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Research Article

LOCAL INJECTION OF PLATELET-RICH PLASMA VERSUS STEROID INJECTION IN PLANTAR FASCIITIS: A COMPARATIVE STUDY

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ABSTRACT

Objectives: The aim of the study was to compare the effect of local steroid injection and injection of platelet rich plasma in patients with plantar fasciitis.

Methods: Eighty patients diagnosed to be having plantar fasciitis were included in this study on the basis of a predefined inclusion and exclusion criteria. The study was conducted in PIOS Medilinks Pvt limited jaysingpur Kolhapur India. The duration of study was 1 year from January 2022 to January 2023. Institutional ethical committee approved the study. Patients were assigned to two equal, parallel groups of 40 patients each. Patients in one group were given local steroid injection (Group S) whereas patient in other group was given local injection of platelet rich plasma (Group P). The patients were followed up for 12 weeks. Visual analog score (VAS) Score and American orthopedic foot and ankle society (AOFAS) score were compared at each follow-up visit. For statistical purposes, $p<0.05$ was taken as statistically significant.

Results: The M: F ratio in Group P and Group S was found to be 1:1.85 and 1:1.50, respectively. Overall, most commonly affected age group was 41–50 years (32.50% and 37.50%) followed by 51–60 years (25% and 27.50%). The analysis of body mass index (BMI) in patients of Group S showed that among 40 patients 12 (36.67%) patients were obese (BMI ≥30) and 15 (30%) patients were overweight (BMI ≥25 but <30). In Group P, 22 (73.33%) patients were either obese or overweight (BMI ≥25). IN our study from time of presentation till 4 weeks the reduction in VAS score was found to be comparable in both the groups. However, at the time of 8-week and 12-week follow-up, mean VAS score in Group P was less as compared to group S and the difference was found to be statistically significant ($p<0.05$). At the time of follow-up at 12 weeks, better AOFAS score was seen in Group P (90.12±14.26) as compared to group S (82.08±8.68) and the difference was found to be statistically significant ($p=0.0032$).

Conclusion: Injection of platelet rich plasma is found to have better outcomes as compared to steroid injection in plantar fasciitis treatment over the course of 12 weeks as assessed by improvement in VAS and AOFAS scores.

Keywords: Plantar fasciitis, Functional outcome, Visual analog score, American orthopedic foot and ankle society.

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INTRODUCTION

Plantar fasciitis can be defined as inflammation of plantar fascia and usually present as painful heel [1]. The pain is characteristically aggravated by standing for prolonged period and excessive walking. The exact mechanism of pain in plantar fasciitis is not known widely accepted theory is that repeated microtrauma to plantar fascia is responsible for inflammation causing pain [2]. The common factors which predisposes an individual for development of plantar fasciitis include pes planus, overpronation, and extensive femoral anteversion leg length discrepancy. Obesity is one of the important predisposing factors for development of plantar fasciitis. Individuals involved in sports and athletic activities are also prone for developing plantar fasciitis [3]. Irrespective of underlying pathology it uniformly presents as sharp and intense heel pain which is worse in the morning. Pain is characteristically present on the plantar surface of foot. The pain is characteristically severe in the morning and gradually decreases with the activity [4].

Plantar fasciitis is more common in females and is usually seen in 3rd–4th decades of life. The diagnosis is usually made on the basis of history and clinical examination [5]. Clinical examination generally elicit pain on palpation of medial calcaneal tubercle and below the heel. In some patients, passive dorsiflexion of toes may also produce sharp shooting pain. The diagnosis can be confirmed on the basis of imaging. On ultrasound, the diagnosis of plantar fasciitis is usually made if there is decreased echogenicity of plantar fascia with thickness more than 4.5 mm [6]. On magnetic resonance imaging, intermediate signals on T1 and hyperintense signal on T2-weighted images are suggestive of plantar fasciitis. On STIR, it plantar fasciitis usually presents as poorly marginated areas of high signal intensity [7].

