International Journal of Frontiers in
Medicine and Surgery Research
Journal homepage: https://frontiersrj.com/journals/ijfmsr/
ISSN: 2783-0489 (Online)

(RESEARCH ARTICLE)

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Comparison of autologous platelet-rich plasma and corticosteroid injection in the treatment of chronic plantar fasciitis

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International Journal of Frontiers in Medicine and Surgery Research, 2023, 03(02), 042–050

Publication history: Received on 17 June 2023; revised on 04 August 2023; accepted on 07 August 2023

Article DOI: https://doi.org/10.53294/ijfmsr.2023.3.2.0071

Abstract

Chronic plantar fasciitis is one of the leading causes of heel pain and medical professionals can find it difficult to treat successfully over the long term. Due to any factor which increases tension on the medial calcaneal tuberosity insert (e.g., running, walking, prolonged standing, pes cavus, pes planus, overpronation), results in local inflammation. While the results of the use of platelet-rich plasma to treat chronic plantar fasciitis were encouraging, there is little documentation that compares the long-term effectiveness of chronic plantar fasciitis with steroid injection. It stimulates wound healing, bone healing, and tendon healing by releasing platelet-derived growth factors. This prospective randomized study is conducted to compare the efficacy of platelet-rich plasma and local injection of corticosteroid.

Keywords: plantar fascia, fasciitis, heel pain, intra-articular injection

1. Introduction

Chronic plantar fasciitis is one of the leading causes of heel pain and medical professionals can find it difficult to treat successfully over the long term.[1] The pathophysiology is unknown, but it is thought to be caused by microscopic degeneration of the plantar fascia as a result of repetitive micro tears and local disruption of the collagen matrix.2,3 Plantar fasciitis is the most common cause of adult heel pain. It is caused by micro trauma and excessive stress in the plantar fascia, either by calcaneal tuberosity or through the fascial band. Due to any factor which increases tension on medial calcaneal tuberosity insert (e.g., running, walking, prolonged standing, pes cavus, pes planus, overpronation), resulting in local inflammation. [1] The majority of patients with plantar fasciitis experience severe heel pain (plantar medial), which is often described as knife like and is most noticeable with the first step after a period of inactivity. [2] Typically, a medical history and physical examination can be used to make a diagnosis. [3] The following are the initial treatments: rest, ice pack application, compression bandaging, and elevation of the affected foot, as well as NSAIDs (e.g., ibuprofen, naproxen) for short-term pain relief, if necessary. [3] Most patients benefit from physical therapy, which includes stretching exercises and orthoses. [4] Conservative treatment is effective in 90 to 95 percent of patients; other treatment options include corticosteroid injections and high-energy extracorporeal shock wave therapy. Surgery is rarely required; consider it for patients with severe plantar heel pain that limits daily activities despite treatment for at

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least 6 months. 4 Typically, this is a self-limiting condition, with most cases spontaneously resolving within 12 months. Five treatment options include plantar fascia and heel stretching exercises, heel cups, night splits, foot contrast bath, weight loss and nonsteroidal anti-inflammatory medicines. [1] Steroids, which produce excellent results but only for a short time, are traditionally used. Moreover, complications like plantar fascia rupture, atrophy, nerve damage, infection, muscle injury and skin depigmentation are associated with the fat pad. [4] While the results of the use of platelet-rich plasma to treat chronic plantar fasciitis were encouraging, there is little documentation that compares the long-term effectiveness of chronic plantar fasciitis with steroid injection. It stimulates wound healing, bone healing, and tendon healing by releasing high concentrations of platelet-derived growth factors. This prospective randomized study is conducted to compare the efficacy of the platelet-rich plasma and local injection of corticosteroid.

2. Material and methods

This was a randomized control trial performed in the department of Orthopaedics, School of Medical Sciences and Research, Sharda Hospital, Greater Noida. The study population was selected based on the inclusion and exclusion criteria from Orthopaedics department, Sharda University. The study included 44 participants that presented with chronic plantar fasciitis between January 2021 and June 2022.

