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Efficacy of Intra-Articular Platelet-Rich Plasma in Reducing Pain and Improving Function in Patients with Temporomandibular Joint Internal Derangement: A Prospective Observational Study

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ABSTRACT

Background: Temporo-mandibular joint internal derangement is considered as a common intra-articular disorder which is characterised by pain, restricted mandibular movement, ultimately affecting the quality of life. Conventional therapies frequently provide incomplete or temporary relief and lack regenerative potential.

Objective: To evaluate the efficacy of intra-articular platelet-rich plasma (PRP) in reducing pain and improving function in patients with Wilkes stage I–III TMJ internal derangement.

Methods: A prospective study was conducted at the Department of Oral & Maxillofacial Surgery, LUMHS, Jamshoro, enrolling 42 patients (aged 18–65 years) with clinically confirmed Wilkes stage I–III TMJ internal derangement refractory to conservative management. Autologous PRP (2–4 mL) was prepared by two-step centrifugation and administered intra-articularly. Outcomes—Visual Analog Scale (VAS) pain score and Maximum Mouth Opening (MMO)—were recorded at baseline, 1, and 3 months. Data were analysed using paired t-tests and repeated-measures ANOVA.

Results: Mean VAS fell from 7.4±1.2 at baseline to 3.1±1.0 at three months (58.1% reduction; $p<0.001$). Mean MMO improved from 31.2±5.1 mm to 38.4±4.2 mm (23.1% improvement; $p<0.001$). Stage III prevalence decreased from 28.6% at baseline to 16.7% at three months. Overall, 78.6% of patients achieved ≥50% pain reduction at three months. Minor adverse events occurred in 11.9%; no serious complications were reported.

Conclusion: Intra-articular PRP therapy produced significant, progressive pain relief and functional improvement over three months with a favourable safety profile in patients with early-to-moderate TMJ internal derangement. Randomised controlled trials with longer follow-up and imaging endpoints are warranted.

Keywords	temporomandibular joint; internal derangement; platelet-rich plasma; PRP; pain; jaw function; regenerative therapy; Wilkes staging
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INTRODUCTION

Temporo-mandibular joint disorders represent one of the most prevalent chronic orofacial pain conditions, second in frequency only to odontogenic pain, and constitute a significant clinical burden for oral and maxillofacial surgeons worldwide.[1] Among the spectrum of TMJ disorders, internal derangement—characterised by an abnormal positional relationship between the articular disc, mandibular condyle, and articular eminence—is the most frequently encountered intra-articular pathology.[2] Its cardinal manifestations include pre-auricular pain, joint sounds, restricted or deviated mandibular opening, and episodic locking, all of which impair mastication, speech, and daily function.[3] The Wilkes classification, which categorises the disorder into five progressive stages based on clinical, radiographic, and intra-articular criteria, remains the most widely accepted staging framework.[5] Early stages (I–III) are characterised predominantly by disc displacement and synovial inflammation, making them the most suitable target for minimally invasive biologic intervention before irreversible degenerative changes supervene.[6]

Current management follows a stepwise continuum from conservative measures—physical therapy, occlusal splints, and pharmacotherapy—to minimally invasive procedures such as arthrocentesis, and finally open-joint surgery for advanced or refractory cases.[24] Although conservative therapy benefits a substantial proportion of patients, a meaningful subset experiences persistent or recurrent symptoms, and none of the established modalities actively promote disc fibrocartilage or condylar cartilage regeneration.[8] Platelet-rich plasma is an autologous concentrate of platelets in a small plasma volume, rich in growth factors including platelet-derived growth factor (PDGF), transforming growth factor-β (TGF-β), vascular endothelial growth factor (VEGF), and insulin-like growth factor-1 (IGF-1).[1213] When injected intra-articularly, PRP exerts anti-inflammatory effects by down-regulating pro-inflammatory cytokines, promotes chondrocyte viability and extracellular matrix synthesis, enhances synovial fluid quality, and recruits mesenchymal progenitor cells—collectively addressing both the symptomatic and structural dimensions of internal derangement.[1′15] Despite accumulating evidence from international studies, locally derived data evaluating PRP efficacy in the Pakistani population remain scarce. This prospective observational study therefore aimed to assess the effect of intra-articular PRP injections on pain intensity and mandibular function in patients with Wilkes stage I–III TMJ internal derangement at a tertiary care teaching hospital, with the objective of contributing to regionally relevant, evidence-based practice.

