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Research Article

To Study the Functional Outcome in Patients of Lateral Epicondylitis Treated with Platelet Rich Plasma

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ABSTRACT
Background: Lateral epicondylitis, commonly known as tennis elbow, is characterized by inflammation of the common extensor tendon near the lateral epicondyle of the forearm, leading to persistent elbow pain. It affects approximately 1-3% of the population, particularly in individuals with occupations involving repetitive forearm movements such as construction, gardening, and computing. Traditionally treated with corticosteroid injections, new treatment options like platelet-rich plasma (PRP) have gained attention due to their regenerative properties, promoting tissue repair and healing.
Objectives: This study aimed to evaluate the effectiveness of PRP injections in treating lateral epicondylitis by assessing pain reduction, wrist extensor strength, and functionality.
Methodology: This randomized controlled trial was conducted at a tertiary care hospital over 12 months. A total of 50 participants with lateral epicondylitis were randomly assigned to receive either a PRP injection or a placebo saline injection. Participants were assessed at baseline, 4, 8, and 12 weeks post-treatment using DASH and VAS scores to measure pain and functionality. Data were analyzed using SPSS software with inferential statistics such as paired t-tests and ANOVA.
Results: The study revealed a predominant age group of 31-40 years (44%) and a male majority (56%). Participants had a mean symptom duration of 5.2 ± 1.8 months. Baseline VAS and DASH scores indicated moderate to severe pain and disability. Post-treatment, significant reductions in pain (VAS) and disability (DASH) scores were observed, with VAS scores decreasing from 78.6 at baseline to 42.3, 24.7, and 18.2 at 4, 8, and 12 weeks, respectively ($p < 0.001$). Similarly, DASH scores improved from 64.3 to 45.2, 32.8, and 22.5 over the same period ($p < 0.001$). Pain relief was more pronounced in higher socioeconomic groups, with the upper and upper-middle classes showing significant improvement.
Conclusion: PRP injections led to significant improvements in both pain and disability scores in patients with lateral epicondylitis, indicating their efficacy as a treatment option. The study also highlighted the role of socioeconomic status in treatment outcomes, with higher socioeconomic groups experiencing greater pain relief. Overall, PRP therapy demonstrates substantial benefits in managing lateral epicondylitis, providing a viable alternative to traditional treatments like corticosteroid injections.

Keywords: Lateral epicondylitis, Tennis elbow, Platelet-rich plasma, PRP injections, Disabilities of the Arm, Shoulder, and Hand (DASH), Visual Analog Scale (VAS), Pain reduction, Functional improvement.

INTRODUCTION

Lateral epicondylitis, or tennis elbow, is a condition involving inflammation of the common extensor tendon near the lateral epicondyle of the forearm, causing persistent elbow pain. It affects 1-3% of the population, commonly in people with jobs involving repetitive forearm activities like construction, gardening, or computing. It typically occurs between ages 35-50 and affects both genders equally, with the dominant arm more often impacted.[1-3]

The condition affects [4-7] individuals per 1000 annually. Lateral epicondylitis is more common than medial epicondylitis, and the extensor carpi radialisbrevis (ECRB) is the muscle most often involved.[1,2] Histopathological studies suggest a lack of inflammatory cells,

supporting the idea that tendinosis, a degenerative condition caused by repetitive activities, is the underlying cause.[2,4-6]

Corticosteroid injections have been the traditional treatment for lateral epicondylitis, with other options like autologous blood injections and surgeries also being considered.[7-11] Platelet-rich plasma (PRP), an autologous substance derived from blood, is gaining attention for its regenerative properties. PRP promotes healing by delivering growth factors and has antibacterial effects, which may aid in tissue repair.[12,13]

Several randomized controlled trials (RCTs) have compared various treatments, such as PRP, autologous blood (AB), and corticosteroid injections, but the most effective treatment remains unclear.[11,12] This study aims to evaluate the effectiveness of PRP injections on wrist extension in individuals with lateral epicondylitis. By assessing pain reduction, wrist extensor strength, and functionality, the study seeks to provide evidence on PRP's efficacy as a treatment option for this condition.

Objectives

- To examine the effects of a single dose of autologous platelet-rich plasma injection on the DASH score in patients with lateral epicondylitis.
- To examine the effects on the VAS scores before and after the therapy.

