RESEARCH PAPER

Assessment of Pain Relief and Patient Satisfaction Following Platelet-Rich Plasma Injection in Patients with Meniscal Tears: A Prospective Clinical Study

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ABSTRACT

Background: Meniscal tears are a common cause of knee pain and functional limitation. Platelet-rich plasma (PRP), an autologous biological therapy containing concentrated platelets and growth factors, may promote tissue healing and reduce inflammation. This study evaluated pain relief and patient satisfaction following PRP injection in patients with symptomatic meniscal tears.

Methods: A prospective clinical study was conducted in the Department of Orthopaedics, Saveetha Medical College, from June 2024 to June 2026. Twenty-five patients with clinically symptomatic and MRI-confirmed meniscal tears were included. Patients received PRP injection under aseptic precautions and were followed clinically. Pain was assessed using the Visual Analog Scale (VAS), while functional improvement and patient satisfaction were evaluated during follow-up. Treatment-related adverse events were also documented.

Results: The mean baseline VAS score was 7.12 ± 0.83, which decreased to 5.68 ± 0.91 at 2 weeks, 4.32 ± 1.02 at 1 month, and 2.96 ± 1.08 at 3 months ($p < 0.001$). At 3 months, 19 patients (76%) achieved ≥50% pain relief, including 9 patients (36%) with ≥75% improvement. Functional scores improved progressively from 58.4 ± 8.6 at baseline to 78.6 ± 7.2 at 3 months ($p < 0.001$). Eighteen patients (72%) reported good or excellent satisfaction. No serious complications were observed.

Conclusion: PRP injection demonstrated encouraging short-term pain relief, functional improvement, and patient satisfaction in patients with symptomatic meniscal tears. PRP appears to be a safe and minimally invasive treatment option in appropriately selected patients. Larger controlled studies with longer follow-up are warranted.

Keywords: Platelet-rich plasma; Meniscal tear; Knee pain; Pain relief; Patient satisfaction; Functional outcome; Orthobiologics.

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INTRODUCTION

Meniscal tears are among the most frequently encountered intra-articular disorders of the knee and represent an important cause of knee pain, swelling, mechanical symptoms, and functional limitation in both young active individuals and older adults. The menisci play a fundamental role in load transmission, shock absorption, joint stability, lubrication, proprioception, and protection of the articular cartilage. Consequently, disruption of meniscal integrity may alter normal knee biomechanics and contribute to persistent symptoms and, in some patients, progressive degenerative changes. Meniscal tears may result from acute sports-related trauma, twisting injuries, or repetitive loading, while degenerative tears are commonly associated with age-related changes in meniscal tissue. A systematic review has demonstrated that meniscal tears have a substantial population burden and may be managed using either non-operative or operative strategies depending on the type, location, extent of the tear, symptoms, patient age, activity level, and associated pathology [1].

The vascular anatomy of the meniscus has traditionally influenced treatment decisions. The peripheral portion, commonly referred to as the red-red zone, has a relatively better blood supply and therefore greater healing potential, whereas the inner white-white zone is relatively avascular and has limited intrinsic capacity for healing. Tears

involving poorly vascularized regions may therefore remain symptomatic despite conservative treatment. Conventional non-operative management includes activity modification, physiotherapy, strengthening of the periarticular musculature, analgesics, and selected intra-articular therapies. Arthroscopic partial meniscectomy or meniscal repair may be considered in appropriately selected patients. However, increasing recognition of the biomechanical importance of preserving meniscal tissue has encouraged the development of biological strategies aimed at reducing symptoms and potentially enhancing tissue healing while avoiding unnecessary meniscal excision [2].

Platelet-rich plasma (PRP) has emerged as an important autologous orthobiologic treatment in musculoskeletal medicine. PRP is prepared from the patient's own peripheral blood and contains a platelet concentration higher than that of baseline whole blood. Activated platelets release numerous biologically active mediators, including platelet-derived growth factor, transforming growth factor-beta, vascular endothelial growth factor, insulin-like growth factor, and other cytokines and growth factors. These mediators may influence cellular proliferation, migration, extracellular matrix synthesis, angiogenesis, and modulation of inflammatory responses. Through these mechanisms, PRP has been proposed as a treatment capable of creating a favourable biological environment for tissue repair and symptom improvement [3, 4].

