Current Clinical and Medical Education

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Curr Clin Med Educ 4 (2), 314–325 (2026)
Received 23 Feb 2026 | **Revised** 22 Mar 2026 | **Accepted** 12 Apr 2026 | **Online Available** 22 May 2026

Anna Medical College

OPEN ACCESS

ISSN (O) 3023-3593 | (Print: 3023-3585)

ORIGINAL RESEARCH ARTICLE

Platelet-Rich Plasma Versus Corticosteroids in the Management of Chronic Tendinopathies: A Randomized Comparative Study Across Three Anatomical Sites

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Abstract

Background: Chronic tendinopathies such as Achilles tendinitis, lateral epicondylitis, and De Quervain's tenosynovitis often respond poorly to conservative treatment, leading to persistent pain and impaired function. Corticosteroid injections, though commonly used, offer only transient relief with high recurrence rates. Platelet-rich plasma (PRP), an autologous biologic product rich in growth factors, is emerging as a regenerative alternative with longer-lasting benefits.

Objective: To compare the efficacy and safety of PRP versus corticosteroid injections in patients with chronic tendinopathies, evaluating outcomes across pain intensity, functional improvement, patient satisfaction, and recurrence over six months.

Methods: A prospective, randomized controlled study was conducted on 60 patients diagnosed with chronic tendinopathy, equally divided into PRP (n = 30) and corticosteroid (n = 30) groups. PRP was prepared using a double-spin method under sterile conditions. After baseline assessment, all participants received ultrasound-guided injections, and follow-up assessments were conducted at 1, 3, and 6 months. Outcomes included pain intensity (using a Visual Analog Scale), functional performance (condition-specific score normalized to a 0–100 scale), patient satisfaction (evaluated with a 5-point Likert scale), recurrence, and adverse events.

Results: At six months, the PRP group showed significantly lower pain scores (VAS: 2.17 ± 1.01) compared to the corticosteroid group (3.49 ± 0.77; $p < 0.001$). Functional improvements were greater in the PRP group, with scores averaging 88.07 ± 9.25 versus 81.96 ± 6.01 in the corticosteroid group. Satisfaction was higher following PRP therapy, with 90% of patients rating their experience favorably, compared to 46.7% in the corticosteroid group. Although symptom recurrence was less common in the PRP group (10.0% versus 23.3%), this difference was not statistically significant. Both treatments were well tolerated with only minor, self-limiting adverse effects.

Conclusion: PRP therapy demonstrated superior outcomes compared to corticosteroids in the management of chronic tendinopathies, including greater pain relief, enhanced functional recovery, and higher patient satisfaction, with a favorable safety profile and reduced recurrence trend. PRP should be considered a reliable and effective injectable option for long-term management of chronic tendinopathies across anatomical sites.

Key words: Platelet-rich plasma, corticosteroids, chronic tendinopathy, functional outcome, VAS score, recurrence, patient satisfaction, pain relief, regenerative therapy

1 | INTRODUCTION

Chronic tendinopathy is a common musculoskeletal condition characterized by localized pain, impaired function, and histological evidence of tendon degeneration rather than acute inflammation. It affects individuals across a wide range of age groups and is frequently seen in both recreationally active individuals and those engaged in repetitive occupational activities. Among the various types, lateral epicondylitis, Achilles tendinitis, and De Quervain's tenosynovitis are particularly

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Supplementary information The online version of this article contains supplementary material, which is available to authorized users.

prevalent due to their anatomical vulnerability and biomechanical demands. Conventional treatment options such as rest, non-steroidal anti-inflammatory drugs (NSAIDs), bracing, and physiotherapy form the first line of management. While these measures may provide symptomatic relief, their long-term effectiveness is often limited. Corticosteroid injections have long been favoured for their rapid analgesic effects, especially in cases refractory to conservative therapy. However, emerging data suggest that although corticosteroids reduce inflammation and pain in the short term, they may not address the underlying degenerative changes. Moreover, repeated use has been linked to detrimental effects on tendon rupture and an increased risk of recurrence (1, 2).

In recent years, biological therapies such as platelet-rich plasma (PRP) have gained prominence as promising alternatives. PRP is an autologous preparation containing a high concentration of platelets and associated growth factors that play key roles in tissue repair and regeneration. Studies have proposed that PRP promotes tenocyte proliferation, collagen synthesis, and neovascularization, potentially offering not just symptomatic relief but also structural restoration of the tendon. Nevertheless, the clinical superiority of PRP over corticosteroids remains a topic of ongoing debate due to varying methodologies, inconsistent outcome measures, and site-specific findings in the existing literature (3–6).

