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Efficacy of autologous platelet rich plasma injection in plantar fascitis

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Abstract
Background and Objectives: Platelet-rich plasma has been used in sports medicine, for cartilage degeneration and chronic enthesopathies like plantar fasciitis. Platelet-rich plasma exhibited the biological healing capacity.
Methods: The study was conducted from December 2019 to December 2021, patients at the department of orthopedics at Navodaya Medical College and Research Center, Raichur. Approval was taken from ethical committee. 30 patients were selected based on the inclusion criteria and exclusion criteria. Platelet rich plasma injection intralesionally given to all patients. All patients are evaluated with the use of a numerical pain score.
Results: The numerical pain score was assessed at the time of injection. The mean numerical pain score of all patients was 8.52 in plantar fasciitis. The mean numerical pain score for plantar fasciitis at 0, 1, 2, 4, and 6 months was 8.52, 4.15, 2.38, 0.61, and 0.33, respectively. From the above data, it can be concluded that patient receives maximum relief of symptoms at the fourth month and is sustained until sixth month.
Conclusion: In this study, we observed that platelet-rich plasma has significantly better results in safe and effective plantar fascitis. This was observed maximum at 4 months and sustained for atleast 6 months.

Keywords: Plantar fasciitis, platelet rich plasma, intralesional

Introduction
Plantar fasciitis (PF) is the most common cause of chronic pain beneath the heel in adults, making up 11–15% of the foot symptoms requiring professional care among adults. It is estimated that 1 in 10 people will develop PF during their lifetime.
Recently, platelet plasma has been used for cartilage regeneration, chronic enthesopathies like tennis elbow, plantar fasciitis, and in the field of sports medicine. Platelet-rich plasma was developed in the early 1970s as a part of blood in which platelets are concentrated in plasma. The basic science of platelet-rich plasma mainly depends on the growth factors in the alpha-granules. PDGF, TGF-BETA 1, EGF, and VEGF are the growth factors seen in platelet granules. These growth factors have an effect on the healing process of many tissues. PDGF is platelet-derived growth factor. It is found in the alpha granules of platelets. PDGF has mytogenic potential for both mesenchymal and osteoblast cells. Growth factors have similar potential activities. These are potential substances for regeneration and differentiation of tissues and its use in the treatment of various conditions. Low recurrence rate. Hence, this study on intralesional injection of autologous platelet-rich plasma will be useful for the treatment of chronic tennis elbow and plantar fasciitis.

Materials and Methods
All the patients were admitted in the orthopedics ward and diagnosed as plantar fasciitis and admitted in Navodaya Medical College Hospital and Research Centre, Raichur. It is a Prospective study did from December 2019-December 2021. A total of 30 patients are included in this study. All the patients will be selected based on the inclusion and exclusion criteria described. All the patients will undergo the same method of treatment and will be assessed based on the numerical pain score which will be described. Inclusion criteria is patients with clinically diagnosed as plantar fasciitis, Patients should have minimum of three months duration of symptoms, Patients should have underwent conservative treatment for a minimum period of three months, Patients should have a pain score greater than seven at the time of PRP injection,

Patients should not have had a local steroid injection in the last 2 months, Both sexes- males and female, Aged- 18 years and above. Exclusion criteria is Less than 3 month duration of plantar fasciitis, Pain score of less than seven, Patients without any trial of conservative treatment, Recent local steroid injection, Infection or ulcer at the injection site, Rheumatoid arthritis, Sero negative spondylo arthritis, Pregnant ladies.

Platelet-rich plasma preparation: Initially, a venous puncture is done at the anti cubital vein and 10 ml of venous blood is collected from the patient into a tube containing an anticoagulant (sterile sodium citrated tubes). Double centrifugation method is used to prepare platelet-rich plasma.

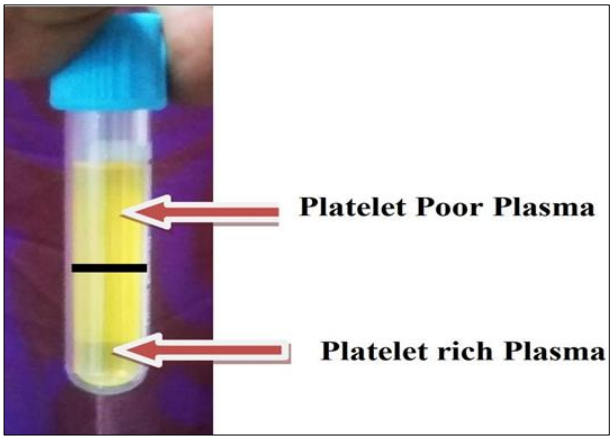


Fig 1: Shows platelet-poor plasma and platelet-rich plasma

After the preparation of PRP, the cell counts in the sample is assessed using the haematology laboratory. The platelet count in the sample ranged from 2.1 to 5.9 lakhs.

