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Original Research Article

# COMPARATIVE STUDY OF EFFECTIVENESS OF LOCAL PLATELET RICH PLASMA VS LOCAL CORTICOSTEROID IN PATIENT WITH "LATERAL EPICONDYLITIS'' A RANDOMIZED PROSPECTIVE STUDY

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## ABSTRACT

**Background:** Aim of this study is to compare the clinical efficiency of PRP with that of corticosteroids for treatment of patient with lateral epicondylitis. Lateral epicondylitis is an inflammatory disorder of the lateral epicondyle at the point where the common extensor tendon of the forearm originates. It is the most prevalent persistently painful, incapacitating elbow ailment. Those whose jobs need them to rotate their forearm frequently, such as knitters, carpenters, gardeners, and computer professionals, frequently experience it. There is an equal male to female sex ratio, the age range at which lateral epicondylitis first appears is 35 to 50 years old. Most often, the dominant upper limb is impacted. **Materials and Methods:** This randomized prospective study was conducted in N.S.C.B. Medical College & Hospital Jabalpur (M.P.) from August 2022 to February 2024. 47 patients of lateral epicondylitis who fulfilled the inclusion criteria were randomly selected and divided in 2 groups of 23 patients and 24 patients. Group with 24 patients was given corticosteroid injection (triamcinolone acetonide) and another group of 23 patients was given PRP injection as treatment modality. Follow up was done at 1, 3 and 6 months after injection. Clinical outcome was assessed using visual analogue scale[VAS], modified mayo performance scale[MAYO], disabilities of the arm, shoulder and hand score[DASH]. Data analysis was performed with help of SPSS (Statistical Package for Social Sciences) for windows. **Result:** DASH score among platelet rich plasma group has declined from pre injection score of 70.17 to 62.46 at 4 weeks, 51.75 at 12 weeks and 33.92 at 24 weeks. VAS score among platelet rich plasma group has declined from the pre injection score of 7.18 to 6.16 at 4 weeks, 4.91 at 12 weeks and 2.88 at 24 weeks. MAYO score among platelet rich plasma group has increased from the pre injection score of 61.04 to 65.42 at 4 weeks, 70 at 12 weeks and. 8229 at 24 weeks. DASH score among steroid group started to decline from the pre injection score of 71.57 to 27.57 at 4 weeks, 38.52 at 12 weeks and 58.69 at 24 weeks. VAS score among steroid group declines from 7.35 of pre injection score to 2.30 at 4 weeks, 3.52 at 12 weeks and 5.69 at 24 weeks. MAYO score among steroid group improves from 60.87 of pre injection score to 83.47 at 4 weeks, 78.91 at 12 weeks and 65 at 24 weeks. **Conclusion:** A single injection of autologous platelet rich plasma improves elbow pain and functional activities more effectively than corticosteroid injection in lateral epicondylitis. These improvements were maintained in our follow up period without any significant complications. Corticosteroid gives better results up to 4 weeks and after that improvement was not very significant.

## INTRODUCTION

An inflammatory disorder known as lateral epicondylitis develops across the lateral epicondyle at the point where the common extensor tendon of the forearm originates. It is the most prevalent persistently painful, incapacitating elbow ailment. In 1% to 3% of the general population, it results in symptoms. Those whose jobs need them to rotate their forearm frequently, such as knitters, carpenters, gardeners, and computer professionals, frequently experience it. When there is an equal male to female sex ratio, the age range at which lateral epicondylitis first appears is 35 to 50 years old. Most often, the dominant upper limb is impacted.[1-3]

