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A Study On Outcome Of Platelet Rich Plasma Therapy In Resistant Plantar Fasciitis

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ABSTRACT
Introduction*: Plantar fasciitis is the most common cause of heel pain. It usually presents with severe sharp early morning first step inferior heel pain. Local injection of platelet rich plasma (PRP) is an emerging therapeutic alternative for Plantar fasciitis. We conduct this study to find the effect of PRP for patients with Plantar fasciitis.*
Materials and Methods*: 40 cases of resistant Plantar fasciitis satisfying inclusion and exclusion criteria were treated with Platelet Rich Plasma injection between 1st June 2021 to 31st May 2022 at Silchar Medical College, Silchar. Patients were followed up at 1 month, 2 months, 4 months and 6 months and pain intensity was assessed with Visual Analogue Score (VAS).*
Result*: Majority of cases were in age groups more than 40 years. Majority 62.5% of cases were obese on BMI. Majority 80% of respondents had an active lifestyle. Only 10% of cases had injection site pain and walking difficulty. Majority 80% cases had post procedure satisfaction.*
Conclusion*: Study concludes that PRP treatment was seen effective in decreasing the pain. PRP treatment showed satisfactory long term effect and very less complications were noted.*
KEY WORDS: *Plantar Fasciitis , Platelet Rich Plasma, Peppering Technique*

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I. INTRODUCTION:

Plantar fasciitis is the most common cause of heel pain. [1] The pathophysiology is not fully understood and seems to be multifactorial. Several established risk factors include prolonged weight bearing, obesity, and reduced plantar flexion.[2] Although plantar fasciitis is a self-limiting condition, the rehabilitation may require several months. Moreover, pain may become chronic, and disabling would carry a heavy healthcare burden for patents [3] and influence their quality of life.[4]

Increased body mass index (BMI), calcaneal spur, pes planus, pes cavus, deficits in flexibility of the plantar flexors (reduced ankle dorsiflexion), weak intrinsic foot muscles, excessive pronation, and improper footwear are identified risk factors for the development of PF. There is also a weak association of PF with increasing age prolonged standing and decreased first metatarsophalangeal joint extension.[5]

The diagnosis of PF is exclusively based on clinical history and physical examination;[6,7] it usually presents with severe sharp early morning first step inferior heel pain that improves with movements but aggravated by weight-bearing activities. PF is usually unilateral, but up to 30% of cases may have bilateral presentation. On physical examination, patients have local tenderness at medial calcaneal tuberosity, plantar flexors tightness, increased discomfort with passive dorsiflexion of great toe or standing on the tip of toe.[8,9]

Rest, ice, stretching, orthoses, non-steroidal anti-inflammatory drugs, extracorporeal shock wave therapy, injections (of corticosteroids, botulinum toxin, dextrose, platelet-rich plasma) and surgery are commonly used in the management of the condition. Almost 90% of patients get better with non-surgical treatment [10].

Local injection of platelet-rich plasma (PRP) is an emerging therapeutic alternative for plantar fasciitis. PRP, derived by centrifuging whole blood, has a platelet concentration higher than that of whole blood.[11] The platelet releases a variety of growth factors and cytokines, which can stimulate and accelerate the natural physiological tissue healing process.[11] Current evidence has shown the promising results of PRP in the treatment of plantar fasciitis. [12] However, whether it is more effective in reducing pain and improving function than other treatments (such as steroid injection, or whole blood) remains controversial. Therefore, we conducted this study to find the effects of PRP for patients with plantar fasciitis.

II. AIMS AND OBJECTIVES

To study the outcome of Platelet Rich Plasma therapy in resistant plantar fasciitis to observe the improvement of pain relief by visual analogue score in resistant plantar fasciitis treated with platelet rich plasma therapy

III. MATERIALS AND METHODS

This study was carried out in the **Department of Orthopaedics**, Silchar Medical College and Hospital, Silchar, Assam The study was designed as a Hospital-based prospective study.

The study was done for One year from 1st June 2021 to 31st May 2022. After obtaining Ethical clearance was taken from Institutional Ethics Committee (H), Silchar Medical College and Hospital, Silchar, Assam, All the patients attending Orthopaedics OPD of Medical College & Hospital with the following criteria were included in our study. 40 cases were studied.