MATERIALS AND METHODS

Study Design and Setting

A Prospective Observational Study was designed and conducted at the Department of Oral & Maxillofacial Surgery, Faculty of Dentistry, Liaquat University of Medical & Health Sciences (LUMHS), Jamshoro, Sindh, Pakistan from September 2025 to March 2026, after obtaining ethical approval by the LUMHS Ethical Review Committee vide No.LUMHS/REC/-1116 Dated 25-09-2025

Participants

A consecutive sample of 42 patients aged 18–65 years with clinically and radiographically confirmed Wilkes stage I–III TMJ internal derangement, refractory to at least eight weeks of conservative management, was enrolled using non-probability consecutive sampling. Diagnosis was established using Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) clinical criteria supplemented by MRI where indicated.

Inclusion criteria: pain duration ≥3 months; VAS score ≥5; willingness to attend scheduled follow-up. Exclusion criteria: Wilkes stage IV or V; prior TMJ surgery; active joint infection; rheumatoid arthritis or systemic inflammatory disorder; pregnancy or lactation; anticoagulant therapy; platelet count <150 000/μL; known allergy to local anaesthetics.

PRP Preparation and Injection Protocol

Venous blood (10–20 mL) was collected into sterile citrate-containing tubes. Two-step centrifugation was performed: first at 1500–2000 rpm for 10–15 minutes to separate cellular layers, followed by collection of the buffy coat and a second centrifugation at 1500–2000 rpm for 5–10 minutes to concentrate platelets. The resulting autologous PRP (2–4 mL) was activated with calcium chloride and administered intra-articularly into the superior joint compartment under aseptic conditions following local anaesthetic infiltration.

Outcome Measures

The primary outcome was pain intensity assessed by a 10-cm Visual Analog Scale (VAS; 0 = no pain, 10 = worst imaginable pain). The secondary outcome was Maximum Mouth Opening (MMO) measured in millimetres between the upper and lower central incisor edges at maximum unassisted opening. Both outcomes were recorded at baseline (pre-injection) and at one and three months post-injection. Wilkes staging was reassessed clinically at each follow-up. Adverse events were recorded throughout.

Statistical Analysis

Data were entered and analysed using SPSS version 27.0 (IBM Corp., Armonk, NY). Descriptive statistics—mean and standard deviation (SD)—summarised continuous variables; frequencies and percentages described categorical variables. Paired t-tests compared pre- and post-treatment VAS and MMO values at each time point, and repeated-measures ANOVA examined change trajectories over three months. Statistical significance was set at $p<0.05$.

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Ethical approval

Ethical approval was obtained from the LUMHS Ethical Review Committee (No.LUMHS/REC/-1116 Dated 25-09-2025). Written informed consent was obtained from all participants before enrolment.

RESULTS

Demographic and Baseline Characteristics

Forty-two patients completed the study. The mean age was 37.5±10.2 years, with a female predominance (57.1%; n=24). The mean duration of TMJ pain prior to enrolment was 7.8±3.5 months. At baseline, 28.6% (n=12) were classified as Wilkes stage I, 42.9% (n=18) stage II, and 28.6% (n=12) stage III (Table 1 and 2).

Table 1: Demographic and Baseline Characteristics of Study Participants (N = 42)

Variable	Value
Mean age ± SD (years)	37.5 ± 10.2
Female, n (%)	24 (57.1%)
Male, n (%)	18 (42.9%)
Mean pain duration ± SD (months)	7.8 ± 3.5

Table 2: Wilkes Stage Distribution at Baseline and Three-Month Follow-up (N=42)

Wilkes Stage	Baseline N (%)	3-Month N (%)
Stage I	12 (28.6%)	15 (35.7%)
Stage II	18 (42.9%)	20 (47.6%)
Stage III	12 (28.6%)	7 (16.7%)

Pain Outcomes (VAS)

Mean VAS pain scores declined progressively at each follow-up interval (Table 3). The reduction from baseline (7.4±1.2) to three months (3.1±1.0) represented a 58.1% decrease ($p<0.001$). A clinically meaningful improvement was already apparent at one month (37.8% reduction; $p<0.001$).