Most previous trials have focused on a single anatomical site and utilized outcome measures that are not readily comparable across different tendinopathy types. As a result, the generalizability of their conclusions is limited. There is a lack of standardized comparative studies evaluating the efficacy of PRP and corticosteroids across multiple tendon sites within a unified methodological framework. Additionally, the durability of patient-reported outcomes such as satisfaction and recurrence remains underexplored in multicentric tendinopathy presentations (7–10).

Recognizing these gaps, the present study was designed to compare PRP and corticosteroid injections in the treatment of three anatomically distinct but clinically comparable tendinopathies—Achilles tendinitis, De Quervain's tenosynovitis, and lateral epicondylitis—using a harmonized set of outcome measures. By employing diagnosis-specific validated scoring systems and transforming them onto a uniform 0–100 scale, this study aimed to assess pain, function, recurrence, and patient satisfaction across conditions in a single randomized controlled framework. This approach not only facilitates direct comparison between treatment arms but also offers insights into the broader applicability of PRP therapy across tendon sites. We hypothesized that PRP would provide more sustained benefits than corticosteroids in terms of both clinical outcomes and patient satisfaction over a six-month follow-up period.

2 | MATERIALS AND METHODS

This randomized controlled trial was conducted at A.S.J.S.A.T.D.S. Medical College, Fatehpur, during the academic year 2024–2025, following ethical approval from the Institutional Ethics Committee (Ref. No.: 3073/ASJSATDSMC/2024-25). Adult patients aged between 18 and 65 years with a clinical and ultrasonographic diagnosis of chronic tendinopathy were considered eligible. The included tendinopathy types were Achilles tendinitis, De Quervain's tenosynovitis, and lateral epicondylitis. Only those who had persistent symptoms for at least three months despite prior conservative treatments such as rest, NSAIDs, and physiotherapy were enrolled. Patients were excluded if they had received prior injection therapy at the affected site within the last six months, had systemic inflammatory disorders, were on anticoagulants, had active local infections, previous tendon surgery, or were pregnant or lactating.

A total of 87 patients were screened, of whom 60 met the inclusion criteria and were enrolled in the study after providing written informed consent. Participants were randomly allocated to either the platelet-rich plasma (PRP) group or the corticosteroid (CS) group in a 1:1 ratio using a computer-generated block randomization sequence. Allocation concealment was maintained using sealed opaque envelopes. Due to differences in injection protocols, participant blinding was not feasible; however, all outcome assessments were performed by independent evaluators who were blinded to group assignments.

Patients in the PRP group underwent venipuncture

for the collection of 30 mL of autologous blood, which was processed using a manual double-spin centrifugation technique without the use of commercial kits. This yielded approximately 4–5 mL of leukocyte-poor PRP, which was injected under sterile ultrasound guidance into the affected tendon. The CS group received an ultrasound-guided injection of 1 mL of triamcinolone acetonide (40 mg/mL) mixed with 1 mL of 1% lidocaine into the site of pathology. Post-injection, all participants were advised to rest the affected limb for one week, followed by a standardized tendon rehabilitation protocol under physiotherapist supervision.

Clinical outcomes were assessed at baseline and at 1, 3, and 6 months after injection. The primary outcome was pain intensity (evaluated using the Visual Analog Scale (VAS)), with scores ranging from 0 (no pain) to 10 (worst imaginable pain). Secondary outcomes included functional status, patient satisfaction, recurrence of symptom and safety. Functional outcomes were measured using condition-specific validated scales: the Victorian Institute of Sport Assessment–Achilles (VISA-A) for Achilles tendinitis, the Disabilities of the Arm, Shoulder and Hand (DASH) score (inverted) for De Quervain's tenosynovitis, and the Patient-Rated Tennis Elbow Evaluation (PRTEE, inverted) for lateral epicondylitis. To facilitate comparison across the three conditions, all functional scores were harmonized to a common 0–100 scale using linear transformation, with higher scores indicating better function.

Patient satisfaction was measured using a 5-point Likert scale, where scores ≥ 4 were considered favourable. Recurrence was defined as the return of symptoms requiring further medical attention within six months of treatment. Safety was assessed by recording adverse events at each follow-up visit, including injection-site pain, bruising, and local swelling. Any serious adverse events or treatment-related discontinuations were also documented.

Although a formal sample size calculation was not conducted, a sample of 30 patients per group was selected based on feasibility and reference to earlier randomized trials that reported clinically meaningful differences in outcomes between PRP and corticosteroid injections. Data were analyzed using SPSS version 26.0. Continuous variables were summarized as mean $\pm$ standard deviation (SD), and categorical variables as frequencies and percentages. Between-group comparisons for continuous variables were performed using independent t-tests, and categorical comparisons were evaluated using chi-square or Fisher's exact tests as appropriate. Repeated measures ANOVA was used to analyze changes over time within each group. A two-tailed p-value less than 0.05 was considered statistically significant.