Diagnosis of Plantar Fasciitis was made on the following parameters

- Sharp morning heel pain and “first-step” pain that improves with daytime use but often worsens with heavy use.
- Tenderness at the medial tubercle of the calcaneus
- Ankle joint plain radiograph (lateral view)

Based on computer-based randomization, patients with a clinical diagnosis of plantar fasciitis will be chosen and treated with either Autologous Platelet Rich Plasma or Corticosteroid Injection.

Those study participants between the age groups of 20-60 years with chronic plantar fasciitis that failed to respond to conservative treatment for at least 3 months with VAS score >5 were included in the study. Those patients that underwent any previous treatment for heel pain with a local injection (corticosteroids) within the previous 6 months, receiving Nonsteroidal anti- inflammatory drugs were delivered in the week prior to admission, any history of heel pain surgery, those with local infection at the site of the procedure, those having HIV, Hepatitis B or C, hypothyroidism, seronegative rheumatoid arthritis, gout, bleeding disorders, and systemic disorders or BMI greater than 30 were excluded from this study.

Institutional ethical committee clearance was sought for the study.

3. Methodology

With all aseptic precautions, 20 ml of autologous whole blood was aspirated from the cubital vein. A first centrifugation at 3000 rpm for 10 minutes was performed (soft spin). The plasma and Buffy coat were separated from the RBCs and placed in sterile plain vials. For 10 minutes, perform a second centrifugation at 5000 rpm (hard spin). The resulting plasma contains the top two-thirds (65%) of platelet poor plasma and the bottom one-third (35%) of platelet rich plasma. 3.0 mL PRP activation using 10% calcium chloride. Under strict aseptic conditions, injections were administered by palpating the most tender point.

3.1. Blood sample collection

PRP INJECTION TECHNIQUE • Group A received a peppering injection of 3 mL autologous Platelet Rich Plasma into the most tender area of the plantar fascia at its origin on the heel.

Triamcinolone 2mL (40 mg) was given to patients in group B (corticosteroid group) (Kenacort Inj. 40mg). • After 4 weeks, evaluate.

3.2. Post-procedure protocol

Following the treatment, a sterile bandage was put to the wound. The patients were asked to remain seated while being monitored for a period of fifteen to twenty minutes without moving their feet. They were instructed to apply ice to the area that had been injected in order to reduce swelling and pain, and they were told to refrain from engaging in activities

that involved a lot of impact for a week and also advised not to take any NSAIDS. For pain, only paracetamol tablets were prescribed. Plantar fascia stretching exercises were demonstrated to each and every one of the patients.

