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A Study on the Role of Autologous Platelet-Rich Plasma as a Treatment Modality in Lateral Epicondylitis and its Functional Outcome

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ABSTRACT

Lateral epicondylitis, commonly referred to as tennis elbow, is a common musculoskeletal condition of the elbow that results from overuse-related tendon micro tears, causing pain and functional impairment. Traditional treatments, such as corticosteroids, are still inconsistent in long-term efficacy. Autologous platelet-rich plasma preparation rich in growth factors that enhance tendon healing and regeneration has emerged as a new therapeutic option. This study will find out whether PRP therapy is effective in improving pain and functionality among patients with lateral epicondylitis. This is a prospective study that involves 50 patients diagnosed with lateral epicondylitis in Bhaskar Medical College Hospital from September 2019 to March 2021. Single injection of prepared autologous PRP, 3-4ml, was given under ultrasound-guided centrifugation. The outcomes were measured in terms of the level of pain, according to the Visual Analog Scale (VAS) and functionality was measured by using the Disabilities of the Arm, Shoulder and Hand scores at baseline and 1, 3 and 6 months after treatment. Data analysis comprised descriptive statistics and Pearson correlation to assess the relationship between the reduction of pain and functional improvement. Overall, as reflected by this six-month follow-up, there was an evident great improvement in the level of pain and function of the shoulder joint. Mean VAS score went down from 72.06 at baseline to 47.83 at 1 month, 38.33 at 3 months and to 27.29 at 6 months. There was similar improvement of DASH mean scores from 66.26 at baseline, down to 42.53 at 1 month, down further to 33.13 at 3 months and further reduction to 20.08 at 6 months. Changes in VAS and DASH scores showed significant improvement, at $p<0.001$. A positive correlation of moderate degree, $r=0.504$ and $p<0.001$, between pain reduction and functional improvement points to the consistency of the therapeutic effect. These findings support the potential of PRP therapy in maintaining symptom relief with better functional recovery. These results confirm that intra-articular, autologous PRP effectively reduces pain and improves function over six months in lateral epicondylitis treatment, with a moderate correlation between pain relief and functional improvements, validating PRP's holistic benefits. Considering promising baseline results and variations in PRP preparation and methodologies, studies are needed to establish standardization. Larger randomized controlled trials are required to validate these findings and optimize PRP protocols for broader clinical use in tendinopathy management.

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Key Words

Lateral epicondylitis, tennis elbow, platelet-rich plasma, PRP, application, regenerative medicine, functionality, pain levels and finally tendon healing

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INTRODUCTION

Lateral epicondylitis, commonly referred to as tennis elbow, is a prevalent musculoskeletal disorder characterized by pain and tenderness at the lateral epicondyle of the humerus[1-3]. This condition primarily results from overuse and micro-tears in the common extensor tendon of the forearm[4-7]. Affecting 1-3% of the population, predominantly individuals aged 35-55 years, lateral epicondylitis significantly impairs daily activities and work productivity[8-10]. Conventional treatments frequently yield inconsistent outcomes with high recurrence rates[8,11], while corticosteroid injections provide short-term relief but demonstrate limited long-term efficacy[12-16]. Autologous platelet-rich plasma (PRP) therapy, a concentrated preparation of platelets derived from a patient's blood, has emerged as a promising alternative[17-19]. PRP releases growth factors and cytokines, which stimulate tissue regeneration, angiogenesis and cell proliferation[5]. However, the optimal PRP preparation, injection technique and post-treatment protocol remain the subject of ongoing investigation[5]. Studies assessing the efficacy of PRP in treating lateral epicondylitis have produced varying results, necessitating comprehensive evidence analysis[20].

Methodology of PRP Treatment in Lateral Epicondylitis: PRP preparation involves centrifugation to separate platelets from other blood components[4,9]. Various centrifugation protocols yield PRP with different platelet and leukocyte concentrations[5]. The selection of leukocyte-rich PRP (LR-PRP) or leukocyte-poor PRP (LP-PRP) may influence treatment outcomes, although evidence remains inconclusive. LR-PRP, containing a higher concentration of white blood cells, may elicit a more pronounced inflammatory response, potentially accelerating healing[20] whereas LP-PRP may attenuate inflammation and reduce the risk of adverse effects. Following preparation, PRP concentrate is administered to the affected tendon at the lateral epicondyle[17,18], frequently utilizing ultrasound guidance to enhance accuracy and therapeutic efficacy[3]. The injection technique, whether single or multiple, also affects the outcomes. Several studies have proposed combining PRP injections with physiotherapy to optimize results. Post-injection rehabilitation, including exercise and stretching, facilitates tissue healing and functional restoration.

