The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 3, 2025

EFFECTIVENESS OF PLATELET RICH PLASMA VERSUS CORTICOSTEROID IN LATERAL EPICONDYLITIS

Dr Zia Ullah[*1], Dr Syed Dilbagh Ali Shah[2], Dr. Irfan Khan[3], Dr Shahab Falak[4], Dr Rahim Ullah[5], Afnan Ullah Khan[6], Maab Falak[7]

*[*1]FCPS PG-Trainee, Department of Trauma and Orthopedic, MTI, Khyber Teaching Hospital, Peshawar*
[2]Associate Professor, Department of Trauma and Orthopedic, MTI, Khyber Teaching Hospital, Peshawar
[3]East Kent Hospitals University, NHS Foundation Trust.
[4]FCPS, PGR Orthopedics Unit, MTI GMC, Dera Ismail Khan
[5,6]Department of Trauma and Orthopedic Unit C, MTI, Khyber Teaching Hospital, Peshawar
[7]Northwest School of Medicine

[*1]drziaullahmarwat@gmail.com, [2]drdilbagh@gmail.com, [3]drirfankhan878@gmail.com, [4]drshahabfalak@gmail.com, [5]rahimullah2481@gmail.com, [6]afnankhan8710103@gmail.com, [7]maabfalak5566@gmail.com

DOI: https://doi.org/10.5281/zenodo.15087789

Keywords
platelet rich plasma, corticosteroid, lateral epicondylitis, pain.

Article History
Received on 25 January 2025
Accepted on 23 March 2025
Published on 26 March 2025

Corresponding Author: *

Abstract

Introduction: *Lateral epicondylitis primarily arises from repetitive strain due to tasks involving sustained and repeated gripping and/or wrist extension. Various therapeutic modalities have been suggested, with Platelet-rich plasma (PRP) being the most commonly utilized. PRP is an emerging method for tissue healing and regeneration, offering prolonged pain relief effects.*

Objective: *To compare the efficacy of platelet rich plasma and corticosteroid injection in lateral epicondylitis.*

Material and Methods: *The research took place at the Department of Orthopedics KTH Peshawar from September 2024 to January 2025 as a Randomized Controlled Trial. The total patient sample required 80 subjects who received equal distribution into two distinct groups. A total number of 40 patients underwent either corticosteroid or PRP treatment procedures. The treatment procedure involved injecting 2 mL of PRP solution combined with 1 mL of prilocaine hydrochloride (20 mg/mL) into the lateral epicondyle area using a 21-G injector according to the affected spot with maximum pain. Betamethasone was the medication used during the corticosteroid group injections. A systematic follow-up check occurred at the second week post-injection. Visual analog scale (VAS)scores less than 3 were considered an effective result after two weeks of treatment based on the evaluation through VAS. A statistical analysis took place on the SPSS software system.*

Results: *Our study population entailed of 53.8% males and 46.3% females. PRP was significantly ($p = 0.025$) more effective than corticosteroids, with 65.0% of patients in the PRP group achieving positive outcomes compared to 40.0% in the corticosteroid group. Stratification analysis reflected that PRP was*

significantly (p=0.040) more effective in younger patients, those having BMI >29kg/m^2 (p=0.004) and belonged to rural areas (p=0.049).

Conclusion: *PRP is a more effective treatment option for lateral epicondylitis compared to corticosteroids, particularly in younger patients, those with higher BMI, and those from rural areas.*

INTRODUCTION

The condition known as tennis elbow under its alternative name of lateral epicondylitis develops due to excessive tendon stress that affects the common extensor tendons at the extensor carpi radialis brevis (ECRB) tendon origin. This condition develops mostly due to repeated stresses from activities requiring frequent grasping motions alongside wrist extension and forearm supination positioning within tennis, squash and badminton sports or corresponding activities.[i,ii] The traditional association of tennis elbow with tennis still applies to any sport that demands repetitive wrist extension as well as radial deviation and forearm supination. Various sports like squash and badminton and additional activities with matching movements present this condition to their participants.[iii]

