

International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2023; 9(2): 150-157
© 2023 IJOS
<https://www.orthopaper.com>
Received: 25-02-2023
Accepted: 29-03-2023

Dr. R Siddarth
Postgraduate, Department of
Orthopedics, Sri Lakshmi
Narayanan Institute of Medical
Sciences, Pondicherry, India

Dr. V Nishanthan
Postgraduate, Department of
Orthopedics, Sri Lakshmi
Narayanan Institute of Medical
Sciences, Pondicherry, India

Dr. R Vijayaragavan
Professor and HOD, Department
of Orthopedics, Sri Lakshmi
Narayanan Institute of Medical
Sciences, Pondicherry, India

A comparative study to analyze the efficacy of platelet rich plasma versus corticosteroids in treatment of chronic plantar fasciitis

Dr. R Siddarth, Dr. V Nishanthan and Dr. R Vijayaragavan

DOI: <https://doi.org/10.22271/ortho.2023.v9.i2b.3365>

Abstract

Plantar Fasciitis is responsible for 15% of all foot problems. Over ten percent of the population will be affected at some point in their lives. It is caused by inflammation of a broad band of tissue that links your heel bone to your toes and runs across the bottom of your foot (plantar fascia). Plantar fasciitis is a type of plantar fasciitis that causes stabbing pain when you take your first steps in the morning. The discomfort usually goes away as you get up and move around, but it may come back after long periods of standing or when you stand up after sitting. Runners are more likely to get plantar fasciitis. The plantar fascia is made up of white-coloured fibers that run longitudinally from the calcaneum to the toes. The attachments include the following: Proximal- Affixed to the calcaneum's medial tubercle. The fascia fanning out into five slips against the metatarsophalangeal joints and attaches to the base of the appropriate toes' proximal phalanges. Chronic heel pain is a difficult condition to treat and takes a long time to resolve. This study outlines both PRP and steroid are effective and safe modalities in the treatment of plantar fasciitis. But statistical data suggest that steroid injection is effective for immediate pain relief. And PRP injection is better for long term pain relief in plantar fasciitis with no side effects.

Keywords: Platelet rich plasma, corticosteroids, chronic plantar fasciitis

Introduction

Plantar Fasciitis is responsible for 15% of all foot problems. Over ten percent of the population will be affected at some point in their lives. It is caused by inflammation of a broad band of tissue that links your heel bone to your toes and runs across the bottom of your foot (plantar fascia). Plantar fasciitis is a type of plantar fasciitis that causes stabbing pain when you take your first steps in the morning^[1, 2]. The discomfort usually goes away as you get up and move around, but it may come back after long periods of standing or when you stand up after sitting. Runners are more likely to get plantar fasciitis. Plantar fasciitis is more common in those who are overweight or who use shoes with insufficient support^[3]. Plantar Fasciitis is caused by degenerative irritation of the plantar origin at the medial calcaneal tuberosity of the heel. It is made up of three segments, all of which originate from the calcaneous origin. The fascia plays a crucial role in supporting the arch and providing shock absorption. Despite the fact that the diagnosis includes segmentis, this illness is distinguished by the absence of inflammatory cells. Plantar Fasciitis is a highly widespread condition in India, with millions of people suffering from heel discomfort each year. Plantar fasciitis can be caused by a variety of factors, but the majority of instances are caused by overuse or stress^[4, 5]. The most common symptom is intense, localised pain in the heel. A heel spur may be discovered in some circumstances. Plantar Fasciitis is difficult to treat, and most therapies result in dissatisfaction. The majority of cases are treated without surgery, however discomfort recurrence is frustrating.