Table 3: VAS Pain Scores Before and After PRP Therapy (N = 42)

Time Point	Mean VAS ± SD	% Reduction from Baseline
Baseline	7.4 ± 1.2	–
1 month	4.6 ± 1.3	37.8%
3 months	3.1 ± 1.0	58.1%

Functional Outcomes (MMO)

MMO increased progressively over the study period (Table 4). The mean gain from baseline (31.2±5.1 mm) to three months (38.4±4.2 mm) was 23.1% ($p<0.001$), with the most substantial improvement occurring within the first three months.

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Table 4: Maximum Mouth Opening (MMO) Before and After PRP Therapy (N = 42)

Time Point	Mean MMO ± SD (mm)	% Improvement from Baseline
Baseline	31.2 ± 5.1	–
1 month	35.0 ± 4.8	12.2%
3 months	38.4 ± 4.2	23.1%

Overall Efficacy and Safety

Overall, 78.6% (n=33) of patients achieved the predefined threshold of ≥50% reduction in VAS pain score by three months. Mild adverse events occurred in 11.9% (n=5): transient localised swelling in 7.1% (n=3) and mild bruising in 4.8% (n=2), all resolving spontaneously within one week. No serious adverse events, anaphylaxis, or joint infections were recorded (Table 5).

Table 5: Overall Efficacy and Adverse Events Following PRP Therapy (N = 42)

Outcome	N (%)
Overall positive response (≥50% VAS reduction at 3 months)	33 (78.6%)
Mild adverse events—any	5 (11.9%)
Transient swelling	3 (7.1%)
Mild bruising	2 (4.8%)
Serious adverse events	0 (0%)

DISCUSSION

This prospective study evaluated intra-articular PRP therapy in 42 patients with Wilkes stage I–III TMJ internal derangement and demonstrated significant, progressive improvement in both pain intensity and mandibular function over a three-month follow-up. The mean VAS score fell by 58.1% and mean MMO increased by 23.1%, with 78.6% of patients achieving clinically meaningful pain relief. These findings are consistent with, and extend, the growing body of literature supporting PRP as a safe minimally invasive option for early-to-moderate TMJ internal derangement. The pain reduction observed in the present cohort aligns closely with results from published randomised controlled trials. Liu et al.[18] conducted a well-designed RCT among 70 patients with TMJ osteoarthritis that compared PRP directly with hyaluronic acid; the PRP group demonstrated statistically superior reductions in pain intensity at 1, 3 months, with additional imaging evidence of structural improvement, lending biological plausibility to the symptomatic benefits recorded in our cohort. Similarly, Soni et al.[20] compared arthrocentesis followed by PRP versus hyaluronic acid in 47 patients and found significant improvements in pain, MMO, and joint sounds in the PRP arm, corroborating the magnitude of improvement observed in the present study despite methodological differences.

The functional gains measured by MMO (mean increase 7.2 mm; 23.1%) are consistent with estimates reported in a recent systematic review by Haddad et al.,[17] which pooled seven controlled studies and concluded that intra-articular PRP injections after arthrocentesis produced significant improvements in mandibular range of motion and pain up to 12 months post-treatment. The mechanistic basis for these functional gains is well-established: PRP growth factors—principally PDGF, TGF-β, and VEGF—down-regulate pro-inflammatory cytokines such as interleukin-1β and tumour necrosis factor-α, reduce synovial inflammation, and stimulate fibrocartilage repair, collectively restoring disc-condyle kinematics and facilitating wider, smoother jaw movement.[12–17] The observed reduction in Wilkes stage III prevalence from 28.6% to 16.7% at three months suggests not merely symptomatic masking but a genuine modulation of intra-articular pathology. This is consistent with findings by Vingender et al.,[24] who demonstrated in a prospective comparison of HA, PRP, and injectable platelet-rich fibrin in 94 joints that PRP achieved the most pronounced stage regression at 12-month follow-up, underpinned by superior fibrocartilage remodelling. The regenerative hypothesis is further supported by preclinical evidence: Chen et al. demonstrated reduced inflammatory cytokine concentrations and histological evidence of cartilage repair in PRP-treated rabbit TMJ models, and animal studies have consistently shown enhanced disc fibrocartilage thickness and improved condylar surface integrity following PRP application.