Despite its designation, tennis players represent merely 10% of the impacted demographic.[iv] Approximately 50% of all tennis players encounter elbow pain, with 75% exhibiting true tennis elbow symptoms. This illness is more prevalent in those over 40 years of age.[v] Risk factors for its development in the general population encompass smoking, obesity, performing repetitive movements for a minimum of two hours daily, and engaging in strenuous activities involving physical loads over 20 kg. The prognosis of the illness is favorable, with spontaneous healing noted in 80% to 90% of patients within one to two years.[5,vi] Initial therapy for lateral epicondylitis entails abstaining from aggravating activities, contingent upon pain severity. Application of ice post-activity and the administration of oral or topical NSAIDs may assist in pain management. Forearm counterforce straps are recommended to alleviate stress at the lateral epicondyle.[vii] Surgery should serve as the last course of action when treating lateral epicondylitis. The decision to proceed with surgery must wait until patients receive at least 6-12 months of nonoperative treatment.[viii]

Corticosteroid injection is regarded as a primary therapeutic modality for lateral epicondylitis (LE).[ix] The primary objective of corticosteroids is to diminish inflammation; nonetheless, it remains uncertain whether they possess any long-term therapeutic capability regarding the disease's degenerative alterations. Whitman, Berry and Green introduced PRP which exhibits platelet concentrations 3 to 5 times greater than whole blood levels supporting essential bone-to-tendon restorative growth factors together with vascular and epidermal and connective tissue growth factors.[x]

No such study has been done in our local population. Corticosteroids provide short-term pain relief but high recurrence rates, while platelet rich plasma has demonstrated longer-term improvement but variable results across trials. Additional high-quality studies are warranted to clarify which patients stand to benefit most from each intervention. Determining the relative efficacy of these injection therapies will allow physicians to better tailor evidence-based treatments to individual patients with lateral epicondylitis and optimize their functional outcomes. Given the prevalence of this condition, resolving these uncertainties through further comparative effectiveness research should be a priority.

MATERIAL AND METHODS

The research took place at the Orthopedics Department of KTH Peshawar. The research hypothesis established that platelet rich plasma exhibits different therapeutic effects compared to corticosteroid injection for treating lateral epicondylitis. Researchers collected the data during the period from September 2024 through January 2025. The research calculated its sample size with 95% confidence while using 5% significance and an 80% test power. The study found that platelet rich plasma effectiveness amounted to 82.3% whereas corticosteroid injection proved 52.9% effective for

lateral epicondylitis treatment.[17] The study recruited 80 patients into separate treatment groups, each containing 40 patients. This research included all patients 18 to 50 years old who suffered from lateral epicondylitis regardless of gender. Acute elbow trauma along with rheumatoid arthritis and diabetes mellitus and hepatitis and anemia and bleeding problems and malignancy served as inclusion criteria for participant exclusion. The research excluded all pregnant females from participation. The condition of lateral epicondylitis displays through forearm and elbow lateral aspects when patients experience intense pain (VAS >3) along with burning sensations and discomfort while MRI shows any of these abnormalities: 1) common extensor origin's abnormal thickening as well as heightened signal intensity at the lateral epicondyle. The presence of abnormal thickening in the radial collateral ligaments together with separation of the extensor carpi radialis brevis (ECRB) tendon and granulation tissue manifestation. All patients received recording of their personal demographic information at the beginning. The study included written consent participation from all patients involved in the study. For randomization purposes blocked randomization served as the method. The practitioners treated the patients with 2 mL of PRP that received 1 mL of prilocaine hydrochloride (20 mg/mL) by injecting it through a 21-G injector into the most painful part of the lateral epicondyle using the peppering technique. Identical conditions operated during both platelet-rich plasma preparation and delivery stages for all patients. The physicians obtained 30mL of peripheral blood from the antecubital region. Tests for peripheral platelet counting occurred first in 3.2% sodium citrate tubes before the analysis moved to an EDTA test tube. The centrifugation process happened at ambient temperature for 8 minutes using 1500 revolutions per minute. The laboratory received one milliliter of PRP after its collection for performing platelet count analysis. The most sensitive area of the lateral epicondyle received the activated PRP solution (50 µL Cl2 Ca per 1 mL PRP) through sterile palpation procedures at the elbow. The corticosteroid group received an elbow flexion at 90 degrees with an injection of 2 mL autologous whole blood containing 1 mL prilocaine hydrochloride (20 mg/mL) before receiving 2 mL prilocaine hydrochloride (20 mg/mL) combined with 1 mL betamethasone (the injection included betamethasone dipropionate equivalent to 5 mg betamethasone and betamethasone sodium phosphate equivalent to 2 mg betamethasone). All participants received identical post-injection instructions to keep elbows rested with shoulder arm sling immobilization as they refrained from anti-inflammatory medications except paracetamol during the first two weeks and avoided heating or blood-thinning and anti-aggregating drugs throughout the period. During follow-up the patients received warning instructions against additional elbow region injections. Professional medical personnel checked on all patients during the second post-injection week. The Visual Analogue Scale (VAS) assessed patients for effectiveness measurement. The therapeutic success criterion was defined as a VAS pain score below level 3 after therapy during the second week. Data were analyzed using the statistical analysis software IBM-SPSS version 26. Frequencies and percentages were calculated for categorical factors such as gender, residential status, and efficacy. Mean ± SD were reported for quantitative characteristics such as age, BMI, and pain duration. The Chi-square test was utilized to assess efficacy between the two groups, with $p < 0.05$ considered significant. The efficacy was categorized based on age, gender, residence status, BMI, and pain duration. Post stratification employing the chi-square test for both groups, with $p < 0.05$ being statistically significant.