Corresponding Author:
Dr. V Nishanthan
Postgraduate, Department of
Orthopedics, Sri Lakshmi
Narayanan Institute of Medical
Sciences, Pondicherry, India

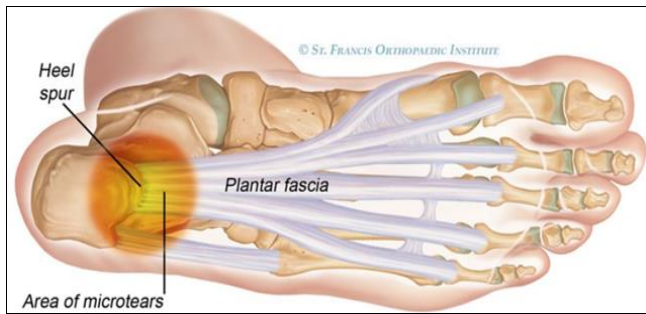


Fig 1: Showing the location of plantar Fascia in foot

This is typically an overuse injury caused by repetitive strain generating micro-tears in the plantar fascia, although it can also be caused by trauma or other multifactorial factors. Pesplanus, pescavus, limited ankle dorsiflexion, and severe pronation or supination are all predisposing factors. Pesplanus can produce higher tension at the plantar fascia's origin. Because the foot does not adequately evert or absorb shock, pescavus can generate undue strain on the heel. Patients with this illness frequently have tight gastrocnemius, soleus, and/or other posterior leg muscles. These tense muscles are hypothesised to affect the usual biomechanics of ambulation. Heel spurs are present in almost half of all individuals with this illness, but they are not the cause. Obesity, heel pad atrophy, ageing, employment requiring prolonged standing, and weight-bearing are some of the additional risk factors. Although plantar fasciitis has been linked to a variety of seronegatives podyloarthropathies, there are no known systemic causes in about 85% of patients [6].

Anatomy of foot

The plantar fascia is made up of white-coloured fibers that run longitudinally from the calcaneum to the toes. The attachments include the following: Proximal- Affixed to the calcaneum's medial tubercle. The fascia fanning out into five slips against the metatarsophalangeal joints and attaches to the base of the appropriate toes' proximal phalanges.

1. The central band is the most important portion.
2. The middle band
3. Band on the side

Heel Spur: A heel spur is an osseous elongation of the plantar calcaneal tuberosity in the form of an exostosis found at the medial process.



Fig 2: Showing the heel spur in patient with plantar fasciitis

Heel spurs affect 15% of the population. The appearance of a heel spur may indicate the presence of plantar fasciitis, although it is not conclusive evidence.

Symptoms include: Plantar fasciitis creates a stabbing pain near the heel on the bottom of your foot [7]. The discomfort is normally the severe when you take your first few steps after waking up, but it can also be caused by long periods of standing or getting up after sitting. Exercise generally makes the pain worse, not during it.

Treatment includes

In case of Conservative therapy treatment include: ICE therapy, Laser therapy, stretching exercises, orthotics, night splints, ultrasound therapy In case of invasive therapy: Corticosteroids, nerve therapy, Plantar Fascia release, excision of heel, autologous blood, PRP

Platelet rich plasma (PRP) is an autologous biological blood-derived substance that is given to various tissues where it releases high quantities of PDGF to aid wound, bone, and tendon repair. PRP also has antibacterial properties that aid in the prevention of infections. The growth factors in the alpha-granules are crucial to the basic science of PRP [8, 9].

