



A PROSPECTIVE COMPARATIVE STUDY OF THE TREATMENT OF PLANTAR FASCITIS WITH CORTICOSTEROID INJECTION AND PLATELET REPERFUSION THERAPY

Orthopaedics

Dr. Mohammed Faiz Nadaf*	Junior Resident, Department of Orthopaedics, Sapthagiri Institute of Medical Sciences and Research Centre, Bengaluru, Karnataka, India. *Corresponding Author
Dr. Mahesh G	Professor, Department of Orthopaedics, Sapthagiri Institute of Medical Sciences and Research Centre, Bengaluru, Karnataka, India.
Dr. A Rishidhar	Junior Resident, Department of Orthopaedics, Sapthagiri Institute of Medical Sciences and Research Centre, Bengaluru, Karnataka, India.
Dr. Sainesh S Pissay	Junior Resident, Department of Orthopaedics, Sapthagiri Institute of Medical Sciences and Research Centre, Bengaluru, Karnataka, India.

ABSTRACT

Introduction: One of the most frequent reasons of heel discomfort that orthopedicians see in the outpatient department is plantar fasciitis. It is not an inflammatory process, but rather a degenerative pathology, and in chronic forms, treatment can be rather challenging. The plantar fascia can sustain microscopic injuries as a result of the windlass process. Through the action of the tendoachilles and the forefoot, a combination of recurring opposing forces occur on the fascia. Chaotic vascularity exacerbates the cumulative cellular damage that follows. Zones of hyperplasia and hypoplasia form in the fascia. Several conservative treatment options for plantar fasciitis include extracorporeal shockwave therapy, stretching exercises, orthotics, and night splinting. Injections of corticosteroids have been used to treat plantar fasciitis and are a useful way to relieve discomfort. There is evidence in the literature of side effects from corticosteroid injections, including fascial rupture. Because PRP is autologous, it is considered a safer alternative that has less of an impact on the foot's metabolic function. We can determine which of the two therapies is more effective both functionally and subjectively with this study. **Objectives of the Study:** To compare the clinical outcome of plantar fasciitis treated with platelet reperfusion therapy and corticosteroid injection. **Methods:** 60 patients diagnosed with plantar fasciitis and meeting inclusion criteria, giving valid written consent for the study were enrolled and were randomized into corticosteroid injection and PRP injection group. Corticosteroid group were treated with 40mg (1ml) Triamcenolone group and PRP group were treated with 3ml of autologous PRP group locally. Similar post procedure protocol was advised for both groups. The patients were followed up at 1, 3, 6 and 9 months interval and were evaluated using AOFAS and VAS scores. **Results:** At baseline, both groups had identical mean AOFAS scores (66.43), the mean VAS score in the PRP group was 6.66 ± 1.02 , while in the steroid group it was 6.86 ± 1.08 . At 1 month and 3 months follow-up, both groups showed significant reduction in VAS scores and improvement in AOFAS scores; however, the difference between the groups remained statistically insignificant. At 6 and 9 months follow-up, the PRP group showed a higher mean AOFAS score compared with the steroid group which was statistically significant. Also the PRP group demonstrated a lower mean VAS scores during the same intervals when compared with the steroid group, which was also statistically significant. **Conclusion:** For treatment of plantar fasciitis both steroid and PRP are both safe and effective. Both Steroid and PRP therapy is effective for short term treatment and gives early symptomatic relief. PRP seems to be more effective for long term management of tennis elbow with more promising efficacy than corticosteroids. However higher power studies with much larger sample sized and longer duration follow up are required to obtain more conclusive results.

KEYWORDS

Heel Pain, Plantar Fasciitis, Corticosteroid Injection, PRP Injection.

INTRODUCTION

Plantar fasciitis is one of the most common causes of heel pain, affecting approximately 4–7% of the population and up to 10% during their lifetime¹. It commonly affects middle-aged individuals and is associated with obesity, prolonged standing, excessive walking, improper footwear, and altered foot biomechanics. The condition results primarily from repetitive microtrauma and degeneration of the plantar fascia at its calcaneal origin. Patients typically present with medial heel pain that is most severe during the first steps in the morning or after prolonged rest².