INCLUSION CRITERIA:

- Patients age 18 to 60 years
- Giving written informed consent.
- Unilateral/ bilateral clinically diagnosed patient of resistant plantar fasciitis with history of at least 4 weeks of unsuccessful conservative treatment.
- Clinically diagnosed patients of plantar fasciitis with history of unsuccessful treatment with steroid injection.

EXCLUSION CRITERIA:

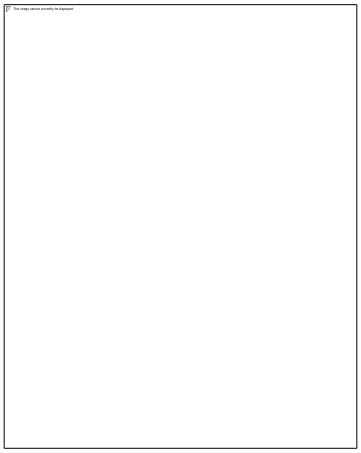
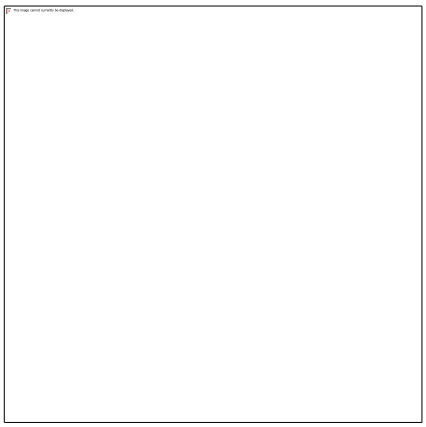
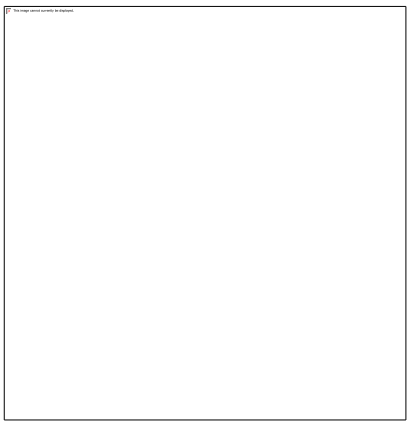
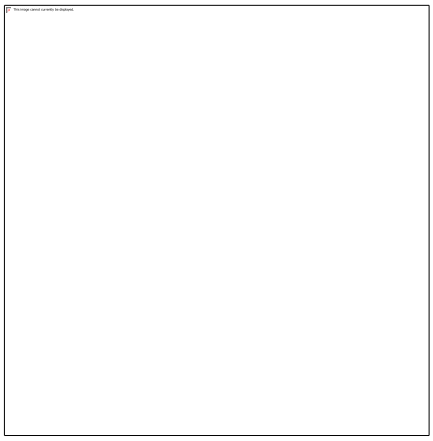
- Patients age <18 years
- Patients with diabetes mellitus, RA, Gout, inflammatory or degenerative polyarthritis, PVD, clotting disorder on anticoagulant therapy.
- History of congenital foot deformity
- Not willing to participate
- Anemic (Hb<7)
- Pregnant and breast feeding females
- Achilles tendon pathology
- Complex regional pain syndrome or with metastatic cancer
- Work related or compensable injury

METHODS:

Clinical and radiological evaluations were done for Diagnosis of plantar fasciitis. All included patients on the first visit was evaluated by a full medical history and physical examination. Written informed consent from patients were taken.

PRP was prepared under all aseptic measures and standardised procedures. A 20 cc venous blood was drawn to yield 2-3 cc of PRP depending on the baseline platelet count of an individual, the device used, and the technique employed. There are many ways of preparing PRP. Here, in our study, we have prepared using PRP method. In the PRP method, an initial centrifugation to separate red blood cells (RBC) was followed by a second centrifugation to concentrate platelets, which were suspended in the smallest final plasma volume. WB (whole blood) was initially collected in tubes that contain anticoagulants. The first spin step was performed at 1500 rpm for 15 minutes to separate whole blood into three layers: an upper layer that contains mostly platelets and WBC, an intermediate thin layer that is known as the buffy coat and that is rich in WBCs, and a bottom layer that consists mostly of RBCs. Then the upper layer and superficial buffy coat were transferred to an empty sterile tube. The second spin step was then performed at 4000 rpm for 10 minutes duration. The upper portion of the volume that is composed mostly of PPP (platelet-poor plasma) was removed. Pellets were homogenized in lower 1/3rd (2ml of plasma) to create the PRP (Platelet-Rich Plasma).