Growth Factors

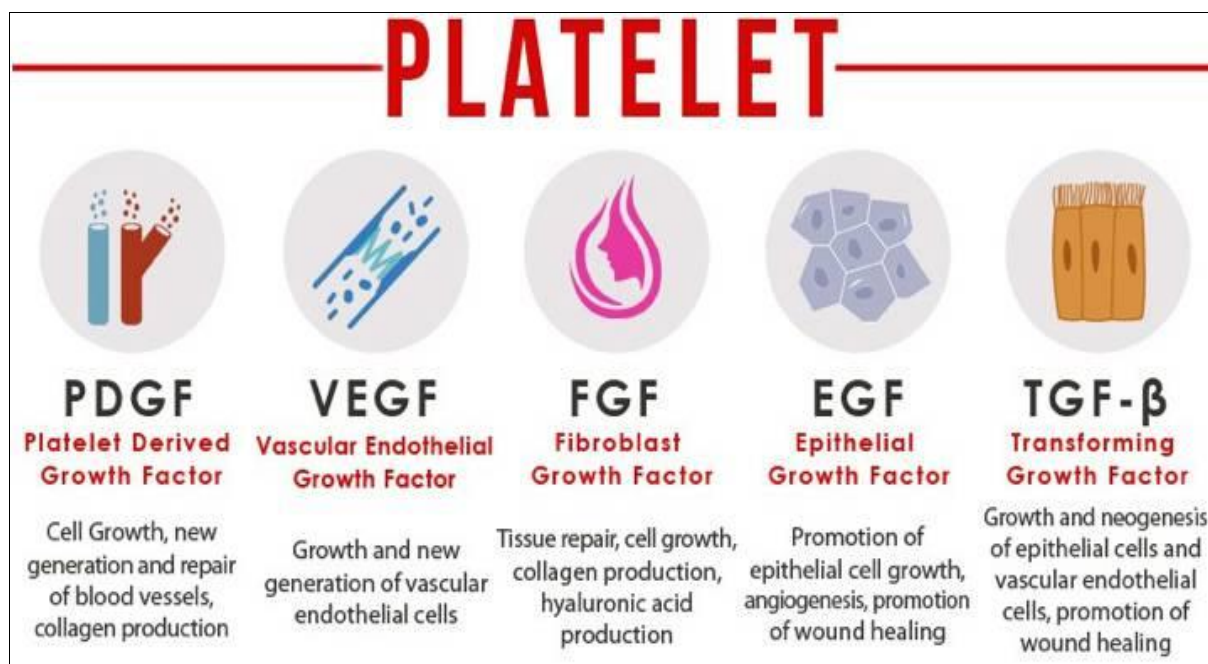


Fig 3: Showing growth factors

Corticosteroids

Corticosteroids have been shown to suppress fibroblast growth and reduce the synthesis of ground substances. The aforementioned action of steroid injection, rather than its anti-inflammatory activity, may be responsible for its positive effect [10, 11, 12].

Methodology

Study Site: The study was conducted at RMMCH, Annamalai University, between May 2020 to December May 2020.

Study Design: Prospective Comparative study

Study Population: Total Number of Patients- 30

- PRP-15 was given to an unknown number of patients.
- The total majority of patients who got steroid treatment was reduced by 15%.
- Male patients- 15; Female patients -16

The following include the types of groups

- Patients were divided into two categories at random.
- Patients in Category 1 had a single 3 ml PRP injection regionally.
- Patients in Category 2 received a single injection of 3 cc [40 mg methyl prednisolone acetate] regionally.

Inclusion criterion

1. Heel irritation on one side > 6 weeks
2. Has been on conservative therapy for more than four weeks and has not seen any symptomatic improvements.
3. Have you had any past local injections in your heel?
4. Are you willing to follow up?
5. Patients with normal blood pressure and glucose levels

Exclusion Criterion

1. Heel soreness on both sides
2. Has had prior injections in the nearby area
3. Doesn't want to be followed up on
4. Patients suffering from various medical conditions
5. Pathology of the Achilles tendon and foot deformity
6. Patients with a history of foot surgery

PRP Preparation

Under strict aseptic precautions, 20 milliliters of the patient's blood were taken from the antecubital vein and placed in pre-sterilized centrifuge vials. Anticoagulant acid citrate dextrose

was pre-loaded into these centrifuge vials. After that, the blood was centrifuged for 15 minutes at 3200 rpm. Platelet-poor plasma and platelet-rich plasma are isolated from the blood. The former is taken out and thrown away. When compared to reference entire blood, the platelet concentrate comprises 6-8 percent the amount of platelets [13, 14].

Ultrasound Evaluation of Plantar Fascia Thickness

- The researchers utilized a diagnostic ultrasound apparatus with a 4 cm broad transducer tip and an 8 MHz probes.
- The thickest part of the plantar fascia was evaluated from the base of the medial calcaneal tubercle, where a strong echogenic line could readily be seen. A thickness of greater than 4mm in the plantar fascia was deemed unusual.