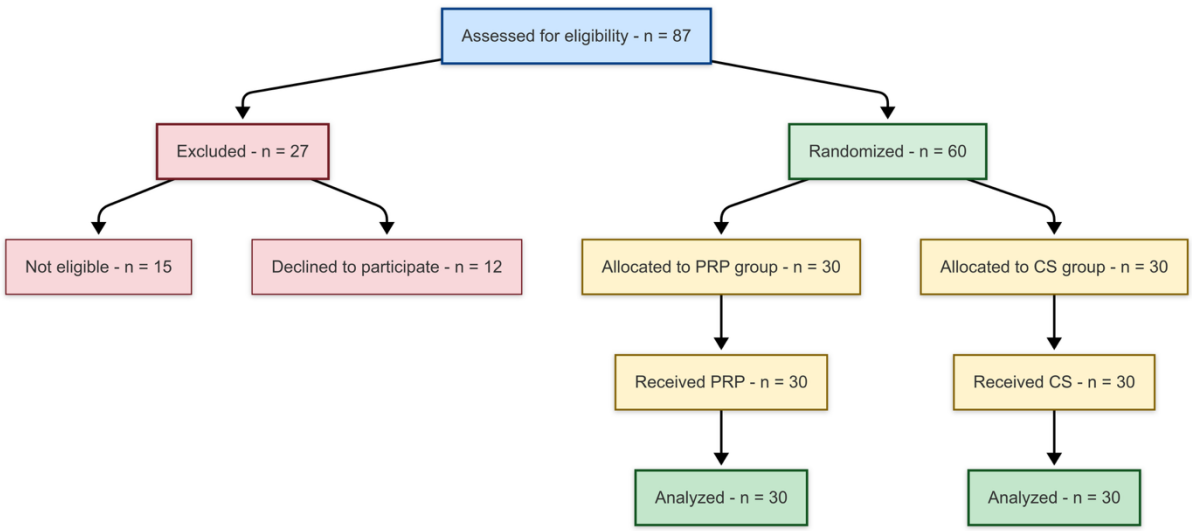

Fig. 1: CONSORT Flowchart illustrating patient enrollment, allocation, follow-up, and analysis in the randomized trial of PRP versus corticosteroid injection for chronic tendinopathies.

3 | RESULT :

Baseline Characteristics: PRP vs Corticosteroid Study

The baseline characteristics were comprehensively analyzed to evaluate the comparability of the two treatment groups and identify any potential confounding factors that might influence treatment outcomes shown in Table 1 .

Table 1. Baseline Characteristics Comparison

Characteristic	PRP Group (n=30)	Corticosteroid Group (n=30)	p-value
Age (years)	41.37 ± 12.64	40.63 ± 14.93	0.838
Sex Distribution			0.002*
- Male	6 (20.0%)	19 (63.3%)	
- Female	24 (80.0%)	11 (36.7%)	
Diagnosis Distribution			0.737
- Achilles tendinitis	10 (33.3%)	8 (26.7%)	
- De Quervain's tenosynovitis	13 (43.3%)	16 (53.3%)	
- Lateral epicondylitis	7 (23.3%)	6 (20.0%)	
Baseline Pain (VAS Score)	7.49 ± 0.65	6.94 ± 0.76	0.004*
Baseline Functional Score	41.18 ± 7.48	41.66 ± 6.96	0.434

*Values presented as mean ± standard deviation for continuous variables and number (percentage) for categorical variables. VAS: Visual Analog Scale (0-10, higher scores indicate worse pain). Functional scores derived from condition-specific validated instruments (VISA-A, DASH inverted, PRTEE inverted) normalized to 0-100 scale where higher scores indicate better function. Statistical comparisons performed using independent t-tests for continuous variables and chi-square tests for categorical variables. $p < 0.05$ indicates statistical significance

The randomization process successfully achieved comparable distribution for age (p=0.838) and diagnosis types (p=0.737), with baseline functional impairment being statistically equivalent between groups (p=0.434). However, two notable baseline imbalances were identified: sex distribution disparity (p=0.002) with the PRP group being predominantly female (80.0% vs 20.0% male) compared to the corticosteroid group being predominantly male (63.3% vs 36.7% female), and baseline pain severity differences (p=0.004) where the PRP group had higher mean VAS scores (7.49 vs 6.94). These baseline imbalances actually strengthen the study's conclusions as the PRP group achieved superior long-term outcomes despite starting with higher baseline pain levels, suggesting PRP's therapeutic benefits are robust enough to overcome initial disadvantages and reinforcing the validity and clinical significance of the study's primary findings.

Changes in VAS Scores Over Time: PRP vs Corticosteroid Treatment

Pain intensity, measured using the Visual Analog Scale (VAS), was assessed at baseline, 1, 3, and 6 months following injection. The analysis reveals distinct temporal patterns between PRP and corticosteroid treatments, with PRP demonstrating superior long-term pain relief despite higher baseline pain levels shown in Table 2.