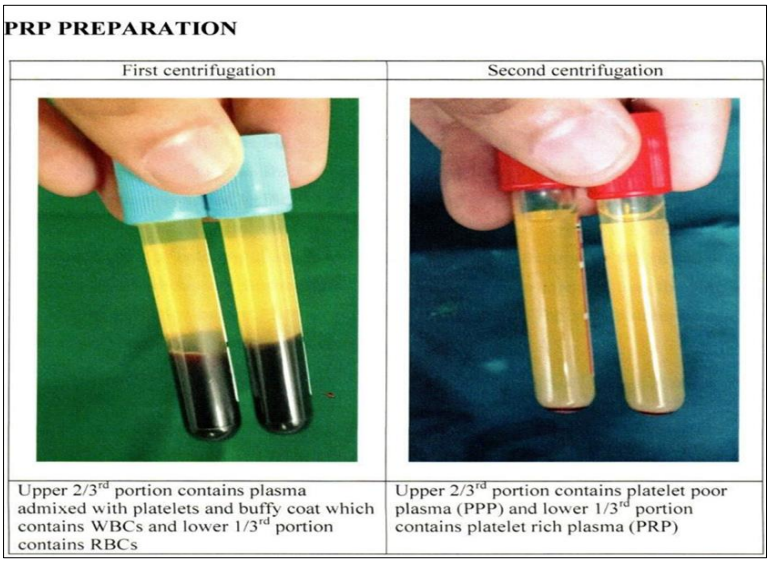

Figure 1 PRP preparation

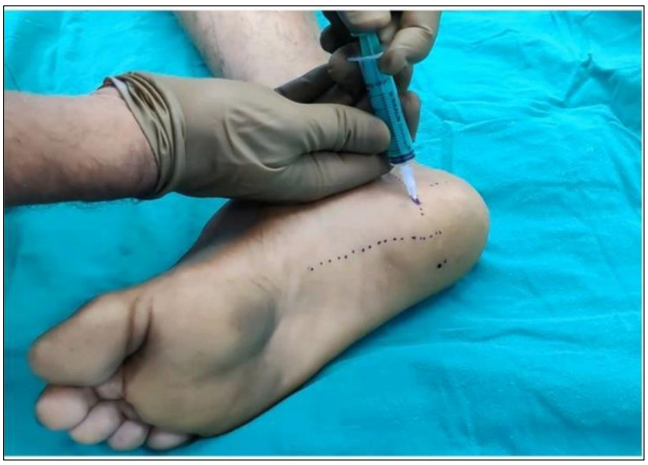

Figure 2 Location of PRP Injection

3.3. Evaluation of Outcome

Clinical evaluations were carried out prior to the injection, as well as after it had been in place for one month, three months, and six months. As part of the clinical evaluation, a pain assessment will be performed with a visual analogue scale (VAS) with a range from 0 to 10 (0 indicating no pain and 10 indicating the greatest pain imaginable). Additionally, the Modified Roles and Maudsley Scale will be utilized for the purposes of this study.

3.4. Statistical analysis

STATISTICAL PACKAGE FOR SOCIAL SCIENCES (SPSS) version 21.0 was used to analyse the data. Descriptive statistics were used to calculate the socio-demographic variables' frequencies, percentages, and means. Data tested using the ANOVA, Student-T, and Fischer's Exact tests. P values less than 0.05 were considered statistically significant.

4. Results

This study consisted of 44 participants divided randomly into two groups- one receiving steroids and one receiving PRP. The mean age of the study participants was 33.59±5.75 years in steroid group and 37.09±7.36 years in PRP group.

Both the groups were comparable with respect to age. Majority of the study participants in both the study groups were males, however there was no statistically significant differences.

Table 1 Distribution of age among the study participants (N=44)

Sl. no	Age	Steroid (n=22)	PRP (n=22)	X2 (df) p
1	20-30	6 (27.3)	7 (31.8)	1.759 (3) 0.62
2	31-40	10 (45.5)	12 (54.5)	
3	41-50	5 (22.7)	3 (13.6)	
4	51-60	1 (4.5)	0	
Mean±SD		33.59±5.75	37.09±7.36	

The mean duration of disease in months of the study participants was 5.77±1.48 months in steroid group and 6.73±1.48 months in PRP group. Both the groups were comparable with duration of disease.

Table 2 Distribution of duration of disease among the study participants (N=30)

Sl. no	Duration (months)	Steroid (n=22)	PRP (n=22)	X^2 (df) p
1	4 to 5	12 (54.5)	5 (22.7)	4.701 (2) 0.09
2	6 to 7	6 (27.3)	10 (45.5)	
3	8 to 10	4 (18.2)	7 (31.8)	
Mean±SD		5.77±1.48	6.73±1.48	

