

## The Efficacy of Autologous Platelet Rich Plasma in Lateral Epicondylitis (Tennis Elbow)

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### Abstract:

**Background:** Lateral epicondylitis is the commonest chronic disabling painful condition affecting 1% to 3% of the population predominantly those between 35 and 55 years of age. Elbow pain with tenderness and restricted wrist extension are its common manifestations. Although a few conservative methods of treatment are available, recent studies have suggested platelet rich plasma (PRP) to be a safe and effective therapy in relieving pain and improving function for tennis elbow.

**Aim:** To study the efficacy of autologous platelet rich plasma in tennis elbow.

**Methods:** A prospective observational study was conducted in our hospital. 50 patients with chronic lateral epicondylitis aged above 18 years were included in the study. All the patients had a minimum of three months of symptoms, were selected based on the inclusion and exclusion criteria and underwent same method of treatment. All patients had a baseline assessment of numerical pain score and was repeated at 2 weeks, 4 weeks, 8 weeks, 3 months and 6 months post treatment. The platelet rich plasma (PRP) was prepared from venous whole blood. All patients had single dose injection of autologous platelet rich plasma in their extensor tendons at elbow through a peppering needling technique.

**Results:** The Patients were more often successfully treated. When baseline numerical pain scores were compared with the scores at 8 weeks, 12 weeks and 24 weeks follow up, they showed improvement across time. There were no complications observed related to the use of PRP.

**Conclusion:** Autologous PRP injection is a safe and useful modality of treatment in the treatment of tennis elbow. Maximum benefit after PRP injection was observed at 2 months and had sustained for at least 6 months.

**Keywords:** Lateral Epicondylitis; Platelet Rich Plasma (PRP); Pain; Disability

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### Introduction

Lateral epicondylitis is an inflammatory condition that occurs at the origin of the common extensor tendon of forearm over the lateral epicondyle. It is the commonest chronic disabling painful condition of the elbow. It causes symptoms in 1% to 3% of the general population. It is common in people whose occupation requires frequent rotary motion of the forearm like carpenter, gardener, computer workers and knitting workers. The age of onset of lateral epicondylitis is between 35 and 50 years with equal male to female sex ratio. The dominant upper limb is most affected [1,2,3]. The actual cause of lateral epicondylitis is not clearly understood. Now it is considered that degenerative process occurs at the common extensor ten-

don origin of the wrist and fingers due to overuse and abnormal microvascular responses [4,5,6]. Nirschl observed that the basic pathology was in the origin of the extensor carpi radialis brevis (ECRB) tendon. But sometimes the anteromedial edge of extensor digitorum communis (EDC) and the deep surface of extensor carpi radialis longus (ECRL) may also be involved. Various modalities of treatment have been recommended for lateral epicondylitis like rest, activity modification, nonsteroidal anti-inflammatory drugs, counterforce braces, massage, physiotherapy, laser treatment, extracorporeal shockwave treatment, acupuncture, ultrasound treatment and botulinum toxin type A injection. Previously Injection of corti-

steroids was thought to be the gold standard treatment in lateral epicondylitis.

The autologous blood injection and different types of open and arthroscopic operative treatment are also advised for lateral epicondylitis [7,8,9,10,11]. At present, platelet rich plasma (PRP) is considered as an ideal biological autologous blood derived component. It can be injected to different tissues where, platelet is activated and it releases high levels of transforming growth factors-beta (TGF- $\beta$ ), platelet derived growth factors (PDGF), fibroblast growth factors (FGF), vascular endothelial growth factors (VEGF) and cytokines at the injected site.

These growth factors released from platelet rich plasma promote healing of wound, tendons, and bone at cellular level [12]. In addition, platelet rich plasma has high antimicrobial potency, and this property may prevent infections [13]. These details make us to conduct this study.

#### Aims and Objectives

To compare pre and post infiltration pain by numerical pain score.

#### Materials and Methods

The study was conducted at the department of orthopaedics at KIMSH Bangalore including 50 patients from October 2019 to may 2021. All patients included in the study were assessed clinically and confirmed radiologically to avoid any other pathologies.

Plain radiograph of Elbow in AP and LATERAL view of affected site was obtained. After diagnosis, the patients are selected for the study depending on inclusion and exclusion criteria. Patients are assessed based on the numerical pain scoring system. Regular OPD follow up will be done on 2weeks, 4 weeks, 8 weeks, 12 weeks and 24 weeks.

