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Clinical Efficacy and Comparison of Extracorporeal Shock Wave Therapy (ESWT) and Platelet-Rich Plasma (PRP) in Lateral Epicondylitis: A Systematic Review

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ABSTRACT

Background and Objectives: Lateral epicondylitis, or tennis elbow, is a common musculoskeletal condition caused by repetitive strain, particularly affecting the extensor carpi radialis brevis (ECRB) tendon. While often self-limiting, chronic cases can impair daily function. Among conservative treatments, platelet-rich plasma (PRP) and extracorporeal shock wave therapy (ESWT) are widely used. PRP provides biological regeneration through growth factor release, while ESWT offers mechanical stimulation to promote healing. However, their comparative effectiveness remains uncertain. ***Methods:*** A systematic review was conducted based on PRISMA-P guidelines. Searches were performed in PubMed, Scopus, and Cochrane Library to identify randomized controlled trials (RCTs) comparing PRP and ESWT in adults with chronic lateral epicondylitis. Outcomes of interest included pain (VAS) and function (PRTEE, DASH, HSG). Study quality was assessed using the JBI checklist. ***Results:*** Five RCTs met inclusion criteria, involving 17 to 63 participants and follow-up periods of 3 to 40 months. PRP showed gradual, long-term improvements in pain and function, with one study reporting a 93.85% success rate. ESWT provided more immediate pain relief within weeks. ***Discussion:*** Both PRP and ESWT are effective nonoperative treatments with distinct mechanisms and timelines. PRP is suited for long-term recovery, while ESWT offers faster symptom control. Despite promising outcomes, limitations include small sample sizes and variation in treatment protocols, underscoring the need for further research.

Keywords: extracorporeal shock wave therapy; lateral epicondylitis; platelet-rich plasma injection; tennis elbow.

INTRODUCTION

Lateral epicondylitis, commonly known as tennis elbow, is a prevalent musculoskeletal disorder affecting 1% to 3% of the population[1]. Characterized by pain and tenderness on the lateral aspect of the elbow. This condition results from repetitive overuse of the forearm extensors, leading to microtears and degeneration of the extensor carpi radialis brevis (ECRB) tendon[2]. It can significantly impair daily activities and reduce work productivity.

Among the various therapeutic options, Platelet-Rich Plasma (PRP) and Extracorporeal Shock Wave Therapy (ESWT) have gained attention for their potential in managing chronic lateral epicondylitis. PRP, an autologous concentration of platelets, delivers growth factors to enhance tissue repair and reduce inflammation[3]. Conversely, ESWT, a non-invasive modality, utilizes acoustic shock waves to stimulate tissue regeneration, increase blood circulation, and modulate pain[4]. Despite their widespread use, the relative efficacy of PRP and ESWT remains controversial. Several randomized controlled trials (RCTs) report conflicting outcomes, with some favoring PRP's regenerative effects, while others highlight ESWT's non-invasive benefits[5]. Hence, a systematic review is essential to consolidate existing evidence and guide clinical decision-making.

This systematic review aims to compare the efficacy of PRP and ESWT in patients with lateral epicondylitis by analyzing outcomes such as pain relief and functional improvement. The findings will contribute to evidence-based clinical practice and inform future non-operative treatment strategies for managing chronic lateral epicondylitis.

MATERIALS & METHODS

This systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The study protocol was registered with PROSPERO (CRD420251067349)

Search Strategy

A comprehensive literature search was performed in major electronic databases, including PubMed, Scopus, and Cochrane Library, to identify relevant studies. A structured search strategy was designed using relevant keywords and Medical Subject Headings (MeSH) terms, including "lateral epicondylitis," "platelet-rich plasma," and "extracorporeal shock wave therapy".