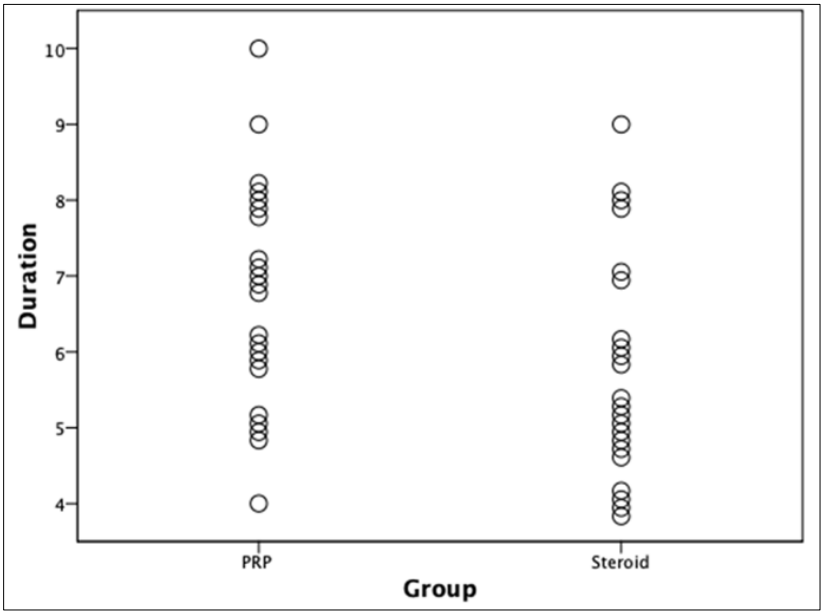

Figure 2 Distribution of duration of disease among the study participants (N=30)

Right sided predominance was seen in steroid group whereas left side predominance in PRP group. However, the difference was statistically not significant.

The mean preVAS score of the study participants was 7.18±1.14 in steroid group and 8.05±0.95 in PRP group. PRP group had significantly higher preVAS score.

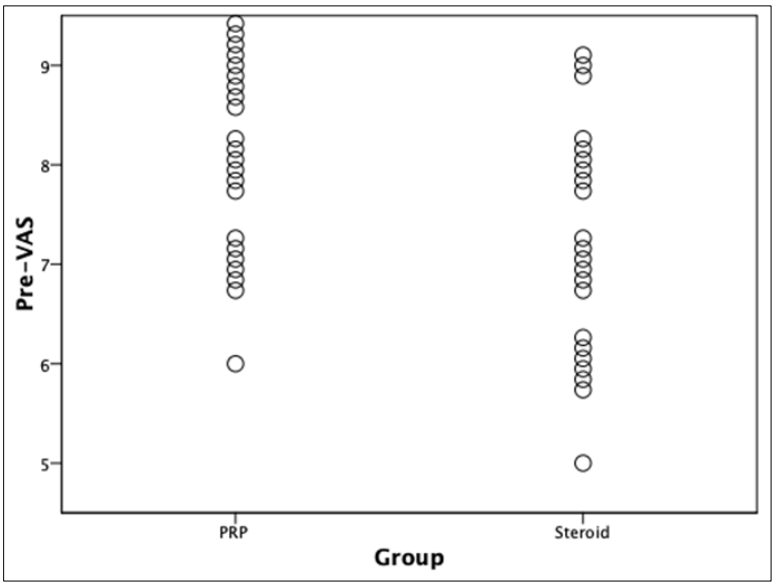

Figure 4 Distribution of Pre-VAS score among the study participants (N=30)

The mean VAS score at 1 month of the study participants was 74.82±1.36 in steroid group 4.73±1.16 in PRP group. The mean VAS score at 3rd month of the study participants was 4.73±1.07 in steroid group 4.41±0.79 in PRP group. Both the groups had comparable VAS score at 1st and 3rd month.

The mean VAS score at 6th month, however, 4.36±1.52 in steroid group 1.95±1.29 in PRP group. PRP group had comparatively lower VAS score at 6 months when compared to steroid group.

The mean pre-MRM score of the study participants was 2.45±0.59 in steroid group and 3.05±0.84 in PRP group. PRP group had significantly higher pre-MRM score. The mean MRM score at 1 month of the study participants was 2.37±0.60 in steroid group 2.27±0.46 in PRP group. The mean MRM score at 3rd month of the study participants was 2.28±0.19 in steroid group 2.18±0.39 in PRP group. Both the groups had comparable MRM score at 1st and 3rd month.

