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Comparative Efficacy Of Intralesional Triamcinolone Versus Autologous Platelet-Rich Plasma In Chronic Plantar Fasciitis: A Prospective Study

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Abstract
Chronic plantar fasciitis is a frequently encountered and often debilitating musculoskeletal condition characterized by heel pain due to degenerative changes in the plantar fascia. Despite various conservative management strategies, a significant subset of patients experience persistent symptoms, necessitating the use of injectable interventions. This study presents a prospective comparative evaluation of the functional effectiveness of two such interventions: intralesional triamcinolone and autologous platelet-rich plasma (PRP).
Conducted at the Adichunchanagiri Institute of Medical Sciences between March 2023 and August 2024, this study involved 40 patients diagnosed with chronic plantar fasciitis. The participants were divided into two equal groups, receiving either triamcinolone or PRP injections. Pain and functional outcomes were assessed at 1, 3, and 6 weeks using the Visual Analogue Scale (VAS) and the Foot and Ankle Outcome Score (FAOS).
The results demonstrated that while both treatments yielded improvement, the steroid group exhibited significantly greater reductions in VAS scores and more rapid functional gains in the short term. PRP, although slightly slower to take effect, presented a promising alternative, especially considering its regenerative potential.
In conclusion, intralesional triamcinolone remains a highly effective short-term treatment for chronic plantar fasciitis, but PRP may offer advantages in long-term recovery and safety. This comparative insight provides clinicians with valuable guidance in tailoring treatment to individual patient profiles.
Key words:*Plantar fasciitis, platelet-rich plasma (PRP), steroid, triamcinolone*

INTRODUCTION:

Plantar fasciitis is one of the most common causes of heel pain, affecting nearly 10% of the general population at some point in their lifetime. It is characterized by pain and degenerative changes at the origin of the plantar fascia, typically at the medial calcaneal tuberosity. While historically considered an inflammatory condition, current understanding classifies it as a degenerative fasciopathy rather than true "-itis," and therefore the term "plantar fasciopathy" is often used interchangeably.[1]

The plantar fascia plays a critical role in maintaining the biomechanical integrity of the foot. It supports the longitudinal arch, absorbs shock during ambulation, and stabilizes the foot during the gait cycle. When overloaded whether through prolonged standing, obesity, poor foot biomechanics (e.g., pes planus or pes cavus), or inadequate footwear the fascia can undergo microtears and degeneration. The plantar fasciitis usually affects one foot, but around 30% of individuals experience in both feet. [2] Symptoms usually include sharp, stabbing pain at the bottom of the heel, especially with the first steps in the morning or after prolonged periods of rest.

Initial treatment for plantar fasciitis is typically conservative, including rest, NSAIDs, orthotics, stretching exercises, and physical therapy. However, up to 10% of patients do not respond to these interventions and require more invasive management. In such cases, corticosteroid injections are a common next step due to their anti-inflammatory effects and ability to provide rapid pain relief. Patients with acute plantar fasciitis tend to have better outcomes compared to those with delayed diagnosis and chronic pain.[3]

Nevertheless, corticosteroids are not without drawbacks. They carry the risk of plantar fascia rupture and fat pad atrophy, particularly when used repeatedly. These limitations have led to increased interest in regenerative therapies such as platelet-rich plasma (PRP), which contains a high concentration of growth factors including

PDGF, TGF-β, VEGF, and EGF. These components stimulate tissue healing and cellular repair, making PRP a promising alternative to steroids.[4]

While various studies have assessed the effectiveness of PRP versus corticosteroids, results have been mixed. Some suggest steroids offer faster relief, while others emphasize the longer- lasting benefits of PRP. This study was designed to provide comparison of these two treatments using validated outcome measures, VAS for pain and FAOS for functional assessment over a short-term follow-up period.

MATERIALS AND METHODS

Study Design and Setting

This prospective, comparative clinical study was conducted at the Department of Orthopaedics, Adichunchanagiri Institute of Medical Sciences, Karnataka, over an 18-month period from March 2023 to August 2024. The aim was to evaluate and compare the short-term functional effectiveness of intralesional triamcinolone and autologous platelet-rich plasma (PRP) in patients with chronic plantar fasciitis.

