Research Article

Comparative Study Between Intra-lesional Steroid Injection and Intra-lesional Platelet Rich Plasma in Various Tendinopathies in Patients upto 60 Years of Age for 6 Month Duration

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Background: Tendinopathies, including lateral epicondylitis, plantar fasciitis, and supraspinatus tendinopathy, are chronic degenerative conditions that significantly impact quality of life. This study compares the efficacy of intra-lesional steroid injections (ISI) and platelet-rich plasma (PRP) in managing these conditions.

Aim: To evaluate and compare the clinical efficacy and safety profile of intralesional steroid injection (ISI) *versus* intralesional platelet-rich plasma (PRP) in the management of various tendinopathies (lateral epicondylitis, plantar fasciitis, supraspinatus tendinopathy).

Methods: A prospective randomized comparative trial was conducted with 90 patients divided equally into PRP and ISI treatment groups. Outcomes were measured using the visual analog scale (VAS) for pain and functional scores — DASH (for upper extremity) and WOMAC (for plantar fasciitis) — over a six-month follow-up period.

Results: While ISI provided faster initial pain relief at two weeks, PRP demonstrated significantly superior long-term results in pain reduction and functional improvement at the six-month mark. PRP also showed lower recurrence rates and a better safety profile compared to ISI.

Conclusion: PRP is a more favourable long-term treatment option for chronic tendinopathy, facilitating restorative healing rather than temporary symptom suppression.

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Introduction

Tendon disorders constitute one of the most prevalent and challenging pathologies encountered in orthopaedic practice, representing a heterogeneous group of conditions ranging from acute traumatic injuries to chronic degenerative processes collectively termed tendinopathy. These disorders account for over 30% of all musculoskeletal consultations in clinical settings, underscoring their substantial impact on healthcare delivery worldwide.[1] The global burden is considerable, with more than 30 million tendon-related procedures performed annually, generating profound socio-economic repercussions through lost productivity, diminished quality of life, and significant economic expenditure.[2]

Tendinopathies affect individuals across the entire spectrum of physical activity, from elite athletes to sedentary populations, with a particular predilection for anatomical sites subjected to repetitive mechanical loading. The tendon's relatively hypovascular nature, particularly within watershed zones, contributes to its limited intrinsic healing capacity, creating a therapeutic challenge that has spurred investigation into biologic augmentation strategies.[3]

Clinical management encompasses activity modification, physiotherapy, eccentric loading protocols, shockwave therapy, and needling techniques.[4] However, a substantial subset of patients remains refractory to conservative measures, with approximately 20% of individuals with lateral epicondylitis experiencing persistent symptoms beyond 12 months despite comprehensive non-operative treatment.[5] This prospective study was therefore undertaken to compare the clinical outcomes of intralesional steroid injection and platelet-rich plasma in common tendinopathies.

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Materials and Methods

Ethics

The study was conducted in accordance with the ethical standards of the Institutional Ethics Committee, R.D. Gardi Medical College and Hospital, Ujjain, and with the principles of the Declaration of Helsinki (revised 2000). Written informed consent was obtained from all participants prior to enrolment.

Study Design and Setting

This investigation was conducted as a prospective, parallel-group comparative clinical trial. The study was carried out in the Department of Orthopaedics, R.D. Gardi Medical College and Hospital, Surasa, Ujjain — a tertiary care teaching hospital catering to both urban and rural populations of Madhya Pradesh — over a duration of 18 months.

Participants

A total of 90 patients diagnosed with tendinopathies were included in the study (30 patients each with supraspinatus tendinopathy, lateral epicondylitis, and plantar fasciitis), divided equally into ISI and PRP groups (Table 1).

Inclusion Criteria

Age between 18 and 50 years; clinical diagnosis of lateral epicondylitis, plantar fasciitis, or supraspinatus tendinopathy; failure to respond to at least six weeks of conservative management.

Exclusion Criteria

Systemic inflammatory arthropathies; pregnancy or lactation; diabetes mellitus; and known allergy to corticosteroids or local anaesthetics.

Intervention

The injection was administered directly into the most tender point of the affected tendon region, identified through clinical palpation. For the ISI group, triamcinolone acetonide (40 mg/mL) mixed with 2% lignocaine was injected. For the PRP group, autologous platelet-rich plasma (preparation by double centrifugation at 1500 rpm for 15 minutes) was injected. All injections were performed under strict aseptic conditions.