The management of plantar fasciitis is usually symptomatic and depends on severity, functional disability experiences by the individual as well as duration of pain. The first line of management usually consists of rest, physiotherapy, and non-steroidal anti-inflammatory drugs [8]. In patients with moderate pain interventions such as night splints and orthotic devices may be considered. In patients with severe, unbearable, and acute pain extracorporeal shock wave therapy, local steroid injection as well as local injection of platelet rich plasma can be used and is reported to have variable results [9]. Although local injection of steroid usually reduce pain significantly its effect is reported to be short lived and repeated injections of steroid injections may be required which may cause adverse effects such as skin thinning, fat atrophy, and plantar fascia rupture. It is therefore alternative management therapies such as injection of platelet rich plasma is being increasingly used instead of local steroid injections [10]. Autologous platelet rich plasma act by tissue repair due to presence of various growth factors including platelet-derived growth factor and transforming growth factor-beta. Injection of platelet rich plasma is reported to cause considerable reduction in pain and improvement in functional capacity in patients having plantar fasciitis [11].

We conducted this study to compare the effect of local steroid injection as well as injection of platelet rich plasma in patients with plantar fasciitis.

METHODS

This was a comparative study conducted in PIOS Medilinks Pvt limited jaysingpur Kolhapur India. The duration of study was 1 year from January 2022 to January 2023. The Institutional Ethical Committee approved the study. Eighty patients diagnosed to be having plantar fasciitis were included in this study on the basis of a predefined inclusion and exclusion criteria. Before enrolling the patients in the study, an informed and written consent to be part of study was obtained from them. Demographic details of all the patients were noted. Body mass index (BMI) was calculated. A detailed history was obtained in terms of presence of any chronic system illness such as diabetes mellitus, hypertension, arthritis, or any autoimmune disorder.

A general clinical examination as well as local examination was done. The presence of tenderness below the heal or on medial calcaneal tubercle was noted. Basic investigations such as complete blood count, erythrocyte sedimentation rate, C-reactive Protein, and rheumatoid factor. Anteroposterior and oblique X-ray of affected foot was done in all cases to rule out other causes of pain such as fracture or coexisting arthritis. Local ultrasound was also done in all the cases. Magnetic resonance imaging was done in selected cases. Randomization was done using a computer-generated program through which patients were assigned to two equal, parallel groups of 40 patients each.

Group S (Steroid): 2mL of injection of Methylprednisolone (80 mg) along with 1 mL lignocaine (0.25%) were loaded in a 5-cc syringe. Then, this mixture was injected into the medial calcaneal tuberosity at the most tender point.

Group P (Platelet Rich Plasma): 2–3 mL Platelet rich plasma along 1 mL lignocaine (0.25%) were loaded in a 5-cc syringe. Then, this mixture was injected into the medial calcaneal tuberosity at the most tender point.

Patients were assessed for pain by visual analog score (VAS) [12] and for functional status by American Orthopedic Foot and Ankle Society (AOFAS) score [13], at the time of presentation and at the time of each follow-up visits. The patients were followed up at 4 weeks, 8 weeks and 12 weeks A VAS score of 0–3 was taken as pain relief and VAS score of 4–10 was considered as no pain relief. Whereas AOFAS scores of 90–100, 80–89, 60–79, and <60 were taken as excellent, good, fair, and poor outcome, respectively, improvement in pain as well as functional improvement and incidence of adverse effects was compared in both the groups.

Sample size was calculated according to previous reference studies, when patients with plantar fasciitis were studied for various management strategies, as the main result in the event of at least 30 patients was calculated by Open Epi-Version 3 online software, a 10% difference could be determined between the group at 80% power and 5% significance (α=0.05, β=0.80). For statistical purposed SSPS 21.0 software was used and p<0.05 was taken as statistically significant.

Inclusion criteria

The following criteria were included in the study:

1. Patients who gave informed written consent
2. Age above 18 years
3. Patients diagnosed with plantar fasciitis and not responded to conservative management strategy.

Exclusion criteria

The following criteria were excluded from the study:

1. Those who refused consent
2. Any additional local pathology such as arthritis, fracture or local infection
3. Any local intervention in the past 1 year such as local steroid injection or surgery
4. Congenital anomalies of foot and ankle likely to affect functional outcome.