The mean MRM score at 6th month of the study participants was 1.95±0.84 in steroid group 1.32±0.47 in PRP group. PRP group had comparatively lower MRM score at 6 month when compared to steroid group.

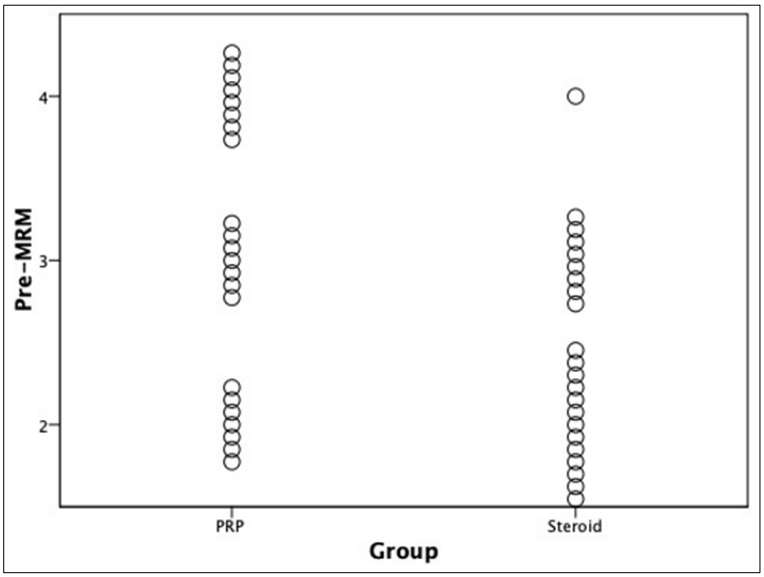

Figure 5 Distribution of PreMRM score among the study participants (N=30)

Complications such as pigmentation and recurrence were more seen in steroid group than PRP group.

Table 3 Correlation of Pre-VAS score vs Post VAS scores among the study participants (N=30)

Sl. no	Variable	Steroid (n=22)	PRP (n=22)
1	1st month	r=0.114, p=0.61	r=0.055, p=0.81
2	3rd month	r=-0.152, p=0.50	r=-0.163, p=0.47
3	6th month	r=0.261, p=0.24	r=-0.503, p=0.02

Among our study participants pre-VAS scores were significantly negatively correlated only with VAS score follow up at 6 months for PRP group.

Table 4 Correlation of Pre-MRM score Vs Post MRM scores among the study participants (N=30)

Sl. no	Variable	Steroid (n=22)	PRP (n=22)
1	1^{st} month	r =0.223, p=0.32	r =-0.281, p=0.21
2	3^{rd} month	r=0.239, p=0.28	r=-0.169, p=0.45
3	6^{th} month	r=0.232, p=0.29	r=0.081, p=0.72

Pre-MRM scores didn't show any significant correlation between the groups among our study participants.

5. Discussion

Plantar fasciitis affects a significant percentage of the general population and can have significant negative effects on a patient's life and ability to work 6-10. An answer to the question of how to treat plantar fasciitis effectively and permanently has not been found as of yet.

Orthoses, physical therapy, and steroid injections are some of the treatment options that have been used in the past for plantar fasciitis. Other possibilities include medication and rest. After more conservative treatment options have been tried without success, injectable therapy is the next treatment option that is investigated11-13. It is believed that they lower both inflammation and pain, which results in an improvement in functioning. Steroid injections, which are the most common form of this treatment, have been linked to side effects including as infection, thinning of the fat pad, and even rupture of the plantar fascia in some patients14-16.

