EFFECTS OF PLATELETS RICH PLASMA INJECTION ON PAIN RELIEF IN PATIENTS WITH PLANTAR FASCIITIS

Mudir Khan[1], Khalid Iqbal[2], Omer Aziz[3], Muhammad Usama[1], Shabir Muhammad[4], Imran Ali[5]

ABSTRACT

Introduction: Plantar fasciitis (PF) is a degenerative tissue condition which involves plantar fascia at the site of its origin at the medial tuberosity of the calcaneus and causes heal pain. Plantar fasciitis is usually diagnosed on the basis of history and clinical findings. Generally, patients with plantar fasciitis feel worsening heal pain when they first step on the floor in the early morning. However, as the patient starts physical activity the pain gradually improves. Various treatment options are available for planter fasciitis, including corticosteroid injections, non-steroidal anti-inflammatory drugs, foot orthosis, night splints, extracorporeal shock wave therapy and physiotherapy(1)

Objectives: To determine the effect of Platelet-Rich Plasma (PRP) injection on pain relief in patients with planter fasciitis.

Materials and Methods: This quasi-experimental study was conducted in the Orthopedic and Trauma department, Ghurki Trust Teaching Hospital, Lahore from 14th April 2018 to 13th October 2018. All patients with plantar fasciitis and aged between 30-60 years were included in the study. Patients with history of local steroid injection, previous surgery of the foot, fracture of calcaneus and lower limb disorders including ankle-joint diseases and diabetic neuropathy were excluded. Peppering technique was used to inject three mL of platelet-rich plasma, blood plasma enriched with platelets taken from the same patient, with a 22-g needle into the plantar fascia after anaesthetizing the area with lidocaine. Numerical rating scale (NRS) was used for grading of pain before procedure and two weeks after procedure. A score of less than 4 two weeks after PRP injection was considered as satisfactory pain relief.

Results: Out of 161 patients, 104 (64%) were male whereas 57 (35.40%) were female. Mean age of study population was 52±7.89 years while mean duration of pain was 3±0.57 weeks. 144(89.44%) patients reported satisfactory pain relief two weeks after injection of PRP

Conclusion: Treatment with PRP results in satisfactory pain relief two weeks after the injection in majority of patients with plantar fasciitis.

Key Words: Planter fasciitis, platelet-rich plasma, pain relief

INTRODUCTION

One of the most prevalent and frustrating foot disorder that presents to orthopedics outpatient department is plantar fasciitis.(2) Plantar fascia is connective tissue that lies at the plantar aspect of foot and serves as a connection between heel bone and toes. It supports the medial longitudinal arch of the foot and functions as shock absorber during walking mechanism. Plantar fasciitis (PF) is a degenerative tissue condition which involves plantar fascia at the site of its origin at the medial tuberosity of the calcaneus and causes heal pain. Plantar fasciitis affects sport participants as well as physically inactive middle-aged individuals; however, age, higher Body Mass Index (BMI), excessive weight bearing, and excessive tightness of Achilles tendon are among the common predisposing factors. It is most prevalent between 40 and 60 years of age in both genders. Plantar fasciitis is usually diagnosed on the basis of history and clinical findings. Generally, patients with plantar fasciitis feel worsening heal pain when they first step on the floor in the early morning. However, as the patient starts physical activity the pain gradually improves. Dorsiflexion of the

1. Khyber Teaching Hospital, Peshawar
2. Ghurki Trust Teaching Hospital, Lahore
3. Surgimed Hospital, Lahore
4. Hayatabad Medical Complex, Peshawar
5. DHQ Hospital Alpura, Shingla

Address for Correspondence:
Dr. Khalid Iqbal
Ghurki Trust Teaching Hospital, Lahore
dr.khalidwazir123@yahoo.com

toes deteriorates the pain as this action causes pulling of the plantar fascia.(3)

Various treatment options are available for planter fasciitis, including corticosteroid injections, non-steroidal anti-inflammatory drugs, foot orthosis, night splints, extracorporeal shock wave therapy and physiotherapy(1). However, a recent concept of use of platelets rich plasma in patients of plantar fasciitis has been introduced(4). Platelets rich plasma (PRP) is a derivative of patient's own blood (autologous blood) and is abundant in growth factors necessary for tissue healing.(5)