Inclusion and Exclusion Criteria

The inclusion criteria sought in the study were as follows:

(1) *Population:* The Subjects of research are adults diagnosed with chronic lateral epicondylitis based on clinical or imaging criteria.
(2) *Intervention:* directly compare the effects of PRP and ESWT in patients diagnosed with lateral epicondylitis.
(3) *Study Design:* Randomized controlled trials (RCTs)
(4) *Language:* Research publication in English

This review will include randomized controlled trials (RCTs) that Only studies that report measurable outcomes such as pain relief and functional improvement will be considered. Additionally, the studies will be excluded if they are case reports, review articles, animal studies, or in vitro research. Additionally, studies that do not provide a direct comparison between PRP and ESWT, lack sufficient outcome data, or have a short follow-up duration will not be considered.

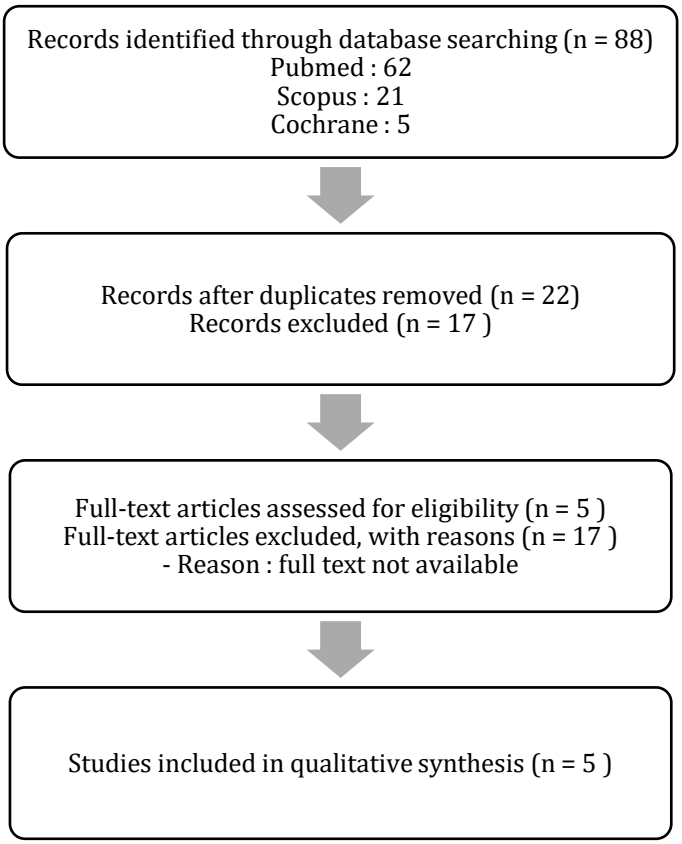

FIGURE 1: Study Search Design.

Data Extraction

From the collected studies, we will extract relevant data, including authors and year of publication, study design, sample size, patient age, clinical outcomes, treatment type, and follow-up duration (Table 1). Data extraction will be conducted independently by the reviewer.

Risk of Bias and Quality Assessment

The quality of the studies will be assessed using the Joanna Briggs Institute (JBI) checklist for randomized controlled trials (RCTs).

The assessment will include methodological aspects such as randomization methods, allocation concealment, blinding of participants and assessors, completeness of follow-up, intention-to-treat analysis, and statistical reliability (Table 2).

Data Synthesis

Studies with high scores will be considered to have a low risk of bias, while those with lower scores will be further analysed to evaluate their impact on the systematic review findings.

TABLE 1: Characteristics of Included Randomized Controlled Trials.

Author	Study Design	Sample Size	Age Range	Follow-up
Othman, A. (2014)	Randomized Controlled Study	37	23-57 years	40 months
Sabhaz et al. (2021)	Randomized Controlled Study	74	26-60 years	6 months
Alessio-Mazzola et al. (2018)	Randomized Controlled Study	63	18-65 years	24 months
Akcin A. et al. (2025)	Randomized Controlled Study	91	18-65 years	3 months
Sabhaz T. et al. (2021)	Randomized Controlled Study	74	20-60 years	12 months

RESULT

Study Selection

The search for studies of PRP vs ESWT treatment of lateral epicondylitis identified 88 potential articles, and 22 articles after duplicates were removed. These were reviewed as full abstracts. Of these, four articles were reviewed as full texts, and 17 articles were excluded.