Injection Protocol

- The technique was performed as an outpatient under strict aseptic circumstances.
- Maximum sensitivity sites have been found. After that, the patient was given 3 cc of PRP injection. With a single skin gateway and 4 to 5 rounds through the fascia itself, a peppering method, i.e. distributing in a clockwise way, was employed to produce a more broad zone of administration [15].

Post Injection Protocol

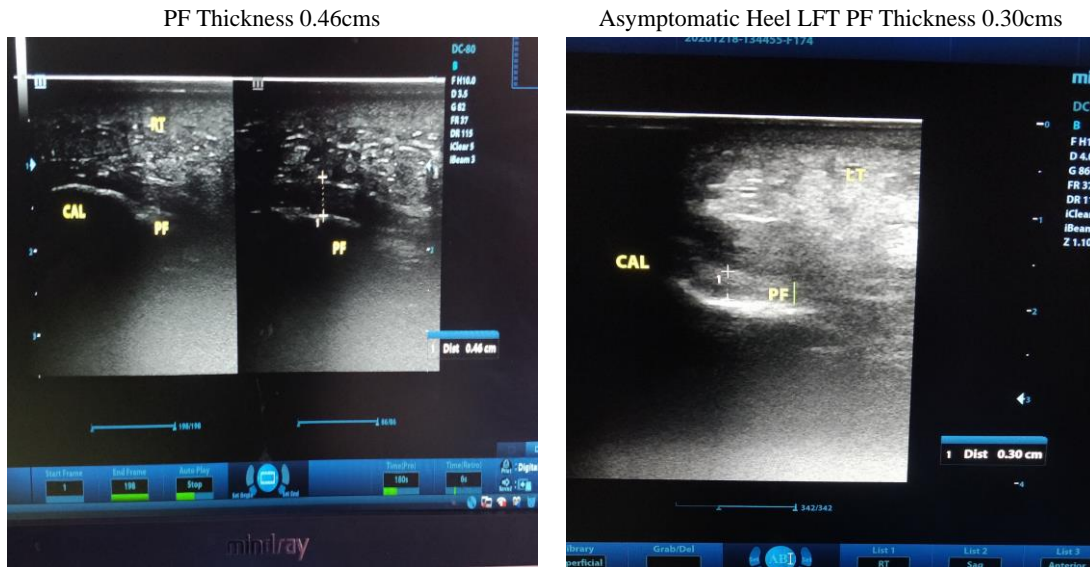
- The patients were observed for 20 minutes to see whether they had any negative responses.
- To confine their usage of their foot and narcotic painkillers for 48 hours.
- Patients were given conventional stretching routines to practice for two weeks after 48 hours.
- Patients were permitted to resume normal athletic or leisure activities as appropriate after 4 weeks.
- Any sort of foot, including those, was not recommended.

Aim and Objective

- To analyze the effectiveness of platelet rich plasma versus corticosteroids in the treatment of chronic plantar fasciitis
- To assess the relief of symptoms of heel pain and patient satisfaction using VAS [Visual Analog Score] and FAAM[Foot and Ankle Ability Measure]
- To assess the plantar fascia thickness [pre injection and post injection] using ultrasound