Comparison with established intra-articular agents further contextualises our results. Comert Kilic and Gungormus[21] reported that arthrocentesis combined with PRP was superior to arthrocentesis combined with hyaluronic acid in reducing pain and increasing MMO at three months, a finding replicated by Asadpour et al.[23] in a controlled trial of combined PRP-HA versus HA alone. Hegab et

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al.[22] additionally demonstrated that the synergistic combination of PRP and HA after arthrocentesis outperformed either agent alone in terms of pain scores and functional outcomes at three months, implying a complementary mechanism. Against corticosteroids—which offer reliable short-term anti-inflammatory effects but risk accelerated cartilage degradation with repeated use—PRP confers regenerative advantages without the attendant chondrotoxicity, a clinically relevant distinction for younger patients with Wilkes stage I–III disease who require long-term joint preservation.[19, 25] The safety profile observed in this study is reassuring. Minor adverse events (11.9%), exclusively transient and self-limiting, are consistent with previously published rates. Neither joint infection nor anaphylaxis was encountered, reflecting the autologous nature of PRP and the importance of strict aseptic technique. These data support adoption of PRP in resource-limited settings such as public sector teaching hospitals in Pakistan, where minimally invasive, cost-effective interventions with low complication profiles are particularly valued.[19]

Several limitations of the present study must be acknowledged. The absence of a parallel control group—such as arthrocentesis alone, hyaluronic acid, or placebo—precludes definitive attribution of outcomes to PRP and limits internal validity. The sample size (n=42), while sufficient for the primary analysis, reduces power for meaningful subgroup comparisons by Wilkes stage or gender. The three-month follow-up period did not allow assessment of the long-term durability of treatment response or structural regeneration; MRI-based confirmation of disc position and condylar cartilage thickness was not incorporated. Variability in individual PRP platelet concentrations, due to biological differences in donor blood, represents an inherent limitation of autologous preparations and may have contributed to inter-patient outcome variability. Finally, concomitant conservative therapies—physical therapy, analgesics—were not uniformly standardised, introducing the possibility of additive confounding. Future work should address these gaps through adequately powered, double-blind randomised controlled trials incorporating imaging endpoints, standardised PRP preparation with platelet quantification, and follow-up extending to at least 24 months.

CONCLUSION

Intra-articular PRP therapy produced clinically significant and progressive reductions in pain and improvements in mandibular function in patients with Wilkes stage I–III TMJ internal derangement over a three-month period, with an excellent safety profile. The findings support PRP as a promising minimally invasive, regenerative treatment option for early-to-moderate TMJ internal derangement, particularly for patients who have failed conventional conservative therapy. Rigorous randomised controlled trials with standardised PRP preparation protocols, imaging-based structural endpoints, and extended follow-up are essential to establish high-level evidence and refine clinical guidelines for the therapeutic use of PRP in TMJ disorders.

REFERENCES

1. Scrivani SJ, Keith DA, Kaban LB. Temporomandibular disorders. N Engl J Med. 2008;359(25):2693–705.

2. Okeson JP. Management of Temporomandibular Disorders and Occlusion. 7th ed. St. Louis: Mosby; 2013.

3. Nitzan DW, Dolwick MF, Martinez GA. Temporomandibular joint arthrocentesis: a simplified treatment for severe, limited mouth opening. J Oral Maxillofac Surg. 1991;49(11):1163–7.

4. Tanaka E, Detamore MS, Mercuri LG. Degenerative disorders of the temporomandibular joint: how do we address them? J Dent Res. 2008;87(4):296–307.

5. Wilkes CH. Internal derangements of the temporomandibular joint: pathologic variations. Arch Otolaryngol Head Neck Surg. 1989;115(4):469–77.

6. Dworkin SF, LeResche L. Research diagnostic criteria for temporomandibular disorders: review, criteria, examinations and specifications, critique. J Craniomandib Disord. 1992;6(4):301–55.

7. Manfredini D, Guarda-Nardini L, Winocur E, Piccotti F, Ahlberg J, Lobbezoo F. Research diagnostic criteria for temporomandibular disorders: a systematic review of axis I epidemiologic findings. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2011;112(4):453–62.

8. De Leeuw R, Klasser GD. Orofacial Pain: Guidelines for Assessment, Diagnosis, and Management. 6th ed. Chicago: Quintessence; 2018.