Conservative treatment, including rest, stretching, physiotherapy, NSAIDs, and orthotic support, is effective in approximately 80–90% of patients³. However, persistent or chronic cases may require additional interventions such as local injections⁴.

Corticosteroid injections provide rapid and effective short-term pain relief but may have limited long-term benefits and potential complications⁴.

Platelet-rich plasma (PRP) is a regenerative treatment containing growth factors that promote tissue healing, collagen synthesis, and angiogenesis. PRP generally has a slower onset of action but has demonstrated better sustained pain relief and functional improvement over the long term⁵. Comparative studies suggest that corticosteroids are more effective for early symptom relief, whereas PRP may provide superior outcomes after three to six months⁶.

However, variations in PRP preparation, injection protocols, patient selection, and treatment costs remain important considerations. Therefore, this prospective comparative study evaluates PRP versus

corticosteroid injections in plantar fasciitis based on pain relief, functional improvement, recurrence, and complications.

MATERIALS AND METHODS

Study Design- A Prospective Comparative study.

Study Setting- The study was carried out in the Department of Orthopaedics, Sapthagiri Institute of Medical Sciences and Research Centre, Bengaluru, Karnataka, India.

Study Duration- Patients were recruited between May 2024 to October 2025 (18 MONTHS) , with each patient followed for a minimum period of 6 months after surgery.

Sample Size- A total of 60 consecutive patients fulfilling the eligibility criteria were enrolled in the study.

Inclusion Criteria

- Patients between age group of 18–60 years
- Patients presenting with complaints of heel pain for more than 4 weeks.
- Patients with maximal tenderness at the attachment of plantar fascia on the medial tubercle of the calcaneus
- Willingness to participate and give informed consent

Exclusion Criteria

- Previous surgery for heel pain.
- Patients with systemic diseases like diabetes mellitus, local or systemic infection,
- peripheral vascular diseases, metabolic diseases such as gout
- Pregnant or breast-feeding female patients.
- Dysfunction of the ankle or foot.
- Previous treatment: Corticosteroid injection in the last 6 months or NSAIDS
- treatment within the last 7 days.

Preoperative Assessment

Patients fulfilling the inclusion criteria were enrolled for the study after obtaining informed consent. Their demographic profile, examination findings and assessment scores were documented in case record Performa with follow up chart. Patients are randomised to steroid and PRP group.

Particulars of patient like name, age, sex, MRD number, and address were noted. Then a detailed history was taken regarding occupation, duration of symptoms, similar complaints in the past, treatment for similar complaints in the past, past medical history, family history were noted. General physical examination and local examination of the foot was done. Unaffected foot examined first and then affected foot with patient sitting in comfortable position. Radiological investigations were done, while Blood investigations were not done routinely, done only if required.

Once clinical diagnosis is made, patients were taken to procedure room, in comfortable supine or sitting position part is prepared using betadine scrub solution and painted with 5% scrub solution, foot is draped using sterile hole towel, and wiped using alcohol swab.

Surgical Technique :

For Steroid Group :

40mg (1ml) triamcinolone injection with 1 ml of 2% lignocaine given intralesional, with peppering technique at maximal tender point.

Preparation of PRP :

With patients sitting in comfortable position 20ml venous blood was taken from patients unaffected upper limb cubital vein under aseptic condition into 5 vacutainers containing anticoagulant. These vacutainers were put in centrifuge for first spin (soft spin) at 1500 rpm for 15 min. this separated blood into 3 layers. The top and middle layer transferred into a fresh vacutainer and this vacutainer is subjected to second spin (hard spin) at 3300rpm for 15min, which separates it into two layers. The top platelet poor plasma layer was discarded and bottom layer of platelet rich plasma was separated and 3ml was used for giving injection.