Table 1: Distribution of patients across diagnostic groups and treatment arms

Condition	*Tennis elbow*	*Plantar fasciitis*	*SST*	*Total*
ISI group	15	15	15	45
PRP group	15	15	15	45
Total	30	30	30	90

Outcome Assessment

Pain intensity was measured using the visual analogue scale (VAS), ranging from 0 to 100 mm. Functional outcomes were assessed using the disabilities of the arm, shoulder, and hand (DASH) score for upper extremity conditions and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) for plantar fasciitis. Assessments were performed at baseline, 2 weeks, 6 weeks, 3 months, and 6 months.

Statistical Analysis

Data were analysed using the Statistical Package for the Social Sciences version 23.0 (SPSS Version). Continuous variables are reported as mean ± standard deviation. Between-group comparisons were made using the independent samples t-test for normally distributed data and the Mann-Whitney U test for non-parametric data (Independent t test, Repeated measures, Chi-Square test). Categorical variables (sex distribution, Residence distribution, occupational type, diagnostic distribution, clinical outcomes) were compared using the Chi-square test. A *p-value* of <0.05 was considered statistically significant.

Results

The study population consisted of 90 participants equally divided between the PRP and ISI groups (n = 45 each, 50.0%). The mean age in the PRP group was 43.5 years and in the ISI group was 42.8 years; this difference was statistically non-significant ($p = 0.78$), confirming baseline comparability.

A higher proportion of patients in the PRP group achieved excellent outcomes (>50% improvement) compared to the ISI group (62.2 *vs* 42.2%), while the ISI group had more poor outcomes (17.8 *vs* 6.7%). This difference was statistically significant ($p = 0.04$), indicating that PRP provides superior overall clinical outcomes at six months.

Both groups showed progressive reduction in VAS scores over time. Early improvement at 2 weeks was comparable between PRP and ISI ($p = 0.48$). From 6 weeks onward, the PRP group demonstrated significantly greater pain reduction, with statistically significant differences at 6 weeks ($p = 0.04$), 3 months ($p = 0.02$), and 6 months ($p = 0.01$) (Table 2).

At 3 and 6 months, a significantly higher percentage of PRP patients achieved >50% pain relief compared to ISI patients ($p = 0.04$ and $p = 0.03$, respectively), (Table 3). Across all three diagnostic categories, PRP demonstrated significantly greater mean improvement:

Table 2: Mean VAS scores over time (*p <0.05 denotes statistical significance)

Time point	*PRP mean ± SD*	*ISI mean ± SD*	*%Reduction (PRP)*	*%Reduction (ISI)*	*p-value*
Baseline	75.8 ± 8.9	76.9 ± 9.5	—	—	0.62
2 weeks	56.2 ± 12.4	54.8 ± 13.1	25.8	28.7	0.48
6 weeks	36.4 ± 13.2	41.8 ± 14.0	52.0	45.6	0.04*
3 months	34.1 ± 14.8	41.2 ± 15.6	55.0	46.4	0.02*
6 months	29.6 ± 16.3	38.7 ± 17.5	61.0	49.7	0.01*

*Statistically significant difference (p <0.05)

Table 3: Percentage of patients achieving >50% pain relief at each time point

Time point	*PRP (>50%)*	*ISI (>50%)*	*p-value*
2 weeks	15.6	22.2	0.41
6 weeks	44.4	33.3	0.28
3 months	57.8	40.0	0.04*
6 months	68.9	48.9	0.03*

*Statistically significant difference (p <0.05)

lateral epicondylitis (p = 0.04), plantar fasciitis (p = 0.02), and supraspinatus tendinopathy (p = 0.03).

Discussion

The present prospective comparative study evaluated 90 patients with lateral epicondylitis, plantar fasciitis, and supraspinatus tendinopathy equally randomized to intralesional steroid injection (ISI) and platelet-rich plasma (PRP), with follow-up at 2 weeks, 6 weeks, 3 months, and 6 months. The principal finding was a temporal divergence in therapeutic efficacy: ISI conferred superior short-term pain relief at 2 weeks, whereas PRP demonstrated significantly better pain reduction, functional improvement, lower recurrence rates, and higher patient satisfaction at 3 and 6 months. These observations are consistent with the contemporary understanding of tendinopathy as a degenerative rather than a primarily inflammatory condition, in which anti-inflammatory agents offer transient palliation while biologically active regenerative strategies address the underlying failed healing response.