RESULTS

In our study, a total of 80 participants were included, equally divided into the PRP group (n=40) and the corticosteroid group (n=40). Details of the various quantitative variable (including demographic and clinical) such as age, BMI and duration of pain are presented in table 1. There was no significant difference in any of these variables; however, duration of pain was slightly higher in PRP group. Our study population entailed of 53.8% males and 46.3% females, with a nearly equal distribution between the two treatment groups. 65.0% of study subjects were from urban areas, while 35.0% were from rural areas, with no significant differences between the groups. Patients were further divided into subcategories of age, BMI and duration of pain and it was noticed that majority of the participants (75.0%) were ≤ 40 years

old, having BMI between 25-29 kg/m² and presented with onset of symptoms for ≤ 8 weeks (table 2).

It was noticed that PRP was significantly (p = 0.025) more effective than corticosteroids, with 65.0% of patients in the PRP group achieving positive outcomes compared to 40.0% in the corticosteroid group (figure 1).

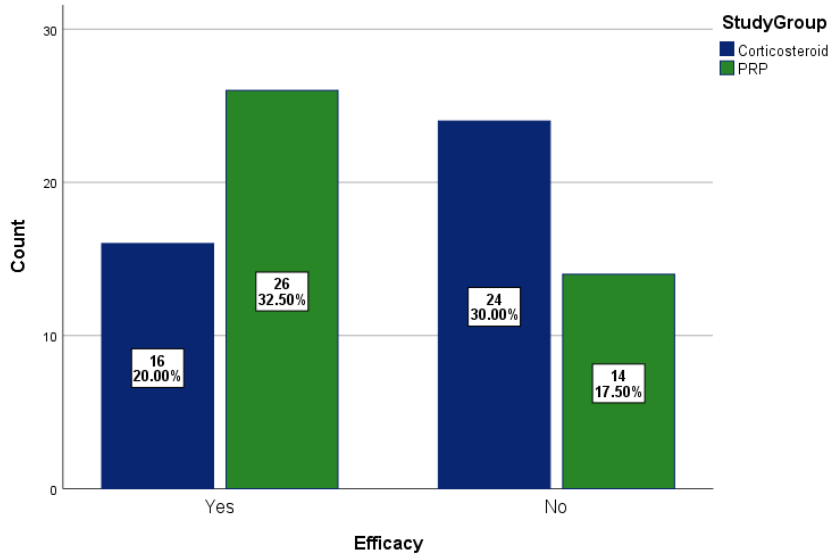
Stratification analysis reflected that PRP was significantly (p=0.040) more effective in younger patients, with 67.7% reporting positive outcomes compared to 41.4% in the corticosteroid group. Furthermore, PRP was significantly (p=0.004) more effective in patients with > 29 kg/m² BMI, with 81.3% reporting positive outcomes compared to 28.6% in the corticosteroid group. Interestingly, PRP was significantly (p=0.049) more effective in patients who belonged to rural areas, with 76.9% reporting positive outcomes compared to 40.0% in the corticosteroid group. No significant association with any other study confounder has been observed through the data analysis (table 3).

Table 1: Demographic and clinical details of the quantitative variables of the study participants

Demographic and Clinical Quantitative Variables	Corticosteroid Group N=40		PRP Group N=40	
	Mean	± SD	Mean	± SD
Age (Years)	35.78	8.04	33.30	7.51
Body Mass Index (kg/m^2)	27.93	3.69	27.77	3.47
Duration of Pain (weeks)	7.65	2.54	8.10	2.56

Table 2: Clinical, demographic and comorbid details of study subjects in both groups [n (%)]