The illness known as plantar fasciitis is regarded to be a degenerative condition of the plantar fascia, and recent research suggests that small rips in the plantar fascia may play a role in its development. Angiofibroblastic hyperplastic tissue has been seen to replace normal plantar fascia in some cases, despite the fact that the lesion itself does not have any evidence of inflammatory cell invasion14,15. The effectiveness of autologous platelet-rich plasma and corticosteroids in the treatment of persistent plantar fasciitis is investigated and compared in this study.

Table 1 Comparison of age amongst various studies

Sl.no	Author	Year	Steroid	PRP
1	Tabrizi et al[17]	2020	31.7 ± 7.5	33.6 ± 8.5
2	Khurana et al[18]	2020	34.70 ± 5.46	32.57 ± 4.98
3	Somasundaram AK et al[19]	2020	34.7 ± 7.42	39.4 ± 8.61
4	Present study	2021	33.59 ± 5.75	37.09 ± 7.36

The mean age of the study participants was 33.59±5.75 years in steroid group and 37.09±7.36 years in PRP group. Both the groups were comparable with respect to age. These results were comparable with other study findings.

Table 2 Comparison of gender amongst various studies

Sl. no	Author	Year of study	Steroid (M/F)	PRP (M/F)
1	Tabrizi et al[17]	2020	6.3%/93.7%	6.3%/93.7%
2	Khurana et al[18]	2020	51.7%/48.3%	58.6%/41.4%
3	Somasundaram AK et al[19]	2020	10:15	8:17
4	Present study	2021	68.2%/31.8%	59.1%/40.9%

Over all male preponderance was seen among our study participants. Our results were comparable with all other study findings except Tabrizi et al where female preponderance was seen among the study participants.

Table 3 Comparison of steroid and PRP amongst various studies

Sl.no	Author	Year of study	Steroid (R/L)	PRP (R/L)
1	Tabrizi et al[17]	2020	56.3%/43.7%	73.3%/26.7%
2	Khurana et al[18]	2020	58.3%/41.7%	56.9%/43.1%
3	Somasundaram AK et al[19]	2020	54%/46%	36%/64%
4	Present study	2021	54.5%/45.5%	36.4%/63.6%

Right sided predominance was seen in steroid group whereas left side predominance in PRP group. These results were comparable with other study findings.

The mean preVAS score of our study participants was 7.18±1.14 in steroid group and 8.05±0.95 in PRP group. PRP group had significantly higher preVAS score. These results were comparable with other study findings.

The mean VAS score at 6th month of our study participants was 4.36±1.52 in steroid group 1.95±1.29 in PRP group. PRP group had comparatively lower VAS score at 6 month when compared to steroid group. These results were comparable with other study findings.

The authors compared corticosteroid injection efficacy (30 patients) with PRP injection in the Study of Shetty et al (30 patients). The after-surgical measurement results in both groups improved significantly during the 3-month follow-up.20 And in the PRP group these results were far better than in the steroid.20 Also among patients with Plantar Fasciitis, Say et al. compared the effect on PRP and steroid.21 The AOFAS and VAS rates of 22 steroid PRP were significantly modified in the 6 weeks and 6 months of both.22 Regarding the long-term impact of PRP, our results indicate that the changes in VAS and AOFAS were linked to PRP with more than 6 months of local steroid injections.94 Likewise, during the 12- and 24-month follow-up evaluation ($P < 0.001$) differences in the AOFAS score between the PRP and the steroid groups were clinically important.23

An earlier study by Lee and Ahmad compared the effects of PRP and corticosteroid injection on 64 patients over the course of six months. The study was prospective, randomised, and controlled. The authors discovered that there is a statistically significant drop in the VAS score throughout the course of time for both groups. At 6 months, the difference between the corticosteroid group and the PRP group was not determined to be statistically significant; nevertheless, at 6 weeks and 3 months, the corticosteroid group had considerably lower VAS score than the PRP group. On the other hand, in the course of our research, we discovered that the corticosteroid group experienced a significant reduction in the mean VAS score at 4 weeks, 8 weeks, and 3 months; however, the PRP group experienced a significant reduction in the VAS score at 6 months, in comparison to the corticosteroid group's score at the same time.24

