ORIGINAL ARTICLE

# Determination of the effectiveness of platelets rich plasma injection in treatment of plantar fasciitis

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**Abstract**

**Introduction:** Plantar fasciitis is one of the commonest, and most frustrating, foot ailments seen in a regular Orthopedic clinic. Plantar fascia is a connective tissue on the posterior surface of the foot which connects heel bone to toes. It helps in maintaining the medial 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 calcaneous and causes heal pain. Plantar fasciitis affects sport participants as well as physically inactive middle-aged individuals; however, age, obesity, excessive weight bearing, and tight Achilles tendon are the common predisposing factors. The peak incidence occurs 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 toes deteriorates the pain as this action causes pulling of the plantar fascia.

**Objective:** To determine the effectiveness of platelets rich plasma injection in treatment of plantar fasciitis.

**Setting:** Department of Orthopedic and Trauma, Khyber Teaching Hospital, Peshawar & District Headquarter Hospital (DHQ), KDA, Kohat.

**Study design:** Descriptive case series.

**Duration of study:** 14 April, 2018 to 14 October, 2018.

**Material and Methods:** All patients with planter fasciitis, who presented to outpatient department at Orthopedic and Trauma units were included in the study based upon the selection criteria. An informed consent was taken. For each patient, demographic information (age, sex and address) was recorded. For each patient 55 milliliters whole blood was collected from the un-involved arm into a 60 ml syringe that contained 5 ml sodium citrate. The blood was centrifuged to obtain approximately 3 ml platelet concentrate for each patient and injected in the foot affected with plantar fasciitis. Prior to the procedure the patients was assessed using numerical rating scale (NRS) for grading of plantar fasciitis pain.

**Results:** As per efficacy of platelet rich plasma (PRP), on 144 (89.44%) patients it was effective whereas on 17 (10.55%) patients platelet rich plasma was not proved effective.

**Conclusion:** In this study we concluded that PRP therapy might provide an effective alternative to conservative management of PF with no obvious side effect or complication. The onset of action after PRP injection also greatly depended on the degree of degeneration.

**Keywords:** Planter fasciitis, platelet rich plasma (PRP), local infiltration, bupivacaine

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**Introduction**:

Plantar fasciitis is one of the commonest, and most frustrating, foot ailments seen in a regular orthopedic clinic.[1] Plantar fascia is a connective tissue on the bottom of the foot which connects heel bone to toes. It helps in maintaining the medial 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 calcaneous and causes heal pain. Biomechanical dys-

function of the foot is the most common etiology of plantar fasciitis.[8-10] Plantar fasciitis affects sports participants as well as physically inactive middle-aged individuals; however, age, obesity, excessive weight bearing, and tight Achilles tendon are the common predisposing factors. The peak incidence occurs 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 toes deteriorates the pain as this action causes pulling of the plantar fascia.[2,11,12]

Plantar fasciitis is typically a self-limited condition, and studies have reported a resolution incidence of up to 90% with non- surgical measures.[16-20]

Various treatment options are available for planter fasciitis, including non-steroidal anti-inflammatory drugs, corticosteroid injections, foot orthosis, night splints, extracorporeal shock wave therapy and physiotherapy. The use of platelets rich plasma in the treatment of plantar fasciitis is a recent concept. Platelets rich plasma (PRP) is derived from autologous blood and contains high concentration of growth factors necessary for tissue healing.[3]

Use of platelets rich plasma injection is a new way of treatment for planter fasciitis, so the present study will help in establishing local statistics in our population. Moreover different authors have reported different results internationally on this treatment modality for planter fasciitis, so, we will be able to obtain our own statistics for this treatment option. This will helps us in reducing the cost of treatment. The results of this study will be disseminated to other health professionals and suggestions will be given for rational use of platelets rich plasma injection for planter fasciitis.

**Material and Methods**:

Setting: Department of Orthopedic and Trauma, Khyber Teaching Hospital, Peshawar & DHQ hospital KDA, Kohat.

Study design: Descriptive case series.

Duration of study: From 24 April, 2018 to 24 October, 2018.

Sample size: Sample size was 161 keeping efficacy of 88% of platelet rich plasma for plantar fasciitis on the basis of previous study, confidence interval being 95% and margin of error5% under WHO sample size calculation formula.

Sampling technique: consecutive non probability sampling

Our inclusion criteria both genders having planter fasciitis on clinical examination. Age 30 to 60 because it is the common age for this disease.