It's unclear what exactly causes lateral epicondylitis. According to current theory, overuse and aberrant microvascular reactions cause a degenerative process at the common extensor tendon origin of the wrist and fingers.[4-6] Nirschl noted that the extensor carpi radialis brevis (ECRB) tendon's origin was the site of the fundamental disease. However, the deep surface of the extensor carpi radialis longus (ECRL) and the anteromedial border of the extensor digitorum communis (EDC) may also be involved occasionally. Many treatment modalities, including rest, activity reduction, non-steroidal anti-inflammatory drugs, counterforce braces, massage, physiotherapy, laser treatment, extracorporeal shockwave treatment, acupuncture, ultrasound treatment, and injections of botulinum toxin type A, have been suggested for lateral epicondylitis. Previously Injection of corticosteroids 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.[7-11] Currently, platelet rich plasma (PRP) is thought to be the best biological component obtained from autologous blood. It can be injected into various tissues that have activated platelets, releasing large concentrations of cytokines, fibroblast growth factors (FGF), platelet derived growth factors (PDGF), transforming growth factors-beta (TGF-β), and vascular endothelial growth factors (VEGF) at the injection site. These growth factors, which are secreted from platelet-rich plasma, aid in the cellular repair of tendons, bone, and wounds.[12] Furthermore, the strong antibacterial effectiveness of platelet-rich plasma may help to avoid infections. These specifics prompt us to carry out this investigation.

**Aim and Objectives**

The aim of this study is to compare the clinical efficiency of PRP with that of corticosteroids for treatment of patient with lateral epicondylitis. Our primary objective is compare the functional outcome following platelet rich plasma and corticosteroid injection in patient with lateral epicondylitis and secondary objective is assess the factors that might play role in recurrence if any and to review the literature.

## MATERIALS AND METHODS

This experimental study was conducted at N.S.C.B. Medical College & Hospital, Jabalpur (M.P.) from August 2022 to August 2024. Patients presenting to the OPD of Dept. of Orthopaedics, N.S.C.B. Medical College & Hospital, Jabalpur who were in the age group of 20– 70 years and had symptoms of lateral epicondylitis for more than 3 months not responding to 6 weeks of conservative management were included in this study. Exclusion criteria were Diabetic patients, patients suffering with rheumatoid arthritis, patients with history of trauma or surgery to the lateral epicondyle, patients who have previously received an injection at the lateral epicondyle in the last 3 months and patients suspicious of nerve involvement. 47 patients of lateral epicondylitis who fulfilled the inclusion criteria were randomly selected and divided in 2 groups of 23 patients and 24 patients. Group with 24 patients was given corticosteroid injection (triamcinolone acetonide) and another group of 23 patients was given PRP injection as treatment modality. Follow up was done at 1, 3 and 6 months after injection. Clinical outcome was assessed using visual analogue scale [VAS], modified mayo performance scale [MAYO], disabilities of the arm, shoulder and hand score [DASH]. Data analysis was performed using SPSS (Statistical Package for Social Sciences) for Windows.

## RESULTS

47 cases of lateral epicondylitis who met the inclusion criteria were included for the study. There were 32 females with 23 right side lateral epicondylitis and 9 left side lateral epicondylitis. There were 15 males with 12 right side lateral epicondylitis and 3 left side lateral epicondylitis. The mean age was 43.96 years and the range was 30 to 67 years. The mean duration of symptom was 4.9 months.

**Table 1: Comparison between vas scores of PRP group and steroid group**

| MEAN VAS SCORE | PRP GROUP | CORTICOSTEROID GROUP |
|---|---|---|
| PRE INJECTION | 7.18 | 7.35 |
| AT 1 MONTH | 6.16 | 2.30 |
| AT 3 MONTH | 4.91 | 3.52 |
| AT 6 MONTH | 2.88 | 5.69 |


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**Table 2: Comparison between dash scores of PRP group and steroid group**

| Mean dash score | PRP group | Corticosteroid group |
|---|---|---|
| PRE INJECTION | 70.17 | 71.57 |
| AT 1 MONTH | 62.46 | 27.65 |
| AT 3 MONTH | 51.75 | 38.52 |
| AT 6 MONTH | 33.92 | 58.69 |


Average DASH score among platelet rich plasma group has declined from pre injection score of 70.17 to 62.46 at 4 weeks, 51.75 at 12 weeks and 33.92 at 24 weeks. Average VAS score among platelet rich plasma group has declined from the pre injection score of 7.18 to 6.16 at 4 weeks, 4.91 at 12 weeks and 2.88 at 24 weeks. Average MAYO score among platelet rich plasma group has increased from the pre injection score of 61.04 to 65.42 at 4 weeks, 70 at 12 weeks and. 8229 at 24 weeks.