#### Inclusion Criteria

- Patients should have minimum three months duration of symptoms.
- Patients should have undergone conservative treatment for a minimum period of three months.
- Patients should have pain score greater than seven at the time of PRP injection.
- Patients should not have a local steroid injection in last 2 months.
- Age- 18 years and above

#### Exclusion Criteria

- Pain score less than seven
- Recent local steroid injection. Infection or ulcer at the injection site
- Rheumatoid arthritis
- Seronegative spondyloarthritis
- Pregnant ladies
- Patients younger than 18 years

#### Results

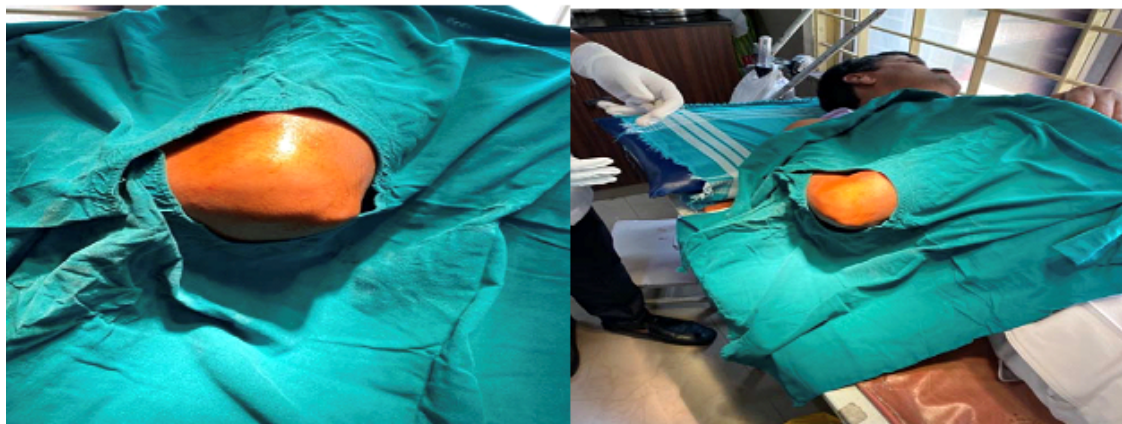


Figure 1: Clinical image of the patients elbow after preparation



Figure 2: Platelet rich plasma



Figure 3: PRP mixture being injected into the point of maximal tenderness.

In the study, out of fifty patients, 25 patients were female and 25 patients were males. 27 were right sided lateral epicondylitis and 23 were left sided lateral epicondylitis. In our study of 50 cases, maximum number of patients had symptoms for less than 6 months and only 2 patients for more than 1 year.

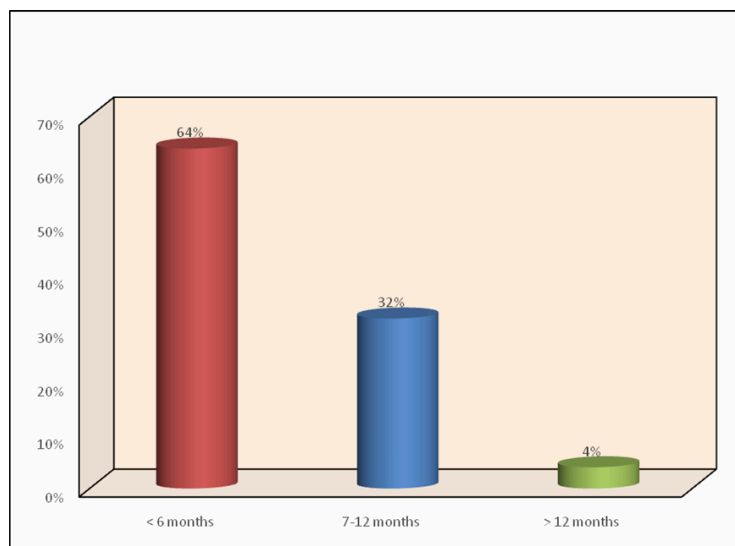


Figure 4: Duration of pain

The mean pain score at 3rd and 6th month was found to be significantly equal but pain score at 2 weeks, 4 weeks and 8 weeks was not significantly equal. When comparing the significance of pain reduction, it was found that there was significant pain reduction till two months and further the reduction was not significant.