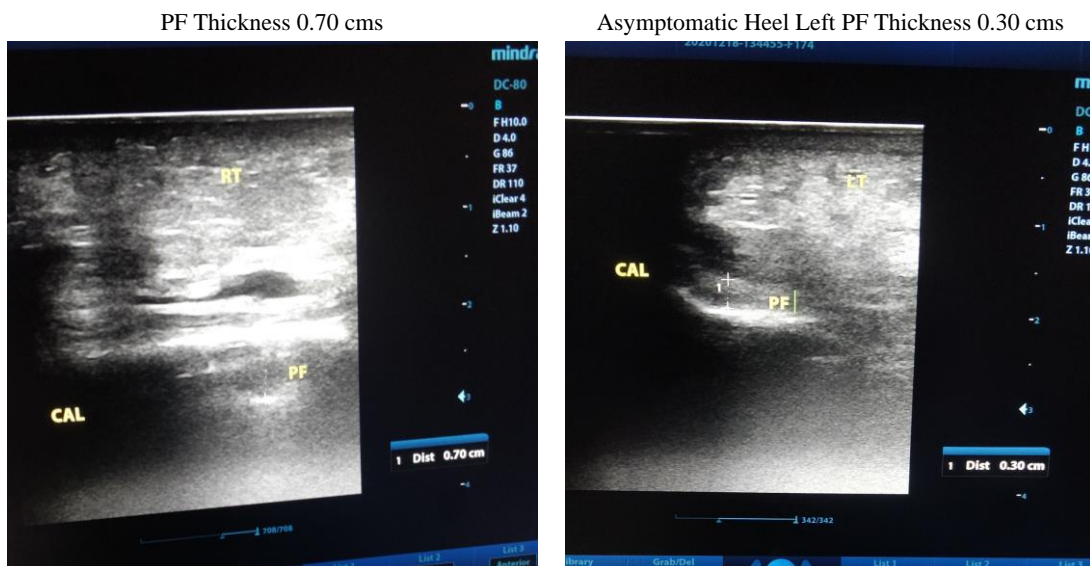
Clinical pictures for case 1 include 54 years / male



Symptomatic Heel RT



Clinical pictures of case of 50/F



Symptomatic Heel RT

Figure showing the symptomatic an asymptomatic PF thickness in patient with Plantar Fasciitis

Follow up

- Follow up was done at 2,4,8,12, and 24 weeks

- For discomfort and operational result, we utilized the VAS [VISUAL ANALOG SCORE] and FAAM [FOOT AND ANKLE ABILITY Measurement] scores.
- Patients were also observed for complications, if any at the injection site

Patient Name: _____ **Date:** _____

Foot and Ankle Ability Measure (FAAM)

Please answer every question with one response that most closely describes to your condition within the past week. If the activity in question is limited by something other than your foot or ankle mark not applicable (N/A).

	(4) No difficulty	(3) Slight difficulty	(2) Moderate difficulty	(1) Extreme difficulty	(0) Unable to do	(n/a) N/A
Standing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking on even ground	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking on even ground without shoes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking up hills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking down hills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Going up stairs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Going down stairs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking on uneven ground	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stepping up and down curbs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Squatting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coming up on your toes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking initially	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking 5 minutes or less	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking approximately 10 minutes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking 15 minutes or greater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

©2000 RobRoy Martin

Page 1 Score: _____

Patient Signature: _____ **Date:** _____

Therapist Signature: _____ **Date:** _____

Patient Name: _____ **Date:** _____

Foot and Ankle Ability Measure

Because of your foot and ankle how much difficulty do you have with:

	(4) No difficulty at all	(3) Slight difficulty	(2) Moderate difficulty	(1) Extreme difficulty	(0) Unable to do	(n/a) N/A
Home Responsibilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Activities of daily living	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Personal care	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Light to moderate work (standing, walking)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heavy work (push/pulling, climbing, carrying)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recreational activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How would you rate your current level of function during your usual activities of daily living from 0 to 100 with 100 being your level of function prior to your foot or ankle problem and 0 being the inability to perform any of your usual daily activities?

.0 %

Page 2 Score: _____

Total Page 1 & 2 Scores: _____

Scoring:

$\frac{\text{total patient score}}{\text{total number complete} \times 4} \times 100 = \text{_____ \% physical function}$