Technique of infiltration: The most tender point was palpated (figure 1), and the area was prepared for injection. Under aseptic conditions, 1ml PRP is injected initially over the most tender point with a 21 and 1 1/2 inch needle, then the needle is partially withdrawn and multiple punctures are made in the surrounding tissue (peppering technique). The remaining 1 ml platelet-rich plasma was injected into the surrounding tissue by peppering technique.

Peppering technique: To inject autologous technique, peppering technique is used. In this technique involves inserting the needle into the tendon, injecting some of the blood, withdrawing without emerging from the skin, slightly redirecting and reinserting.

Fig 2: Palpating most tender point after preparation of foot

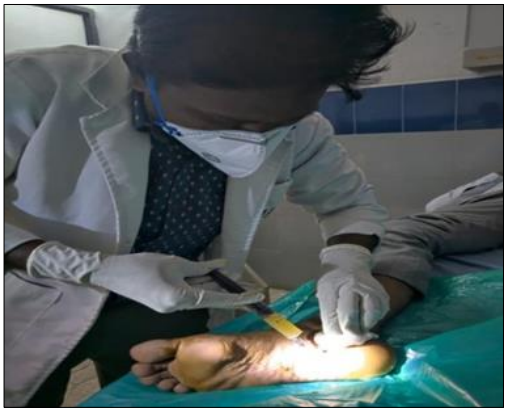


Fig 3: PRP injection into a tender point in the foot

Fig 4: PRP injection in the surrounding area to tender point in foot

Fig 2, 3, 4 PRP injection in plantar fascitis.

Platelet activation: According to Kenneth s Lee *et al*., Needling of surrounding tissue activates platelets by releasing thrombin from fresh bleeding. This method was used to activate platelets.

Follow-up: Patients were followed for a period of six months. A telephonic follow-up was performed on the second day after injection to determine any adverse reactions. Follow-ups were performed at 1, 2, 4, and 6 months. A numerical pain score was used to assess patients subjectively. A numerical pain score is a subjective assessment of pain, where the patient rates the intensity of the pain perceived. Score Zero refers to no pain. Score 10 refers to the worst pain possible. On the basis of numerical pain score, the intensity of pain was divided into mild, moderate and severe. Score zero to three was taken as mild, four to six as moderate and seven to ten as severe pain.

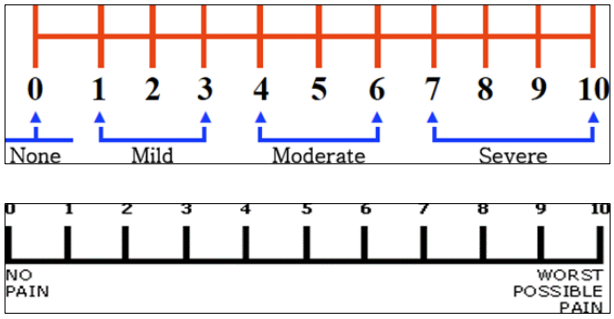


Fig 5: Numerical pain score

Results and Analysis

Patients were assessed for pain relief at 1, 2, 4, and 6 months.

Patients were analyzed for percentage reduction of pain. Percentage reduction of pain is obtained by calculating the percentage of the difference of pain score at every follow up from initial pain score at the time of injection.

Percentage of reduction of pain in plantar fascitis

In 1st month 100% pain relief in no of patients 8(26.6%),50-99% pain relief in no of patients 12(40.00%), <50% pain relief in no of patients 7(23.3%),0% pain relief in no of patients 3(10.0%). In 2nd month 100% pain relief in no of patients 11(36.6%),50-99% pain relief in no of patients 12(40.00%), <50% pain relief in no of patients 4(13.3%),0% pain relief in no of patients 3(10.0%).

In 4th month 100% pain relief in no of patients 15(50%),50-99% pain relief in no of patients 11(36.6%), <50% pain relief in no of patients 2(6.66%),0% pain relief in no of patients 2(6.66%).

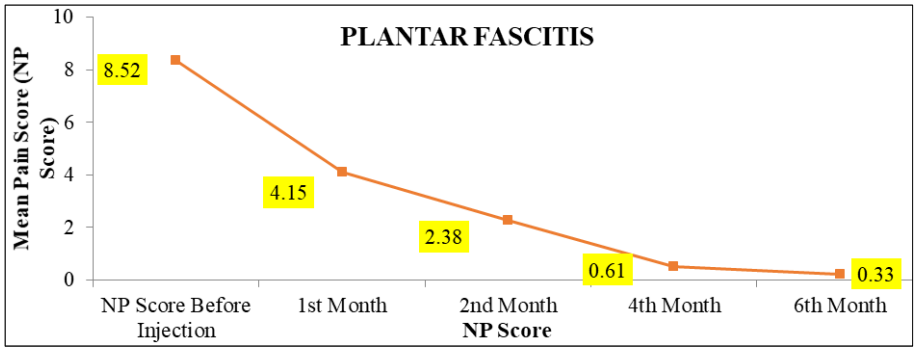
In 6th month 100% pain relief in no of patients 15(50%),50-99% pain relief in no of patients 11(36.6%), <50% pain relief in no of patients 2(6.66%), 0% pain relief in no of patients 2(6.66%).