9. Guarda-Nardini L, Manfredini D, Ferronato G. Temporomandibular joint total replacement prosthesis: current knowledge and considerations for the future. Int J Oral Maxillofac Surg. 2008;37(2):103–10.

10. Al-Moraissi EA, Wolford LM, Pérez D, Laskin DM, Ellis E III. Does orthognathic surgery cause or cure temporomandibular disorders? A systematic review and meta-analysis. J Oral Maxillofac Surg. 2017;75(9):1835–47.

11. Marx RE. Platelet-rich plasma (PRP): what is PRP and what is not PRP? Implant Dent. 2001;10(4):225–8.

12. Anitua E, Andia I, Ardanza B, Nurden P, Nurden AT. Autologous platelets as a source of proteins for healing and tissue regeneration. Thromb Haemost. 2004;91(1):4–15.

13. Foster TE, Puskas BL, Mandelbaum BR, Gerhardt MB, Rodeo SA. Platelet-rich plasma: from basic science to clinical applications. Am J Sports Med. 2009;37(11):2259–72.

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HEALTH AND REHABILITATION

ORIGINAL RESEARCH (ID:1736)

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14. Dhurat R, Sukesh M. Principles and methods of preparation of platelet-rich plasma: a review and author's perspective. J Cutan Aesthet Surg. 2014;7(4):189–97.

15. Everts PA, Knape JT, Weibrich G, Schönberger JP, Hoffmann J, Overdevest EP, et al. Platelet-rich plasma and platelet gel: a review. J Extra Corpor Technol. 2006;38(2):174–87.

16. Lin SL, Tsai CC, Wu SL, Ko SY, Chiang WF, Yang JW. Effect of arthrocentesis plus platelet-rich plasma and platelet-rich plasma alone in the treatment of temporomandibular joint osteoarthritis: a retrospective matched cohort study. Medicine (Baltimore). 2018;97(26):e0477.

17. Haddad C, Zoghbi A, El Skaff E, Touma J. Platelet-rich plasma injections for the treatment of temporomandibular joint disorders: a systematic review. J Oral Rehabil. 2023;50(11):1330–9.

18. Liu SS, Xu LL, Liu LK, Lu SJ, Cai B. Platelet-rich plasma therapy for temporomandibular joint osteoarthritis: a randomized controlled trial. J Craniomaxillofac Surg. 2023;51(11):668–74.

19. Anitua E, Alkhraisat MH, Orive G. Perspectives and challenges in platelet-rich plasma use in dentistry and oral surgery. J Clin Exp Dent. 2018;10(12):e1218–25.

20. Soni A, Singh V, Mohammad S, Pal US, Rao NN, Verma R. Efficacy of platelet-rich plasma versus hyaluronic acid following arthrocentesis for temporomandibular joint disc disorders: a randomized controlled trial. J Maxillofac Oral Surg. 2022;21(4):1199–204.

21. Comert Kilic S, Gungormus M. Is arthrocentesis plus platelet-rich plasma superior to arthrocentesis plus hyaluronic acid for the treatment of temporomandibular joint osteoarthritis: a randomized clinical trial. Int J Oral Maxillofac Surg. 2016;45(12):1538–44.

22. Hegab AF, Hameed HA, Hassaneen AM, Hyder A. Synergistic effect of platelet-rich plasma with hyaluronic acid injection following arthrocentesis to reduce pain and improve function in TMJ osteoarthritis. J Stomatol Oral Maxillofac Surg. 2023;124(1s):101340.

23. Asadpour N, Shooshtari Z, Kazemian M, Gholami M, Vatanparast N, Samieirad S. Combined platelet-rich plasma and hyaluronic acid can reduce pain in patients undergoing arthrocentesis for temporomandibular joint osteoarthritis. J Oral Maxillofac Surg. 2022;80(9):1474–85.

24. Vingender S, Dőri F, Schmidt P, Hermann P, Vaszilkó MT. Evaluation of the efficiency of hyaluronic acid, PRP and I-PRF intra-articular injections in the treatment of internal derangement of the temporomandibular joint: a prospective study. J Craniomaxillofac Surg. 2023;51(1):1–6.

25. Christidis N, Al-Moraissi EA, Barjandi G, Svedenlöf J, Jasim H, Christidis M, et al. Pharmacological treatments of temporomandibular disorders: a systematic review including a network meta-analysis. Drugs. 2024;84(1):59–81.