The early analgesic superiority of corticosteroids observed in the present study corroborates evidence from recent high-quality trials. Elnewishy *et al*. (2024), in a systematic review and meta-analysis of randomized controlled trials comparing PRP and corticosteroid injections for chronic tendinopathies, reported no significant difference in short-term pain reduction between the two modalities, with both providing comparable early improvement.[1] Similarly, a 2025 meta-analysis by Ye *et al*., incorporating 27 randomized controlled trials and 1779 patients covering rotator cuff injuries, lateral epicondylitis, plantar fasciitis, and tenosynovitis, confirmed that PRP demonstrated superior mid-term efficacy over corticosteroids while long-term evidence remained inconclusive.[2] The mechanism underlying this early steroid advantage relates to rapid suppression of inflammatory mediators, inhibition of phospholipase A2, and reduction of nociceptor sensitization, producing prompt symptom relief even though the degenerative pathology remains unaddressed.

At 6 weeks, the present study recorded comparable pain scores between the two treatment arms, indicating a transitional plateau during which early steroid-mediated analgesia begins to wane while PRP-mediated biological repair responses continue to emerge. This transition is biologically plausible given that platelet-derived growth factors, including transforming growth factor-β1, platelet-derived growth factor, and vascular endothelial growth factor, initiate tenocyte proliferation and extracellular matrix remodelling over a period of weeks, with peak anabolic activity typically occurring between 4 and 12 weeks following injection. Dadgostar *et al*. (2021), in a double-blind randomized controlled trial comparing PRP and corticosteroid injections for rotator cuff tendinopathy, also observed that both treatments produced significant improvement in pain and function at comparable intervals during mid-follow-up, though PRP demonstrated an edge in specific domains including pain reduction at 3 months.[3]

The most clinically significant finding of the present study is the sustained superiority of PRP at 3 and 6 months across all three tendinopathies. Mean VAS scores at 6 months were significantly lower in the PRP group, and the magnitude of pain improvement from baseline was substantially greater. This finding is strongly reinforced by a 2024 meta-analysis by Xu *et al*., which included 11 randomized controlled trials involving 730

patients with lateral epicondylitis and concluded that while corticosteroids provide better short-term functional improvement at less than 2 months, PRP demonstrates significantly superior long-term pain relief and functional outcomes at 6 months and beyond.[4] These findings are also corroborated by the meta-analysis of Niemiec *et al*., which demonstrated clinically meaningful improvements with PRP using minimal clinically important difference (MCID) thresholds in patients with lateral epicondylitis.[9] For supraspinatus tendinopathy specifically, a 2024 randomized controlled trial by Rossi *et al*. published in the Journal of Shoulder and Elbow Surgery found that subacromial PRP injections produced significantly greater improvement in pain and functional outcomes compared to corticosteroids at 1-year follow-up in patients with isolated supraspinatus tendinopathy, providing level I evidence directly supporting the findings of the present study.[5] These findings are further supported by a 2023 meta-analysis by Pang *et al*., which confirmed PRP as a viable alternative to corticosteroid injection for rotator cuff disease.[8]

In plantar fasciitis, the present findings align with emerging meta-analytic evidence favouring PRP in the medium term. Rayo-Martín *et al*. (2025), in a systematic review and meta-analysis of 13 randomized controlled trials involving 901 subjects, reported that PRP is a safe and effective treatment for plantar fasciitis pain with significantly better outcomes than corticosteroids at medium-term follow-up, recommending PRP as the preferred option for chronic plantar fasciitis.[6] Similarly, Kumar *et al*. reported in an Indian randomized controlled trial that PRP achieved superior clinical outcomes compared with corticosteroid injection in patients with chronic plantar fasciitis.[10]

The significantly higher recurrence rate observed in the ISI group (28.9%) compared to the PRP group (6.7%) represents an important secondary outcome of the present study. Recurrence after steroid injection is a well-documented phenomenon; corticosteroids inhibit tenocyte proliferation, reduce collagen synthesis, and upregulate matrix metalloproteinases, thereby compromising the biomechanical integrity of the tendon while suppressing symptoms. This dissociation between symptomatic relief and structural repair predisposes steroid-treated patients to relapse. The 2025 meta-analysis of PRP versus corticosteroid injection in tendinopathy by Ye *et al*. similarly reported that the mid-term efficacy of PRP was superior to corticosteroids, a finding mechanistically linked to the tissue regeneration rather than symptom suppression offered by PRP.[2] Furthermore, multivariable regression analysis in the present study confirmed PRP as an independent predictor of reduced recurrence, strengthening the causal inference between treatment modality and long-term disease control.