2ml of PRP was injected in the most tender point over the origin of the plantar fascia on the medial tubercle of the calcaneus, using the peppering technique by 22 gauze needle in a fan-shaped fashion. 0.5 ml of PRP sent to laboratory for count estimation. Post injection, patients were rested for 15 minutes and then allowed to walk. They were advised to avoid strenuous activities and rest for 2 weeks and use of soft and proper footwear. Standard Achilles and plantar fascia stretching and strengthening exercises are given to all patients. Patients were followed up at 1 month, 2 months, 4 months and 6 months were subjected to the following for outcome evaluation. Results were recorded. Pain intensity were assessed with Visual Analogue Score (VAS). The scale records the patient's reported pain using a scale of 0 – 10, where 0 is pain-free and 10 is the worst pain imaginable. The score were marked at the point on the line that corresponds with the patient's response. Functional outcome were assessed


PREPARATION OF PRP AND APPLICATION OF PRP IN A PATIENT WITH PLANTAR FASCITIS

IV. RESULTS AND OBSERVATIONS

Table No 1: Shows the age distribution among cases

Age in years	Frequency	Percentage (%)
18 to 30	6	15
31 to 40	10	25
41 to 50	12	30
51 to 60	12	30
Total	40	100

Majority of cases were in age group more than 40 years. Mean age was 44.02$\pm$10.3 years.

Table no 2: Shows gender distribution among cases

Gender	Frequency	Percentage (%)
Male	17	42.5
Female	23	57.5
Total	40	100

Female preponderance was seen. 57.5% were female and 42.5% were males

Table no 3: Shows side involvement among cases

Left side was more affected 52.5%

Side	Frequency	Percentage (%)
Right	19	47.5
Left	21	52.5
Total	40	100

Table no 4: Shows Body Mass Index among cases

BMI	Frequency	Percentage (%)
Normal	15	37.5
Obese	25	62.5
Total	40	100

Majority 62.5% of cases were obese on BMI.

Table no 5: Shows duration of pain among cases

Duration (in Years)	Frequency	Percentage (%)
<1	13	32.5
1 to 5	19	47.5
>5	8	20
Total	40	100

47.5% cases had history of pain since 1 to 5 years, followed by 32.55 had for less than 1 years and only 20% had it for more than 5 years.

Table no 6: shows presence of calcaneal spur among cases

Spur	Frequency	Percentage (%)
Present	5	12.5
Absent	35	87.5
Total	40	100

Calcaneal spur was seen among 12.5% of cases

Table no 7: shows daily lifestyle among cases

Lifestyle	Frequency	Percentage (%)
Active	32	80
Sedentary	8	20
Total	40	100

Majority 80% of respondents had an active lifestyle, only 20% had a sedentary lifestyle

Table no 8: Shows visual analogue scale of patients

VAS	Mean	Standard Deviation(SD)
Day 0	8.6	0.7
1st month	3.6	0.6
2nd month	2.2	0.8
4th month	1.35	0.5
6th month	0.7	0.5

VAS score showed a decreasing trend on each follow up. Applying repeated ANOVA, p value is <0.0001, shows statistical significance.

Table no 9: shows occurrence of complication among cases

Complication	Frequency	Percentage (%)
No	36	90
Yes	4	10
Total	40	100

As such no major complication was noted. Only 10% cases had injection site pain, and walking difficulty.

Table no 10: Shows post procedure satisfaction among cases

Final outcome	Frequency	Percentage (%)
Satisfied	32	80
Not satisfied	8	20
Total	40	100

Majority 80% cases had post procedure satisfaction.

V. DISCUSSION

In our study total 40 cases of resistant plantar fasciitis were studied. They were given autologous PRP injection. Majority of cases were in age group more than 40 years. Mean age was 44.02±10.3 years. Vishwas Sharad Phadke et al [13] showed that most common affected age group was between the age of 41-50 years (35%) followed by 51-60 years (21.67%) and 31-40 years (20%). Study by Kalia RB et al [14] showed that mean age was 39 years (range 20–55 years). Similar findings were seen in study by Carlos AO et al (15) where, average age of the patients was 44.8 years (range, 24-61 years). Sachdev T et al (16) showed mean of 44 years, and 47years by Say F et sl (17).