MEDICARE PATIENTS ONLY

100% - _____ % Function = _____ % Impairment

Patient Signature: _____ **Date:** _____

Therapist Signature: _____ **Date:** _____

Results and Discussion

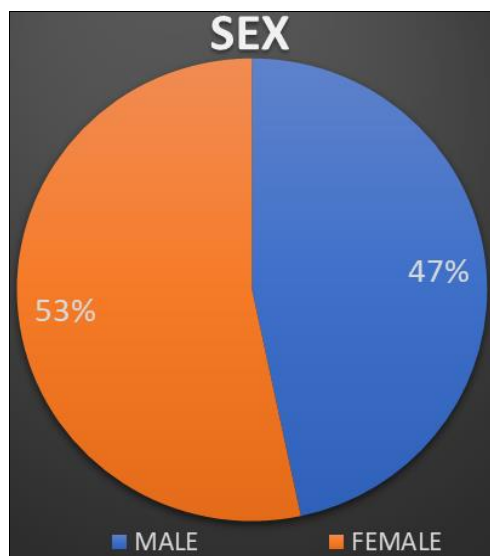


Fig 3: Showing distribution of Plantar Fasciitis among male and Females

The above figure shows that 53% of male were found to be affected with Plantar Fasciitis while female was found to be 47%.

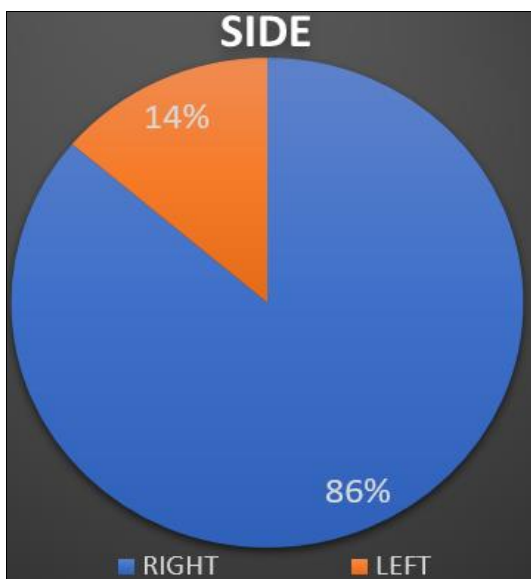


Fig 4: Showing the side distribution among general Population

The above figure shows that 86% of right foot is more effected than that of left 14%

Table 1: Showing VAAS Score

Group Statistics	Groups Group 1 [PRP] Group 2 [Steroids]	N	Mean Value
VAS base score	1 2	15 15	8.38 8.44
VAS score 4 weeks	1 2	15 15	7.74 4.07
VAS score 8 weeks	1 2	15 15	6.26 2.60
VAS score 12 weeks	1 2	15 15	3.43 1.18
VAS score 24 weeks	1 2	15 15	1.45 3.02

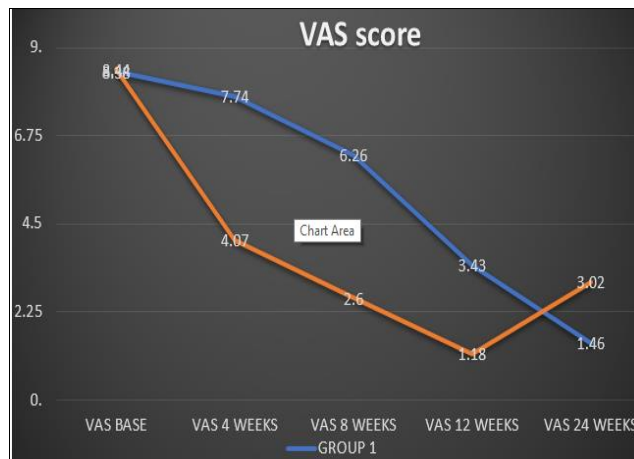


Fig 5: Showing Group 1 PRP, Group 2 Steriods

The above figure shows that in our study, we found a significant reduction in VAS score at 4,8, 12 weeks with steroid groups whereas at 6 months, there was a drastic reduction in VAS [1.45] in PRP Group in comparison with steroid groups [3.02].