Recent literature shows beneficial effects of platelets rich plasma in the aforementioned illness. Ragab and Othman followed 25 patients who received platelet rich plasma for chronic plantar fasciitis in a prospective study. Mean follow-up period was 10.3 months and considerable improvement in pain from an average of 9.1 to 1.6 on the visual analogue scale was noted. Moreover, 88% of patients were completely satisfied with the treatment option.(6)

Barrett and coworkers investigated effects of platelet rich plasma in nine patients of plantar fasciitis. For determination of efficacy pain scale was used before and after treatment. Complete remission of symptoms was noted in 6 out of 9 patients only after 2 months. Moreover 77.9% of the study group demonstrated absence of symptoms after only one year of treatment. Reduction in thickness of plantar fascia was also noted after injection of PRP. (7)

Whereas Aksahin and colleagues compared effects of PRP with corticosteroids as a treatment modality for plantar fasciitis. Thirty patients were treated with each of the aforementioned regimes and both the groups showed significant, and similar improvement in symptoms as compared to conservative treatment. Moreover, PRP was found to be safer than corticosteroid injections despite similar effectiveness.(8) Another prospective study revealed that 28 patients (64%) were satisfied with the PRP treatment and would opt for the same again. More importantly, no complications were noted.(9)

Use of platelets rich plasma injection is a new technique of treatment for planter fasciitis & has ever been used in Pakistan till date, so the present study will help in establishing local statistics in our population. Aim of this study is to asses the effectiveness of PRP injection in patients with plantar fasciitis.

MATERIALS AND METHODS

Operational Definitions**:**
1: Plantar fasciitis is defined as pain lasting for more than three weeks at the point of the fascia plantaris origin elicited by direct palpation and having no bony or subtalar joint abnormalities on X-ray. Typically it is a stabbing pain at the bottom of foot near the heel.
2: Platelets Rich Plasma is blood plasma with one of the cellular ingredients of blood called platelets taken from the same patient (autologous blood).
3: Numerical Rating Scale (Pain)- The patients were advised to rate their pain intensity on a 10-point scale before and two weeks after the injection of PRP. A score of zero on NRS indicated no pain at all while scores of 1-3, 4-6 and 7-10 indicated mild, moderate and severe pain, respectively. A score of less than 4 two weeks after PRP injection was considered as satisfactory pain relief(10).

This quasi-experimental study was conducted in the department of Orthopedic and Trauma, Ghurki Trust Teaching Hospital Lahore, from 14th April 2018 to 13th October 2018. Sample size was 161 keeping efficacy 88% of platelet rich plasma for plantar fasciitis, confidence interval being 95% and margin of error 5% under WHO sample size calculation formula. All patients with plantar fasciitis aged between 30-60 years presenting to outpatient department were eligible to be included in the study. Patients with history of local steroid injection, previous surgery of foot, fracture to calcaneus and other associated diseases of lower limb like diabetic neuropathy and ankle joint disorders thinking them as potential confounders that can affect the original results were excluded from the study. Consecutive

non probability sampling technique was used for enrolling the patients into the study.

Study comprised of subjects according to the pre-determined criteria. Patients meeting the pre-fixed criteria were included in the study after obtaining informed consent. Demographic information (age, sex and address) for each patient, was taken and recorded. Fifty-five ml of blood was collected from each patient with a 60 ml syringe containing 5ml of sodium citrate with aseptic technique. The sample was centrifuged with two steps centrifugation 1500 rotation/minutes for 15 minutes and 3500rpm for 10 minutes to obtain approximately 3 mL PRP for that patient.

Initially, 1 mL lidocaine was infiltrated into the overlying skin and subcutaneous tissue of the tender site of the affected heals and 2 minutes was given for local anesthetic effect to occur. Then, peppering technique was used to inject three mL of platelet-rich plasma with a 22-g needle into the plantar fascia. This technique involves usage of a single skin portal and then five penetration of fascia in different directions. After the injection, the patient was advised to keep sitting without moving his foot for at least 15 minutes. Oral opioid analgesics were used for post procedure pain control for 3 days and use of non-steroidal inflammatory drugs was avoided.

Prior to the procedure the patients were asked to grade the pain using NRS. Follow-up was done at the end of two weeks' time and improvement was measured using the same grading system to assess the response to treatment The pre-procedure pain assessment, the injection of PRP and follow-up pain assessment for all cases were performed by the same qualified orthopedic surgeon to minimize bias in the results.