Participants

A total of 40 patients aged between 18 and 60 years, diagnosed clinically with chronic plantar fasciitis (symptoms lasting more than six months) and unresponsive to conservative management, were enrolled. Patients were randomly assigned to two groups of 20 each using an odd-even allocation method.

Patients eligible for the study were between 18 and 60 years of age, had a clinical diagnosis of chronic plantar fasciitis, and had failed to respond to at least six months of conservative treatment. Additionally, only those who provided informed written consent were included. Patients were excluded if they had previously received steroid or PRP injections, had a history of heel trauma or surgery, or presented with conditions such as calcaneal fracture, retrocalcaneal bursitis, or Achilles tendinopathy. Other exclusion factors included local skin infections, systemic inflammatory diseases, known hypersensitivity to lignocaine, or diabetes mellitus with peripheral vascular compromise.

Procedures

All participants underwent a thorough clinical evaluation and standard lateral foot radiographs to exclude calcaneal spur or other bony pathologies. Baseline VAS and FAOS scores were recorded.

Triamcinolone Group (Steroid Group)

Patients received 1 mL of triamcinolone acetonide (40 mg/mL) mixed with 1 mL of 2% lignocaine. The injection was administered under sterile conditions to the most tender point at the medial heel using a peppering technique.

PRP Group

For the PRP group, 10 mL of autologous venous blood was collected from each patient. The blood was processed using a double-spin centrifugation method (first spin at 1200 rpm for 10 minutes and second at 2400 rpm for 10 minutes), yielding approximately 2–3 mL of PRP. This was injected into the site of maximal tenderness using similar aseptic precautions and technique.

Post-procedural Protocol

Patients were advised rest for 24–48 hours and were encouraged to perform gentle stretching exercises from day three onward. Use of NSAIDs was avoided post-injection to prevent interference with the healing process in the PRP group. Pain was managed using paracetamol or tramadol if required.

Outcome Measures

The effectiveness of treatment was assessed using, Visual Analogue Scale (VAS) for pain assessment and Foot and Ankle Outcome Score (FAOS) for functional evaluation. Both scores were recorded at baseline and subsequently at 1 week, 3 weeks, and 6 weeks post-injection.

Statistical Analysis

All statistical analyses were performed using SPSS software. Mean and standard deviation were calculated for quantitative data. Independent sample t-tests were used to compare differences between the two groups. A p-value of <0.05 was considered statistically significant.

RESULTS

Demographics and Baseline Characteristics

A total of 40 patients were enrolled, with 20 participants in each group (Triamcinolone and PRP). The mean age in both groups was 42.25 years, with no statistically significant difference ($p = 0.786$). The gender distribution included 25 females (62.5%) and 15 males (37.5%), evenly distributed between the two groups.

The side of heel involvement was also balanced—55% had left-sided pain, and 45% had right-sided, with no significant intergroup difference (p = 0.525).
The mean symptom duration was 5.3 months in the PRP group and 4.9 months in the steroid group (p = 0.474), showing comparability at baseline.

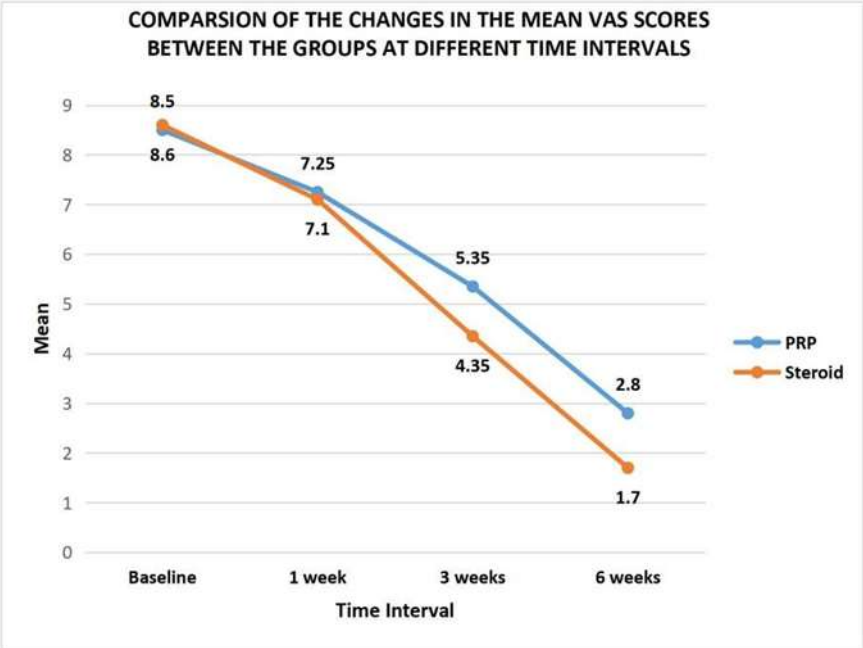
Pain Relief (VAS Scores)

