminish with time. In contrast, PRP was associated with more durable improvements in both pain and function, which may make it a better option for long-term management of chronic plantar fasciitis. While individual patient factors and access to treatment still matter, these findings suggest that PRP is likely to be the preferred choice for patients looking beyond short-term relief toward sustained functional recovery.

***Keywords****: Plantar fasciitis, platelet-rich plasma, corticosteroid injection, heel pain, regenerative medicine.*

## INTRODUCTION

Plantar fasciitis is a common foot disorder, affecting roughly 10% of individuals at some point in their lives and accounting for an estimated 11–15% of foot-related complaints seen in clinical practice. It typically presents in adults between 40 and 60 years of age and is linked to microtears and ongoing tissue stress at the plantar fascia's insertion on the medial calcaneal tubercle. For many patients, the condition is more than an isolated heel pain—it interferes with routine activities such as prolonged standing, walking to work, or even getting out of bed in the morning, ultimately affecting productivity and overall quality of life.

Over time, the understanding of plantar fasciitis has evolved. What was once considered a primarily inflammatory process is now more often described as a degenerative condition, or fasciosis, marked by collagen disorganization, fibroblast proliferation, and neovascularization. This shift in perspective may help explain why treatments aimed solely at reducing inflammation do not always provide lasting relief and why approaches that support tissue repair appear increasingly relevant.

Most patients respond well to conservative measures such as rest, footwear modification, orthotic support, physiotherapy, and nonsteroidal anti-inflammatory medications, with reported success rates of 80–90%. Still, a notable minority—roughly 10–20%—continue to experience persistent symptoms despite these interventions. In such cases, corticosteroid injections have traditionally been used as a second-line option because they can provide rapid pain relief. That benefit, however, is often short-lived, and concerns remain about potential complications, including plantar fascia rupture, fat pad atrophy, and the absence of any true regenerative effect.

Against this backdrop, platelet-rich plasma (PRP) has gained attention as a treatment that may address the underlying pathology rather than simply dampen symptoms. PRP contains a concentrated mix of platelets and growth factors, such as platelet-derived growth factor, transforming growth factor-β, vascular endothelial growth factor, and epidermal growth factor, all of which are thought to play roles in tissue repair, angiogenesis, and modulation of inflammation. While the biological rationale is compelling, its clinical advantage over established therapies is not yet fully settled.

Several studies have reported favorable outcomes with PRP in chronic tendinopathies, including plantar fasciitis, but direct comparisons with corticosteroid injections have produced mixed results. Differences in study design, patient selection, injection protocols, follow-up duration, and outcome measures make it difficult to draw firm conclusions. In addition, evidence from Indian tertiary care settings remains relatively sparse, despite the likelihood that patient characteristics, occupational demands, and healthcare access may influence treatment response.

In light of these uncertainties, the present study was designed to compare autologous PRP and corticosteroid injections in patients with chronic plantar fasciitis treated at an Indian tertiary care center. By using standardized treatment protocols and systematic follow-up over 24 weeks, we aimed to provide clearer insight into both short-term and longer-term clinical outcomes.

## METHODS

**Study Design and Setting:** The study was designed as a prospective, interventional, comparative investigation and was carried out in the Department of Orthopaedics at Mahatma Gandhi Medical College and Hospital in Jaipur, Rajasthan, from April 2023 to September 2024. Approval was obtained from the Institutional Ethics Committee prior to patient enrollment. All participants provided written informed consent, which was taken in both English and Hindi to ensure the information was clearly understood and participation was entirely voluntary.

**Participants:** Adult patients (≥18 years) presenting to the orthopedics outpatient department with heel pain and clinically diagnosed with plantar fasciitis were screened for eligibility. Inclusion criteria comprised: (1) clinical diagnosis of plantar fasciitis based on characteristic heel pain, particularly with first steps in the morning or after prolonged rest; (2) point tenderness at the medial calcaneal tuberosity; (3) failure to respond adequately to conservative treatment for at least 6 weeks; and (4) provision of written informed consent.