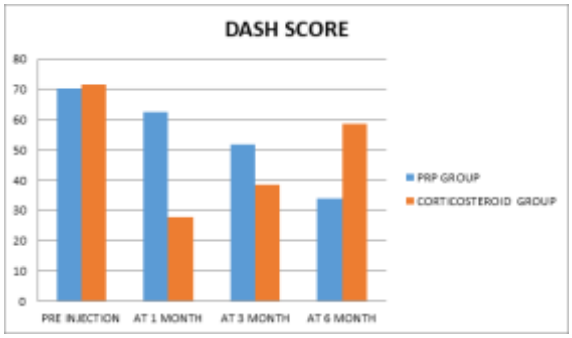



**Table 3: comparison between mayo scores of PRP group and steroid group**

| Mean mayo score | PRP group | Corticosteroid group |
|---|---|---|
| PRE INJECTION | 61.04 | 60.87 |
| AT 1 MONTH | 65.42 | 83.47 |
| AT 3 MONTH | 70 | 78.91 |
| AT 6 MONTH | 82.29 | 65 |

**Table 4: comparison between vas score, dash score and mayo score in PRP group**

| P. R. P. GROUP | VAS SCORE | DASH SCORE | MAYO SCORE |
|---|---|---|---|
| PRE-INJECTION | 7.167 | 70.08 | 61.04 |
| AT 4 WEEKS | 6.125 | 62.46 | 65.42 |
| AT 12 WEEKS | 4.92 | 51.75 | 70 |
| AT 24 WEEKS | 2.88 | 33.92 | 82.29 |

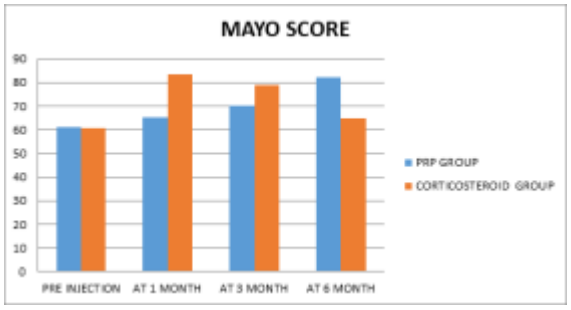
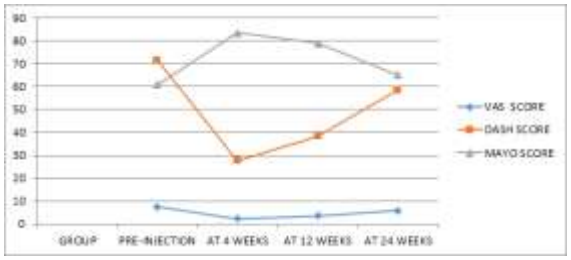




**Table 5: comparison between vas score, dash score and mayo score in steroid group**

| Corticosteroid group | VAS score | Dash score | Mayo score |
|---|---|---|---|
| Pre-injection | 7.35 | 71.57 | 60.87 |
| At 4 weeks | 2.30 | 27.65 | 83.47 |
| At 12 weeks | 3.52 | 38.52 | 78.91 |
| At 24 weeks | 5.69 | 58.70 | 65 |




Average DASH score among steroid group started to decline from the pre injection score of 71.57 to 27.57 at 4 weeks ,38.52 at 12 weeks and 58.69 at 24 weeks. Average VAS score among steroid group declines from 7.35 of pre injection score to 2.30 at 4 weeks, 3.52 at 12 weeks and 5.69 at 24 weeks. Average MAYO score among steroid group improves from 60.87 of pre injection score to 83.47 at 4 weeks, 78.91 at 12 weeks and 65 at 24 weeks.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## DISCUSSION

This study compared the use of local platelet rich plasma with local corticosteroids for patient with lateral epicondylitis; the use of platelet rich plasma showed to be a safe and simple procedure. Even 6 months after the PRP application, there was still a noticeable difference in the reduction of pain and improvement in functional activity. The effect in the corticosteroid group decreased during further follow up but the result in the PRP group remained stable at the 6 month follow up. A noteworthy finding revealed that the PRP group's DASH scores were higher prior to therapy and improved throughout the first 24 weeks of treatment. Corticosteroid gives better results up to 4 week and after that improvement was not very significant. This strengthens the case for why we concluded that PRP was beneficial.