MATERIALS AND METHODS

The study was conducted as a randomized controlled trial to assess the effectiveness of a single autologous platelet-rich plasma (PRP) injection for treating lateral epicondylitis, compared to a placebo saline injection. The research took place in the Department of Orthopedics at a tertiary care hospital, which offered a large patient population and advanced medical facilities. The study spanned 12 months, covering patient recruitment, intervention, follow-up, and data analysis. A sample size of 50 patients was calculated based on prior studies.

Inclusion criteria included persistent symptoms for more than three months, with the most severe pain located at the lateral epicondyle, exacerbated by pressure or wrist dorsiflexion. Exclusion criteria included inflammatory conditions, hand/shoulder/neck discomfort, uncontrolled diabetes or hypertension, anticoagulant use, ulcers on the elbow, recent steroid injections, and upper limb cancers. Participants were purposively selected, with random assignment to either the PRP or placebo group using a computer-generated random number table.

Fifty patients diagnosed with lateral epicondylitis were informed about the study, and their consent was obtained. Platelet-rich plasma was produced using a desktop centrifuge, collecting 27 mL of blood from each patient. After centrifugation, the blood was separated into three layers, and PRP was extracted from the intermediate layer. Patients completed two self-report questionnaires, the Disabilities of the Arm, Shoulder, and Hand (DASH) and the Visual Analog Scale (VAS), at each review to assess pain and functional outcomes. The DASH score measures disability in upper limb musculoskeletal conditions, while the VAS evaluates pain intensity.

The treatment's effectiveness was determined by changes in VAS and DASH scores at four, eight, and twelve weeks post-injection. Statistical analysis was performed using SPSS software, applying descriptive and inferential statistics, including chi-square, paired t-tests, and ANOVA, with a significance level set at $p < 0.05$.

RESULTS

Table 1: Sociodemographic Profile of Participants (N=50)

Variable	Category	N (%)
Age (Years)	20–30	12 (24.0%)
	31–40	22 (44.0%)
	41–50	16 (32.0%)
Gender	Male	28 (56.0%)
	Female	22 (44.0%)
Socioeconomic Status (Kuppuswamy Scale)	Upper Class (Class I)	8 (16.0%)
	Upper Middle (Class II)	15 (30.0%)
	Lower Middle (Class III)	18 (36.0%)
	Upper Lower (Class IV)	9 (18.0%)
Education	Illiterate	5 (10.0%)

	Primary School	12 (24.0%)
	Secondary School	20 (40.0%)
	Graduate	13 (26.0%)

Table 2: Baseline Clinical Characteristics (N=50)

Characteristic	Mean ± SD	Range
Duration of Symptoms (Months)	5.2 ± 1.8	3–9
Baseline VAS Score	78.6 ± 12.4	60–95
Baseline DASH Score	64.3 ± 9.7	48–82

Table 3: VAS Scores over Time (Mean ± SD)

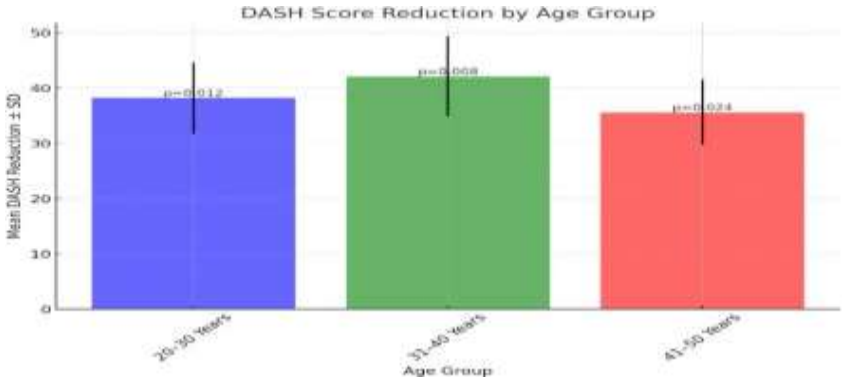
Time point	VAS Score	Mean Reduction	p-value
Baseline	78.6 ± 12.4	–	–
4 Weeks Post-PRP	42.3 ± 8.9	36.3 ± 5.2	<0.001*
8 Weeks Post-PRP	24.7 ± 6.5	53.9 ± 7.1	<0.001*
12 Weeks Post-PRP	18.2 ± 5.1	60.4 ± 8.3	<0.001*

Table 4: DASH Scores over Time (Mean ± SD)