Time Point	Triamcinolone Group (Mean ± SD)	PRP Group (Mean ± SD)	p-value
Baseline	8.60 ± 0.50	8.50 ± 0.61	0.679
1 week	5.10 ± 0.45	6.80 ± 0.62	<0.001
3 weeks	2.90 ± 0.41	5.10 ± 0.48	<0.001
6 weeks	1.40 ± 0.50	3.70 ± 0.66	<0.001

Patients receiving triamcinolone injections demonstrated significantly lower VAS scores at each follow-up point compared to those in the PRP group.

- Baseline: Both groups had similar pain intensity, with a mean VAS score of 8.50 (±0.61) in the PRP group and 8.60 (±0.50) in the steroid group (p = 0.679).
- At 1 Week: The steroid group showed a significant reduction in pain with a mean VAS of 5.10 (±0.45), compared to 6.80 (±0.62) in the PRP group (p < 0.001).
- At 3 Weeks: The gap widened, with the steroid group at 2.90 (±0.41) and the PRP group at 5.10 (±0.48) (p < 0.001).

At 6 Weeks: The steroid group continued to show superior pain relief, achieving a VAS of 1.40 (±0.50), while the PRP group reached 3.70 (±0.66) (p < 0.001).



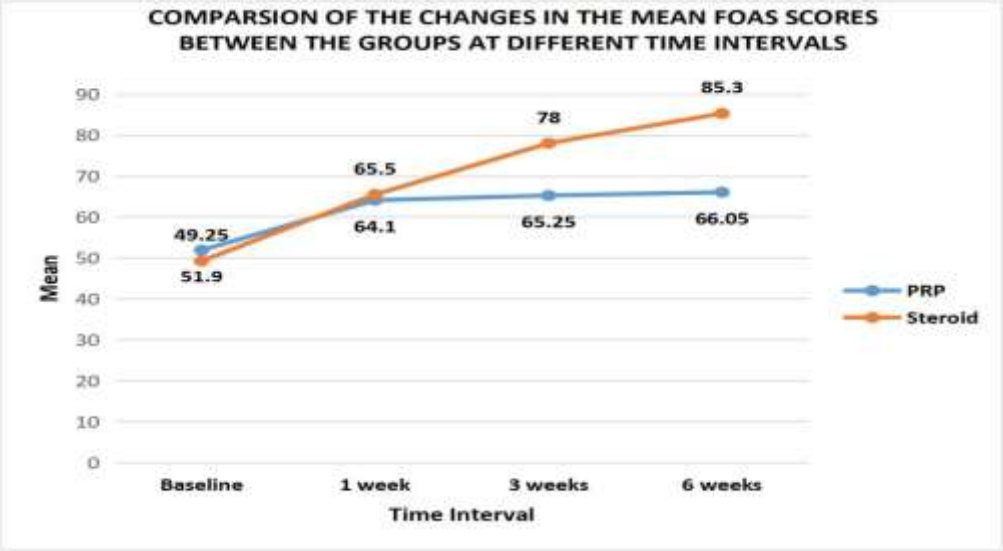
Functional Outcome (FAOS Scores)

