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Role of platelet rich plasma in the treatment of plantar fasciitis

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Abstract
Introduction: Plantar fasciitis is a commonly occurring foot complaint that seriously affects the patient's daily activities and quality of life. Plantar fasciitis is characterised by pain in the heel, which is aggravated on weight bearing after prolonged rest. Conservative noninvasive lines of treatment are numerous, among which platelet-rich plasma (PRP) has recently been demonstrated to be helpful in managing plantar fasciitis.
Aim: The aim of this study was to evaluate the effectiveness of platelet-rich plasma as a form of interventional pain management for plantar fasciitis.
Materials and Methods: This prospective study was carried out on 40 patients suffering from chronic Plantar Fasciitis who did not respond to conservative therapies including physical therapy, NSAIDs and heel cushions for a longer period. The patients were selected from the outpatient department of the Orthopaedics SKIMS medical College, Bemina Srinagar. All enrolled patients were treated with single dose of local injection of 3 mL autologous PRP. Assessment was done using visual analogue scale (VAS) for pain intensity. Functionally, foot and ankle ability measure (FAAM) was used at baseline and after injection.
Results: The mean VAS score before the procedure was 7.21± 2.33 and after procedure were 2.96 ± 0.54. The mean difference of 4.24 was statistically significant. There was a significant raise of mean FAAM score 29.37 after 24 weeks of treatment and the difference was statistically significant.
Conclusion: The present study observed by follow-up of PRP treated plantar fasciitis patients at intervals, revealed that this procedure is safe, efficient and effective for long term pain reduction along with reduction in thickness of plantar fascia.

Keywords: Plantar Fasciitis, Platelet rich plasma (PRP), foot and ankle ability measure (FAAM), visual analogue scale (VAS)

Introduction
Plantar fasciitis is a common foot condition that occurs in adults, with prevalence estimates between 4 and 7% [1-3]. Pain is intensified by prolonged weight bearing, obesity, and gradually increased activity [4, 5]. It is estimated that approximately 1 in 10 people experience heel pain at some point. Although plantar fasciitis (PF) occurs at all ages, the highest risk of occurrence of PF is 40 to 60 years of age, with no significant sex bias [6].
The etiology and cause of pain is not well understood and is multifactorial. The risk factors which precipitate include intrinsic and extrinsic factors. The intrinsic factors include anatomical, functional and degenerative factors. Increased stress on plantar fascia occurs due to anatomical factors like pes planus, pes cavus, overpronation, leg length discrepancy, excessive lateral tibial torsion and femoral anteversion; functional risk factors like tightness or weakness in gastrocnemius, soleus muscles and Achilles tendon; and degenerative factors includes ageing and atrophy of heel pad of fat [4, 7, 8]. The extrinsic risk factors include excessive use, training error among athletes and improper footwear. The pain is sharp, insidious in onset, typically worst in the morning usually after first step, also appears after prolonged sitting or inactivity [8].
Numerous methods have been advocated for treating Plantar fasciitis including rest, non-steroidal anti-inflammatory drug (NSAID), night splints, foot orthosis, stretching protocols, extra corporeal short wave therapy, steroid injections, and surgical intervention [9, 10].

It is reported that the symptoms will disappear after nonsurgical treatment in more than 80% of patients [11]. In 10% of patients, symptoms do not improve with conservative measures and further develop into chronic diseases [12]. In general, when these conservative treatments fail, injecting steroids is considered an option [13]. However, steroid injections are often not successful after 1 injection and can thus require multiple injections, which may be associated with potential complications, including plantar fascia rupture and fat pad atrophy [14, 15]. Therefore, the study of alternative therapies is important.