Exclusion criteria included: (1) history of neurological disorders or bleeding diathesis; (2) bony pathologies or functional impairments of the foot and ankle; (3) previous treatment with corticosteroid or PRP injections within the preceding 6 months; (4) pregnancy; (5) active infection; and (6) inability to comply with follow-up requirements.

**Randomization and Interventions:** Eligible patients were allocated to one of two treatment arms using a consecutive sampling approach, resulting in two equal groups of 60 participants each.

Group A received autologous PRP injections, while Group B was treated with corticosteroid injections.
For patients assigned to the PRP group, 20 mL of autologous blood was drawn from the antecubital vein under standard sterile conditions. The sample was then processed using a double-spin centrifugation protocol. An initial spin at 1500 rpm for 10 minutes allowed separation of red blood cells, followed by a second spin at 3000 rpm for 15 minutes to concentrate the platelets. This process typically yielded about 3.5 mL of PRP, with platelet levels approximately three to five times higher than baseline, a concentration that is generally considered adequate for clinical use.

Patients in the corticosteroid group received an injection consisting of 2 mL of methylprednisolone acetate (40 mg/mL) combined with 4 mL of normal saline, producing a total injection volume of 6 mL.

All injections were administered at the point of maximum tenderness near the medial calcaneal tuberosity using a palpation-guided technique and strict aseptic precautions. Local anesthesia with 1% lidocaine was used to improve patient comfort, as heel injections can be painful. Following the procedure, patients were advised to apply ice, use oral analgesics if necessary, and limit physical activity for 48–72 hours, which is likely sufficient to allow early symptom settling.

**Outcome Measures:** Primary outcome measures included pain assessment using the Visual Analogue Scale (VAS) ranging from 0 (no pain) to 10 (worst possible pain), and functional evaluation using the American Orthopaedic Foot and Ankle Society (AOFAS) Ankle-Hindfoot Score ranging from 0 to 100 points, with higher scores indicating better function.

Secondary outcomes included patient satisfaction, return to normal activities, and adverse events. All assessments were performed by blinded evaluators at baseline (pre-injection) and at 6, 12, and 24 weeks post-intervention.

**Statistical Analysis:** Data analysis was performed using SPSS version 26.0. Continuous variables were summarized as means with standard deviations, while categorical data were reported as frequencies and percentages. Changes before and after intervention within each group were assessed using paired *t*-tests when the data appeared to be normally distributed; in situations where this assumption did not hold, the Wilcoxon signed-rank test was used instead. For comparisons between the two groups, independent *t*-tests or Mann–Whitney U tests were applied as appropriate. A *p*-value of 0.05 or less was considered indicative of statistical significance.

Sample size estimation was informed by prior studies reporting clinically meaningful differences in VAS scores. On this basis, a minimum of 52 patients per group was likely sufficient to achieve 80% power at a 5% significance level. To account for possible dropouts during follow-up, the final enrollment was increased to 60 participants in each group.

## RESULTS

### Baseline Characteristics

A total of 120 patients completed the study without any dropouts. The demographic characteristics were well-balanced between groups. In Group A (PRP), the mean age was 46.8±12.4 years with 32 males (53.3%) and 28 females (46.7%). Group B (corticosteroid) had a mean age of 44.2±11.8 years with 34 males (56.7%) and 26 females (43.3%). The age distribution showed the highest prevalence in the 31-40 years group for both cohorts (Group A: 16 patients; Group B: 28 patients). Symptom duration exceeded 6 months in the majority of patients (Group A: 36 patients, 60%; Group B: 42 patients, 70%), indicating chronic, refractory plantar fasciitis in most participants. Physical activity levels were relatively evenly distributed across sedentary, moderate, and heavy

categories in both groups, with Group B showing slightly higher representation in the heavy activity category (24 vs 20 patients).

All patients (100%) presented with heel pain as the primary complaint, while difficulty in walking was reported by 48 patients (80%) in Group A and 50 patients (83.3%) in Group B. These findings underscore the significant functional impact of the condition on the study population.

**Pain Outcomes (VAS Scores):** At baseline, both groups demonstrated comparable pain severity with no statistically significant difference (Group A: 7.67±1.12 vs Group B: 7.47±0.90, p=0.450), confirming appropriate randomization.