Five trials were included in the review that compared nonoperative treatment of lateral epicondylitis with a control. The study flow is summarized in Figure 1. The sample sizes of individual studies ranged from 17 to 63 patients. Follow-up time was most commonly 20 months but ranged from 3 to 40 months. Study characteristics are summarized in Table 1.

DISCUSSION

TABLE 2: Comparative Clinical Outcomes of PRP and ESWT in Included RCTs.

Author	Outcome Measures			
	VAS	DASH	PRTEE	Handgrip Strength
Othman, A. (2014)	The average post-treatment VAS score in the PRP group was lower than in the ESWT group, with a statistically significant difference (P = 0.02).	The DASH score was also lower in the PRP group than in the ESWT group, with a significant difference (P = 0.01).	-	-
Sabhaz et al. (2021)	PRP group had significantly lower VAS scores than ESWT group (P = 0.001).	PRP group had significantly lower DASH scores than ESWT group (P = 0.001).	PRP group had significantly lower PRTEE scores than the ESWT group at six months (P = 0.007).	-
Alessio-Mazzola et al.	PRP group showed better VAS reduction compared to ESWT group (P < 0.05).	PRP group had better DASH scores than ESWT group (P < 0.05).	PRTEE scores were lower in the ESWT group than in the PRP group, but both treatments showed significant improvement from baseline (P < 0.0001)	PRP group showed better handgrip strength than ESWT group (P < 0.05).
Akcin A. et al. (2025)	The PRP+ESWT group had significantly lower VAS scores for activity compared to Sham PRP and ESWT alone groups (P = 0.001).	The PRP+ESWT group had significantly lower DASH scores compared to Sham PRP+ESWT and ESWT groups (P = 0.026).	The PRP+ESWT group had significantly lower PRTEE scores compared to Sham PRP and ESWT groups (P = 0.017).	The PRP group showed greater improvement in handgrip strength than Sham PRP and ESWT groups (P = 0.002).
Sabhaz T. et al (2021)	The PRP group had significantly lower VAS scores compared to the ESWT group at six months follow-up (P = 0.001), indicating greater pain reduction.	The PRP group showed significantly lower DASH scores than the ESWT group (P = 0.001), reflecting better functional improvement in the PRP group.	The PRP group demonstrated significantly lower PRTEE scores compared to the ESWT group (P = 0.007), indicating superior patient-reported outcomes.	The PRP group achieved significantly greater improvement in handgrip strength compared to the ESWT group (P = 0.002).

A study conducted by Othman (2014) compared the effectiveness of PRP and ESWT in treating chronic lateral epicondylitis. The results showed that the PRP group experienced greater improvements in the Visual Analog Scale (VAS) and Disabilities of the Arm, Shoulder, and Hand (DASH) scores compared to the ESWT group. The success rate of PRP therapy reached 93.85%, while ESWT was only 70%. Additionally, PRP provided more significant pain reduction and better elbow function improvement compared to ESWT in long-term follow-ups[1]. PRP therapy harnesses the body's natural healing mechanisms by injecting a concentrated solution of autologous platelets directly into the injured tendon. The platelets release growth factors such as PDGF, VEGF, and TGF-β, which promote angiogenesis, fibroblast proliferation, and extracellular matrix remodeling, essential processes in tendon regeneration.

Across both studies, PRP demonstrated the most consistent and significant improvements in both pain reduction and functional recovery. In the study by Othman et al. (2014)**,** PRP reduced the average VAS pain score from 8.52 to 1.47 and DASH scores from 72 to 48.23 ($p = 0.0001$), with a success rate of 93.85%, significantly higher than the 70% success rate in the ESWT group ($p < 0.001$). PRP also achieved greater patient satisfaction. Similarly, Alessio-Mazzola et al. (2018) observed substantial improvements in the PRP group, including reductions in VAS (from 8.4 to 0.9), PRTEE (from 60.1 to 15.9), and DASH scores (from 65.1 to 5.5), all with $p < 0.0001$. Although statistical differences between PRP and ESWT were not significant ($p > 0.05$), PRP led to faster symptom resolution and quicker return to normal activity. ESWT has been extensively studied for musculoskeletal disorders due to its non-invasive nature and ability to induce biological responses. ESWT works through mechanotransduction, stimulating biological activity through acoustic waves that promote neovascularization, disrupt nociceptors, and trigger a local inflammatory response that initiates healing. While less invasive than PRP, ESWT generally provides more rapid pain relief rather than deep tissue regeneration.