A local injection of platelet-rich plasma (PRP) is an emerging therapy for ligament pathologies and recalcitrant tendons, including PF. PRP is prepared from autologous whole blood that contains an increased concentration of autologous platelets. In the clinic, PRP has been widely applied to various tissue injuries, such as osteoarthritis, muscle strain, bone healing, and tendon injury [16-18]. PRP has also been used as an effective treatment modality in sports medicine to rehabilitate disabled muscles [19]. Recently, many studies have focused on the effectiveness of PRP as a treatment for PF; however, the results are inconsistent. In addition, the relationships between PRP and pain relief and improvements in functional restoration are unknown. Thus, we conducted this study to further analyze the effects of PRP on functional restoration and pain control in patients with PF.

Materials and Methods

This prospective study was conducted in SKIMS medical college Srinagar India from June 2019 to August 2021. In this study a total of 40 patients with chronic plantar fasciitis were enrolled. The patients were explained purpose, procedure and benefits of the study and a written consent was taken. Institutional ethical committee approval was obtained before starting this study.

Inclusion Criteria

- Age of subject is 20-60 years of both genders.
- Patients with plantar fasciitis for more than 3 months.
- Patients without any deformity.
- Normal random blood sugars and HbA1c.

Exclusion Criteria

1. Patients with Rheumatoid arthritis.
2. Any fractures or injury around the ankle or knee.
3. Patients with the bone tumor infection.
4. Patients with a history of corticosteroid injection past two months.
5. Patients with Hemorrhagic disorder.
6. Age group for less than 20 years and over 60 years.
7. Any systemic or local infective pathology.

Procedure

Injection infiltration: The procedure was done on an outpatient basis and under complete aseptic conditions. Sites of maximum tenderness were pre-marked with a sterile marker. Lidocaine sensitivity was assessed and 2cc of 2% Lidocaine was infiltrated, into the skin and subcutaneous tissue as local field block, followed by 3cc of PRP was injected at the origin of the plantar fascia and site of maximum tenderness. A peppering technique i.e., spreading in clockwise manner was used to achieve a more expansive zone of delivery, with a single skin portal and 4-5 passes through the fascia itself. Patients were allowed to rest for 15 minutes and then advised to walk. The patients were monitored for 20 minutes for any reactions and then were sent home, advised to limit movement for period of 48 hours. The use of non-steroidal medication was not advised. After 48 hours, patients were given a stretching protocol that was to be followed for two weeks.

Follow-Up

Patients were called for Follow-up at regular intervals. Patients were allowed to proceed with normal sporting or recreational activities at 4 weeks follow up. Final assessment was done at 24 weeks.

USG evaluation of thickness of plantar fascia was done post-treatment. Assessment was done using visual analogue scale (VAS) for pain intensity. Functionally, foot and ankle ability measure (FAAM) was used at baseline and after injection.

Results

In the present study, a total of 40 patients were enrolled diagnosed with plantar fasciitis were treated with PRP therapy. The mean age study was 43.25 (range 23-59) years. There were 14 (35%) patients in the age group of 41-50 years. In this study there were 29 (72.5%) female patients and 11 (27.5%) male patients. Majority of the patients 17 (42.50%) had right involvement. In this study 31 (77.5%) of the study population had pain for around 6-8 months (Table 1).

Table 1: Demographic characters of the patients

Parameters		No. of patients	Percentage
Age group	20-30	5	12.50
	31-40	9	22.50
	41-50	14	35.00
	51-60	12	30.00
Gender	Male	11	27.50
	Female	29	72.50
Side	Right	17	42.50
	Left	14	35.00
	Both	9	22.50
Duration of pain (Months)	3-5	4	10.00
	6-8	31	77.50
	9-12	5	12.50

The mean VAS score before the procedure was 7.21± 2.33 and after procedure were 2.96 ± 0.54. The mean difference of 4.24 was statistically significant. There was a significant raise of mean FAAM score 29.37 after 24 weeks of treatment and the difference was statistically significant.

Table 2: VAS and FAAM Score at follow-up period.