Table 2: Showing FAAM Score

Group Statistics	Groups Group 1 [PRP] Group2 [Steroids]	N	Mean Value
FAAM base score	1 2	15 15	29.97 31.68
FAAM score 4 weeks	1 2	15 15	37.97 52.50
FAAM score 8 weeks	1 2	15 15	54.00 72.36
FAAM score 12 weeks	1 2	15 15	72.97 81.08
FAAM score 24 weeks	1 2	15 15	83.43 69.12

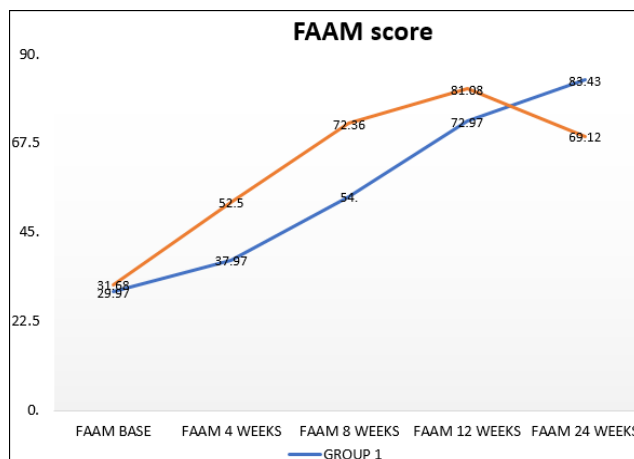


Fig 6: Showing FAAM SCORE

In our study, we found a significant reduction in VAS score at 4, 8, 12 weeks with steroid groups whereas at 6 months, there was a drastic reduction in VAS [1.45] in PRP Group in comparison with steroid groups [3.02].

Table 3: Showing the Ultrasound Evaluation

Groups	Mean Plantar Fascia Thickness Pre-Treatment	Mean Plantar Fascia Thickness Post treatment [After 24 Weeks]
PRP Group	6.10 mm	3.91 mm
Steroids Group	5.83 mm	4.15 mm

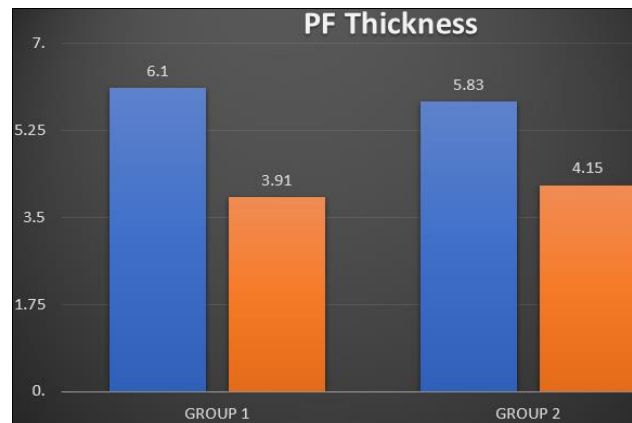


Fig 7: Showing PF thickness

The above figure shows the plantar fascia thickness measured using ultrasound shows more reduction in PF thickness in PRP group [35.90%] than in steroid group [28.67%].

Discussion

- Augustus D. Marzocco *et al.*, 2012 did studies on the technique of PRP injection (peppering) and found this method to be very effective in the sample application
- Raymond Rocco Monto *et al.* [AOFAS] 2014 PRP was shown to be more efficacious and long-lasting than cortisone injection in the treatment of severe intractable plantar fasciitis.
- Nishanth Shetty *et al.* [Int journal of foot and ankle] 2018 concluded that Both PRP and corticosteroid injections give symptomatic alleviation in the therapy of plantar fasciitis, both operationally and subjectively. Outcomes at 6 months show that PRP injections produced greater aggregate functions.
- Scholars such as Matthew V. Smith, MD, Sandra E. Klein, MD, John C, and others have determined that the FAAM rating is the most thoroughly established foot and ankle actual result instrument known; it is sensitive to general health and comorbidities. As a result, we used FAAM rating as one of our methods for assessing the functional status of the foot
- Ultrasonography has a number of benefits over MRI, including being noninvasive, radiation-free, a cost-effective technique, and being well accepted by patients. It is also ideal for serial close (Fabrikant and Park). So we did USG evaluation to measure the thickness of plantar fascia
- Gnasher *et al.* [JFAS] 2017 did study on 80 patients and concluded that treatment of plantar fasciitis with PRP reduces pain and significantly increases function, exceeding the effect of steroid on long term follow-up.
- In his research on plantar fasciitis using Platelet Rich Plasma and Steroids, Akashic *et al.*, 2012 observed that PRP was similarly efficient as steroid injection and was preferable since problems such as fat necrosis could be prevented.