In Othman et al.**,** ESWT reduced VAS from 8.2 to 1.95 and DASH from 72.25 to 51.7 ($p = 0.0001$), showing clinical improvement, but it was inferior to PRP in all measures, with a significantly lower success rate ($p < 0.001$). Alessio-Mazzola et al**.** found that ESWT was comparable to PRP in terms of pain and function improvement at 12 months (VAS, PRTEE, DASH all ($p < 0.0001$), but patients receiving PRP experienced faster recovery. While ESWT contributed to improvement, it lacked the comprehensive impact observed with regenerative therapy combinations. In the study conducted by Sabbaaz et al. (2021), the PRP group demonstrated significantly lower VAS scores compared to the ESWT group ($P = 0.001$), indicating better pain reduction. Additionally, the PRP group showed significantly lower DASH scores than the ESWT group ($P = 0.001$), suggesting improved functional outcomes.

The PRP group also had significantly lower PRTEE scores compared to the ESWT group at six months ($P = 0.007$), indicating superior patient-reported outcomes in the PRP group. Meanwhile, the study conducted by Sabhaz et al. (2021) demonstrated that (PRP) therapy is more effective than extracorporeal shock wave therapy (ESWT) in improving pain, functional outcomes, patient satisfaction, and handgrip strength in patients with lateral epicondylitis. The PRP group showed significantly better improvements across all outcome measures, including VAS, DASH, PRTEE scores, and handgrip strength, compared to the ESWT group. Meanwhile, in the study by Akcin et al. (2025), the PRP and ESWT group exhibited significantly lower VAS scores for activity compared to both the Sham PRP and ESWT alone groups ($P = 0.001$). This combination group also achieved significantly lower DASH scores than the Sham PRP and ESWT and ESWT groups ($P = 0.002$). Furthermore, the PRP and ESWT group demonstrated significantly lower PRTEE scores than the Sham PRP and ESWT groups ($P = 0.017$), indicating better functional recovery and pain relief. In terms of handgrip strength, the PRP group showed greater improvement compared to both the Sham PRP and ESWT groups, with statistically significant differences ($P = 0.002$). The key advantage of ESWT lies in its rapid pain relief and non-invasive application. Patients often report symptomatic improvement after only a few sessions. Moreover, ESWT has minimal side effects and can be repeated if necessary. Despite these benefits, some studies suggest that its regenerative potential might be limited compared to PRP, particularly in advanced or degenerative cases. Therefore, while ESWT is ideal for symptom control and functional recovery, it may not fully address the underlying tendon pathology in chronic conditions.

CONCLUSION

The management of lateral epicondylitis requires a personalized approach based on the chronicity and severity of symptoms, patient preference, and available resources. PRP and ESWT have both demonstrated clinical efficacy, each offering distinct advantages. PRP for long-term tendon regeneration, and ESWT for rapid symptomatic relief. The management of chronic lateral epicondylitis requires a comprehensive and evidence-based approach due to its degenerative nature and resistance to conventional therapies. From the synthesis of two randomized controlled trials, it is evident that Platelet-Rich Plasma (PRP) and Extracorporeal Shock Wave Therapy (ESWT) played important roles in symptom control and functional restoration. However, their effectiveness varies depending on treatment goals, whether it is pain reduction, tendon healing, or restoration of muscular function. However, further research is warranted, especially in larger subjects, to better understand the benefits and limitations of each combination therapy and to optimize their clinical application.

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