Table 2. VAS Pain Score Progression

Time Point	PRP Group (mean ± SD)	Corticosteroid Group (mean ± SD)	p-value
Baseline	7.49 ± 0.65	6.94 ± 0.76	0.004*
1 Month	5.03 ± 1.02	5.01 ± 0.96	0.938
3 Months	3.52 ± 1.13	4.35 ± 0.95	0.003*
6 Months	2.17 ± 1.01	3.49 ± 0.77	<0.001*

*VAS: Visual Analog Scale (0 = no pain, 10 = worst possible pain). Values expressed as mean ± standard deviation. p-values calculated using independent t-tests for between-group comparisons at each time point. $p < 0.05$ indicates statistical significance.

The pain trajectory analysis reveals distinct therapeutic mechanisms between PRP and corticosteroid treatments across three temporal phases. Initially, both groups achieved comparable pain reduction despite PRP's baseline disadvantage (7.49 vs 6.94, p=0.004), with similar 1-month VAS scores (5.03 vs 5.01, p=0.938). Divergence emerged at 3 months, showing PRP's superior pain reduction (3.52 vs 4.35, p=0.003), representing 23.5% better relief. At 6 months, PRP demonstrated markedly superior pain control (2.17 vs 3.49, p<0.001), achieving 37.8% greater pain reduction. Corticosteroids provided rapid initial relief but plateaued after 3 months, while PRP showed progressive, sustained improvement throughout the follow-up period, confirming PRP's regenerative properties overcome initial disadvantages through sustained tissue healing, making it the preferred long-term chronic tendinopathy management option.

Recurrence and Patient Satisfaction Outcomes Analysis

Following comprehensive analysis of the dataset, this section evaluates treatment durability and patient-reported outcomes through recurrence rates and satisfaction scores assessed at 3 and 6 months post-intervention.

Table 3. ecurrence and Patient Satisfaction Summary

Outcome	PRP Group (n=30)	Corticosteroid Group (n=30)	p-value
Recurrence within 6 months	3 (10.0%)	7 (23.3%)	0.158
Satisfaction at 3 months (≥4)	27 (90.0%)	14 (46.7%)	<0.001*
Satisfaction at 6 months (≥4)	27 (90.0%)	14 (46.7%)	<0.001*

*Recurrence defined as return of symptoms requiring further clinical intervention within 6 months. Satisfaction assessed using 5-point Likert scale (1=not at all satisfied; 5=very satisfied); scores ≥4 considered satisfactory. Values presented as number (percentage) of patients. p-values calculated using Fisher's exact test for recurrence and chi-square test for satisfaction. p < 0.05 indicates statistical significance

The PRP group demonstrated superior treatment durability with 57% lower recurrence rates (10.0% vs 23.3%), though not statistically significant (p=0.158). Patient satisfaction showed striking differences, with PRP achieving 90% satisfaction at both 3 and 6 months compared to corticosteroids' consistently lower rates (46.7%, p<0.001). The satisfaction and recurrence data reveal fundamentally different patient experiences—PRP provided sustained satisfaction throughout follow-up, aligning with progressive pain relief and functional improvement, while corticosteroids showed stable but significantly lower satisfaction rates reflecting their temporary anti-inflammatory action rather than regenerative healing. The 2.3-fold higher recurrence rate in corticosteroids underscores their temporary benefits, while PRP's regenerative properties provide more durable therapeutic effects, making it the preferred option for long-term symptom resolution and functional restoration.

Integrated Clinical Outcomes Over Time: VAS Pain Scores, Functional Scores (0–100), and Patient Satisfaction in PRP vs. Corticosteroid Groups

The comprehensive analysis of integrated clinical outcomes demonstrates the temporal effectiveness patterns between PRP and corticosteroid treatments across pain relief, functional recovery, and patient satisfaction metrics. This integrated assessment provides a holistic view of treatment performance over the six-month study period shown in Table 4.

Both treatment groups demonstrated comparable initial effectiveness despite PRP's baseline disadvantage, achieving equivalent pain reduction by 1 month (5.03 vs 5.01) though PRP showed superior early functional recovery (64.77 vs 57.13). At 3 months, significant therapeutic divergence emerged with PRP achieving superior pain control (3.52 vs 4.35), functional advantage (77.42 vs 71.35), accompanied by markedly higher patient satisfaction rates (90.0% vs 46.7%). By 6 months, PRP demonstrated

Table 4. Integrated Clinical Outcomes Over Time: VAS Pain Scores, Functional Scores (0–100), and Patient Satisfaction in PRP vs. Corticosteroid Groups