The study on PRP-injecting for plantar fasciitis has been published by Barrett and Erredge.25 They suggested that fasciitis disease is a degenerative condition of fascia, not an inflammatory condition. PRP injection, known as plantar fasciorrhaphy, is hypothesized as an improvement in plantar fasciitis which is symptomatic and therapeutic. Full recovery was observed in 6 out of 9 cases investigated, and 1 in 2 injection patients improved. After about one year, 77.9% of the patients seems to be symptom free.

In a study that was carried out by Tiwari and Bhargava, the group that received cortisone had a pretreatment mean VAS score of 8.5. After treatment, the group's score initially improved to 1.1 after 12 weeks, but then it steadily increased to 4.9 after 26 weeks, and then it steadily increased to near baseline levels of 8.4 after 52 weeks. In comparison, the PRP group began with an average pretreatment score of 8.6; however, this score dropped to 3.4 after 12 weeks, continued to drop to 1.2 after 26 weeks, and finally reached 0.3 after 52 weeks.26

Naik et al27 came to the conclusion that in 92 patients who had undergone PRP injection, after 12 weeks, more than 60 patients showed a great improvement in pain with their VAS score of pain being below 7; as a result, it is good and effective in the treatment of PF, along with being a simple and safe procedure. In addition, the authors noted that the procedure is both simple and safe. This study results was similar to our study findings.

6. Conclusion

On the basis of the results of our randomized, controlled study, PRP injection appears to be more effective in terms of functional performance and decreasing heel pain compared to corticosteroid treatment in patients with chronic plantar fasciitis.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to disclosed.

Statement of ethical approval

Ethical approval was obtained.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1] Riddle DL et al: Risk factors for plantar fasciitis: a matched case-control study. J Bone Joint Surg Am. 85-A(5):872-7, 2003

[2] Martin RL et al: Heel pain-plantar fasciitis: revision 2014. J Orthop Sports Phys Ther. 44(11):A1-33, 2014

[3] Shi GG et al: Plantar fasciitis. In: Frontera WR et al, eds: Essentials of Physical Medicine and Rehabilitation. 4th ed. Saunders; 2019:501-5

[4] Lim AT et al: Management of plantar fasciitis in the outpatient setting. Singapore Med J. 57(4):168-71, 2016

[5] Omar AS, Ibrahim ME, Ahmed AS, Said M. Local injection of autologous platelet rich plasma and corticosteroid in treatment of lateral epicondylitis and plantar fasciitis: randomized clinical trial. The Egyptian Rheumatologist. 2012 Apr 1;34(2):43-9.

[6] Sherpy NA, Hammad MA, Hagrass HA, Samir H, Abu-ElMaaty SE, Mortada MA. Local injection of autologous platelet rich plasma compared to corticosteroid treatment of chronic plantar fasciitis patients: a clinical and ultrasonographic follow-up study. The Egyptian Rheumatologist. 2016 Jul 1;38(3):247-52.

[7] Shetty VD, Dhillon M, Hegde C, Jagtap P, Shetty S. A study to compare the efficacy of corticosteroid therapy with platelet-rich plasma therapy in recalcitrant plantar fasciitis: a preliminary report. Foot and Ankle Surgery. 2014 Mar 1;20(1):10-3.

[8] Jain SK, Suprashant K, Kumar S, Yadav A, Kearns SR. Comparison of plantar fasciitis injected with platelet-rich plasma vs corticosteroids. Foot & ankle international. 2018 Jul;39(7):780-6.

[9] Kim E, Lee JH. Autologous platelet-rich plasma versus dextrose prolotherapy for the treatment of chronic recalcitrant plantar fasciitis. PM&R. 2014 Feb 1;6(2):152-8.