Statistical Analysis: SPSS version 17 was used for data entry and analysis. Descriptive statistics included calculation of mean and standard deviation (SD) for quantitative variables and frequency and percentages for categorical variables. Chi square was applied to look for statistically significant results: keeping p value ≤0.05 as significant. All the results were presented in the form of tables.

RESULTS

This study was conducted on 161 patients, where mean age was 52 ± 7.89 years and mean duration of pain was recorded as 3 ± 0.57 weeks. The rest of descriptive statistics are summarized in table 1. Stratification of efficacy with respect to age, gender and duration of pain are mentioned in table 2. Age ($p = 0.741$), gender ($p = 0.598$) and duration of pain ($p = 0.966$) had no significant effect on the response to PRP therapy.

Table 1: Descriptive Statistics of Categorical Variables

Variables	Subgroups	Frequency	Percentages
Age Groups	30-45 Years	42	26.09%
	46-60 Years	119	73.91%
Gender	Male	104	64.60%
	Female	57	35.40%
Effect on pain NRS <4	Yes	144	89.45%
	No	17	10.55%

Table 2: Stratification of efficacy of PRP in Planter Fasciitis patients with respect to Age groups, Gender and Duration of pain

Variable	Categories	Satisfactory pain relief	Percentages	p value
Age Groups	30-45 Years	Yes	23.00%	0.741
		No	03.10%	
	46-60 Years	Yes	66.45%	
		No	07.45%	
Gender	Male	Yes	31.05%	0.598
		No	04.34%	
	Female	Yes	58.38%	
		No	06.21%	
Pain Duration	≤ 2 Weeks	Yes	41.61%	0.966
		No	4.97%	
	> 2 Weeks	Yes	47.83%	
		No	5.59%	

DISCUSSION

Plantar fasciitis (PF) is a degenerative tissue condition which involves plantar fascia at the site of its origin at the medial tuberosity of the calcaneus and causes heal pain. Basically it is an overuse causing micro-tears at the aforementioned site. Thus it is known to affect sport participants as well as physically active middle-aged individuals; however age, higher Body Mass Index (BMI), excessive weight bearing, and excessive tightness of Achilles tendon are among the common predisposing factors. Histological analysis has revealed that it is a chronic degenerative disease: not an inflammatory disorder. This is evident by infiltration with macrophages, lymphocytes, and plasma cells; alongside the picture of tissue destruction and repair evident on the histology. Normal plantar fascia is replaced by an angiofibroblastic hyperplasic tissue; spreads itself throughout the surrounding tissue creating a self-perpetuating cycle of degeneration.(11) This explains why conventional treatment modalities like anti-inflammatories are not effective. Platelets rich plasma (PRP) is a derivative of patient's own blood (autologous blood) and is abundant in growth factors necessary for tissue healing.(12) Growth factors that are released from α granules of platelets are known to play a central role in the tissue healing and regeneration process. Among these are platelet derived growth factor (PDGF), transforming growth factor β, insulin like growth factor 1(IGF1), vascular endothelial growth factors etc.(13) Therefore PRP can potentially provide beneficial effect in plantar fasciitis.

Previously done research on the subject has shown that the disease is more prevalent in females and those with occupations that necessitates continual standing or walking such as maids, waiters and kitchen workers.(14) But majority of our sample (64.6%) were males that can be due to many factors including that males have more access to the health facilities like outpatient department in our society than females and in

our country males are mostly responsible for earning livelihood for the families and doing various jobs and hence males being more frequently affected as compared to females. Thus, making up the larger proportion of our sample population.

In our study majority of the patients (89.44%) showed good response regarding pain evident by a score of less than 4 two weeks after PRP injection. These results are comparable with that of Omar et al.; who found reduction in mean VAS score from 8.2±1.3 at baseline to 2.6±2.1 at 6 weeks. Their results were also significant for improvement in Foot Health Status Questionnaire (FHSQ). Thus, they documented in favor of both safety and effectivity of autologous PRP in plantar fasciitis.(15)

Inferential statistics of our data also makes it obvious that PRP therapy is effective in both genders irrespective of age and duration of pain. Which is also supported by the findings of the study conducted by Gopinath et al.;in their study the outcome was not effected by age and duration off pain.(16)

Hence it is evident from the project that autologous PRP in form of local injections is a promising form of therapy in case of plantar fasciitis.

Conclusion: In this study we concluded that PRP therapy has favorable effects on pain relief in majority of patients of PF.