Post Injection Protocol

Patients were told to do avoid strenuous activities for 3-4 days, and prescribed paracetamol 650 mg BD for 3 days for pain management. After 10-12 days stretching exercises were started, followed by strengthening exercises.

Evaluation

Patients were evaluated at 1 month, 3 months, 6 months and 9 months. Outcomes evaluated using VAS score and AOFAS score.

Statistical Analysis

The data collected was entered in MS excel and analysis was carried out using standard formulas. The result was expressed in the form of descriptive statistics like Mean +/- standard deviation, and percentage. The inferential statistics like independent t test was used to find the association between the variables. If P value < 0.05 is statistically significant.

Ethical Approval

The study protocol was reviewed and approved by the Institutional Ethics Committee of Saphthagiri Institute of Medical Sciences and Research Centre, Bengaluru.

RESULTS

1. Age Distribution :

Table 1: Age Distribution of Patients

Age Group (Years)	Number of Patients	Percentage
30-40	12	20%
41-50	21	35%
> 51	27	45%

Age group involved was between 32 to 66 years. The majority of patients were in the >51 years age group (45%), followed by 41-50 years (35%). Plantar fasciitis was therefore more commonly observed in the middle-aged and elderly population.

2. Gender Distribution:

Table 2: Gender Distribution

Gender	Number	Percentage
Male	29	48%
Female	31	52%

Male	29	48%
Female	31	52%

The study population showed a slight female predominance, with females constituting 52% of the total cases.

3. Mean VAS Score of Steroid Group at Each Follow-up Interval

Table 3 : Mean VAS Score in Steroid Injection Group

Follow-up Interval	Mean VAS Score $\pm$ SD	t value	p value
Baseline	6.86 $\pm$ 1.08	-	-
1 Month	4.80 $\pm$ 1.02	7.63	<0.0001
3 Months	3.53 $\pm$ 0.96	12.71	<0.0001
6 Months	2.23 $\pm$ 0.88	18.57	<0.0001
9 Months	1.70 $\pm$ 0.82	21.30	<0.0001

The mean VAS score in the steroid injection group decreased progressively from 6.86 at baseline to 4.80 at 1 month, 3.53 at 3 months, 2.23 at 6 months, and 1.70 at 9 months.

4. Mean VAS Score of PRP Group at Each Follow-up Interval

Table 4 : Mean VAS Score in PRP Group

Follow-up Interval	Mean VAS Score $\pm$ SD	t value	p value
Baseline	6.66 $\pm$ 1.02	-	-
1 Month	4.66 $\pm$ 0.95	11.54	<0.0001
3 Months	3.40 $\pm$ 0.88	20.30	<0.0001
6 Months	1.96 $\pm$ 0.79	32.56	<0.0001
9 Months	0.86 $\pm$ 0.70	45.38	<0.0001

The mean VAS score decreased from 6.66 at baseline to 4.66 at 1 month, 3.40 at 3 months, 1.96 at 6 months, and 0.86 at 9 months.

5. Comparison of Mean VAS Scores Between PRP and Steroid Groups

Table 5 : Independent t-test Comparison of VAS Scores

Follow-up Interval	PRP Mean VAS $\pm$ SD	Steroid Mean VAS $\pm$ SD	t value	p value
Baseline	6.66 $\pm$ 1.02	6.86 $\pm$ 1.08	-0.74	0.462
1 Month	4.66 $\pm$ 0.95	4.80 $\pm$ 1.02	-0.55	0.586
3 Months	3.40 $\pm$ 0.88	3.53 $\pm$ 0.96	-0.55	0.585
6 Months	1.96 $\pm$ 0.79	2.23 $\pm$ 0.88	-1.25	0.215
9 Months	0.86 $\pm$ 0.70	1.70 $\pm$ 0.82	-4.27	<0.001