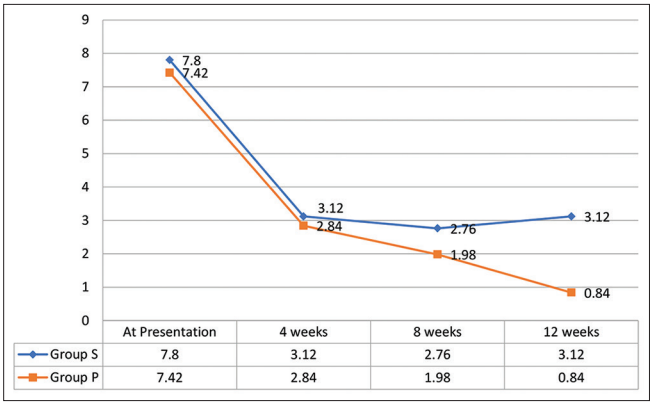

Fig. 1: Mean visual analog score scores at 0, 4, 8, and 12 weeks

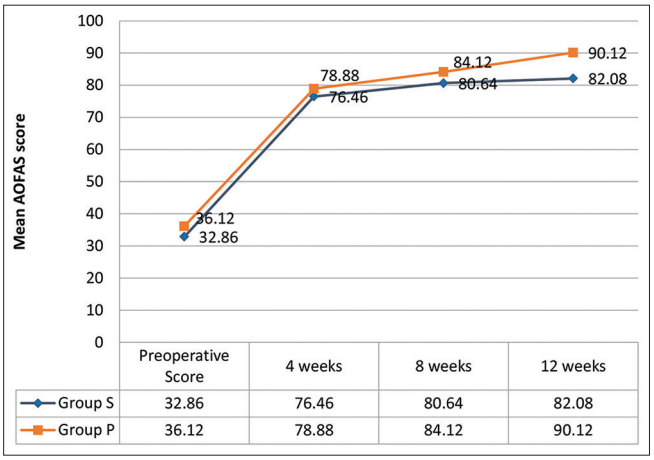

Fig. 2: Mean American orthopedic foot and ankle society scores at 0, 4, 8, and 12 weeks

RESULTS

This was a comparative study in which patients having plantar fasciitis and treated either by local injection of steroid or platelet rich plasma were included in the study. Total 80 patients were enrolled. Out of 40 patients in Group S, there were 14 (35.00%) males and 26 (65.00%) females whereas in Group P, there were 16 (40.00%) males and 24 (60.00%) females. The M: F ratio in Group P and Group S was found to be 1:1.85 and 1:1.50, respectively. The gender distribution was comparable in both the groups with no statistically significant difference (Table 1).

In Group S, the most common affected age group was 41–50 years (32.50%) followed by 51–60 years (25%) and 31–40 years (17.50%). In Group P, the most common affected age group was 41–50 years (37.50%) followed by 51–60 years (27.50%) and 31–40 years (17.50%) (Table 2).

The mean age of patients in Group S and Group P was found to be comparable with no statistically significant difference in the mean age (p=0.426) (Table 3).

Overweight and obesity were found to be one of the important features associated with patients having plantar fasciitis. The analysis of BMI in patients of Group S showed that among 40 patients, 12 (36.67%) patients were obese (BMI ≥30) and 15 (30%) patients were overweight (BMI ≥25 but <30). Rest of the patients had BMI <25. In Group P, 22 (73.33%) patients were either obese or overweight (BMI ≥25). The mean BMI of both the groups was found to be comparable with no statistically significant difference (p=0.7506) (Table 4).

The analysis of the duration of the pain in patients showed that in Group S majority of the patients (67.50%) had pain since more than 6 months but <1 year, 8 (20%) patients had pain since 3–6 months and 5 (12.50%) patients had pain since more than 1 year. In Group P, also majority of the patients (57.50%) had pain since more than 6 months but <1 year. The mean duration of pain in Group S and Group P was found to be months and months, respectively. The duration of pain was found to be comparable with no statistically significant difference (p=0.5567) (Table 5).

Table 1: Comparison of gender distribution among both the groups

Gender	Group S (Steroid)		Group P (PRP)	
	No of patients	Percentage	No of patients	Percentage
Males	14	35.00	16	40.00
Females	26	65.00	24	60.00
Total	40	100	40	100

p (Two-tailed)=0.817 (Not significant)

Table 2: Comparison of age distribution in both the groups

Age groups	Group S		Group P	
	No of cases	Percentage	No of cases	Percentage
30 years or less	4	10.00	3	7.50
31–40 years	7	17.50	7	17.50
41–50 years	13	32.50	15	37.50
51–60 years	10	25.00	11	27.50
>60 years	6	15.00	4	10.00
Total	40	100.00	40	100.00