Recommendation: As this was a quasi-experimental study with no control arm for comparison, we recommend randomized control trials to document the efficacy of PRP therapy in PF against placebo and other established treatment modalities.

DECLARATIONS: This data is not published or used in any other research study. All authors and reviewers declared that they have no conflict of interest.

Authors Contributions:

Mudir khan: Main idea, data collection, result compilation, research review, introduction, discussion.

Khalid Iqbal: Help in data collection, contributed in research review.

Omer Aziz: Method and material, conclusion.

Muhammad Usama: Research review, introduction, method and material, help in data collection, discussion.

Muhammad Shabir: Technical support in result, discussion.

Imran Ali: Research review, operational definitions.

Conflict of Interests: there is no conflict of interest.

Funding: Self.

Acknowledgments: Dr Raza Ullah for final review and technical support.

REFERENCES:

1. Roxas M. Plantar fasciitis: diagnosis and therapeutic considerations. Alternative medicine review : a journal of clinical therapeutic. 2005;10(2):83-93.
2. Shetty VD, Dhillon M, Hegde C, Jagtap P, Shetty S. A study to compare the efficacy of corticosteroid therapy with platelet-rich plasma therapy in recalcitrant plantar fasciitis: a preliminary report. Foot and ankle surgery : official journal of the European Society of Foot and Ankle Surgeons. 2014;20(1):10-3.
3. Sherpy NA, Hammad MA, Hagrass HA, Samir H, Abu-ElMaaty SE, Mortada MA. Local injection of autologous platelet rich plasma compared to corticosteroid treatment of chronic plantar fasciitis patients: a clinical and ultrasonographic follow-up study. Egyptian rheumatologist. 2016;38(3):247-52.
4. Meaney EJ, Adelman EW. Corticosteroid vs Platelet Rich Plasma Injections in the Treatment of Chronic Plantar Fasciitis.
5. Mahindra P, Yamin M, Selhi HS, Singla S, Soni A. Chronic plantar fasciitis: effect of platelet-rich plasma, corticosteroid, and placebo. Orthopedics. 2016;39(2):e285-e9.
6. Ragab EMS, Othman AMA. Platelets rich plasma for treatment of chronic plantar fasciitis. Archives of orthopaedic and trauma surgery. 2012;132(8):1065-70.
7. Babak Baravarian D, Chandler LM. Point-Counterpoint: Is PRP Beneficial For Chronic Plantar Fasciitis?
8. Akşahin E, Doğruyol D, Yüksel HY, Hapa O, Doğan Ö, Çelebi L, et al. The

comparison of the effect of corticosteroids and platelet-rich plasma (PRP) for the treatment of plantar fasciitis. Archives of orthopaedic and trauma surgery. 2012;132(6):781-5.
9. Kumar V, Millar T, Murphy PN, Clough T. The treatment of intractable plantar fasciitis with platelet-rich plasma injection. The Foot. 2013;23(2-3):74-7.
10. Downie W, Leatham P, Rhind V, Wright V, Branco J, Anderson J. Studies with pain rating scales. Annals of the rheumatic diseases. 1978;37(4):378-81.
11. Lemont H, Ammirati KM, Usen N. Plantar fasciitis: a degenerative process (fasciosis) without inflammation. Journal of the American Podiatric Medical Association. 2003;93(3):234-7.
12. Schmitz JP, Hollinger JO. The biology of platelet-rich plasma. Journal of oral and maxillofacial surgery: official journal of the American Association of Oral and Maxillofacial Surgeons. 2001;59(9):1119-21.
13. Rano JA, Fallat LM, Savoy-Moore RT. Correlation of heel pain with body mass index and other characteristics of heel pain. The Journal of foot and ankle surgery. 2001;40(6):351-6.
14. Lapidus PW, Guidotti FP. 15 Painful Heel: Report of 323 Patients With 364 Painful Heels. Clinical Orthopaedics and Related Research (1976-2007). 1965;39:178-86.
15. Omar AS, Ibrahim ME, Ahmed AS, Said M. Local injection of autologous platelet rich plasma and corticosteroid in treatment of lateral epicondylitis and plantar fasciitis: Randomized clinical trial. The Egyptian Rheumatologist. 2012;34(2):43-9.
16. Gopinath S, Gudi N, Das S. A study of outcome of autolougous platelet rich plasma injection in patients with chronic plantar fasciitis. Int J Orthop. 2018;4(1):940-3.