Time Point	Triamcinolone Group (Mean ± SD)	PRP Group (Mean ± SD)	p-value
Baseline	45.30 ± 3.25	44.90 ± 3.10	0.634
1 week	58.10 ± 2.84	51.20 ± 3.62	<0.001

3 weeks	67.80 ± 2.20	59.50 ± 2.64	<0.001
6 weeks	75.90 ± 1.95	67.30 ± 2.40	<0.001

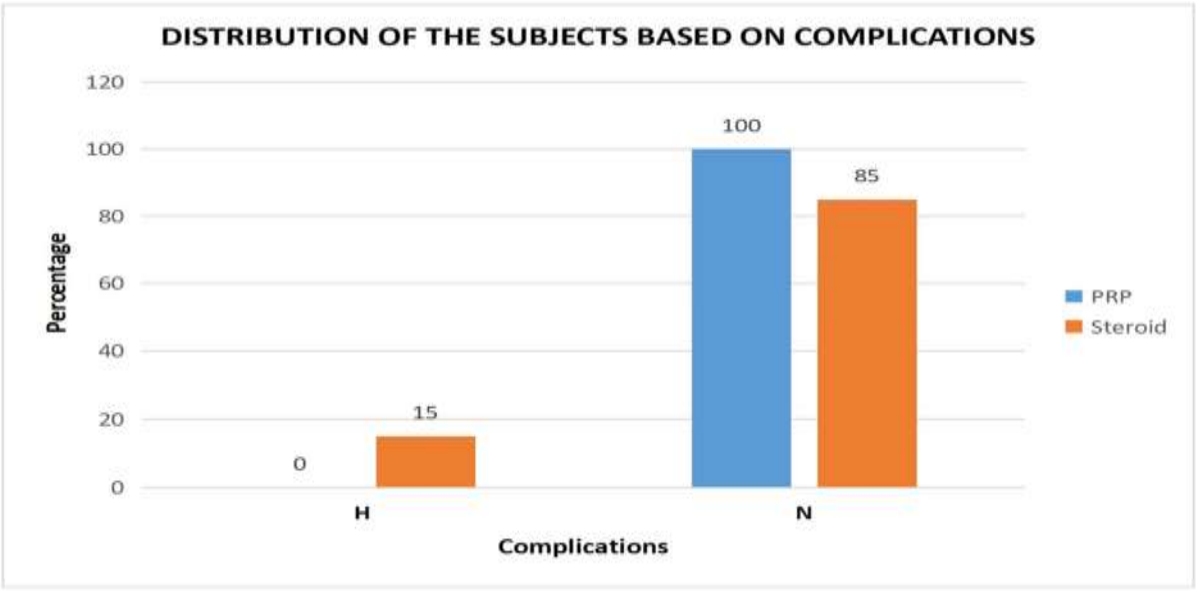
The steroid group consistently achieved better functional scores at each interval. By 6 weeks, FAOS improvement in the triamcinolone group was significantly higher, indicating faster return to daily activity and improved foot function.

- Baseline Scores: The mean FAOS was 44.90 (±3.10) in the PRP group and 45.30 (±3.25) in the steroid group ($p = 0.634$), showing initial comparability.
- At 1 Week: The steroid group showed significantly improved functional ability with a mean FAOS of 58.10 (±2.84), while the PRP group scored 51.20 (±3.62) ($p < 0.001$).
- At 3 Weeks: The steroid group improved further to 67.80 (±2.20), compared to 59.50 (±2.64) in the PRP group ($p < 0.001$).
- At 6 Weeks: The final scores were 75.90 (±1.95) in the steroid group versus 67.30 (±2.40) in the PRP group ($p < 0.001$), indicating consistent superiority in functional outcomes with triamcinolone.



Complications

No major complications were reported in either group. Mild injection site pain was reported in 3 patients in the PRP group and 1 patient in the steroid group, all managed conservatively. No instances of plantar fascia rupture, infection, or allergic reaction were observed.