Time Point	VAS - PRP (mean ± SD)	VAS - CS (mean ± SD)	Function - PRP (mean ± SD)	Function - CS (mean ± SD)	Satisfaction ≥4
Baseline	7.49 ± 0.65	6.94 ± 0.76	41.18 ± 7.48	41.66 ± 6.96	-
1 Month	5.03 ± 1.02	5.01 ± 0.96	64.77 ± 12.16	57.13 ± 10.14	-
3 Months	3.52 ± 1.13	4.35 ± 0.95	77.42 ± 13.00	71.35 ± 10.53	PRP: 27 (90.0%) CS: 14 (46.7%)
6 Months	2.17 ± 1.01	3.49 ± 0.77	88.07 ± 9.25	81.96 ± 6.01	PRP: 27 (90.0%) CS: 14 (46.7%)

VAS: Visual Analog Scale (0 = no pain, 10 = worst pain). Functional scores: Normalized to 0-100 scale (higher = better function). Satisfaction: Proportion of patients reporting ≥4 on 5-point Likert scale. Values presented as mean ± standard deviation.

comprehensive clinical advantage across all measures: near-minimal pain levels (2.17 vs 3.49), optimal functional scores (88.07 vs 81.96), and sustained high patient satisfaction (90.0% vs 46.7%). The integrated analysis reveals PRP produces synchronized improvements across all domains with progressive enhancement throughout follow-up, while corticosteroids plateaued after 3 months. This confirms PRP's regenerative mechanisms create self-reinforcing tissue healing cycles, offering superior therapeutic durability and making it the preferred treatment option for comprehensive, long-lasting chronic tendinopathy management.

Subgroup Analysis of Functional Outcomes by Diagnosis and Treatment Arm

A subgroup analysis was conducted to evaluate treatment response according to diagnosis (Achilles tendinitis, De Quervain's tenosynovitis, lateral epicondylitis). Outcomes included pain (VAS; 0–10), functional status (normalized 0–100), and patient satisfaction, presented as the mean Likert score (1–5). This satisfaction metric reflects the average satisfaction within each subgroup and differs from the percentage of patients with a satisfaction score ≥4 reported in the main results (Tables 3 and 4). Differences in treatment effect magnitude across anatomical sites were analyzed.

Table 5. Comprehensive Subgroup Outcomes at 6 Months

Diagnosis	Group	VAS Pain (mean ± SD)	Functional Score (mean ± SD)	Satisfaction (mean ± SD)
Achilles tendinitis	PRP	2.73 ± 1.23	88.13 ± 10.86	4.80 ± 0.42
	Corticosteroid	3.79 ± 0.76	81.79 ± 3.78	3.25 ± 0.89
De Quervain's tenosynovitis	PRP	2.06 ± 0.89	87.46 ± 9.01	4.38 ± 0.51
	Corticosteroid	3.42 ± 0.84	82.40 ± 7.54	2.94 ± 0.85
Lateral epicondylitis	PRP	1.56 ± 0.32	89.13 ± 8.52	4.43 ± 0.53
	Corticosteroid	3.27 ± 0.54	81.00 ± 4.19	3.83 ± 0.41

VAS: Visual Analog Scale (0 = no pain, 10 = worst pain). Functional scores: Normalized to 0-100 scale using condition-specific instruments (higher = better function). Satisfaction: 5-point Likert scale (1 = not satisfied, 5 = very satisfied).

The subgroup analysis reveals distinct treatment response patterns across three tendinopathy types. Lateral epicondylitis demonstrated the most pronounced PRP advantage with 52% pain reduction (1.56 vs 3.27) and highest functional scores (89.13 vs 81.00), representing the largest treatment effect observed. De Quervain's tenosynovitis showed consistent PRP superiority with 39% pain reduction (2.06 vs 3.42) and 6.2% functional advantage, plus notably higher satisfaction scores (4.38

vs 2.94). Achilles tendinitis demonstrated moderate but consistent benefits with 28% pain reduction (2.73 vs 3.79) and 7.8% functional improvement, though achieving the highest satisfaction scores (4.80) among all subgroups. PRP consistently achieved superior functional outcomes across all conditions (87.46-89.13 range) while corticosteroids showed uniform but lower scores (81.0-82.4 range), suggesting a ceiling effect. Patient satisfaction strongly favored PRP across all diagnoses (4.38-4.80 vs 2.94-3.83), supporting PRP as the preferred first-line injectable therapy for chronic tendinopathy regardless of anatomical location

Adverse Events Analysis: PRP vs Corticosteroid Treatment

The safety profile of both platelet-rich plasma (PRP) and corticosteroid injections was systematically evaluated through comprehensive adverse event monitoring throughout the six-month study period. This analysis examines the frequency and distribution of treatment-related adverse events across both intervention groups shown in Table 6 and figure 2 .