Lateral epicondylitis is an 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. It is common in people whose occupation requires frequent rotary motion of the forearm like in carpenter, gardener, computer workers and knitting workers. Some studies have reported female preponderance.[70,71] However, Shiri R et al., found 1.3% prevalence of lateral epicondylitis without any gender difference.[72] The findings of our study also support a female preponderance. The age of onset of lateral epicondylitis is between 35 and 50 years with an equal male to female sex ratio. The dominant upper limb is most commonly affected. Chard MD and Hazelman BL stated that lateral epicondylitis involves dominant arm more frequently and occurs equally among all socioeconomic classes.[73]

Similar findings are reflected from the results of our study.

The actual cause of lateral epicondylitis is not clearly understood. Now it is considered that degenerative process occurs at the common extensor tendon origin of the wrist and fingers due to overuse and abnormal micro vascular responses.[4-6] 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 may be involved.

Various modalities of treatment have been recommended for lateral epicondylitis. They are rest, activity modification, non-steroidal anti inflammatory drugs, counterforce braces, massage, physiotherapy, laser treatment, extracorporeal shockwave treatment, acupuncture, ultrasound treatment and botulinum toxin type A injection. Injection of corticosteroids was thought to be the gold standard treatment in lateral epicondylitis previously. The autologusblood injection and different types of open and arthroscopic operative treatment are also advised for lateral epicondylitis.[7-11] At present, platelet rich plasma (PRP) is considered as an ideal biological autologous blood derived component. Platelet rich plasma has been utilized and studied since 1970. It can be injected in different tissues where, platelet is activated and it releases high concentrations of transforming growth factor-beta (TGF-β), 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 plays important role on the biological aspects of wound healing. The platelets in platelet rich plasma are delivered in a clot, which contains several cell adhesion molecules including fibronectin, fibrin and fibronectin. These cell adhesion molecules promote cell migration, and potentiate biological activity of platelet rich plasma. The clot itself promotes wound healing by acting as conductive matrix or scaffold upon which cells can adhere and initiate the wound healing process.[12] In addition, platelet rich plasma has high antimicrobial potency and this property may prevent infections.

Thus, the goal of this study is to evaluate the therapeutic effectiveness of PRP in comparison to corticosteroids. Leukocyte-enriched PRP was found to be more effective than standard corticosteroid treatment for treating lateral epicondylitis. Mishra and Pavelko,[68] and Gosens T et al,[67] observed that both groups significantly improved their pain and function at the short-term follow-up. However, over the long-term follow-up, the pain and functional scores for the PRP group remained high while those for the corticosteroid group returned to baseline. In the first follow-up visits, we saw a stronger response with local corticosteroid injection; however, at six months, the PRP group's recovery was noticeably greater.

There are less number of studies regarding the benefits of platelet rich plasma injection over corticosteroid injection therapy for lateral epicondylitis. 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 the study by Gosen et al,[67] (March 2011, compared the effectiveness of autologous platelet rich plasma injection to steroid injection therapy in lateral epicondylitis,) it is proved that platelet rich plasma injection is safe and easy. Concerning functional impairment, the corticosteroid group showed better results during the initial period and then declined to base line level. Whereas in platelet rich plasma group symptoms improved progressively.


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There was a significant difference in decrease of pain and functional impairment after platelet rich plasma application even after one year.

In this study, DASH score among platelet rich plasma group has declined from pre injection score of 7o.17 to 62.46 at 4 weeks, 51.75 at 12 weeks and 33.92 at 24 weeks which is almost similar to the study by Gosen et al,[67] march 2011, where the pre injection DASH score is 54.3 which declines to 43.1 at 4 weeks, 31.2 at 12 weeks.

In this study the VAS score among platelet rich plasma group has declined from the pre injection score of 7.18 to 6.16 at 4 weeks, 4.91 at 12 weeks and 2.88 at 24 weeks which is almost similar to the study by Gosen et al march 2011, where the pre-injection VAS score of 69.0 declines to 55.7 at 4 weeks, 45.1 at 8 weeks and 40.2 at 12 weeks.