At the 6-week follow-up, the corticosteroid group showed dramatically superior pain reduction compared to the PRP group (1.50±0.73 vs 4.80±0.93, p<0.001), representing a 79.9% improvement from baseline for corticosteroids versus 37.4% for PRP. This substantial early benefit of corticosteroids reflects their rapid anti-inflammatory mechanism of action.

By 12 weeks, both groups continued to improve, but the advantage of corticosteroids persisted (2.13±1.04 vs 3.33±1.15, p<0.001). However, the gap between groups had narrowed considerably, with corticosteroids showing 71.5%

improvement from baseline compared to 56.6% for PRP.

The most striking findings emerged at the 24-week endpoint, where the treatment effects crossed over. The PRP group achieved superior pain relief (1.43±0.57 vs 3.23±1.01, p<0.001), representing an 81.4% improvement from baseline compared to 56.8% for the corticosteroid group. Notably, while PRP patients continued to improve progressively, corticosteroid-treated patients experienced some deterioration from their 12-week status, suggesting waning therapeutic effects.

**Functional Outcomes (AOFAS Scores):** Baseline functional scores were similar between groups (Group A: 45.6±3.83 vs Group B: 45.1±3.46, p=0.573), indicating comparable functional impairment at study entry.

At 6 weeks, the corticosteroid group demonstrated markedly superior functional improvement (87.4±2.44 vs 64.7±2.93, p<0.001), with a 94.0% improvement from baseline compared to 41.9% for the PRP group. This paralleled the pain relief pattern, confirming the rapid but short-lived benefits of corticosteroid therapy.

By 12 weeks, both groups showed continued functional gains, with corticosteroids maintaining advantage (85.3±3.42 vs 79.3±3.40, p<0.001). However, the differential had decreased substantially, with improvements of 89.1% and 73.9% respectively.

At the 24-week final assessment, PRP achieved superior functional outcomes (86.3±2.12 vs 80.9±3.53, p<0.001). The PRP group demonstrated 89.3% improvement from baseline compared to 79.4% for the corticosteroid group. This crossover pattern mirrored the pain outcomes, reinforcing the concept of superior long-term benefits with PRP therapy.

**Safety and Tolerability:** Both treatments were well-tolerated with minimal adverse events. Transient post-injection pain lasting 24-48 hours was reported in 8 patients (13.3%) in the PRP group and 6 patients (10.0%) in the corticosteroid group, which resolved with standard analgesics. No cases of infection, plantar fascia rupture, fat pad atrophy, or other serious complications were observed in either group during the study period.

## DISCUSSION

The findings of this prospective randomized study add to the growing body of evidence comparing PRP and corticosteroid injections for chronic plantar fasciitis, while also highlighting how differently these two treatments behave over time. Rather than pointing to a single “best” option, the results suggest that treatment response is closely tied to timing, underlying pathology, and patient expectations—factors that are often underemphasized in routine practice.

The rapid improvement observed with corticosteroid injections, particularly within the first six weeks, is consistent with their well-known pharmacological effects. By inhibiting phospholipase A2 and suppressing the arachidonic acid cascade, corticosteroids effectively reduce local inflammation and pain. In practical terms, this translates into fast relief, which many patients value highly, especially those whose symptoms interfere with work, mobility, or sleep. The substantial reduction in pain and marked improvement in function seen early in our study mirror results reported in several earlier trials and help explain why corticosteroids have remained a popular second-line treatment for years.

Despite this early success, the gradual decline in corticosteroid efficacy between 12 and 24 weeks highlights an important limitation. Chronic plantar fasciitis is increasingly understood as a degenerative rather than purely inflammatory condition. Suppressing inflammation alone does little to reverse collagen disorganization, microtears, or impaired healing at the fascia–bone interface.

Once the short-lived anti-inflammatory effect diminishes, symptoms often return, which is a familiar pattern in clinical follow-up. This may also explain why repeated steroid injections are sometimes requested, despite growing concerns about their cumulative risks.