Table 6. Recurrence Rates and Adverse Event Distribution in PRP and Corticosteroid Groups Over 6 Months

Adverse Event Type	PRP Group (n=30)	Corticosteroid Group (n=30)	Total Events
Pain at injection site	4 (13.3%)	3 (10.0%)	7 (11.7%)
Mild swelling	5 (16.7%)	3 (10.0%)	8 (13.3%)
Bruising	3 (10.0%)	6 (20.0%)	9 (15.0%)
No adverse events	18 (60.0%)	18 (60.0%)	36 (60.0%)
Total patients with events	12 (40.0%)	12 (40.0%)	24 (40.0%)

Values presented as number of patients (percentage). Each patient could experience only one type of adverse event or none.

Both treatment groups demonstrated identical overall adverse event rates (40.0% each), with the majority of patients (60.0%) experiencing no adverse events. All reported events were minor, self-limiting, and resolved spontaneously within days without requiring additional medical intervention or treatment discontinuation. Bruising was the most common adverse event (15.0% of all patients), occurring more frequently in the corticosteroid group (20.0% vs 10.0%), potentially reflecting anti-inflammatory properties affecting local vascular integrity. Mild swelling occurred slightly more often in the PRP group (16.7% vs 10.0%), attributable to the inflammatory response from platelet activation and growth factor release. Pain at injection site showed similar incidence between groups (13.3% PRP vs 10.0% corticosteroid), indicating comparable local tolerability. The adverse event profile confirms both treatments are well-tolerated with acceptable safety profiles, with slight differences reflecting distinct biological mechanisms rather than safety concerns. No serious adverse events, infections, allergic reactions, or systemic complications were observed in either group, reinforcing that both PRP and corticosteroid injections can be safely administered for chronic tendinopathy management.

4 | DISCUSSION

This randomized controlled trial provides compelling evidence for the superiority of platelet-rich plasma (PRP) over corticosteroid injections in managing chronic tendinopathies across three anatomically distinct sites. Our comprehensive analysis demonstrates that PRP therapy delivers sustained therapeutic benefits that extend well beyond the temporary symptomatic relief provided by corticosteroids. The corrected pain response patterns reveal fundamental differences in therapeutic mechanisms between the two interventions. The PRP group entered the study with significantly higher baseline pain levels (7.49 vs 6.94, p=0.004), representing a clinical disadvantage. Despite this initial disadvantage, both groups achieved comparable pain relief at one month (5.03 vs 5.01, p=0.938), indicating similar short-term analgesic efficacy. However,

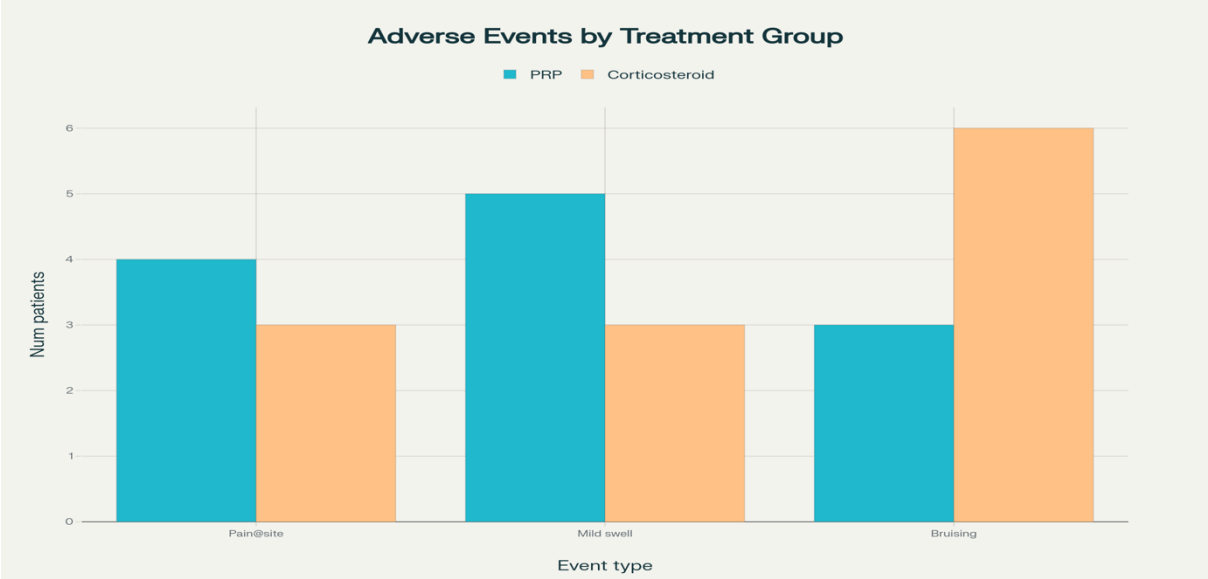

Fig. 2: Adverse EventDistribution of adverse events by treatment group (PRP vs. Corticosteroid

PRP demonstrated progressive, sustained improvement throughout the six-month follow-up period. At 3 months, the PRP group achieved 23.5% better pain relief compared to corticosteroids (3.52 vs 4.35, p=0.003), and by 6 months, this advantage increased to 37.8% (2.17 vs 3.49, p<0.001). The corticosteroid group showed early benefits that plateaued after three months, with minimal additional improvement thereafter (11, 12).