Demographic and Clinical Qualitative Variables		Corticosteroid Group N=40	PRP Group N=40	Total (n=80)
Gender	Male	21 (52.5%)	22 (55.0%)	43 (53.8%)
	Female	19 (47.5%)	18 (45.0%)	37 (46.3%)
Age	≤ 40 Years	29 (72.5%)	31 (77.5%)	60 (75.0%)
	> 40 Years	11 (27.5%)	9 (22.5%)	20 (25.0%)
Body Mass Index	<25 kg/m^2	8 (20.0%)	8 (20.0%)	16 (20.0%)
	25-29 kg/m^2	18 (45.0%)	16 (40.0%)	34 (42.5%)
	> 29 kg/m^2	14 (35.0%)	16 (40.0%)	30 (37.5%)
Duration of Pain Groups	≤ 8 weeks	29 (72.5%)	25 (62.5%)	54 (67.5%)
	>8 weeks	11 (27.5%)	15 (37.5%)	26 (32.5%)
Residential Status	Rural	15 (37.5%)	13 (32.5%)	28 (35.0%)
	Urban	25 (62.5%)	27 (67.5%)	52 (65.0%)



p-value (chi-square test) = 0.025

Figure 1: Efficacy of platelet rich plasma and corticosteroid injection in lateral epicondylitis

Table 3: Stratification of efficacy for various effect modifiers (gender, age, BMI, duration of pain and residential status)

Variables			Study Groups		p-Value (x^2-test)
			CorticosteroidGroup N=40	PRP Group N=40	
Gender	Male	Yes	10 (47.6%)	16 (72.7%)	0.092
		No	11 (52.4%)	6 (27.3%)	
	Female	Yes	6 (31.6%)	10 (55.6%)	0.141
		No	13 (68.4%)	8 (44.4%)	
Age (Years)	≤ 40	Yes	12 (41.4%)	21 (67.7%)	0.040
		No	17 (58.6%)	10 (32.3%)	
	> 40	Yes	4 (36.4%)	5 (55.6%)	0.391
		No	7 (63.6%)	4 (44.4%)	
BMI (Kg/m^2)	≤ 25	Yes	2 (25.0%)	5 (62.5%)	0.131
		No	6 (75.0%)	3 (37.5%)	
	25-29	Yes	10 (55.6%)	8 (50.0%)	0.746
		No	8 (44.4%)	8 (50.0%)	
	>29	Yes	4 (28.6%)	13 (81.3%)	0.004
		No	10 (71.4%)	3 (18.8%)	
Duration of Pain (Weeks)	≤ 8	Yes	10 (34.5%)	15 (60.0%)	0.061
		No	19 (65.5%)	10 (40.0%)	
	> 8	Yes	6 (54.5%)	11 (73.3%)	0.320
		No	5 (45.5%)	4 (26.7%)	
Residential Status	Rural	Yes	6 (40.0%)	10 (76.9%)	0.049

Variables			Study Groups		p-Value (x^2-test)
			CorticosteroidGroup N=40	PRP Group N=40	
Gender	Male	Yes	10 (47.6%)	16 (72.7%)	0.092
		No	11 (52.4%)	6 (27.3%)	
	Female	Yes	6 (31.6%)	10 (55.6%)	0.141
		No	13 (68.4%)	8 (44.4%)	
		No	9 (60.0%)	3 (23.1%)	
	Urban	Yes	10 (40.0%)	16 (59.3%)	0.165
		No	15 (60.0%)	11 (40.7%)	

DISCUSSION

Tennis elbow can be referred to as lateral elbow pain, lateral epicondylitis, rowing elbow, tendonitis of the common extensor origin, or peri-tendonitis of the elbow and elbow. This ailment was initially identified as "writer's cramp" in 1873. [xi] The defining characteristic of this illness is angiofibroblastic dysplasia of the long extensor tendons in the forearm.[xii] Pathology has been identified as degenerative tendinosis, which contrasts with tendinitis due to its high fibroblast populations, vascular hyperplasia, and disorganized collagen structure. The lateral epicondyle may exhibit moderate calcification on radiography.[xiii]