In this study, we have included additional score, MAYO score. MAYO score among platelet rich plasma group has increased from the pre injection score of 61.04 to 65.42 at 4 weeks, 70 at 12 weeks and. 8229 at 24 weeks.

In this study the DASH score among steroid group started to decline from the pre injection score of 71.57 to 27.57 at 4 weeks ,38.52 at 12 weeks and 58.69 at 24 weeks, whereas in the study by Gosen et al march 2011, DASH score among steroid group decline similarly up to 12 weeks.

In this study the VAS score among steroid group declines from 7.35 of pre injection score to 2.30 at 4 weeks, 3.52 at 12 weeks and 5.69 at 24 weeks, whereas in the study by Gosen et al march 2011, the decline of VAS score from pre- injection score of 66.2 to 44.3 at 4 weeks and 38.5 at 12 weeks.

In this study the MAYO score among steroid group improves from 60.87 of pre injection score to 83.47 at 4 weeks, 78.91 at 12 weeks and 65 at 24 weeks.

Comparing the results prescribed in this study with the results of six months follow up, the outcome in the corticosteroid group is declined, whereas the outcome in the platelet rich plasma group is maintained. A significant finding is that the platelet rich plasma group had worse pre injection VAS scores and better after 24 weeks. This strengthens our conclusion that the platelet rich plasma injection is better than corticosteroid injection.

In the Mishra and Pavelko,[68] research, eight weeks after the treatment, the platelet-rich plasma patients noted 60% improvement in their visual analog pain scores versus 16% improvement in control patients (P less than 0.001). Sixty percent (3 of 5) of the control subjects withdrew or sought other treatments after the 8-week period, preventing further direct analysis. Therefore, only the patients treated with platelet-richplasma were available for continued evaluation. At 6 months, the patients treated with platelet-rich plasma noted 81% improvement in their visual analog pain scores (P = 0.0001). At final follow-up (mean, 25.6 months; range, 12-38 months), the platelet-rich plasma patients reported 93% reduction in pain compared with before the treatment (P = 0.0001).

In our study, patients who received platelet-rich plasma reported a 14.45% (p value=<0.001),31.48% (p value=<0.001) and 59.88% (p value = <0.001) improvement in their visual analogue pain levels at 4 weeks,12 weeks and 24 weeks post injection follow up.

In the Hay et al (69) study, Over 2 years, 53 subjects were randomized to injection, 53 to naproxen, and 58 to placebo. Prognostic variables were similar between groups at baseline. At 4 weeks, 48 patients (92%) in the injection group were completely better or improved compared with 30 (57%) in the naproxen group (P < 0.001) and 28 (50%) in the placebo group (P < 0.001). At 12 months, 43 patients (84%) in the injection group had pain scores 0.05). Similarly, In our study ,steroid group experienced a 68.5% (p value=<.001), 52.07%(p value=<.001) and 22.48% (p value=<.001) improvement in their visual analogue pain levels at 4 weeks,12 weeks and 24 weeks post injection follow up.

A recent double-blind randomized control study by Aziza Sayed Omar et al,[74] has reported that effect of corticosteroid injections lasts for about three months while that of PRP injections last for more than 6 months in providing pain relief in tennis elbow and plantar fasciitis. The work by Aziza Sayed Omar, et al,[74] is consistent with our findings of a significant improvement in the corticosteroid group at 1 month, and a significantly greater improvement in all outcome measures in the PRP group at the 6-month follow-up.

It is possible that PRP may provide a durable healing effect on the injured tendon. The discrepancy in PRP's effectiveness observed in certain studies could be ascribed to variations in the amount of growth factors supplied to the damaged tendon.

## CONCLUSION

In conclusion, the comparative study of treatment of lateral epicondylitis with platelet rich plasma verses corticosteroid injection shows that a single injection of autologous platelet rich plasma improves elbow pain and functional activities more effectively than corticosteroid injection in lateral epicondylitis. These improvements were maintained over in our follow up period without any significant complications.

Corticosteroid gives better results up to 4 week and after that improvement was not very significant. 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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