Duration	Mean VAS score	Mean FAAM score
Baseline	7.21 ± 2.33	31.75 ± 7.90
4-weeks	4.86 ± 1.42	39.29 ± 5.92
8-weeks	4.20 ± 1.10	51.10 ± 7.23
12-weeks	3.43 ± 0.96	54.79 ± 6.18
24-weeks	2.96 ± 0.54	61.12 ± 7.64

Discussion

Plantar fasciitis is a commonly occurring foot complaint that seriously affects the patient's daily activities and quality of life characterized by pain in the heel. While the main cause of condition is not known, several risk factors have been reported, but the most accepted theory is repetitive micro tearing and subsequent chronic inflammation of the plantar fascia at its insertion to the medial calcaneal tubercle.

In our study the maximum patients were found in age group of 41-50 years and mean age was 43.25 years, females

predominated and right side was found more involved.

PF is a common ailment, especially among individuals with increased Body Mass Index (BMI) and in those who stand for prolonged periods [4]. It can certainly interfere with the body kinetic chain and quality of life. Its aetiology is not well understood but studies suggest microtrauma as an initiating factor. The histopathological changes include necrosis of collagen, proliferation of fibroblasts and blood vessels, chondroid metaplasia, dystrophic calcification [20]. Although there are many treatment modalities for PF, their clinical outcomes are not satisfactory. PRP injection is a recently emerging treatment alternative for many musculoskeletal conditions [5]. However, the studies [21, 22] on the role of PRP in PF are inconclusive, therefore this study was conducted.

In the present study, the mean VAS score decreased from baseline continuously at four weeks, eight weeks, 12 weeks, and up to 24 weeks which was statistically significant. There were about 38 (95%) of the patients who responded to the treatment except in 2 (5%) patients, who did not showed any improvement in VAS score. The mean FAAM score was observed to improve in 37 (92.5%) patients whereas 3 (107.5%) patients did not improve significantly and those were treated with another modality with anti-inflammatory drugs.

Heel fat pad atrophy and plantar fascia rupture are the two most feared, intractable long-term complications associated with corticosteroid injections [23]. No such complications were seen in any patients treated with PRP in this study. In a study by Jain SK *et al*., PRP was observed to be a better treatment of chronic PF as against steroid. They observed no statistical difference in effectiveness between the therapies at early stage of treatment and remarked that the effectiveness of PRP does not decline with time, making it more durable [24]. Similarly, there was a steady decline in the VAS score at four weeks, eight weeks, 12 weeks and 24 weeks from the baseline score (pretreatment) over the course of this study.

In a Lee TG and Ahmad TS study, a group of 64 patients had been given PRP and steroid therapy for the management of PF. They were followed-up for a period of six months and it was observed that there was significant improvement in both the groups in term of function and pain. No major difference between the two groups was observed at the end of six months [25]. In contrast, in this study, a significant reduction was observed in VAS score at six months and significant increase in FAAM score at six months with PRP therapy, showing better clinical outcome.

The study by de Vos R *et al*., concluded that there was no greater improvement in chronic tendinopathy patients treated with PRP as against saline injection, instead it was attributed that the clinical improvement was due to the eccentric exercises. In addition, they had explained that the effect of PRP depends on the length of time, the platelets remained in the degenerated area, after injection. The greater and rapid the PRP diffusion, the lesser would be its effect [26]. Similarly, Sheth U *et al*., in their study on the efficacy of autologous PRP use for orthopaedic indications, had concluded that there was uncertainty of evidence to support its clinical utility. This could be possibly explained by lack of standardized protocol [27].

This study observed that injecting PRP is effective and a safe modality in treatment of PF. The strengths of the study include patients with illness or therapy interfering with platelet function was excluded, the patients were followed-up for maximum of 24 weeks and the outcome was measured on both patient perspective and objectively by radiology with measurement of plantar fascia thickness.

The present study was not without limitations, which includes small sample size and comparison with other conservative treatment modalities (local steriod injection) was not done. The platelet quantification was not done and the platelet count in PRP was dependent on the patient's platelet count.

Conclusion

The present study observed by follow-up of PRP treated PF patients at intervals, revealed that this procedure is safe, efficient and effective for long term pain reduction along with reduction in thickness of plantar fascia.

Conflict of Interest

Not available

Financial Support

Not available

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