PRP therapy followed a very different trajectory. Improvements were more modest initially but continued to progress over time, with the most notable benefits emerging at 24 weeks. This delayed response appears consistent with the proposed biological mechanism of PRP. Rather than acting as a symptomatic treatment, PRP is thought to initiate a cascade of tissue repair involving growth factor release, angiogenesis, cellular proliferation, and extracellular matrix remodeling. These processes are inherently slow and may not produce immediate relief, but they are more likely to result in structural recovery of the plantar fascia.

Our results align with several published studies that report superior long-term outcomes with PRP compared to corticosteroids. Peerbooms et al. demonstrated significantly greater pain reduction at one year in patients treated with PRP, while Monto reported sustained functional improvement lasting up to two years, long after the effects of corticosteroids had waned. Although differences in PRP preparation methods and outcome measures make direct comparisons challenging, the overall trend toward better durability with PRP is difficult to ignore.

One particularly relevant observation from this study is the crossover effect between the two treatments. Corticosteroids outperformed PRP in the short term, whereas PRP showed clear advantages later in follow-up. This finding has direct clinical implications. For patients seeking rapid symptom control—such as those with impending work demands, travel, or short-term functional goals—corticosteroid injections may still be appropriate. In contrast, patients with long-standing symptoms who are more concerned about lasting improvement than immediate relief may be better served by PRP.

Safety considerations further support the role of PRP in long-term management. Although both treatments were generally well tolerated in our cohort, PRP's autologous nature reduces the risk of allergic or immunological reactions. More importantly, it avoids complications associated with corticosteroids, including plantar fascia rupture, fat pad atrophy, and weakening of local tissues, particularly with repeated injections. These risks, while uncommon, can be clinically significant and difficult to manage once they occur.

Economic factors, though not formally analyzed in this study, are also worth discussing. PRP involves additional costs related to blood collection, centrifugation, and processing. However, if PRP leads to sustained improvement and reduces the need for repeat injections, prolonged medication use, or surgical intervention, it may prove more cost-effective over time. This balance between upfront cost and long-term benefit is especially relevant in resource-limited healthcare settings.

Several limitations of this study should be acknowledged. The 24-week follow-up period, while sufficient to demonstrate differences in response patterns, may not capture the full long-term trajectory of PRP therapy. Some studies suggest continued improvement beyond six months. The single-center design may limit generalizability, particularly to populations with different occupational demands or activity levels. In addition, the absence of a placebo group prevents assessment of absolute treatment effects, although the comparative design remains clinically meaningful given the established efficacy of both interventions.

Future research should focus on standardizing PRP preparation protocols, as variability in platelet concentration and activation methods may influence outcomes. Identifying patient subgroups—based on age, symptom duration, activity level, or imaging findings—who are most likely to benefit from each treatment would also be valuable. Longer follow-up studies extending beyond one year could further clarify the durability of PRP effects and help determine whether repeat treatments are necessary.

Overall, the findings of this study suggest that while corticosteroids remain useful for short-term symptom relief, PRP appears better suited for long-term management of chronic plantar fasciitis.
Careful patient selection and counseling are essential, as the choice of treatment should reflect both the desired speed of relief and the goal of sustained functional recovery.

## CONCLUSION

This prospective randomized study demonstrates that while corticosteroid injections provide superior short-term pain relief and functional improvement in chronic plantar fasciitis, autologous PRP therapy offers significantly better long-term clinical outcomes. The findings suggest distinct therapeutic roles for each modality: corticosteroids for patients requiring rapid symptom relief, and PRP for those seeking sustained improvement and long-term management.

Given the superior long-term efficacy, favorable safety profile, and regenerative potential, PRP should be considered the preferred therapeutic option for chronic plantar fasciitis in patients who can tolerate the delayed onset of action. The results support a paradigm shift toward regenerative medicine approaches that address underlying pathology rather than merely suppressing symptoms. These findings have important implications for clinical practice guidelines and healthcare policy, supporting the integration of PRP therapy into standard treatment algorithms for chronic plantar fasciitis. Further research with extended follow-up periods and larger multicenter studies will help refine treatment protocols and optimize patient selection criteria.

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**CONFLICTS OF INTEREST:** The authors declare no conflicts of interest related to this study.

**Data Availability:** The datasets used and analyzed during the current study are available from the corresponding author on reasonable request, subject to institutional review board approval and patient privacy considerations.

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