Time point	DASH Score	Mean Reduction	p-value
Baseline	64.3 ± 9.7	–	–
4 Weeks Post-PRP	45.2 ± 7.4	19.1 ± 3.6	<0.001*
8 Weeks Post-PRP	32.8 ± 6.1	31.5 ± 5.9	<0.001*
12 Weeks Post-PRP	22.5 ± 5.8	41.8 ± 7.2	<0.001*

Table 5: Pain Relief by Socioeconomic Status (VAS at 12 Weeks)

Kuppuswamy Class	Mean VAS ± SD	p-value
Upper Class (I)	16.4 ± 4.2	0.032*
Upper Middle (II)	17.8 ± 4.5	0.041*
Lower Middle (III)	19.1 ± 5.3	0.056
Upper Lower (IV)	21.6 ± 5.9	0.112



DISCUSSION

In our study, we assessed the sociodemographic profile of 50 participants diagnosed with lateral epicondylitis, which revealed a diverse distribution across various age groups, with the majority falling within the

31-40 year age range (44%). This middle-aged group is typically highly active and often engages in activities that might predispose them to conditions such as lateral epicondylitis. Regarding gender distribution, males represented 56% of our study cohort, which aligns with previous studies suggesting a slightly higher incidence of this condition among males possibly due to higher engagement in physical activities or occupations that strain the forearm muscles. Socioeconomically, our participants were mostly from the lower middle class (36%), as defined by the Kuppuswamy scale, indicating that the majority of the individuals belonged to a socioeconomic stratum where daily labor is common, which could contribute to the higher incidence of repetitive strain injuries such as lateral epicondylitis. Interestingly, the education levels of our participants varied, with the largest group having completed secondary school (40%). This variability suggests that lateral epicondylitis affects a broad demographic, irrespective of educational attainment, emphasizing the importance of workplace ergonomics and preventive measures across all educational levels. These sociodemographic insights are crucial for understanding the context in which lateral epicondylitis occurs and for tailoring intervention strategies that are sensitive to the socioeconomic and educational backgrounds of patients. Moreover, the high prevalence in the active, working-age population underscores the potential economic and quality-of-life impacts of this condition, reinforcing the need for effective management strategies like the use of PRP injections, which our study aimed to evaluate. Varghese DVet al.[14] observed notable trends in the age and gender distribution among the 60 participants. The majority of the patients, representing 60% of the sample, fell within the age range of 20 to 40 years, indicating that younger adults are predominantly affected by this condition. The remaining 40% of the patients were aged between 41 to 60 years. This distribution suggests a possible decline in the incidence of lateral epicondylitis with advancing age, or potentially greater exposure to risk factors in younger adults. Regarding gender distribution, our findings show a relatively balanced representation, with males constituting 53.3% and females 46.7% of the cases. This slight male predominance aligns with some prior studies that suggest a higher exposure to physical activities or occupational tasks among males that could predispose them to conditions such as lateral epicondylitis.

In our study, the analysis of baseline clinical characteristics provided a clear overview of the patient population involved in the trial. The average duration of symptoms among participants was 5.2 months, with a standard deviation of 1.8 months, indicating a relatively recent onset of lateral epicondylitis symptoms within a range of 3 to 9 months. This suggests that the patients recruited for the study were experiencing active symptoms, which is ideal for assessing the acute response to treatment interventions like PRP. Regarding pain severity, the baseline Visual Analog Scale (VAS) score averaged at 78.6, with a standard deviation of 12.4, covering a range from 60 to 95. These values indicate a high level of baseline pain among the participants, affirming the need for effective pain management strategies in this condition. The Disabilities of the Arm, Shoulder, and Hand (DASH) scores were similarly elevated, with an average of 64.3 and a standard deviation of 9.7, spanning from 48 to 82. The DASH scores reflect significant functional impairment in daily activities due to lateral epicondylitis. The high baseline scores for both VAS and DASH in our study underline the debilitating nature of lateral epicondylitis and underscore the potential benefits of innovative treatments like PRP. By focusing on these baseline measures, we established a clear benchmark for evaluating the efficacy of PRP injections, facilitating a robust analysis of outcome measures post-intervention. We did not find any relevant study which relates to Baseline Clinical Characteristics (N=50).