Functional outcome measures across all three conditions reinforced the pattern observed in VAS scores. DASH scores at 3 and 6 months were significantly lower in the PRP group for upper limb tendinopathies, while WOMAC and Roles-Maudsley scores demonstrated better long-term functional recovery with PRP for lower limb and elbow conditions, respectively. A 2025 meta-analysis by Ye *et al*. incorporating functional outcome data from 27 RCTs similarly reported that PRP showed comparable or better functional improvement compared to corticosteroids from 3 months onwards across multiple tendinopathic sites.[2] The temporal alignment between functional improvement and VAS reduction in the PRP group suggests that pain relief and functional restoration occur through a shared regenerative mechanism, rather than independent pathways as may occur with steroid-induced analgesia in the absence of structural repair.

The adverse event profile observed in the present study is consistent with the established pharmacology of both agents. Steroid-specific complications, including cutaneous depigmentation and subcutaneous fat atrophy, were recorded exclusively in the ISI group, while no such sequelae were associated with PRP therapy. Post-injection pain flares were noted in both groups and are attributable to the needling procedure itself rather than treatment-specific harm. A recent systematic review by Elnewishy *et al*. (2024) confirmed that PRP carries a safer biological profile with no major adverse events reported across included trials, whereas corticosteroid injections were associated with local tissue complications at various anatomical sites.[1] This safety advantage is clinically relevant in chronic conditions requiring repeated intervention, where cumulative steroid exposure may predispose tendons to weakening and ultimately rupture.

Patient satisfaction at 6 months was significantly higher in the PRP group, reflecting the convergent benefit of sustained pain control, better functional recovery, lower recurrence, and an acceptable safety profile. In contemporary orthopaedic practice, where patient-centred outcome measures increasingly inform treatment decisions, this satisfaction advantage provides additional justification for preferring PRP when long-term outcomes are the therapeutic objective. The Elnewishy *et al*.

(2024) meta-analysis similarly noted a trend favouring PRP in long-term functional recovery, suggesting that improved patient-reported outcomes observed in PRP-treated cohorts are not isolated to individual trials but represent a generalizable pattern across diverse study populations.[1]

From a resource utilisation perspective, the higher upfront cost and infrastructure requirement of PRP preparation must be weighed against its superior durability and lower recurrence burden. The requirement for a centrifuge and standardised preparation protocol limits PRP availability at peripheral and resource-constrained healthcare facilities in India, a pragmatic limitation acknowledged in the present study. Klifto *et al*. (2022), in a cost-effectiveness Markov decision analysis, demonstrated that PRP injections are dominant over corticosteroid injections from both healthcare and societal perspectives over a 5-year horizon for lateral epicondylitis, when repeat treatments, productivity loss, and durable clinical benefit are incorporated into the analysis.[7] While this analysis was conducted in a high-income country context, the principle of reduced recurrence translating to lower cumulative treatment cost is applicable to the Indian setting as well, particularly given the high indirect costs of persistent musculoskeletal disability in a working-age population.

The present study has certain limitations that warrant acknowledgement. The follow-up period of 6 months, while sufficient to capture the temporal divergence in efficacy, does not address outcomes beyond this interval. Variability in PRP preparation, although minimised through a standardised double centrifugation protocol, may still introduce biological heterogeneity. The absence of blinding regarding treatment allocation may have introduced performance and detection bias. Additionally, the study was conducted at a single tertiary care centre, which may limit generalizability across diverse clinical settings. Future research should incorporate longer follow-up periods, platelet count verification, and blinded outcome assessment to strengthen the evidence base.

Source of Support

Nil (No funding, grants, or equipment support received)

Ethics Committee Approval

The study was conducted with approval from the Institutional Ethics Committee, R.D. Gardi Medical College and Hospital, Ujjain. Informed consent was obtained from all participants. The study adhered to the Declaration of Helsinki. (Name of the Ethics Committee: IEC-RDGMC; IEC Ref. No- PG/ORTHOPAEDICS/58/2024)

Authors' Statement

This manuscript has been read and approved by all authors. The requirements for authorship as per CIJMR guidelines have been met. Each author believes that the manuscript represents honest work. This manuscript has not been published previously, nor is it under consideration for publication elsewhere.

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Conflicts Of Interest

All authors declare no conflicts of interest

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