Our study aimed to evaluate the effectiveness of Platelet-Rich Plasma (PRP) versus corticosteroid injections in the treatment of lateral epicondylitis, a common and often debilitating condition. The results demonstrated that PRP was significantly more effective than corticosteroids in achieving pain relief and functional improvement, with 65% of patients in the PRP group reporting positive outcomes compared to 40% in the corticosteroid group ($p = 0.025$). The findings of this study have important implications for the management of lateral epicondylitis especially for our local population that lack the data on this subject previously. PRP appears to be a more effective treatment option, particularly for younger patients, those with higher BMI, and those with chronic symptoms. Clinicians should consider these factors when selecting a treatment, as PRP may offer long-term benefits that outweigh its higher cost and more invasive nature compared to corticosteroids. For patients in rural areas, where access to advanced treatments may be limited, the superior efficacy of PRP highlights the need for improved healthcare infrastructure and patient education. Additionally, the study underscores the importance of personalized treatment approaches, as patient-specific factors significantly influence treatment outcomes. No major complications were reported in either treatment group. Our study did not assess long-term outcomes beyond the immediate follow-up period. However, the superior efficacy of PRP at the study endpoint suggests potential long-term benefits. Our study findings are aligning with existing literature and provide valuable insights into the differential efficacy of these treatments, particularly when considering patient-specific factors such as age, BMI, and duration of symptoms.

Li A et al reported that PRP yielded significantly lower Visual Analog Scale (VAS) and Disabilities of the Arm, Shoulder, and Hand (DASH) scores at 24 weeks compared to corticosteroids ($p<0.00001$). Unlike our study, this meta-analysis did not specifically address subgroup analysis based on demographic or clinical factors and did not report significant complications associated with PRP or corticosteroids.[xiv] Similarly, Gosens T et al, in their study showed a higher success rate (defined as a 25% reduction in VAS or DASH scores without reintervention) by the PRP compared to corticosteroids at 2-year follow-up ($p<0.0001$).[xv] Moreover, PRP was significantly more effective than corticosteroids, with 73% of PRP-treated patients achieving success compared to 49% in the corticosteroid group ($p<0.001$).[xvi] In a study by Khaliq A, et al. has shown that efficacy of platelet rich plasma was 82.3% as compare to 52.9% with corticosteroid injection in lateral epicondylitis.[xvii] However, unlike our study did not stratify results by age, BMI, or

residential status but confirmed the overall superiority of PRP. Nevertheless, the collective evidence supports the clinical use of PRP for lateral epicondylitis, particularly for patients seeking long-term relief and functional improvement. Contrary to our findings, no significant difference was observed at 6 weeks and 3 months, PRP showed a significant reduction in VAS scores at 6 months compared to corticosteroids (p=0.001).[xviii]

In our study patients aged ≤ 40 years showed a significantly higher response rate to PRP compared to corticosteroids (p=0.040). This suggests that younger patients, who may have better regenerative capacity, benefit more from PRP. In contrast, the difference in efficacy was not statistically significant in patients > 40 years, possibly due to age-related declines in tissue healing.[xix] Patients with a BMI > 29 kg/m² had the most pronounced response to PRP compared to corticosteroid group (p=0.004). This finding is particularly relevant given the rising prevalence of obesity and its association with chronic musculoskeletal conditions. The anti-inflammatory and regenerative properties of PRP may be more effective in addressing the underlying pathophysiology in obese patients.[xx] While PRP was more effective in patients with both shorter and longer symptom durations, the difference was more pronounced in the latter group (p=0.320). This aligns with the notion that PRP is particularly beneficial for chronic cases, where tissue degeneration is more advanced.[xxi] Surprisingly, patients from rural areas showed a significantly higher response rate to PRP compared to corticosteroids (p=0.049). This may reflect differences in access to healthcare or lifestyle factors that influence treatment outcomes.

Strengths and limitations:

Our study employed a head-to-head comparison of PRP and corticosteroids, providing direct evidence of their relative efficacy. The inclusion of subgroup analyses based on age, BMI, symptom duration, and residential status offers valuable insights into which patients are most likely to benefit from each treatment. Lateral epicondylitis is a common condition with significant functional and economic implications. The study provides practical guidance for clinicians in selecting the most appropriate treatment for individual patients.

Despite its strengths, this study is not free of limitations. As, the sample size was adequate for detecting significant differences, a larger cohort would enhance the generalizability of the findings and allow for more robust subgroup analyses. This research assessed outcomes at a single time point, which may not capture the long-term efficacy and potential recurrence of symptoms. Future studies should include longer follow-up periods to evaluate sustained benefits. Above all, this study was conducted at a single center, which may limit the generalizability of the findings to other populations or healthcare settings.

CONCLUSION

The research findings reveal that PRP proves superior to corticosteroids as lateral epicondylitis treatment particularly for young patients with high BMI and rural residence. Data suggests PRP treatment should act as primary intervention for this condition because it works better than corticosteroids when patient-dependent factors are considered. Additional research using larger study populations and extended observation time must be conducted to validate these discoveries and develop advanced treatment plans.

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