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Platelet rich plasma injection in treatment of plantar fasciitis: An interventional study in a tertiary care hospital, Andhra Pradesh

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Abstract
Background: Plantar fasciitis accounts for 11 to 15% of all foot problems in adults. It peaks in 40 to 60 years of age group and in younger age group, commonly among runners. Plantar fasciitis causes heel pain in both active and sedentary adults of all ages. It is the most common degenerative disease for the cause of heel pain and a self limiting disease that affects most of the adult age group in most southern parts of India. Though NSAIDs, steroids, botulinum toxin –A and shock wave therapy have shown better results in plantar fasciitis, they carry potential risk of serious complications and functional disability.
Objectives: To evaluate pain following Platelet rich plasma injection in plantar fasciitis among adults in a tertiary care centre.
Methodology: A Hospital based non – randomized trial (NRT) was conducted among 30 adults (18 – 50 years) in the Orthopaedic out – patient department of GSL Medical College, Rajahmundry, for a period of six months.
Results: Mean age of the study subjects was 37.5± 9.17 years. About two – third of the subjects had duration of symptoms for 7-12 months. All the patients with pain for more than 12 months duration had complete pain relief. Response to autologous PRP injection is statistically significant in patients with chronic plantar fasciitis.
Conclusions: Autologous PRP injection is a safe and useful modality for treatment of chronic plantar fasciitis.

Keywords: Plantar fasciitis, VAS score, PRP injection

Introduction
Plantar fasciitis is classified as a syndrome that results from repeated trauma to the plantar fascia at its origin on the calcaneus [1, 2, 3]. It is a common pathological condition affecting the hind foot and can often be a challenge for clinicians to treat successfully [4]. It is an overuse injury causing inflammation at the origin of the plantar fascia and surrounding perifascial structures, such as the calcaneal periosteum. It is the most common clinical problem that causes inferomedial heel pain in adults [5].
The history of plantar fasciitis dates back to almost two hundred years ago when it was recognized as an overuse syndrome by an author named woods [6] and other authors called it by different names such as heel pain syndrome, subcalcaneal pain syndrome, calcaneodynia, subcalcaneal bursitis, calcaneal periostitis, neuritis, heel syndrome, subcalcaneal spur syndrome, stone bruise, medial arch sprain, runner's heel, jogger's heel and policeman's heel [6].
Plantar fasciitis accounts for 11 to 15% of all foot problems in adults. Prevalence of the disease is 1million per year in global trends of India [4]. It peaks between 40 to 60 years of age group and in younger age group, commonly runners. The predominance of this condition according to gender varies among studies. Plantar fasciitis causes heel pain in both active and sedentary adults of all ages [7, 8]. Patients often complain that they have excruciating pain when arising from bed in the morning, but the discomfort will slowly subside during the next 30-45 minutes.
It is the most common degenerative disease for the cause of heel pain and a self limiting disease that affects most of the adult age group in most southern parts of India.

The literature clearly indicates that nonsurgical management is the treatment of choice. Though NSAIDs, steroids, botulinum toxin –A and shock wave therapy have shown better results in plantar fasciitis, they carry potential risk of serious complications and functional disability.

The advent of platelet rich plasma (PRP) for treatment of plantar fasciitis in recent times is due to its wide advantages with early recovery of pain levels and improved functional activities of the patient in comparison with above mentioned treatments. Platelet rich plasma (PRP) is defined as a volume of the plasma fraction of autologous blood having a platelet concentration above baseline. The injection of an aliquot of concentrated platelet enriched plasma into a localized area introduces platelets into tissue to stimulate a supra-physiologic release of growth factors in an attempt to 'jump-start' the regenerative process in degenerative conditions and reduce pain.

This study is an attempt to evaluate pain following autologous platelet rich plasma injection in patients with chronic plantar fasciitis and to recognize any complications associated with platelet rich plasma injection.

Objectives

To evaluate pain following autologous platelet rich plasma (PRP) injection among adults with chronic plantar fasciitis in a tertiary care centre.

Material and Methods

A Hospital based non – randomized trial (NRT) was conducted among 30 adults (18 – 50 years) who presented with heel pain to the out – patient department of Orthopaedics at GSL Medical College, Rajahmundry, for a period of six months (Feb 2019 to July 2019).

Inclusion criteria: 1. Patients above age 18 yrs with complaints of plantar heel pain worse in the morning and failed conservative management of at least 4 weeks duration.

Exclusion criteria: Patient with known case of Diabetes mellitus, Osteoarthritis of ankle, Infection or ulcer at the injection site.

Ethical clearance from Institutional Ethical Committee of GSL Medical College, was obtained before initiating the study. Prior to the commencement of the study, the procedure was explained to the patient and informed consent was taken from the study participants after explaining the purpose of the study in vernacular language in an understandable manner.

Data collection

All the patients who presented to the orthopaedic OPD and satisfied the inclusion criteria were considered for the study. A total of 38 cases of plantar fasciitis came to Orthopaedic OPD during the study period, among which 3 were below 18 years and were excluded from the study, while five of them did not consent for treatment with injection PRP. Hence, data for study could be collected from 30 patients.