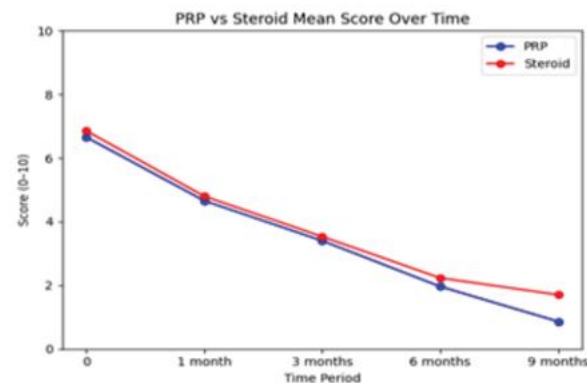


Fig 1: Line diagram Showing Comparison of Mean VAS Scores Between PRP and Steroid Groups

The comparison of mean VAS scores between the PRP and steroid groups was performed using an independent sample t-test.

At baseline, the mean VAS score in the PRP group was 6.66 $\pm$ 1.02, while in the steroid group it was 6.86 $\pm$ 1.08. The difference between the groups was not statistically significant (p = 0.42), indicating that both groups were comparable before treatment.

At 1 month and 3 months follow-up, both groups showed significant reduction in pain; however, the difference between the groups remained statistically insignificant (p > 0.05).

At 6 months follow-up, the PRP group demonstrated a lower mean VAS score (1.96 $\pm$ 0.79) compared with the steroid group (2.23 $\pm$ 0.88). Also at 9 months follow-up, the PRP group showed a markedly lower mean VAS score (0.86 $\pm$ 0.70) compared with the steroid group (1.70 $\pm$ 0.82), and these differences were highly statistically significant (p < 0.001).

6. Mean AOFAS Score of Steroid Group at Each Follow-up Interval

Table 6 : Mean AOFAS Score with Paired t-test Analysis

Follow-up Interval	Mean AOFAS Score $\pm$ SD	t value	p value
Baseline	66.43 $\pm$ 8.9	-	-
1 Month	79.23 $\pm$ 7.5	9.35	<0.0001
3 Months	86.83 $\pm$ 6.8	16.43	<0.0001
6 Months	91.06 $\pm$ 5.7	23.69	<0.0001
9 Months	94.36 $\pm$ 4.9	31.22	<0.0001

The mean AOFAS score increased from 66.43 at baseline to 79.23 at 1 month, 86.83 at 3 months, 91.06 at 6 months, and 94.36 at 9 months.

7. Mean AOFAS Score of PRP Group at Each Follow-up Interval

Table 7 : Mean AOFAS Score with Paired t-test Analysis

Follow-up Interval	Mean AOFAS Score $\pm$ SD	t value	p value
Baseline	66.43 $\pm$ 8.5	-	-
1 Month	81.80 $\pm$ 7.2	11.70	<0.0001
3 Months	87.96 $\pm$ 6.4	18.41	<0.0001
6 Months	94.00 $\pm$ 4.8	31.46	<0.0001
9 Months	97.40 $\pm$ 3.6	47.13	<0.0001

The mean AOFAS score improved from 66.43 at baseline to 81.80 at 1 month, 87.96 at 3 months, 94.00 at 6 months, and 97.40 at 9 months.

8. Comparison of Mean AOFAS Scores Between PRP and Steroid Groups

Table 8 : Independent t-test Comparison of AOFAS Scores

Follow-up Interval	PRP Mean VAS $\pm$ SD	Steroid Mean VAS $\pm$ SD	t value	p value
Baseline	66.43 $\pm$ 8.5	66.43 $\pm$ 8.9	0.00	1
1 Month	81.80 $\pm$ 7.2	79.23 $\pm$ 7.5	1.36	018
3 Months	87.96 $\pm$ 6.4	86.83 $\pm$ 6.8	0.66	0.51
6 Months	94.00 $\pm$ 4.8	91.06 $\pm$ 5.7	2.15	0.03
9 Months	97.40 $\pm$ 3.6	94.36 $\pm$ 4.9	2.74	0.01