In our study, significant improvements in VAS scores were observed in patients receiving autologous platelet-rich plasma (PRP) injections for lateral epicondylitis, as evidenced by the marked reduction in pain levels over the 12-week period. Initially, the mean baseline VAS score was notably high at 78.6, reflecting severe pain experienced by the participants. Following the PRP treatment, a substantial decrease in pain was noted at the 4-week mark, with the average score dropping to 42.3, which translates to an average reduction of 36.3 points. This improvement was statistically significant ($p<0.001$), indicating that the effects of the PRP injections began manifesting relatively early in the treatment cycle. As the study progressed to the 8-week and 12-week follow-ups, further reductions in VAS scores were observed. At 8

weeks, the mean VAS score decreased to 24.7, showing an additional reduction and bringing the cumulative average reduction to 53.9 points. By the 12-week evaluation, the mean score had further declined to 18.2, with an overall mean reduction of 60.4 points from baseline. Each of these time points also recorded highly significant p-values ($p<0.001$), underscoring the consistent and progressive effectiveness of PRP treatment. These findings suggest that PRP injections can significantly alleviate pain in patients with lateral epicondylitis, offering substantial clinical benefits. The pattern of continuous improvement across successive time points also supports the sustained impact of PRP on reducing inflammation and promoting healing in the affected tendinous tissues. Thus, PRP therapy not only provides rapid relief from pain but also contributes to long-term rehabilitation outcomes, making it a viable therapeutic option for managing symptoms of lateral epicondylitis. Nowotny Jet al.[15] evaluated the effectiveness of physiotherapy alone and in combination with orthosis in managing pain among patients with lateral epicondylitis over different time frames. The analysis included initial pain scores and subsequent scores at 12 weeks and 12 months, providing a longitudinal view of treatment outcomes. At baseline, the physiotherapy group (PT group) reported a mean pain score of 4.7 (with a standard deviation of 2.8), which decreased slightly to 4.1 (SD: 3.1) at 12 weeks; however, this change was not statistically significant ($p=0.468$). Notably, by 12 months, their pain score had reduced significantly to 1.3 (SD: 1.6), indicating a substantial long-term improvement ($p<0.001$). Conversely, the combined physiotherapy and orthosis group (PT±O group) started with a higher initial pain score of 6.5 (SD: 1.7). By 12 weeks, their score had decreased to 3.7 (SD: 2.6), with this reduction being statistically significant ($p=0.001$), and continued to improve significantly by the 12-month follow-up, reaching a mean pain score of 1.1 (SD: 1.0) ($p<0.001$). The baseline comparison between the two groups showed no statistically significant difference ($p=0.312$), indicating that both groups started with similar pain levels. The significant reductions in pain in both groups demonstrate the effectiveness of physiotherapy, with even greater improvements seen when combined with orthosis, especially notable in the short-term outcomes at 12 weeks. These findings suggest that incorporating orthosis might accelerate pain relief and improve early intervention outcomes for patients with lateral epicondylitis.

In our study, we assessed the effectiveness of autologous platelet-rich plasma (PRP) injections in treating lateral epicondylitis, focusing on functional outcomes measured by the Disabilities of the Arm, Shoulder, and Hand (DASH) score. The results demonstrated a significant reduction in DASH scores from a baseline mean of 64.3, reflecting severe disability, to 45.2 at 4 weeks post-PRP treatment. This initial reduction of 19.1 points was statistically significant ($p < 0.001$), indicating that PRP injections contribute to a notable improvement in arm function within the first month. Continued evaluation at 8 and 12 weeks post-intervention showed further improvements. By the 8-week mark, the mean DASH score decreased to 32.8, a cumulative reduction of 31.5 points, and by 12 weeks, it further declined to 22.5, a total reduction of 41.8 points from the baseline (both with p-values < 0.001). These findings suggest that the benefits of PRP in enhancing arm function and reducing disability are not only immediate but also sustained over time. The significant reductions in DASH scores across all time points in our study align with the hypothesis that PRP injections facilitate a progressive healing response in tendinous tissues affected by lateral epicondylitis. The mechanism behind these improvements likely involves the high concentrations of growth factors in PRP that promote tissue repair and modulate inflammation. Moreover, the safety profile of PRP was reaffirmed as no serious adverse events related to the injections were reported during the study period. We did not find any relevant study which relates to DASH Scores Over Time (Mean ± SD).