Our exclusion criteria, history of local steroid injection, history of previous surgery of foot, history of previous fracture to calcaneus or as shown by x-ray foot were excluded other associated diseases of lower limb like diabetic, neuropathy, and ankle joint disorders as diagnosed clinically or shown by x-ray foot are also excluded.

The above mention conditions if included would have introduced bias in the study results.

Data collection procedure: After approval from institutional ethical committee. Patients with planter fasciitis, who presented to outpatient department at orthopedic and trauma units were included in the study based upon the above mention selection criteria. An informed consent was taken for assigning them to this particular procedure and using their data for research. For each patient, demographic information (age, sex and address) was taken and recorded. For each patient 55 milliliters whole blood was collected from the uninvolved arm into a 60 ml syringe that contained 5 ml sodium citrate. The blood was centrifuged to obtain approximately 3 mL platelet concentrate for each patient. Initially, 1 ml bupivacaine was infiltrated into the overlying skin and subcutaneous tissue of the tender site

Table 1: *Descriptive statistics (n=161)*

| **Mean and SD for Age** | **52 Years + 7.89** |
|---|---|
| Mean and SD for duration of pain | 3 Weeks + 0.57 |

Table 2: *Frequencies and percentages for age (n=161)*

| **Age** | **Frequencies** | **Percentages** |
|---|---|---|
| 30-45 Years | 42 | 26.08% |
| 46-60 Years | 119 | 73.91% |

Table 3: *Frequencies and percentages for gender (n=161)*

| **Gender** | **Frequencies** | **Percentages** |
|---|---|---|
| Male | 104 | 64% |
| Female | 57 | 35.40% |

Table 4: *Frequencies and percentages for efficay of platelet rich plasma (n=161)*

| **Efficacy** | **Frequencies** | **Percentages** |
|---|---|---|
| Yes | 144 | 89.44% |
| No | 17 | 10.55% |

Table 5: *Stratification of efficacy with respect to age (n=161)*

| **Age** | **Efficacy** | **Frequencies** | **Percentages** | **P Value** |
|---|---|---|---|---|
| 30-45 Years | Yes | 37 | 22.98% | 0.741 |
| | No | 05 | 03.10% | |
| 46-60 Years | Yes | 107 | 66.45% | |
| | No | 12 | 07.45% | |

Table 6: *Stratification of efficacy with respect to gender (n=161)*

| **Gender** | **Efficacy** | **Frequencies** | **Percentages** | **P Value** |
|---|---|---|---|---|
| Male | Yes | 50 | 31.05% | 0.598 |
| | No | 07 | 04.34% | |
| Female | Yes | 94 | 58.38% | |
| | No | 10 | 06.21% | |

Table 7: *Stratification of efficacy with respect to duration of pain (n=161)*

| **Pain Duration** | **Efficacy** | **Frequencies** | **Percentages** | **P Value** |
|---|---|---|---|---|
| ≤ 2 Weeks | Yes | 67 | 41.61% | 0.966 |
| | No | 08 | 4.96% | |
| > 2 Weeks | Yes | 77 | 47.82% | |
| | No | 09 | 5.59% | |

of the affected heals as a local field block. Then, approximately 3 ml of platelet concentrate was injected using a 22-g needle into the plantar fasciitis using a peppering technique. This technique involved a single skin portal and then 5 penetrations of the fascia. Immediately after the injection, the patient was kept in sitting position without moving the foot for 15 minutes. Oral opioid analgesics was used for post procedure pain control and use of non-steroidal inflammatory drugs was prohibited. Prior to the procedure the patients was assessed using numerical rating scale (NRS) for grading of plantar fasciitis pain. Follow-up was done at the end of 2-weeks' time and improvement was measured using the same grading system to confirm the effectiveness of the procedure Confounders and bias were controlled by strictly following selection criteria.

The collected data was entered and analyzed using SPSS version 17. Mean±SD was calculated for quantitative variables like age and duration of pain in the foot. Frequency and percentages were also calculated for different variables like gender and efficacy. Efficacy was stratified among age, gender and duration of foot pain to see effect of these on outcome. Chi square test was applied keeping p value<0.05 as significant. All the results were presented in the form of tables, graphs and charts.

**Results:**

This study was conducted on 161 patients presented at the Department of Orthopedic Surgery, KTH, Peshawar and DHQ hospital Kohat.