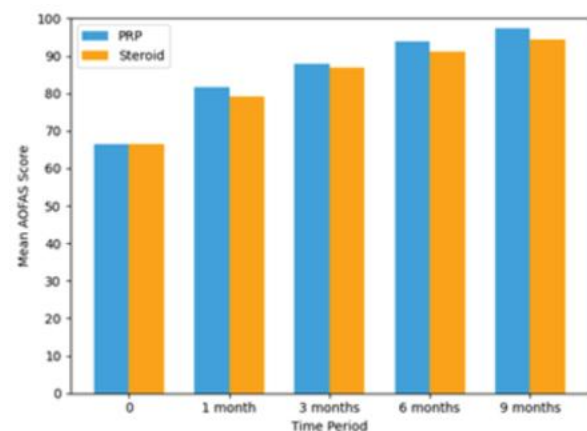


Fig 2: Bar Diagram Showing Comparison of Mean AOFAS Scores Between PRP and Steroid Groups.

Interpretation

The comparison of mean AOFAS scores between the PRP and steroid groups was performed using an independent sample t-test.

At baseline, both groups had identical mean AOFAS scores (66.43), and the difference between groups was not statistically significant ($p = 1.00$), confirming that both groups were comparable before treatment.

At 1 month and 3 months follow-up, both groups demonstrated significant improvement in functional scores; however, the difference between the PRP and steroid groups remained statistically insignificant ($p > 0.05$).

At 6 months follow-up, the PRP group showed a higher mean AOFAS score (94.00 $\pm$ 4.8) compared with the steroid group (91.06 $\pm$ 5.7). Also at 9 months follow-up, the PRP group demonstrated further improvement with a mean AOFAS score of 97.40 $\pm$ 3.6, compared with 94.36 $\pm$ 4.9 in the steroid group. The differences were statistically significant ($p = 0.01$).

DISCUSSION

Plantar fasciitis is a common cause of chronic heel pain in adults. It is now considered predominantly a degenerative condition caused by repetitive microtrauma and collagen degeneration rather than a purely inflammatory disorder. Although several treatment options are available, corticosteroid injections and platelet-rich plasma (PRP) therapy are frequently used in patients who fail conservative management. The present study compared the clinical outcomes of these two modalities using validated VAS and AOFAS scoring systems.

The majority of patients in the present study belonged to the fifth and sixth decades, with predominance in the >51 -year age group. This is consistent with international studies by Riddle et al.⁷ and Buchbinder¹ (2004), and Indian studies like Kumar et al.⁸, which reported a higher incidence in the fourth to sixth decades. This may be attributed to cumulative mechanical stress and age-related reduction in the elasticity and tensile strength of the plantar fascia, increasing susceptibility to repetitive strain and microtears.

A slight female predominance was observed, with females constituting 52% of the study population. Similar findings were reported internationally by Crawford et al.⁹ (2005) and in Indian studies such as Sharma et al.¹⁰. This may be related to footwear habits, prolonged occupational and domestic standing, and hormonal influences on ligamentous laxity and connective tissue properties.

Baseline VAS and AOFAS scores showed no statistically significant difference between the PRP and corticosteroid groups ($p > 0.05$), confirming that both groups were comparable at the beginning of the study. In the PRP group, the mean VAS score decreased progressively from 6.66 at baseline to 0.86 at 9 months, while the corticosteroid group improved from 6.86 to 1.70. Although both treatments were effective, PRP demonstrated superior long-term pain relief, consistent with findings by Hurley et al.¹¹, and Kumar et al.⁸, particularly beyond 3–6 months.

Functional outcomes assessed using AOFAS scores also improved significantly. The PRP group improved from 66.43 at baseline to 97.4 at 9 months, whereas the corticosteroid group reached 94.36. The superior improvement with PRP at 6 and 9 months agrees with Hurley et al.¹¹, and Desouza et al.¹², who reported better sustained functional outcomes with PRP.