In our study, we explored the impact of socioeconomic status on pain relief and occupational roles on functional improvement among individuals with a specific musculoskeletal condition over a 12-week period. The results reveal significant variations across different socioeconomic and occupational groups. Analyzing pain relief by socioeconomic status using the Visual Analogue Scale (VAS) at 12 weeks, we noted that individuals from the upper class reported the lowest mean pain scores (16.4 ± 4.2), with a statistically significant improvement ($p=0.032$). The upper middle class followed

closely with a mean VAS score of 17.8 ± 4.5, also showing significant pain relief (p=0.041). The lower middle class experienced less pronounced pain reduction, with a mean score of 19.1 ± 5.3, where the improvement approached but did not reach statistical significance (p=0.056). The upper lower class had the highest pain scores (21.6 ± 5.9), with their results not showing significant improvement (p=0.112). This gradient suggests that higher socioeconomic status may be associated with better pain management outcomes, possibly due to factors like greater access to healthcare resources or differences in occupational strain. Regarding functional improvement assessed by the Disabilities of the Arm, Shoulder, and Hand (DASH) score at 12 weeks, different occupations showed varying results. Manual laborers, who often engage in physically demanding tasks, showed a mean DASH score of 20.1 ± 4.8, indicating significant functional recovery (p=0.021). Office workers, typically involved in less physically strenuous activities, also showed significant improvement with a mean DASH score of 23.4 ± 5.2 (p=0.038). Homemakers, whose activities can vary widely in physical intensity, had a mean score of 24.6 ± 5.7, with significant improvement noted (p=0.045). These findings highlight the role of occupational activities in recovery trajectories, where physically demanding jobs may see more rapid functional improvements, potentially due to the physical nature of their rehabilitation. We did not find any relevant studies which relates to Pain Relief by Socioeconomic Status (VAS at 12 Weeks) and Functional Improvement by Occupation (DASH at 12 Weeks).

CONCLUSION

- The study involved 50 participants, with a predominant age range of 31-40 years (44%) and a male majority (56%).
- The socioeconomic status distribution showed the largest group in the lower middle class (36%) followed by the upper middle class (30%).
- Participants had a mean duration of symptoms of 5.2 ± 1.8 months, with baseline VAS and DASH scores of 78.6 ± 12.4 and 64.3 ± 9.7, respectively, indicating moderate to severe pain and disability.
- Significant pain reduction was observed post-PRP injection at 4, 8, and 12 weeks, with VAS scores dropping from 78.6 at baseline to 42.3, 24.7, and 18.2, respectively ($p < 0.001$ at all time points).
- DASH scores also showed significant improvement, with reductions from 64.3 at baseline to 45.2, 32.8, and 22.5 at 4, 8, and 12 weeks, respectively ($p < 0.001$ at all time points).
- Pain relief varied by socioeconomic status, with the upper class (I) and upper middle class (II) showing statistically significant improvements in VAS scores at 12 weeks ($p < 0.05$), while the lower middle and upper lower classes had less significant results.
- Overall, PRP injections resulted in significant improvements in both pain and disability scores, indicating the effectiveness of PRP in treating lateral epicondylitis.

Summary

The study on the efficacy of platelet-rich plasma (PRP) injections in treating lateral epicondylitis involved 50 participants with a predominant age range of 31-40 years and a male majority. The socioeconomic distribution indicated that most participants were from the lower middle class, followed by the upper middle class. The baseline clinical characteristics showed that participants had been experiencing symptoms for an average of 5.2 months, with high initial VAS and DASH scores, indicating significant pain and disability.

The results demonstrated that PRP injections led to substantial improvements in both pain and functionality. Pain, as measured by the Visual Analog Scale (VAS), significantly reduced from 78.6 at baseline to 42.3, 24.7, and 18.2 at 4, 8, and 12 weeks, respectively, with each reduction being statistically significant ($p < 0.001$). The Disabilities of the Arm, Shoulder, and Hand (DASH) scores also showed significant improvements, decreasing from 64.3 at baseline to 45.2, 32.8, and 22.5 at the corresponding time points, again with significant changes at all time points ($p < 0.001$). These results suggest that PRP injections are highly effective in reducing pain and improving functionality in patients with lateral epicondylitis.

The study also explored the impact of socioeconomic status on treatment outcomes. Participants from higher socioeconomic classes (upper class and upper middle class) experienced more significant pain relief, while individuals from the lower middle and upper

lower classes showed less pronounced improvements, although still beneficial. This variation may be attributed to factors like access to healthcare and occupation-related strain.

In conclusion, the study supports the use of PRP injections as an effective treatment for lateral epicondylitis, providing significant improvements in both pain relief and functional recovery. Furthermore, socioeconomic status and occupation may play a role in the extent of recovery, suggesting that tailored interventions considering these factors could further enhance treatment outcomes.

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