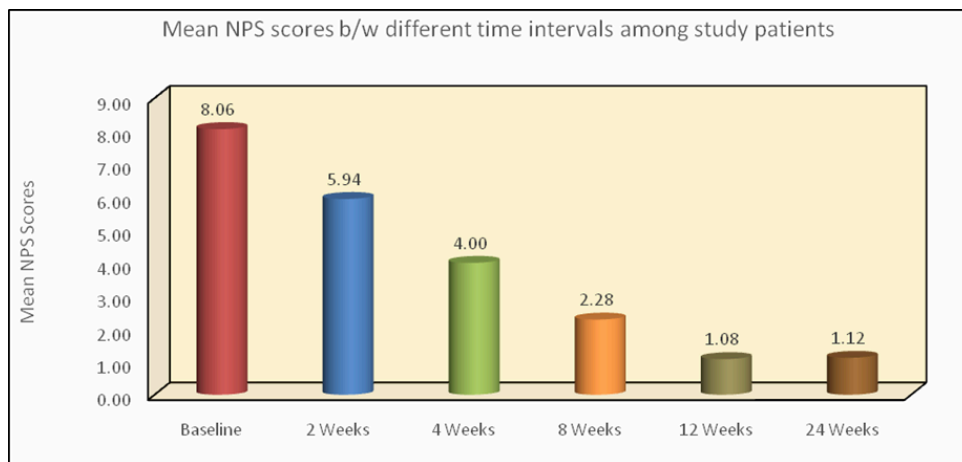


Figure 5: Mean NPS scores between different time intervals among patients

It was found that pain scores in males were significantly lower at every follow up compared to the females.

**Percentage Reduction of Pain**

Patients were analysed 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. It was observed that the pain was decreased by 50.16% at the end of 1 month, 71.58% by 2 months and 89.60% on average at the end of 6 months.

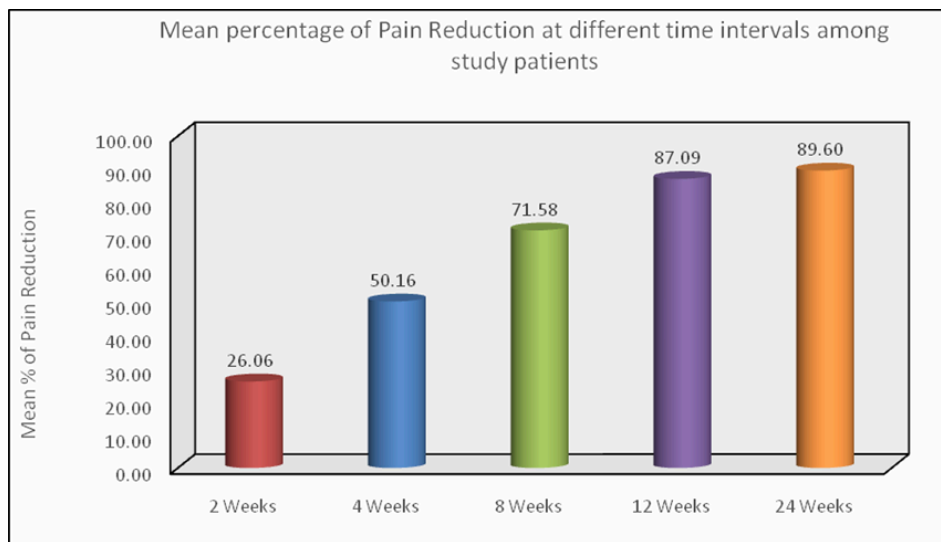


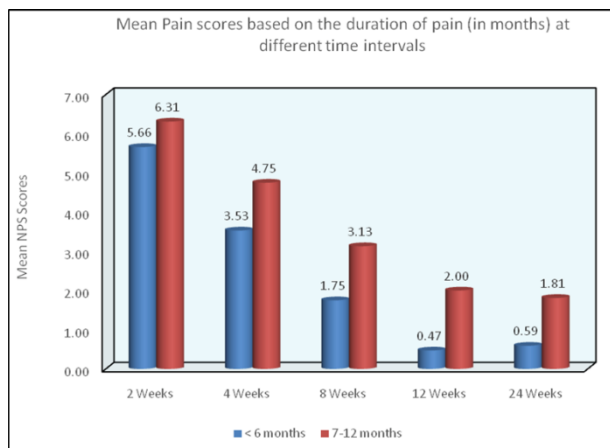
Figure 6: Percentage in reduction of pain

**Duration of Symptoms and Pain Relief**

Analysis was done based on the duration of symptoms. 32 out of the 50 patients had pain for less than 6 months, 16 out of 50 patients between 6-12 months and 2 out of 50 had symptoms of greater than one year. In our study it was found that mean pain score

at the end of 6 months for patients with symptoms less than 6 months was 0.59. while the mean pain score of patients with symptoms from 6-12 months was 1.81. This indicates that duration of symptoms had significant correlation with the clinical outcome after injection.





**Figure 7: Mean pain score at different time intervals**

## Discussion

Lateral epicondylitis is a common inflammatory condition at the origin of the extensor tendon of forearm muscles over the lateral epicondyle. It is the commonest chronic disabling painful condition of the elbow. It causes symptoms in 1% to 3% of the general population.