Clinical Outcomes and Effectiveness of PRP Therapy: Several studies have examined the efficacy of PRP therapy in lateral epicondylitis[19]. These investigations utilized various outcome measures, including visual analog scales (VAS) for pain., functional scores such as the Disabilities of the Arm, Shoulder and Hand (DASH) scale., the Patient-Rated Tennis Elbow Evaluation (PRTEE) score and the Mayo Elbow Performance Score[17]. Grip strength measurements were used to assess functional improvement[4]. Numerous studies have reported significant pain reduction and functional improvement following PRP injection. However, the extent and duration of these improvements exhibit considerable variability[12]. Some studies indicate that PRP is superior to corticosteroids for long-term pain relief and functional recovery[6,8], whereas other studies report no significant difference between PRP, placebo and other conservative treatments[12]. These inconsistencies may be attributed to differences in the study design, PRP preparation, injection techniques, patient populations and outcome measures. A common limitation is the small sample size, which diminishes the statistical power to detect meaningful differences[17]. Additionally, the heterogeneity in study protocols and outcome measures complicates cross-study comparisons[5]. The lack of standardized PRP preparation and injection techniques further contributes to outcome variability[5]. Limited long-term follow-up data impede the evaluation of the durability of PRP-induced improvements and determination of PRP's long-term efficacy of PRP compared to other treatments[5].

Aims: A Study on the Role of Autologous Platelet-Rich Plasma as a Treatment Modality in Lateral Epicondylitis and Its Functional Outcome.

Objectives: To investigate the functional outcome of PRP in lateral epicondylitis.

Patients: Fifty patients with lateral epicondylitis who met the inclusion criteria were admitted to Bhaskar medical college hospital between September 2019 and March 2021.

MATERIALS AND METHODS

- Patients who were admitted, examined according to the protocol and diagnosed with lateral epicondylitis were included in this study.
- The subjects underwent autologous PRP injections.
- The intervention utilized 3-4 ml of autologous platelet-rich plasma.
- Participants were followed up for six months.

Inclusion Criteria:

- Patients with mature skeletal development, aged 20 years and above, of both sexes, presenting with lateral epicondylitis.
- Eligible patients may have undergone conservative treatment with analgesics, brace application and anti-inflammatory medications without improvement.

Exclusion Criteria:

- Patients with a history of arthritis, trauma or fracture, nerve entrapment around the elbow, bleeding disorders, psychiatric disorders, tumors around the elbow, or steroid injection at the same site within the previous 3 months.

Follow Up:

- Patients were followed up for 6 months, with assessments conducted at the conclusion of the 1st, 3rd and 6th months. Additionally, a telephone follow-up was performed immediately following the day of injection to evaluate potential adverse reactions. Outcome measures were assessed using the DASH and VAS scores.

Data were collected and compiled using Microsoft Excel and analyzed using SPSS 30.0. Statistical analyses were performed using descriptive statistics.

RESULTS AND DISCUSSIONS

The study aimed to explore the role of autologous platelet-rich plasma (PRP) as a treatment modality for lateral epicondylitis and assess its functional outcomes. Data were systematically collected and compiled using Microsoft Excel, followed by statistical analyses conducted in SPSS 30.0. Descriptive statistics were employed to summarize demographic and clinical characteristics of the participants, providing a foundation for interpreting the functional effects of PRP treatment. The subsequent results detail the demographic composition of the study cohort, with specific focus on gender and age group distributions, before addressing the primary research objective. Tables and figures are presented to support the findings and ensure clarity of interpretation.

Table 1: Demographic Profile of Study Participants

		Frequency	Percent
Valid	F	31	62.0
	M	19	38.0
	Total	50	100.0

The frequency distribution depicted in the image indicates that among the 50 participants, 62% (n=31) are categorized as "F" and 38% (n=19) as "M," demonstrating a higher representation of the "F" category. This disparity in representation may be significant, contingent upon the research context, particularly if equitable distribution across groups is essential. The Dataset reveals a predominance of the "F" category, which may potentially influence the interpretation of study outcomes.

Table 2: Age Group Distribution

Age Groups	Frequency	Percent
20-29	10	20.0
30-39	16	32.0
40-49	14	28.0
50-59	6	12.0
60-65	4	8.0
Total	50	100.0

These data illustrate the distribution of participants across various age groups. The predominant cohort (32.0%) fell within the 30-39 age range, followed by 28.0% in the 40-49 age range and 20.0% in the 20-29 group. Lower percentages were observed in the 50-59 (12.0%) and 60-65 (8.0%) age categories. This distribution indicates a concentration of participants in younger and middle-aged cohorts, with diminishing representation in older age brackets, which may have implications for the generalizability of the findings across diverse age demographics.

Table 3: Affected Side Distribution

		Frequency	Percent
Valid	L	13	26.0
	R	37	74.0
	Total	50	100.0

The distribution of affected sides revealed that 74.0% of the participants (n=37) exhibited right-side involvement, while 26.0% (n=13) presented with left-side involvement. This distribution demonstrates a notable predominance of right-sided affectation in the sample, which may have implications for elucidating the impact of the condition or informing the focus of intervention strategies.