Table 2: Percentage of reduction of pain in plantar fascitis

Plantar fascitis	100% Pain Relief		50% - 99% Pain Relief		< 50% Pain Relief		0% Pain Relief	
	No.	%	No.	%	No.	%	No.	%
1st Month	8	26.66	12	40.00	7	23.30	3	10
2nd Month	11	36.6	12	40	4	13.30	3	10
4th Month	15	50.0	11	36.6	2	6.66	2	6.66
6th Month	15	50.0	11	36.6	2	6.66	2	6.66

Statistical analysis: SPS software system was used to do statistical analysis by comparing the results of 1,2,4,6 months. *P*-value for the test was taken as 0.05.

Mean pain score: At the time of injection, numerical pain score was assessed. The mean numerical pain score of all patients was 8.37 in plantar fasciitis. The mean numerical pain score for plantar fasciitis at 0, 1, 2, 4, and 6 months was 8.37, 4.11, 2.26, 0.51, and 0.23, respectively. From the above data it can be inferred that patient get maximum relief of symptoms at the fourth month and is sustained till 6th month.



Graph 1: Mean distribution of NP score in plantar fascitis

Discussion

Plantar fasciitis is a most common musculoskeletal problem charecterised by pain in the heel. Primary treatment in initial days is NSAIDS, steroid injections and nondrug approaches such as heel pads, foot arch supports, plantar fascia stretching excercises, ESWT and even surgical treatment has been used for all these treatment methods an alternative has been proposed in this study is platelet rich plasma injection. In a recent study, researchers discovered that compared to local steroids platelet rich plasma injection intraleisionally is a novel kind of treatment, it will provides significant pain relief and improved function in the treatment of plantar fasciitis. Primarily growth factors found in the alfa granules of platelets is the basic science of PRP. In platelet granules the growth factors seen are TGF — beta, CGF, VEGF, and PDGF. Once the platelets were activated, these growth factors will get released[5]. These growth factors also initiate the process of tissue healing through cell proliferation and differentiation, chemotaxis, tissue debris removal, angiogenesis, and the synthesis of extracellular matrix components. Augustus D *et al*. proposed a double centrifugation method is used in this study. The majority of the authors employed a similar infiltration technique for PRP treatment. Keiths Hetchman *et al*, Joost.c. Eerbooms *et al*, Ertugrul ksahin *et al*, Ehab Mohammed selem Ragab *et al*, and Ehab Mohammed selem Ragab *et al* all used a similar technique first they palpated the maximum tender point and they pricked the point of maximum tenderness and injected it with a single skin portal and five to six penetrations into the surrounding tissues. It is called as peppering technique. In our study, we employed the peppering technique for injecting plateletrich plasma. Aziza syed omar published a study in 2011 on the local injection of autologous platelet-rich plasma and corticosteroid in the treatment of lateral epicondylitis and plantar fasciitis: According to the results of their randomised clinical trial, they concluded that local injection of autologous PRP is a promising form of therapy for Tennis elbow and Plantar fasciitis. It is both safe and effective in relieving pain and improving function Numerical pain score was used in this study to assess the pain status. The numerical pain score was assessed at the time of injection. The mean numerical pain score of all patients was 8.52 in plantar fasciitis, the mean numerical pain score for plantar fasciitis at 0, 1, 2, 4, and 6 months was 8.52, 4.15, 2.38, 0.61, and 0.33, respectively. From the above data, it can be concluded that patient receives maximum relief of symptoms at the fourth month and is sustained until sixth month. However, in this study got, the maximum improvement of symptoms occurred after four months. This improvement of symptoms after four months

were maintained until the completion of the research, with the exception of four patients. One patient with plantar fasciitis experienced a recurrence of symptoms after 6 months period of follow-up.

There are no studies that compare the severity of disease and the time it takes to recover after receiving PRP.

Conclusion

Finally, it was determined that intralesional autologous platelet rich plasma injection was safe and effective in the treatment of chronic plantar fasciitis, while we observed to platelet rich plasma injection, the response of the patients in plantar fasciitis was significantly better. At 4 months after platelet-rich plasma injection, maximum benefit was observed and sustained for at least 6 months.

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