[10] Vahdatpour B, Kianimehr L, Ahrar MH. Autologous platelet-rich plasma compared with whole blood for the treatment of chronic plantar fasciitis; a comparative clinical trial. Advanced Biomedical Research. 2016;5.

[11] Jain K, Murphy PN, Clough TM. Platelet rich plasma versus corticosteroid injection for plantar fasciitis: a comparative study. The Foot. 2015 Dec 1;25(4):235-7.

[12] Mahindra P, Yamin M, Selhi HS, Singla S, Soni A. Chronic plantar fasciitis: effect of platelet-rich plasma, corticosteroid, and placebo. Orthopedics. 2016 Mar 1;39(2):e285-9.

[13] Soraganvi P, Nagakiran KV, Raghavendra-Raju RP, Anilkumar D, Wooly S, Basti BD, Janakiraman P. Is Platelet-rich Plasma Injection more Effective than Steroid Injection in the Treatment of Chronic Plantar Fasciitis in Achieving Long-term Relief?. Malaysian orthopaedic journal. 2019 Nov;13(3):8.

[14] Monto RR. Platelet-rich plasma efficacy versus corticosteroid injection treatment for chronic severe plantar fasciitis. Foot & ankle international. 2014 Apr;35(4):313-8.

[15] Akşahin E, Doğruyol D, Yüksel HY, Hapa O, Doğan Ö, Çelebi L, Biçimoğlu A. The comparison of the effect of corticosteroids and platelet-rich plasma (PRP) for the treatment of plantar fasciitis. Archives of orthopaedic and trauma surgery. 2012 Jun;132(6):781-5.

[16] Tabrizi A, Dindarian S, Mohammadi S. The Effect of Corticosteroid Local Injection Versus Platelet-Rich Plasma for the Treatment of Plantar Fasciitis in Obese Patients: A Single-Blind, Randomized Clinical Trial. The Journal of Foot and Ankle Surgery. 2020 Jan 1;59(1):64-8

[17] Khurana A, Dhankhar V, Goel N, Gupta R, Goyal A. Comparison of midterm results of Platelet Rich Plasma (PRP) versus Steroid for plantar fasciitis: A randomized control trial of 118 patients. Journal of Clinical Orthopaedics and Trauma. 2021 Feb 1;13:9-14.

[18] Somasundaram AK, Jambukeswaran PST, Muthu S. Is platelet rich plasma superior to corticosteroid injection for recalcitrant plantar fasciitis? Results of a prospective comparative study. IP Int J Orthop Rheumatol 2020;6(2):58-61

[19] Shetty VD, Dhillon M, Hegde C, Jagtap P, Shetty S. A study to compare the ef- ficacy of corticosteroid therapy with platelet-rich plasma therapy in recalci- trant plantar fasciitis: a preliminary report. Foot Ankle Surg Off J Eur Soc Foot Ankle Surg. 2014 Mar;20(1):10e13.

[20] Say F. Comparison of platelet-rich plasma and steroid injection in the treat- ment of plantar fasciitis. Acta Orthop Traumatol Turcica. 2014;48(6):667e672.

[21] LemontH,AmmiratiKM,UsenN.Plantarfasciitis.JAmPodiatrMedAssoc.2003 May 1;93(3):234e237.

[22] Jain K, Murphy PN, Clough TM. Platelet rich plasma versus corticosteroid in- jection for plantar fasciitis: a comparative study. Foot. 2015 Dec;25(4): 235e237.

[23] Monto RR. Platelet-rich plasma efficacy versus corticosteroid injection treatment for chronic severe plantar fasciitis. Foot Ankle Int. 2014 Apr;35(4): 313e318.

[24] Lee TG, Ahmad TS. Intralesional autologous blood injection compared to corticosteroid injection for treatment of chronic plantar fasciitis. A prospective, randomized, controlled trial. Foot Ankle Int 2007;28:984–990.

[25] Barrett S, Erredge S. Growth factors for chronic plantar fasciitis? Podiatry Today 2004; 17:37–42.