Procedure

Initial assessment: Patients were assessed clinically, a thorough history and clinical examination was carried out. The subjective symptoms and objective signs were recorded in a pre-designed proforma. This was followed by routine investigations as well as an X-ray of the heel and ultrasound of the plantar fascia of all the patients to rule out the other causes that cause heel pain. Once the diagnosis of plantar fasciitis was established, PRP injection was given to the patient. Then the patients were followed up for a period of 4 months. Assessment of functional outcome was done using Visual Analogue Scale (VAS) scores recorded before treatment and follow up at 1st month, 2nd month and 4th month based on following criteria.

Injection of PRP: Under aseptic precaution using a 21G and 1 1/2 inch needle, 2ml PRP was injected initially over the maximum tender point and needle was partially withdrawn and multiple punctures were made in the surrounding tissue (peppering technique). The remaining 2 ml of platelet rich plasma was injected in surrounding tissue. After 48 hours, patients were given a standardized stretching protocol to follow for 2weeks. A formal strengthening program was initiated after this stretching. Patients were advised to avoid strenuous activities and rest for 2 weeks. No aggressive running or jumping activities were allowed for 2 weeks. At 4 weeks after the procedure, patients were allowed to proceed with normal sporting or recreational activities as tolerated. Patients were advised to use MCR footwear. They were followed up at 1st, 2nd and 4thmonth. The outcomes of VAS score were compared with previous visits at each follow-up.

Statistical analysis: Data extraction and analysis was done using Microsoft Excel 2007 and SPPS version 20. Results were expressed as percentages for categorical variables. Continuous variables were expressed as mean and standard deviation. Paired 't' test was applied to compare the mean scores at every follow – up. A 'P' value of <0.05 is considered as statistically significant.

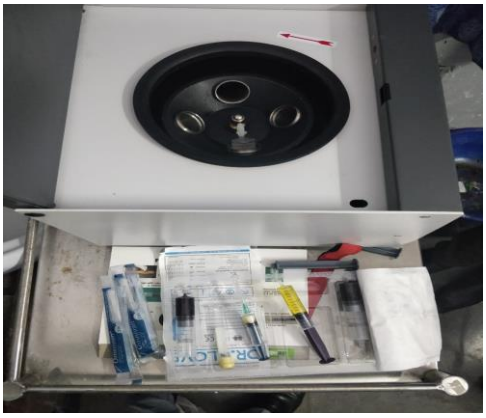

Fig 1: PRP injection tray

Fig 2: Injection of PRP at point of maximum tenderness

Fig 3: Injection PRP

Results and Discussion

A total of 30 patients of plantar fasciitis could be evaluated. About 10 (33%) belonged to 21 – 30 years age group, 9 (30%) each to 31 – 40 years and 41 – 50 years age group, while only 2 (7%) belonged to 51 – 60 years age group. Females constituted majority, 21 (70%) while males were 9 (30%). Mean age of the study subjects in this study was 37.5± 9.17 years. Mean age of the patients in PRP group in a study by Pankaj Mahindra *et al*. [9] is 30.73 years, while in a study by Ferhat say *et al*. [10] mean age was 47±6.8 years and participants' age ranged from 25 – 60 yrs. In the present study, majority (60%) of the subjects were aged 31 – 50 years and 1/3rd (33%) were below 30years. Right side was predominantly involved with 19 (63%) of subjects and 11 (37%) on left side.

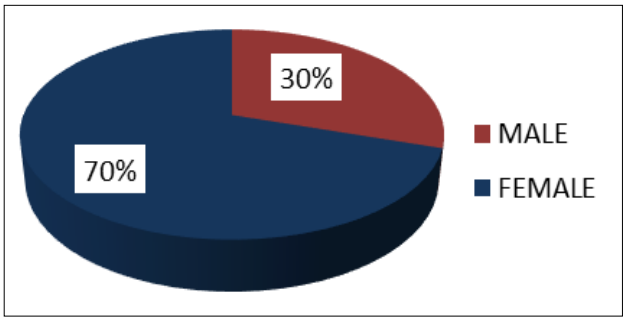

Fig 4: Sex wise distribution of study subjects (n = 30)

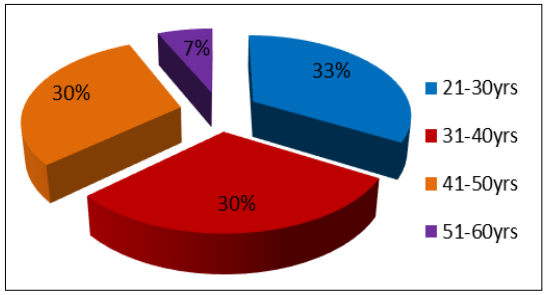

Fig 5: Age wise distribution of study subjects (n = 30)