An important observation was the difference between early and long-term outcomes. Both corticosteroid and PRP injections provided effective early pain relief, at the first and third months. However, PRP demonstrated superior outcomes during longer follow-up. The long-term efficacy of PRP can be explained by its regenerative mechanism. PRP contains growth factors such as platelet-derived growth factor (PDGF), transforming growth factor-beta (TGF- β), and vascular endothelial growth factor (VEGF), which promote angiogenesis, collagen synthesis, and tissue regeneration. These mechanisms have been demonstrated by Herber et al.¹³. Thus, PRP addresses the underlying degenerative pathology rather than providing only symptomatic relief.

Corticosteroids act primarily by suppressing inflammatory mediators, inhibiting fibroblast proliferation, and reducing tissue edema, resulting in effective short-term symptom relief. However, repeated corticosteroid administration may cause complications such as plantar fascia rupture, fat pad atrophy, and infection, as highlighted by Acevedo et al.¹⁴. PRP, being autologous, has minimal adverse effects and represents a biologically safer option for long-term management. While both corticosteroid injections and PRP provide effective early symptomatic relief, PRP offers superior long-term pain reduction and functional improvement. The available evidence therefore supports PRP as a preferred treatment option for chronic plantar fasciitis, particularly in patients who remain symptomatic despite conservative management.

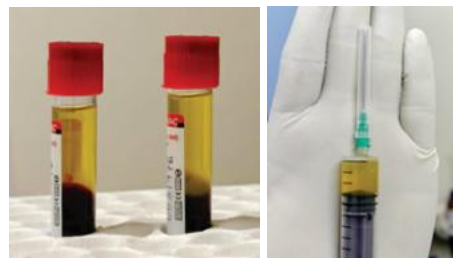


Fig - PRP Injection.

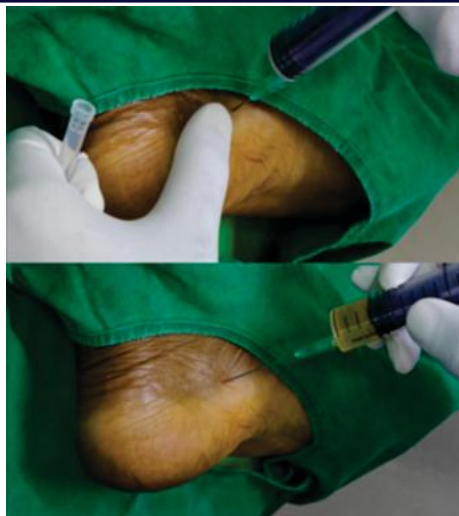


Fig - Administration of PRP Injection at the Point of Maximum Tenderness.

CONCLUSION

The present study demonstrates that both corticosteroid injection and platelet-rich plasma (PRP) therapy are effective modalities for reducing pain and improving functional outcomes in patients with plantar fasciitis. Both treatment groups exhibited significant early improvement, with notable pain relief observed at 1 and 3 months of follow-up. However, PRP therapy showed superior long-term efficacy. At 6 and 9 months follow-up, patients treated with PRP demonstrated significantly lower VAS pain scores and higher AOFAS functional scores compared to those who received corticosteroid injections, indicating a sustained and progressive clinical benefit. These findings suggest that while corticosteroid injections are beneficial for short-term symptomatic relief, PRP therapy offers more durable and clinically meaningful outcomes by addressing the underlying degenerative pathology. Therefore, PRP may be considered a preferable treatment option in the long-term management of chronic plantar fasciitis, particularly in cases refractory to conventional conservative measures.

Declaration by Authors

Ethical Approval: The study was approved by the Institutional Ethics Committee

Source of Funding: No funding was received for this study.

Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

- Buchbinder R. Clinical practice. Plantar fasciitis. *N Engl J Med*. 2004 May 20;350(21):2159-66. doi: 10.1056/NEJMc032745. PMID: 15152061.
- Stuber K, Kristmanson K. Conservative therapy for plantar fasciitis: a narrative review of randomized controlled trials. *J Can Chiropr Assoc*. 2006 Jun;50(2):118-33. PMID: 17549177; PMCID: PMC1839987.
- Wolgin M, Cook C, Graham C, Mauldin D. Conservative treatment of plantar heel pain: long-term follow-up. *Foot Ankle Int*. 1994 Mar;15(3):97-102. doi: 10.1177/107110079401500303. PMID: 7951946.
- Buchbinder R, Ptasznik R, Gordon J, Buchanan J, Prabaharan V, Forbes A. Ultrasound-guided extracorporeal shock wave therapy for plantar fasciitis: a randomized controlled trial. *JAMA*. 2002 Sep 18;288(11):1364-72. doi: 10.1001/jama.288.11.1364. PMID: 12234230.
- Speed CA. Fortnightly review: Corticosteroid injections in tendon lesions. *BMJ*. 2001 Aug 18;323(7309):382-6. doi: 10.1136/bmj.323.7309.382. PMID: 11509432; PMCID: PMC1120980.
- Fei X, Lang L, Lingjiao H, Wei C, Zhou X. Platelet-rich plasma has better mid-term clinical results than traditional steroid injection for plantar fasciitis: A systematic review and meta-analysis. *Orthop Traumatol Surg Res*. 2021 Oct;107(6):103007. doi: 10.1016/j.otsr.2021.103007. Epub 2021 Jul 1. PMID: 34217867.
- Riddle DL, Schappert SM. Volume of ambulatory care visits and patterns of care for patients diagnosed with plantar fasciitis: a national study of medical doctors. *Foot Ankle Int*. 2004 May;25(5):303-10. doi: 10.1177/107110070402500505. PMID: 15134610.
- Kumar K, Rao V, Panda A, K G S, Buddhist H. Comparison of Platelet-Rich Plasma and Corticosteroid Injections for Chronic Plantar Fasciitis: A Randomized Controlled Trial. *Cureus*. 2024 May 4;16(5):e59656. doi: 10.7759/cureus.59656. PMID: 38836136; PMCID: PMC11147740.
- Crawford F, Atkins D, Young P, Edwards J. Steroid injection for heel pain: evidence of short-term effectiveness. A randomized controlled trial. *Rheumatology (Oxford, England)* 1999;38(10):974-7. doi: 10.1093/rheumatology/38.10.974
- Sharma R, Chaudhary NK, Karki M, Sunuwar DR, Singh DR, Pradhan PMS, Gyawali P, Duwal Shrestha SK, Bhandari KK. Effect of platelet-rich plasma versus steroid injection in plantar fasciitis: a randomized clinical trial. *BMC Musculoskelet Disord*. 2023 Mar 7;24(1):172. doi: 10.1186/s12891-023-06277-1. PMID: 36882804; PMCID: PMC9989576.
- Hurley ET, Shimozone Y, Hannon CP, Smyth NA, Murawski CD, Kennedy JG. Platelet-Rich Plasma Versus Corticosteroids for Plantar Fasciitis: A Systematic Review of Randomized Controlled Trials. *Orthop J Sports Med*. 2020 Apr 27;8(4):2325967120915704. doi: 10.1177/2325967120915704. PMID: 32426407; PMCID: PMC7222276.

- Desouza C, Shetty V. Healing Heels: A Meta-analysis of Platelet-rich Plasma vs Corticosteroid Injections in Plantar Fasciitis Treatment. *J Foot Ankle Surg (Asia-Pacific)* 2024;11(4):169-176.
- Herber A, Covarrubias O, Daher M, Tung WS, Gianakos AL. Platelet rich plasma therapy versus other modalities for treatment of plantar fasciitis: A systematic review and meta-analysis. *Foot Ankle Surg*. 2024 Jun;30(4):285-293. doi: 10.1016/j.fas.2024.02.004. Epub 2024 Feb 15. PMID: 38395675.
- Acevedo JI, Beskin JL. Complications of plantar fascia rupture associated with corticosteroid injection. *Foot Ankle Int*. 1998 Feb;19(2):91-7. doi: 10.1177/107110079801900207. PMID: 9498581.