The autologous blood injection and different types of open and arthroscopic operative treatment are also advised for lateral epicondylitis[7,8,9,10,11]. At present, platelet rich plasma (PRP) is considered as an ideal biological autologous blood derived component.

Platelet rich plasma has been utilised and studied since 1970. It can be injected indifferent tissues where, platelet is activated and it releases high concentrations of transforming growth factor-beta (TGF- $\beta$ ), platelet derived growth factors (PDGF), fibroblast growth factors (FGF), vascular endothelial growth factors (VEGF) and cytokines at the injected site. These growth factors play significant roles in cell proliferation, chemotaxis, cell differentiation and angiogenesis. Bioactive factors like serotonin, histamine, dopamine, calcium, and adenosine are also stored in the dense granules in platelets. These non-growth factors play important role on the biological aspects of wound healing. In addition, platelet rich plasma has high antimicrobial potency and this property may prevent infections. The main outcome parameters considered were pain and functional activities of elbow. Currently long term follow up data's regarding the effectiveness of platelet rich plasma are lacking. This study shows six months follow up results using the same outcome parameters. In a study by Gosen et al march 2011, compared the effectiveness of auto logous platelet rich plasma injection to steroid injection therapy in lateral epicondylitis, it isproved that platelet rich plasma injection is safe and easy. Concerning functional impairment, the cortico-

steroid group showed better results during the initial period and then declined to baseline level. Whereas in platelet rich plasma group symptoms improved progressively. There was a significant difference in decrease of pain and functional impairment after platelet rich plasma application even after one year.

This was a prospective trial by study design conducted on 50 patients with Tennis elbow. Our patients were selected based on the inclusion and exclusion criteria described. Patients having chronic inflammatory conditions like rheumatoid arthritis are excluded from the study. Assessment of progression was done based on numerical pain scoring system.

Following are some studies conducted on tennis elbow patients.

1. Christos Thanases et al by comparing PRP to whole blood for tennis elbow (54).
2. Samuel A Taylor et al on 100 tennis elbow patients compared between PRP and steroid injection [15].
3. Keith s Hetchman et al on 31 elbows which was not responded for conservative treatment by single PRP injection [16].

In this study the numerical pain score among platelet rich plasma group has declined from pre injection score of 8.06 to 5.94 at 2 weeks, 4.00 at 4 weeks, 2.28 at 8 weeks, 1.08 at 12 weeks, 1.12 at 24 weeks which is almost similar to the study by Christos Thanasas et al in tennis elbow where the mean injection score was reduced from 6.1 to 2.35 at the end of 6 weeks, at 3 months 1.9 and 6 months 1.7. In this study the NPS score among males and females were found to be 8.12 and 8.0 at base line while it was 5.56 and 6.32 at 2nd week, 3.72 and 4.28 at 4 weeks, 2.08 and 2.48 at 8th week, 0.92 and 1.24 at 12th week and 1.12 at 24th week respectively. While comparing the results at 2 weeks, 1, 2, 4 and 6 months follow up, it was

found that patients got relief at one month. However, the maximum relief of symptoms was at two months. The results obtained at two months sustained till the end of the study except in one patient. One patient had recurrence of symptoms at six months. No patients had repeat injections. The above results were comparable with Ertugrul Aksahin et al and Christos Thanases et al study [14]. The study of Christos Thanases et al in tennis elbow the mean injection score was reduced from 6.1 to 2.35 at the end of 6 weeks, at 3 months 1.9 and 6 months 1.7.

The difference between 1, 2, 4 and 6-months pain reduction were tested for significance by Friedman's test and found that there was no significant difference in pain reduction between 2 months and 3 months, 2 months and 6 months, 3 months and 6 months scores. But there was significant difference in pain score in 1 and 2 months. Duration of symptoms suggests the chronic nature of disease. In this study Analysis was done based on the duration of symptoms. 32 out of the 50 patients had pain for less than 6 months, 16 out of 50 patients between 6-12 months and 2 out of 50 had symptoms of greater than one year. In our study it was found that mean pain score at the end of 6 months for patients with symptoms less than 6 months was 0.59 while the mean pain score of patients with symptoms from 6-12 months was 1.81. This indicates that duration of symptoms had significant correlation with the clinical outcome after injection.

### Conclusion

Autologous PRP injection is a safe and useful modality in the treatment of chronic tennis elbow. Maximum benefit after PRP injection was observed at 2 months and sustained for at least 6 months. More trials are required to optimize the technique for separating platelet rich plasma. These improvements were maintained over in our follow up period without any significant complications. Long term follow up with more number of patients is needed to evaluate lasting benefits of pain relief and functional improvement in lateral epicondylitis.

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