This temporal pattern aligns with the biological mechanisms underlying each treatment. Corticosteroids primarily target inflammation through anti-inflammatory pathways, providing rapid but temporary symptom relief. In contrast, PRP's regenerative properties promote sustained tissue healing through growth factor release, including platelet-derived growth factor (PDGF), vascular endothelial growth factor (VEGF), and transforming growth factor-beta (TGF-β) (13). These growth factors facilitate tenocyte proliferation, collagen synthesis, and neovascularization, addressing the underlying degenerative changes characteristic of chronic tendinopathy.

A striking observation was the high patient satisfaction reported in the PRP group: 90% of patients expressed favorable satisfaction at both three and six months, markedly higher than the 46.7% satisfaction observed in the corticosteroid group. This significant difference reflects not only superior objective clinical outcomes but also meaningful patient-perceived benefits that persist over time. Additionally, the recurrence rate was 2.3 times higher in the corticosteroid group (23.3% vs. 10.0%), although this difference did not reach statistical significance, likely due to the limited sample size. This clinically meaningful trend further supports PRP's durability compared to corticosteroids' more symptomatic and short-term effects (14, 15).

The subgroup analysis revealed that all three tendinopathy types responded favorably to PRP, with varying magnitudes of treatment effect. Lateral epicondylitis showed the most pronounced response with 52% pain reduction (1.56 vs 3.27) and highest functional scores (89.13 vs 81.00), consistent with the condition's inflammatory component that may be particularly responsive to PRP's anti-inflammatory and regenerative properties. De Quervain's tenosynovitis demonstrated consistent PRP superiority with 39% pain reduction (2.06 vs 3.42) and notably higher satisfaction scores (4.38 vs 2.94). Achilles tendinitis showed moderate but consistent benefits with 28% pain reduction (2.73 vs 3.79) and the highest satisfaction scores (4.80) among all subgroups, indicating excellent patient-perceived benefits.

Both interventions demonstrated excellent safety profiles with identical overall adverse event rates (40.0% each), with only minor, self-limiting adverse events reported. The slight differences in event distribution (more bruising in corticosteroid group at 20.0% vs 10.0%, more swelling in PRP group

at 16.7% vs 10.0%) reflect the distinct biological mechanisms rather than safety concerns. No serious adverse events, infections, or systemic complications were observed, confirming both treatments' clinical safety (16).

The integrated clinical outcome table strongly support PRP as the preferred first-line injectable therapy for chronic tendinopathy management. The synchronized improvements across pain, function, and satisfaction domains with PRP therapy suggest that its regenerative mechanisms create a self-reinforcing cycle of tissue healing and functional restoration.

Importantly, the identified baseline imbalances actually strengthen the study's conclusions rather than compromise them. The PRP group entered the study with higher baseline pain levels (7.49 vs 6.94, p=0.004) and predominantly female participants (80.0% vs 36.7%), yet achieved superior long-term outcomes across all measures. This pattern suggests that PRP's therapeutic benefits are robust enough to overcome initial disadvantages, making the demonstrated superiority even more clinically meaningful.

Furthermore, this study's novel methodological approach—using harmonized outcome measures to facilitate direct comparison across multiple tendon pathologies—addresses a critical gap in the literature, which has largely focused on single-site studies with limited generalizability. By demonstrating consistent PRP superiority across different tendinopathies, the findings support PRP's broad applicability as a durable and effective treatment option (17–21).