Table 3: Comparison of mean age of the studied cases in both the groups

Gender	Mean Age	Std Deviation	Test Of Significance
Group S	49.48	12.56	p=0.426
Group P	47.36	11.12	Not Significant

Table 4: Comparison of body mass index in both the groups

BMI	Group S (steroid)		Group P (PRP)	
	No of cases	Percentage	No of cases	Percentage
Normal (>25)	13	32.50	14	35.00
25–30 (overweight)	15	37.50	16	40.00
More than 30 (obese)	12	30.00	10	25.00
Total	40	100.00	40	100.00
Mean BMI	26.7±4.31		26.40±4.10	

p=0.7506 (not significant). BMI: Body mass index

Table 5: Comparison of mean duration of pain in both the groups

Duration of pain	Group S (steroid)		Group P (PRP)	
	No of cases	Percentage	No of cases	Percentage
3–6 months	8	20.00	11	27.50
7–12 months	27	67.50	23	57.50
Above 1 year	5	12.50	6	15.00
Total	40	100.00	40	100.00
Mean duration of pain (months)	8.77±2.73		9.15±3.02	

p=0.5567 (not significant)

At the time of presentation, all patients were having intractable heal pain. The mean VAS score in Group S and Group P at the time of presentation was found to be 7.8±1.76 and 7.42±1.24, respectively. After the platelet rich plasma injection, the patients were followed up for 4, 8, and 12 weeks (Figure 1).

Till 4 weeks, the reduction in VAS score was found to be comparable in both the groups. However, at the time of 8-week and 12-week follow-up, mean VAS score in Group P was less as compared to Group S and the difference was found to be statistically significant (p<0.05) (Table 6).

Functional outcome of the patients was assessed by AOFAS scores. Pre-injection AOFAS scores were determined in all the cases in both the groups. All patients in both groups had a poor (<60) AOFAS score at the time of presentation. Mean AOFAS scores in Group S and Group P at the time of presentation were found to be 32.86±9.12 and 36.12±10.68 (Figure 2).

AOFAS score was found to be comparable at the time of presentation as well as at the time of follow-up at 4 weeks and 8 weeks. However, at the time of follow-up at 12 weeks, better AOFAS score was seen in Group P (90.12±14.26) as compared to Group S (82.08±8.68) and the difference was found to be statistically significant (p=0.0032) (Table 7).

There were no significant complications in any of the cases in both the groups till last follow-up visit at 12 weeks.

DISCUSSION

Our study comprised of 80 patients of plantar fasciitis who had symptoms for more than 3 months.

These 80 patients were randomized to two groups on the basis of the treatment they received. Forty patients received local injection of steroid (Group S) whereas remaining 40 patients received local injection of platelet rich plasma (Group P). There was a female preponderance in both the groups. The M: F ratio in Group P and Group S was found to be 1:1.85 and 1:1.50, respectively. Granado *et al*., conducted a study to investigate gender differences regarding plantar fascia thickness while controlling for metatarsophalangeal joint position in patients with unilateral plantar fasciitis [14]. Forty participants (20 with unilateral plantar fasciitis and 20 controls) with plantar fascia thickness (mean age, 44.8±12.2 years) participated in this study. The majority were

Table 6: Comparison of mean VAS scores in both groups at 0, 4, 8, and 12 weeks

Mean VAS Score	Group S (steroid)	Group P (PRP)	p-value
At Presentation	7.80±1.76	7.42±1.24	0.180 (not significant)
4 weeks	3.12±1.92	2.84±1.86	0.5096 (not significant)
8 weeks	2.76±1.12	1.98±0.96	0.001 (significant)
12 weeks	3.12±2.14	1.24±0.76	<0.0001 (highly significant)

VAS: Visual analog score

Table 7: Comparison of mean AOFAS scores at 0, 4, 8, and 12 weeks

Mean AOFAS Score	Group S (steroid)	Group P (PRP)	p-value
Pre-operative score	32.86±9.12	36.12±10.68	p=0.1461 (not significant)
4 weeks	76.46±10.82	78.88±9.34	p=0.2876 (not significant)
8 weeks	80.64±12.34	84.12±11.64	p=0.1983 (not significant)
12 weeks	82.08±8.68	90.12±14.26	p=0.0032 (significant)

AOFAS: American orthopedic foot and ankle society

females (n=26, 65%). Similar female preponderance is also reported by the authors such as Palomo-López *et al*., [15] and Hansen *et al.* [16].

