INTRODUCTION

Platelet rich plasma (PRP) has been a breakthrough in the field of medicine especially in the field of orthopaedics for enhancing bone and soft tissue healing. Plantar Fasciitis is a very common problem in the field of orthopaedics and are very difficult to treat and a challenge to orthopaedicians. Autologous PRP is a simple and cost effective means of treating plantar fasciitis by tissue regeneration.\(^1\)

Plantar fascitis is one of the most common causes of heel pain in adults. The cause of pain is due to collagen degeneration at the origin of plantar fascia. The plantar fascia is thickened fibrous fascia that originates from the medial tubercle of calcaneum and run forward to support the longitudinal foot arch.

The aim of our study was to find out the efficacy of autologous PRP in relieving pain in patients with plantar fasciitis.

METHODS

This is a prospective trial involving the patients in the department of orthopedics, PSGIMSR Coimbatore, Tamil Nadu, India from Jan 2015 to Jan 2016.

In this study, 25 patients with plantar fasciitis (age above 18 years) were selected. The pain intensity was assessed
with visual analogue score initially and during follow up. All subjects were given single autologous intraleisonal PRP injection and the results were assessed using difference in VAS.

**Selection of patients**

Patients with history of pain and localized tenderness on the medial calcaneal tubercle. The classic sign is pain that occurs with few steps in the morning or at the start of walking which decreases as they warm up.

**Inclusion criteria**

Patients clinically diagnosed to have plantar fasciitis, patients not responding to conservative treatment even after a minimum period of 3 months, both males and females of age 18 years and above.

**Exclusion criteria**

Less than 3 month duration of plantar fasciitis, patients without any trial of conservative treatment, recent local steroid injection (less than 2 months), infection or ulcer at the injection site, rheumatoid arthritis, seronegative spondyloarthritis, pregnant ladies, patients younger than 18 years, suspicion of diagnosis.

**Methodology**

**Method of preparation of PRP**

PRP was prepared using double spin centrifugation method.

10 ml of venous blood is drawn from cubital vein. The blood is transferred into 2.7 ml vaccutainer prefilled with acid citrate dextrose. Acid citrate dextrose will bind to calcium and prevents blood clotting with no known interference to platelet function and no contraindications for using in human beings. The blood is then transferred in the vaccutainer till the marking and centrifugation was done. Initially, with 1500 RPM for 3 minutes. After the initial rotations, blood was separated into plasma and RBC. The plasma will lie in the top with light yellow colour and was withdrawn and transferred into another container without mixing RBC. Later this container is again centrifuged with 2500 rpm FOR 3 MINUTES. After the 2nd centrifugation, the plasma is separated into 2 layers. The top half is platelet poor plasma and bottom half will be platelet rich plasma. The top half is discarded and bottom half is used for infiltration.

**Technique of infiltration**

Using a 21 Gauge, 1 and 1/2 inch needle, 1 ml PRP is injected initially over the maximum tenderness point, and another 1 ml, was injected into the surrounding tissue with the same entry portal. This technique is known as peppering technique.

**Pain scoring system**

Visual analogue pain scoring system was used (Figure 2).

![Figure 2: Visual analogue scoring system for assessment of pain.](image)

**RESULTS**

Patients were analyzed for pain relief subjectively at 0, 1, 2, 4 and 6 months. The results are given below.

**Mean pain score**

The mean pain score of patients with plantar fasciitis at 0, 1, 2, 4, 6 months were 8.08, 4.32, 2.60, 1.88 & 2.00 respectively. While comparing the results at 0, 1, 2, 4, 6 months follow up, it was found that patients started getting pain relief at one month post injection, which was statistically significant (p value <0.05). However the maximum pain relief was seen at 4th month post injection which was also statistically significant (p value <0.05).
Table 1: Showing mean pain scores at 0, 1, 2, 4 and 6 months intervals.

<table>
<thead>
<tr>
<th>Patients receiving</th>
<th>Mean pain score at the time of injection</th>
<th>Mean pain score after 1 month</th>
<th>Mean pain score after 2 months</th>
<th>Mean pain score after 4 months</th>
<th>Mean pain score after 6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRP</td>
<td></td>
<td>1 month</td>
<td>2 months</td>
<td>4 months</td>
<td>6 months</td>
</tr>
<tr>
<td>Plantar Fasciitis</td>
<td></td>
<td>8.08</td>
<td>4.32</td>
<td>2.6</td>
<td>1.88</td>
</tr>
</tbody>
</table>

Table 2: Showing Mean, T-Test and P-values at 0, 1, 2, 4 and 6 months intervals.