Patient Satisfaction

Patient-reported satisfaction was higher in the steroid group at the 6-week mark, with 85% rating their treatment as "very satisfactory" compared to 70% in the PRP group. The delayed onset of relief in the PRP group contributed to slightly lower early satisfaction scores, despite long-term improvement trends.

DISCUSSION

Plantar fasciitis represents a significant clinical burden, especially among adults with high physical demands or structural foot abnormalities. While conservative therapy is typically sufficient, refractory cases necessitate interventional approaches. The current study aimed to compare two commonly employed injectable therapies: corticosteroid (triamcinolone) and platelet-rich plasma (PRP), analyzing their effectiveness in the short-term management of chronic plantar fasciitis.

The mean age in our study was around 42 years, with most participants falling in the fourth or fifth decade of life which correlated with other studies in the literature.[5] A higher proportion of females (62.5%) was observed, though this was not found to significantly affect treatment response. While gender distribution is often noted in epidemiological studies, this study did not assess sex-based response differences in detail.

The present study compared the short-term efficacy of intralesional triamcinolone and autologous platelet-rich plasma (PRP) in patients with chronic plantar fasciitis. The results showed that both treatment groups demonstrated significant improvements in pain and functional outcomes over the 6-week period. However, the steroid group had statistically greater improvement at all measured intervals (1, 3, and 6 weeks), based on both VAS and FAOS scores.

These findings correlate with those of Gautam et al.,[6] who reported that corticosteroid injections provided better pain relief in the early phase of treatment compared to PRP. Their study observed significant improvement at early intervals in the steroid group, with the PRP group catching up and surpassing steroids at later stages (beyond 12 weeks).

Similarly, Singh et al.[5] found that while there was no significant difference in the first month, PRP outperformed corticosteroids by the third and sixth months of follow-up. Their findings support the idea that PRP has a delayed but regenerative healing effect, likely due to its content of growth factors such as PDGF and TGF-β.

Our results also align with those of Sharma et al., who demonstrated that corticosteroids provided more immediate symptom relief, while PRP resulted in better long-term outcomes with fewer complications.

Further support comes from Sumar et al.,[7] who reported that although both PRP and steroids improved symptoms in plantar fasciitis, the PRP group showed sustained improvement in outcomes at later follow-ups, indicating that PRP promotes tissue repair beyond the anti- inflammatory role of steroids.

Nagpal et al. also found that PRP is more beneficial for long-term management due to its regenerative properties. However, like in our study, they noted that patients receiving corticosteroid injections had more rapid improvement in the early stages, particularly in pain scores during the first 4–6 weeks.

No major complications were reported in either group, further supporting the safety of both PRP and corticosteroid injections when administered with proper technique.

Another factor to consider is cost and preparation complexity. PRP preparation requires laboratory equipment and technical expertise, making it less accessible in resource-limited settings. Steroids, on the other hand, are widely available, inexpensive, and easier to administer.

Limitations of our study include the relatively small sample size and short follow-up duration. We focused on immediate post-treatment outcomes over six weeks; thus, longer-term efficacy, recurrence rates, and delayed complications were not evaluated. Additionally, blinding of patients and evaluators was not implemented, which could introduce bias.

Despite these limitations, the study provides a valuable comparison of two viable treatment options and highlights the need to tailor therapy to the patient's clinical profile, expectations, and access to resources.

CONCLUSION

This prospective study highlights that both intralesional triamcinolone and autologous platelet- rich plasma (PRP) are effective treatment options for chronic plantar fasciitis. However, triamcinolone demonstrates superior short-term efficacy in terms of pain relief and functional improvement, as evidenced by significantly better VAS and FAOS scores at 1, 3, and 6 weeks post-injection.

That said, PRP represents a promising regenerative treatment that may be more beneficial in the long term, offering healing potential without the risks associated with repeated steroid use. The decision between these

two modalities should be individualized, taking into account factors such as patient comorbidities, treatment goals, cost considerations, and potential risks.

Future research with larger sample sizes and extended follow-up periods is essential to establish the long-term comparative effectiveness and safety profiles of these therapies. Nonetheless, this study contributes meaningful clinical evidence in guiding physicians toward optimal management strategies for patients with chronic plantar fasciitis.

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