In our study, the overall most commonly affected age group was 41–50 years (32.50% and 37.50%) followed by 51–60 years (25% and 27.50%). The mean age of patients in Group S and Group P was found to be 49.48±12.56 and 47.36±11.12 years, respectively. In Group S, the most common affected age group was 41–50 years (32.50%) followed by 51–60 years (25%) and 31–40 years (17.50%). In Group P, the most common affected age group was 41–50 years (37.50%) followed by 51–60 years (27.50 %) and 31–40 years. Çatal B conducted a study to analyze risk factors particularly hypercholesterolemia in patients with plantar fasciitis [17]. There were 238 patients (mean age, 46.7) in the PF group and 240 patients (mean age, 47.9) in the control group. There was a significant difference between the PF group and the control group in TC levels (207.6±47.5 vs. 195.1±30.1, p=0.001). Hypercholesterolemia (TC level >240 mg/dL) was found in 22.7% (n=54) of the patients in the PF group whereas in the control group, this rate was 10.8% (n=26) (p<0.001). The mean age of patients in this study was found to be similar to our study. Similar mean age of the cases of also reported by the authors such as Abul *et al*., [18] and Naruseviciute and Kubilius [19].

In our study, overweight and obesity were found to be one of the important features associated with patients having plantar fasciitis. The analysis of BMI in patients of Group S showed that among 40 patients, 12 (36.67%) patients were obese (BMI ≥30) and 15 (30%) patients were overweight (BMI ≥25 but <30). In Group P, 22 (73.33%) patients were either obese or overweight (BMI ≥25). Van Leeuwen *et al*., conducted a study to analyze the effect of BMI on plantar fasciitis [20]. The authors found that in symptomatic patients, BMI was significantly high as compared to asymptomatic patients with plantar fasciitis. Similar findings of obesity predisposing an individual for development of plantar fasciitis are also reported by the authors such as Taş *et al*., [21] and Irving *et al.* [22].

The patients in both the groups were followed up for 3 months for reduction in pain as evidenced by reduction in VAS score as well as improvement in functional outcome as evidence by improved AOFAS score. IN our study from time of presentation till 4 weeks the reduction in VAS score was found to be comparable in both the groups. However, at the time of 8-week and 12-week follow-up, mean VAS score in Group P was less as compared to Group S and the difference was found to be statistically significant (p<0.05). Similarly, AOFAS score was found to be comparable at the time of presentation as well as at the time of follow-up at 4 weeks and 8 weeks. However, at the time of follow-up at 12 weeks, better AOFAS score was seen in Group P (90.12±14.26) as compared to Group S (82.08±8.68) and the difference was found to be statistically significant (p=0.0032). Thora *et al*., conducted a study of Sixty patients with chronic plantar fasciitis to compare the results of local injection of steroid and PRP [23]. For this purpose, the patients were randomized to two groups and treated with either a single injection of 3 cc PRP or 40 mg DepoMedrol (Cortisone) injection and followed for a year. Immediately before PRP or cortisone injection AOFAS hindfoot scoring was done for all patients. These scores were repeated at 6 weeks, 6 months, and 12 months. The authors found that the mean visual analog scale (VAS score) showed a significant increase in corticosteroid group (4.2) as compared to PRP group (5.8). However, the PRP group (1.8) showed significant improvement in mean VAS scores as compared to Steroid group (3.4) after a year of the treatment. Similarly, the AOFAS score improved significantly in the steroid group (64.4) at 6 weeks as compared to the PRP group (52.2) but at 12 months however, the PRP group sustained its effect with a mean AOFAS score of 92.2 while in the steroid group, the score dropped to a mean of 78.4. On the basis of these findings, the authors concluded that PRP was more effective than steroid for the long-term treatment of chronic plantar fasciitis. Similar superiority of PRP over steroid injections was also reported by the authors such as Say *et al*., [24] and Jain *et al.* [25].

CONCLUSION

Autologous platelets rich plasma is more effective in long-term reduction of pain as well as improvement in functional outcome as compared to individuals treated by local steroid injection in patients with chronic plantar fasciitis who failed to respond to conservative management.

CONFLICTS OF INTEREST

None.

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