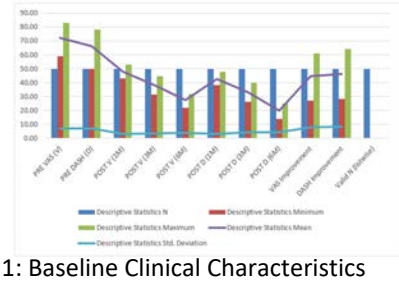

Fig. 1: Baseline Clinical Characteristics

The baseline clinical characteristics table presents a summary of the descriptive statistics for the clinical outcomes. The PRE VAS (V) and PRE DASH (D) scores indicated higher initial severity levels, with means of 72.06 and 66.26, respectively and moderate standard deviations. Following the intervention, scores demonstrated a progressive decrease across the 1-month, 3-month and 6-month follow-up periods, with significant reductions observed in both VAS and DASH scores (POST V (6M) mean=27.29., POST D (6M) mean=20.08). The improvements in VAS (mean=44.77, SD=8.07) and DASH (mean=46.18, SD=8.43) scores reflect substantial clinical progress over time, demonstrating the efficacy of the intervention in reducing symptom severity and functional impairment.

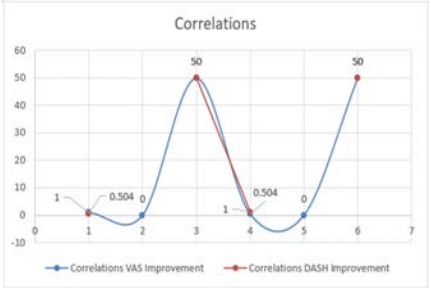

Fig. 2: Correlation

Table 4: Baseline Clinical Characteristics and Longitudinal Outcome Improvements

Baseline Clinical Characteristics	N	Minimum	Maximum	Mean	Std. Deviation
PRE VAS (V)	50.00	59.00	83.00	72.06	7.09
PRE DASH (D)	50.00	50.00	78.00	66.26	7.17
POST V (1M)	50.00	43.21	53.13	47.83	2.98
POST V (3M)	50.00	31.35	44.84	38.33	3.59
POST V (6M)	50.00	22.00	32.00	27.29	4.14
POST D (1M)	50.00	38.23	47.66	42.53	3.04
POST D (3M)	50.00	26.10	39.83	33.13	4.31
POST D (6M)	50.00	14.00	25.00	20.08	4.51
VAS Improvement	50.00	27.00	61.00	44.77	8.07
DASH Improvement	50.00	28.34	64.00	46.18	8.43
Valid N (list wise)	50.00				

Table 5: Correlation Between VAS and DASH Improvements Over Time

Correlation	VAS Improvement		DASH Improvement
VAS Improvement	Pearson Correlation	1	0.504
	Sig. (2-tailed)	<.001	
	N	50	50
DASH Improvement	Pearson Correlation	0.504	1
	Sig. (2-tailed)	<.001	
	N	50	50

The aforementioned data demonstrate the correlation between improvements in Visual Analog Scale (VAS) and DASH (Disabilities of the arm, shoulder and Hand) scores following treatment. A moderate positive correlation (Pearson's r=0.504, p<0.001) was observed, indicating that greater improvement in VAS scores was associated with greater improvement in DASH scores. This relationship is statistically significant, suggesting a substantive association between pain reduction and functional recovery in the study population.

The results of this study demonstrate that the injection of autologous PRP was highly efficacious in reducing pain and improving functionality in patients presenting with lateral epicondylitis. At the six-month follow-up, significant improvements were observed in both the VAS scores, which decreased from 72.06-27.29 and the DASH score, which decreased from 66.26-20.08. These findings are statistically significant, with a p-value of <0.001, indicating a substantial therapeutic effect of PRP in chronic tendinopathy. The study population comprised patients aged 20 years and above, with the highest prevalence of lateral epicondylitis observed in the 35-50-year age range, which is consistent with existing literature. While gender distribution was not specified in this study, other investigations, such as that conducted by Halkude *et al.*, reported equal proportions of male and female participants in PRP studies. Furthermore, Xu *et al.* and additional systematic reviews have similarly reported that lateral epicondylitis affects males and females with equal frequency. The present study corroborates previous research, including that of Xu *et al.* (2024), in demonstrating that PRP yields superior long-term outcomes compared to corticosteroids in terms of pain alleviation and functional improvement. This effect is attributed to the action of various bio active growth factors present in PRP, which facilitate tissue healing and collagen regeneration. Consistent with previous research by Halkude *et al.*, the safety profile of PRP has been satisfactory, with no major complications reported.

CONCLUSION

This study demonstrated the significant therapeutic potential of autologous PRP in managing painful conditions like lateral epicondylitis. PRP therapy notably improved pain and functional recovery, as evidenced by the reduction in VAS scores from 72.06-27.29 and DASH scores from 66.26-20.08 over six months. A positive correlation between pain relief and functional improvement (r=0.504, p<0.001) indicates the effectiveness of PRP in reducing symptom severity and enhancing physical function. Clinically, these findings highlight PRP's efficacy as a less invasive, regenerative treatment for lateral epicondylitis, especially for patients unresponsive to conservative treatments. The sustained six-month improvements suggest PRP offers long-term symptom relief and functional recovery, providing an alternative to corticosteroid injections, which often lack long-term effectiveness. Due to its regenerative properties and favorable safety profile, PRP therapy could be crucial in personalized treatment for tendinopathies.

Conflict of Interest: None to declare.

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