<table>
<thead>
<tr>
<th>Pairs</th>
<th>Time interval</th>
<th>Mean</th>
<th>T-Test</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1</td>
<td>Pain at presentation &amp; 1 month</td>
<td>4.32 ± 0.802</td>
<td>16.660; CI (3.29-4.22)</td>
<td>&lt;0.00</td>
</tr>
<tr>
<td>Pair 2</td>
<td>Pain at presentation &amp; 2 month</td>
<td>2.60 ± 0.645</td>
<td>33.309; CI (5.1-5.8)</td>
<td>&lt;0.00</td>
</tr>
<tr>
<td>Pair 3</td>
<td>Pain at presentation &amp; 4 month</td>
<td>1.88 ± 0.881</td>
<td>26.847; CI (5.72-6.67)</td>
<td>&lt;0.00</td>
</tr>
<tr>
<td>Pair 4</td>
<td>Pain at presentation &amp; 6 month</td>
<td>2.00 ± 0.957</td>
<td>24.877; CI (5.57-6.58)</td>
<td>&lt;0.00</td>
</tr>
</tbody>
</table>

Statistical analysis

Statistical analyses were performed by SPSS for windows 19.0 software system version. Comparing the results at 0, 1, 2, 4, 6 months. P value for the test was taken as 0.05. Our study shows that the pain relief obtained following autologous PRP injection is statistically significant.

DISCUSSION

Platelet rich plasma (PRP) is also known as platelet rich concentrate, autologous platelet gel or platelet releasate. Platelet rich plasma is a portion of the plasma fraction of autologous blood with a concentration of platelets above the base line values. In addition to platelet concentrate, autologous PRP contains complement of clotting factors and secretary proteins. Normal platelet counts ranges between 150000/µL and 350000/µL, and average about 200000/µL in blood. “PRP was introduced by M. Ferrari in 1987 as an autologous component in an open heart surgery to avoid homologous blood product transfusion”. Platelets contain biologically active substance for blood clotting, such as coagulation factors, adhesives proteins and protease inhibitors. Platelets contain growth factors like TGF –beta 1, CGF, VEGF, and PDGF. When activated these growth factors initiates the process of tissue healing by cellular proliferation and differentiation, chemo taxis, tissue debris removal, angiogenesis, and extra cellular matrix formation. These properties of autologous PRP are used in the treatment of plantar fasciitis. An added advantage of autologous PRP is that it eliminates concerns about immunogenic reactions and disease transmission. Our study was a prospective study including 25 patients with plantar fasciitis (age above 18 years). The pain intensity was assessed with visual analogue score initially and during follow up. PRP was prepared by double spin centrifugation method and the platelet count in our samples ranged between three to six lakhs per cc. All subjects were given single intra-lesional PRP injection and the results were assessed using difference in VAS. In our study we did not use local anaesthetic agent which could bias our study by producing pain relief.

The results of our study matched with the results of the study by Ehab Mohamed Selem Ragab et al on 25 patients with plantar fasciitis, they concluded that average pain at the time of presentation was 9.1 and post autologous PRP injection was 1.6 at end of follow up (10.3 months). Which was statistically significant (P <0.001).

In a comparative study by Ertugrul Aksahin et al they concluded that both PRP and corticosteroid treatment is equally effective in treating plantar fasciitis.

The mean pain score at presentation was 8.08. The mean pain scores at subsequent intervals of 1,2,4,6 months after injection were 4.32, 2.60, 1.88 and 2.00 respectively. (P <0.05 which is statistically significant). The maximum pain relief was seen at 4th month post PRP injection and the pain relief was sustained till the last follow up.

The limitations of our study were that our study is not a randomized control double-blinded study, and the sample size was small and follow up was of shorter duration. The available data is insufficient to validate the efficacy of PRP in relieving pain in patients with Plantar Fasciitis. Further randomized control studies with large study population and the longer duration of follow up are needed to validate the efficacy of autologous PRP in the management of plantar fasciitis.

CONCLUSION

From our study we have found that intralesional autologous PRP is effective in relieving pain in patients with plantar fasciitis. PRP is biological and can be a safe adjuvant in the treatment of Plantar Fasciitis.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee
REFERENCES