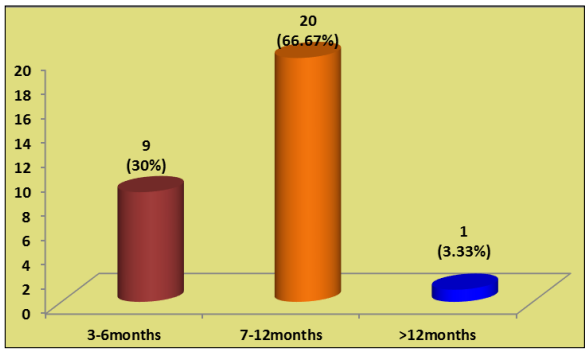

Fig 6: Distribution of study subjects based on duration of symptoms (n=30)

About 20 (66.7%), that is, almost 2/3rd of the subjects had duration of symptoms for 7-12 months, 9 (30%) had for 3-6months and 1 (3.3%) for > 12 months.

Table 1: Duration of symptoms and percentage of pain relief (n=30)

Duration of symptoms	100% pain relief	50-99% pain relief	<50% pain relief	Total
3-6months	5 (55.5%)	3 (33.3)	1(11.1)	9
7-12months	18 (90%)	1	1	20
>12months	1 (100%)	0	0	1
Total	24	4	2	30

It is observed that all the patients with pain for more than 12months duration, 90% of those with 7-12months duration and 55.5% of those with less than 6months duration had complete relief of pain.

Table 2: Mean VAS Score at pre and post injection (n=30)

Variables	Minimum	Maximum	Mean	Standard Deviation
At the time of Injection	9	10.0	9.9	0.275
1st Month	7	9	8.2	0.66
2nd Month	5	7	5.96	0.66
4th Month	2	5	3.53	0.68

Patients were analyzed for pain relief subjectively at 1st month, 2nd month, 4th month and 6th month. Pain score was assessed at the time of injection. The mean pain score of all the patients at the time of injection was 9.9±0.275. The mean pain score at 1st month, 2nd month and 4th month was 8.2±0.66, 5.96±0.66 and 3.53±0.68 respectively.

In a similar study by Ragab EM, Othman AM *et al*. [11] using a visual analogue pain scale, the average pre-injection pain score in patients was 9.1 and decreased to an average post-injection pain score of 1.6.

The mean VAS score showed slight decrease in the 1st month (8.2±0.66), a moderate decrease in the 2nd month (5.96±0.66) and a significant decrease in the 4th month (3.53±0.68). In a similar study by Pankaj *et al*. [6] the VAS score was recorded at the initial visit and after the injection of PRP, patients were evaluated till 3 months by using VAS score. It was observed that the VAS score reduced significantly. The initial visit had mean VAS score of 7.44±1.04, while it decreased to 3.76±1.53 at 3weeks and greatly decreased by 3rd month (2.52±1.71).

Similarly, in a study by Ferhat say *et al*. [10] the VAS score significantly reduced. The initial visit had mean VAS score of 6.96±1.12. After the injection of PRP, patients were evaluated till 6 months by using VAS score. The mean VAS score showed decrease in the 1stmonth (3.83±0.79), a severe decrease in the 2nd month (0.76±0.85) and 6th month (0.33±0.71).

Consistent with the above findings, Mukesh Tiwari *et al*, [12] also revealed that the VAS score significantly reduced in their study with 6 months follow up after PRP injection. The initial

visit had mean VAS score of 5.9±0.76, while the mean VAS score showed decrease in the 1st month (2.1±1.0) and a moderate decrease in the 3rd month (2.0±0.45) and 6th month (2.0±0.45).

Table 3: Comparison of Mean VAS Score at pre injection and at different follow up visits (n=30)

Variables	Mean	Standard Deviation	P value	Significant
At the time of Injection	9.9	0.275	<0.0001	HS
1st Month	8.2	0.66		
At the time of Injection	9.9	0.275	<0.0001	HS
2nd Month	5.96	0.66		
At the time of Injection	9.9	0.275	<0.0001	HS
4th Month	3.53	0.68		

P≤ 0.05 is significant, HS- Highly significant

Comparison was made between mean VAS score at the time of injection and at follow up visits (1st month, 2nd month and 4th month). It was found that the response to autologous PRP injection is statistically significant in patients with chronic plantar fasciitis, that is, a statistically significant difference could be obtained between VAS score at the time of injection and at follow up intervals.

Limitations
Since it is study conducted in a small sample in a single centre, the results may not be applicable to other settings or the general population.

Conclusions and Recommendations
Plantar fasciitis is the most common degenerative disease for the cause of heel pain and a self limiting disease that affects most of the adult age group individuals. It causes excruciating pain and discomfort to the patients, often limiting their activities. Though many modalities of treatment are available, Autologous PRP injection is also a safe and useful modality for treatment of chronic plantar fasciitis. The response of patients with plantar fasciitis to PRP injection was found to be good with highly significant results. However, more studies among more number of patients in different settings could be conducted to provide additional evidence to the findings.

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