Conclusion

Chronic heel pain is a tough to treat illness that takes a long time to heal. Both PRP and steroid are efficient and safe treatments for plantar fasciitis, according to this study. However, statistical evidence suggests that steroid injections are beneficial for pain alleviation right away. Furthermore, PRP injection is more effective for long-term pain alleviation in plantar fasciitis and has no negative side effects.

Conflict of Interest

Not available

Financial Support

Not available

References

1. Monto RR. Platelet-rich plasma and plantar fasciitis. In Sports Medicine and Arthroscopy Review; c2013. <https://doi.org/10.1097/JSA.0b013e318297fa8d>
2. Vivek K, Jagran G. Platelet-rich plasma injections for chronic plantar fasciitis. Indian Journal of Public Health Research and Development; c2019. <https://doi.org/10.5958/0976-5506.2019.03725.2>
3. O'Malley MJ, Vosseller JT, Gu Y. Successful Use of Platelet-Rich Plasma for Chronic Plantar Fasciitis. HSS Journal; c2013. <https://doi.org/10.1007/s11420-012-9321-9>
4. 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. In Orthopaedic Journal of Sports Medicine; c2020. <https://doi.org/10.1177/2325967120915704>
5. Phadke VS, Antrolkar VV, Allamwar AR. Local injection of Platelet Rich Plasma for Plantar Fasciitis. Asian Journal of Medical Sciences; c2021. <https://doi.org/10.3126/ajms.v12i3.32466>
6. Martinelli N, Marinozzi A, Carni S, Trovato U, Bianchi A, Denaro V. Platelet-rich plasma injections for chronic plantar fasciitis. International Orthopaedics; c2013. <https://doi.org/10.1007/s00264-012-1741-0>
7. Siddiqui AA, Yaqoob U, Adeel M. Platelet-rich plasma in the treatment of chronic plantar fasciitis. Rawal Medical Journal; c2020.
8. Ling Y, Wang S. Effects of platelet-rich plasma in the treatment of plantar fasciitis: A meta-analysis of randomized controlled trials. In Medicine (United States); 2018. <https://doi.org/10.1097/MD.00000000000012110>
9. Patil DPV, Chanchpara DG, Gunaki DRB, Gaonkar DK, Gaonkar DN, Solanki DM, *et al.* Platelet rich plasma for plantar fasciitis: Is it a hype??? International Journal of Orthopaedics Sciences; c2017. <https://doi.org/10.22271/ortho.2017.v3.i2d.33>
10. Kalia RB, Singh V, Chowdhury N, Jain A, Singh SK, Das L. Role of Platelet Rich Plasma in Chronic Plantar Fasciitis: A Prospective Study. Indian Journal of Orthopaedics; c2021. <https://doi.org/10.1007/s43465-020-00261-w>

11. Peerbooms JC, Lodder P, den Oudsten BL, Doorgeest K, Schuller HM, Gosens T. Positive Effect of Platelet-Rich Plasma on Pain in Plantar Fasciitis: A Double-Blind Multicenter Randomized Controlled Trial. *American Journal of Sports Medicine*; c2019. <https://doi.org/10.1177/0363546519877181>
12. Chiew SK, Ramasamy TS, Amini F. Effectiveness and relevant factors of platelet-rich plasma treatment in managing plantar fasciitis: A systematic review. In *Journal of Research in Medical Sciences*; c2016. <https://doi.org/10.4103/1735-1995.183988>.

How to Cite This Article

Siddarth R, Nishanthan V, Vijayaragavan R. A comparative study to analyze the efficacy of platelet rich plasma versus corticosteroids in treatment of chronic plantar fasciitis. *International Journal of Orthopaedics Sciences*. 2023;9(2):150-157.

Creative Commons (CC) License

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.