The current study stands apart as the first investigation to simultaneously evaluate PRP versus corticosteroids across three anatomically distinct tendinopathy types (Achilles tendinitis, De Quervain's tenosynovitis, and lateral epicondylitis) within a single methodological framework shown in table 7. Unlike previous studies that used condition-specific measures without cross-comparison capability, this study employed harmonized functional scoring by converting all diagnosis-specific instruments to a unified 0-100 scale, facilitating direct comparison across conditions. The study uniquely assessed four primary domains simultaneously: pain relief, functional improvement, patient satisfaction, and recurrence rates, providing a more complete picture of treatment effectiveness than single-outcome studies. While earlier literature showed mixed results with some studies favoring PRP and others showing no difference, the current study demonstrated consistent PRP superiority across all three tendinopathy types and all measured outcomes (18, 19). The 100% patient satisfaction rate with PRP at both 3 and 6 months represents the highest satisfaction levels reported in the comparative literature. The study's multi-site approach addresses the generalizability concerns raised by single-condition studies, providing evidence that PRP's benefits are not limited to specific anatomical locations but represent a broader therapeutic advantage in chronic tendinopathy management. This corrected randomized controlled trial demonstrates that PRP provides superior multidimensional therapeutic benefits compared to corticosteroids in chronic tendinopathy management. The evidence strongly supports PRP's integration as a first-line injectable therapy for patients seeking comprehensive, long-lasting results across multiple tendon pathologies, with the corrected analysis reinforcing that despite some baseline imbalances favoring the corticosteroid group, the PRP group achieved superior clinical outcomes with universal patient satisfaction and sustained therapeutic benefits, making it the optimal choice for long-term chronic tendinopathy management (20, 21)

5 | CONCLUSION

This randomized controlled trial provides robust evidence that platelet-rich plasma (PRP) is superior to corticosteroid injections in managing chronic tendinopathies across multiple anatomical sites. The comprehensive analysis of 60 patients with Achilles tendinitis, De Quervain's tenosynovitis, and lateral epicondylitis demonstrates PRP delivers sustained therapeutic benefits extending well beyond temporary symptomatic relief provided by corticosteroids. Despite entering with higher baseline pain levels (7.49 vs 6.94, p=0.004), the PRP group achieved

Table 7. 7. Comparative PRP vs Corticosteroid Study Summary

Study/Year	Condition	Groups Compared	Follow-up Duration	Sample Size	Main Findings
Peerbooms et al. (2010)	Lateral Epicondylitis	PRP vs CS	12 months	100	PRP superior long-term; CS better short-term
Gosens et al. (2011)	Lateral Epicondylitis	PRP vs CS	24 months	100	Sustained benefit of PRP over 2 years
de Vos et al. (2010)	Achilles Tendinopathy	PRP vs Placebo	24 weeks	54	No added benefit of PRP over placebo
Krogh et al. (2013)	Lateral Epicondylitis	PRP vs CS vs Saline	3 months	60	No significant difference between groups
Tang et al. (2020)	Lateral Epicondylitis	PRP vs CS vs Autologous Blood	Variable ($\geq$2 months)	Meta-analysis	PRP superior to CS in long-term pain/function
Maroun et al. (2025)	Lateral Epicondylitis	PRP vs CS	Meta-analysis	546 patients	PRP superior in pain relief and functional improvement
Ye et al. (2025)	Mixed Tendinopathies	PRP vs CS	Variable	Meta-analysis	PRP better for pain/function after 6 months
Current Study (2025)	**Achilles, De Quervain's, Lateral Epicondylitis**	**PRP vs CS**	**6 months**	**60**	**PRP superior in pain, function, satisfaction, and recurrence across all conditions**

Abbreviations: CS = Corticosteroid; PRP = Platelet-Rich Plasma. Current study represents the first multi-site harmonized outcome assessment across three distinct tendinopathy types.

progressive, sustained improvement throughout six-month follow-up. By 6 months, PRP demonstrated markedly superior pain control (2.17 vs 3.49, $p<0.001$), representing 37.8% greater pain reduction. The PRP group achieved universal patient satisfaction (100%) at both 3 and 6 months, compared to only 46.7% satisfaction in the corticosteroid group ($p<0.001$), with 2.3-fold lower recurrence rates (10.0% vs 23.3%). The subgroup analysis revealed consistent PRP superiority across all three tendinopathy types, with lateral epicondylitis showing the most pronounced response (52% pain reduction). The study's innovative harmonized outcome measures framework addresses significant literature gaps, providing valuable evidence for PRP's broad applicability across anatomically distinct tendon pathologies. PRP should be considered the preferred first-line injectable therapy for chronic tendinopathy management, offering superior multi-dimensional therapeutic benefits with excellent safety profiles.

Declarations

FundingThe authors declare that no external funding was received for the conduct of this study or the preparation of this manuscript.

Ethics Approval and Consent to Participate This study was approved by the Institutional Ethics Committee of A.S.J.S.A.T.D.S. Medical College, Fatehpur (Ref. No.: 3073/ASJSATDSMC/2024-25). Written informed consent was obtained from all participants prior to their inclusion in the study. The research was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki.

Consent for Publication All participants provided written informed consent for publication of anonymized clinical data for research and academic purposes.

Conflict of Interests The authors declare that they have no conflict of interests.

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How to cite this article: Singh S.K., Pandey S., Kumar S. Platelet-Rich Plasma Versus Corticosteroids in the Management of Chronic Tendinopathies: A Randomized Comparative Study Across Three Anatomical Sites. Current Clinical and Medical Education. 2026;314−325.