In present study female preponderance was seen. 57.5% were female and 42.5% were males. Vishwas Sharad Phadke et al [13] showed that 22 (36.67%) males and 38 (63.33%) females with a M:F ratio of 1:1.72. Study by Vellingiri K et al [18] showed of the 110 patients, 59 were females and 41 were males. Similar findings were seen in study by Carlos AO et al (15), Say F et sl (17) and Yaratapalli SR et al (19) where females were more commonly affected than males.

In present study left side was more affected 52.5% than right side. This is similar to study by Say F et sl (17) where left foot was more affected than right foot. But, contradictory results shown by Carlos AO et al (15), where they showed that right foot was most commonly affected (63%).

In present study majority 62.5% of cases were obese on BMI.

Vishwas Sharad Phadke et al [13] showed that twenty-seven (45%) patients were either overweight or obese. Study by Vellingiri K et al [18] showed majority of the patients were in the BMI range of 18.5 to 24.9, with a mean BMI of 23.6. Hill and Cutting found a statistically significant correlation between plantar fasciitis and increased body weight, and concluded that increased body weight is an associated factor in many patients with plantar fasciitis(20).

47.5% cases had history of pain since 1 to 5 years, followed by 32.55 had for less than 1 year and only 20% had it for more than 5 years.

In present study Calcaneal spur was seen among 12.5% of cases. Plantar fasciitis commonly occurs with those having calcaneal spurs or calcaneal spur is a risk factor for plantar fasciitis. 1 out of 10 people has heel spurs, but only 1 out of 20 (5%) with heel spur has foot pain.(21) Gulzar Saeed Ahmed et al(22) reported radiologically 28% to 66% of plantar fasciitis having calcaneal spurs.

In present study majority 80% of respondents had an active lifestyle, only 20% had a sedentary lifestyle. Thus, our study shows plantar fasciitis to be more common among those having active lifestyle than those with sedentary lifestyles. This is similar to study by Carlos AO et al (15), T J May et al (23) who reported, plantar fasciitis may be acute, but is more often a chronic condition that is directly related to physical activity. Study by Gill LH, Kiezbak et al (24) also found a significant correlation between activity level and plantar fasciitis. Specifically, the plantar fasciitis group was more active than the control group.

In present study VAS score showed a decreasing trend on each follow up. Applying repeated ANOVA, p value is <0.0001, shows statistical significance. Vishwas Sharad Phadke et al [13] showed statistically significant reduction in pain was documented at the time of follow up of 4 weeks. At the end of 12 weeks 58 (96.67%) patient experienced significant pain relief and only 2 (3.33%) patients had significant pain. Study by Kalia RB et al [14] showed that pre-injection VAS score for heel pain was 6.5 ± 1.1 which improved to 2.7 ± 0.5 and 1.8 ± 0.8 at 6 and 12 week respectively and difference was significant ($p < 0.001$).

As such no major complication was noted in present study. Only 10% cases had injection site pain, and walking difficulty. Omar et al(25); Buccili TA Jr et al(26) Acevedo Jl et al(27) in their studies reported complications like plantar fascia rupture, fat pad atrophy, abscess, and osteomyelitis.

In present study majority 80% cases had post procedure satisfaction. The short-term results of single dose PRP injections shows clinical and statistically significant improvements in VAS for heel pain, functional outcome scores and plantar fascia thickness measured by USG. This study concludes that local PRP injection is a viable management option for chronic plantar fasciitis.[14] Platelet rich plasma is beneficial in its ways with less complications. But, the requirement of a centrifuge machine is expensive and thus increases the cost. Also, the process of obtaining PRP needs more time. Since PRP is obtained from autologous blood, there is no risk of immune reactions or disease transfer. There are no studies in the literature that warns about hyperplasia, carcinogenesis or tumor growth of PRP. The greatest benefit of PRP is its longer therapeutic action and lower recurrence rates.

VI. CONCLUSION

Study concludes that the PRP treatment was seen effective in decreasing the pain. PRP treatment showed a longterm effect and no or very less complications were noted. The most important patient's satisfaction was seen. Thus PRP injection should be included in the standard treatment guidelines and protocol of treating plantar fasciitis disease.

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