Mean and SD for Age was recorded as 52 Years+ 7.89 where as Mean and SD for duration of pain was recorded as 3 weeks + 0.57(table-1). 42 (26.08%) patients were recorded in 30-45 years age group whereas 119 (73.91%) were recorded in 46-60 years age group (table-2). In the same manner, 104 (64%) patients were recorded as male patients whereas 57 (35.40%) patients were recorded as female patients (table-3). As per efficacy of platelet rich plasma, on 144 (89.44%) patients it was effective where as on 17 (10.55%) patients platelet rich plasma was not proved effective (table-4). Stratification of efficacy with respect to age, gender and duration of pain are recorded (table 5, 6 and 7 respectively)

**Discussion:**

Plantar fasciitis is one of the commonest, and most frustrating, foot ailments seen in a regular orthopedic clinic.[1] Plantar fascia is a connective tissue on the bottom of the foot which connects

heel bone to toes. It helps in maintaining the medial 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 calcaneous and causes heal pain. The pathology is traditionally believed to be secondary to the development of micro-trauma (microtears), with resulting damage at the calcaneal-fascial interface secondary to repetitive stressing of the arch with weight bearing.[13-15] Plantar fasciitis affects sport participants as well as physically inactive middle-aged individuals; however, age, obesity, excessive weight bearing, and tight Achilles tendon are the common predisposing factors. The peak incidence occurs 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 toes deteriorates the pain as this action causes pulling of the plantar fascia.[2,11,12]

Various treatment options are available for planter fasciitis, including non-steroidal anti-inflammatory drugs, corticosteroid injections, foot orthosis, night splints, extracorporeal shock wave therapy and physiotherapy. The use of platelets rich plasma in the treatment of plantar fasciitis is a recent concept. Platelets rich plasma (PRP) is derived from autologous blood and contains high concentration of growth factors necessary for tissue healing.[3]

Recent literature shows beneficial effects of platelets rich plasma for plantar fasciitis. Ragab and Othman looked at 25 patients who received platelet rich plasma for chronic plantar fasciitis which as compared to our study where as per efficacy of platelet rich plasma, on 144 (89.44%) patients it was effective where as on 17 (10.55%) patients platelet rich plasma was not proved effective (table-4). In their prospective study, they had a mean follow-up of 10.3 months with patients' pain decreasing from an average of 9.1 to 1.6 on the visual analogue scale post-platelet rich plasma injection. They reported that 88 percent of patients were completely satisfied 4 which as compared to my study where as per efficacy of platelet rich plasma, on 144 (89.44%) patients it was effective where as on 17 (10.55%) patients platelet rich plasma was not proved effective (table 4).

Barrett and Erredge investigated the use of platelet rich plasma for plantar fasciitis in nine patients. They used pain scale before and after treatment for determining the efficacy. They found that 6 of the 9- patients achieved complete resolution of symptoms after two months. They noted that 77.9 percent of their patients had no symptoms after one year of treatment which as compared to my study where as per efficacy of platelet rich plasma, on 144 (89.44%) patients it was effective whereas on 17 (10.55%) patients platelet rich plasma was not proved effective (table 4). They also concluded that the thickness of the plantar fascia post-injection showed reduced thickness.[5] Aksahin and colleagues compared 30 patients treated with platelets rich plasma and 30-patients treated with corticosteroid injection. Over a 6-month period, they found both groups of patients to have significant improvement in symptoms & the results were similar for both the groups. They found platelets rich plasma to be safer than corticosteroid injection with the same effectiveness.[6] Similarly in another study prospective data were collected of 50 heels (44 patients). After 6-months, 28-patients (64%) were very satisfied and would have the injection again. No complications were reported[7] which as compared to our study where as per efficacy of platelet rich plasma, on 144 (89.44%) patients it was effective whereas on 17 (10.55%) patients platelet rich plasma was not proved effective (table-4).

Use of platelets rich plasma injection is a new way of treatment for planter fasciitis & is rarely been used in Pakistan till date, so the present study will help in establishing local statistics in our population.

**Conclusion:**

In this study we concluded that platelet rich plasma therapy might provide an effective alternative to conservative management of plantar fasciitis with no obvious side effect or complication. The onset of action after platelet rich plasma injection also greatly depended on the degree of degeneration.

**Conflict of interest**: None

**Funding source**: None

**Role and contribution of authors**:

Dr Khabeer Ahmad Khattak, collected the data, references and did the initial writeup

Dr Basit Hussain, collected the data and helped in introduction writing.

Dr Muhammad Imran Javed, collected the data and helped in discussion writing.

Dr Javedullah Khan, collected the data, referenes and helped in disucccsion wriring.

Dr Nadeem ur Rehman, collected the data and helpd in interpretation of data and helped in result writing.

Dr Imtiaz Ahmad, critically review the article and made final changes.

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