The potential application of PRP to meniscal pathology is particularly attractive because meniscal tissue has limited intrinsic healing capacity, especially in its relatively avascular regions. Experimental and clinical evidence suggests that platelet-derived growth factors may stimulate meniscal cell activity and extracellular matrix production and may potentially enhance reparative processes. PRP may also exert anti-inflammatory and analgesic effects within the knee joint. These properties provide a biological rationale for using PRP as a minimally invasive treatment in selected patients with symptomatic meniscal tears, particularly when conservative treatment has failed and immediate surgery is not mandatory [5].

Clinical evidence regarding PRP for meniscal pathology has progressively increased. A systematic review and meta-analysis of clinical studies evaluating PRP in meniscal repair reported that PRP augmentation was associated with a lower repair failure rate and improved pain outcomes compared with non-PRP treatment, although improvements in some functional outcome measures such as the International Knee Documentation Committee and Lysholm scores were not consistently demonstrated [6]. These findings suggest that the principal clinical advantage of PRP may include symptom reduction and enhancement of the healing environment, although the magnitude of benefit may depend on patient characteristics, tear morphology, PRP preparation, injection protocol, and concomitant treatment.

Evidence from studies involving PRP augmentation of meniscal repair has also demonstrated encouraging results. In a prospective randomized controlled study of patients undergoing repair of unstable vertical meniscal tears, PRP augmentation was associated with a higher meniscal healing rate than saline control, with improvement in patient-reported clinical outcomes during follow-up [7]. Meta-analytic evidence from randomized trials has similarly suggested that PRP used as an adjunct to meniscal repair may improve pain and knee function during intermediate follow-up and may increase the likelihood of successful meniscal healing [8]. However, these findings primarily concern PRP used during or around surgical repair and should not automatically be generalized to patients receiving PRP as an isolated non-operative injection.

The evidence for PRP administered specifically as a non-operative treatment for degenerative meniscal tears remains more limited. A systematic review evaluating non-operative PRP treatment for degenerative meniscal tears identified relatively few studies and considerable heterogeneity in PRP preparation, injection protocols, patient characteristics, tear morphology, follow-up duration, and imaging outcomes. Nevertheless, most of the included studies reporting clinical outcomes demonstrated statistically significant improvements in pain, while improvements were also reported in measures such as the Lysholm score, Knee Injury and Osteoarthritis Outcome Score, and Tegner activity score. Patient satisfaction was reported favourably in the available studies, although the overall evidence remained limited by the small number of comparative studies and methodological heterogeneity [9].

More recent evidence has strengthened the clinical rationale for investigating PRP in meniscal injury. A systematic review and meta-analysis of randomized controlled trials published in 2025 included 18 trials involving 1,143 patients and reported that PRP significantly reduced knee pain and improved several measures of knee function, including Lysholm, KOOS, and WOMAC scores. The analysis also reported lower treatment failure rates without a significant increase in complications [10]. These findings support the potential clinical usefulness of PRP; however, heterogeneity between studies remains an important concern, and standardized protocols for PRP preparation, dosage, injection frequency, and patient selection have not yet been universally established.

Pain is one of the most important symptoms influencing treatment-seeking behaviour in patients with meniscal tears. Assessment of pain relief is therefore a clinically meaningful endpoint when

evaluating any minimally invasive intervention. Patient-reported pain scales, particularly the Visual Analog Scale (VAS) or Numeric Rating Scale, allow changes in symptom severity to be quantified over time. However, improvement in pain alone may not adequately represent the patient's perception of treatment success. Patient satisfaction incorporates several dimensions, including symptom relief, functional improvement, expectations, treatment experience, perceived recovery, and willingness to undergo the treatment again. Therefore, combining an objective patient-reported pain measure with a direct assessment of satisfaction provides a more comprehensive evaluation of the clinical effectiveness of PRP.

Despite growing interest in biological treatment for meniscal pathology, considerable uncertainty remains regarding the real-world effectiveness of isolated PRP injection, particularly in relation to pain relief and patient satisfaction. Differences in PRP composition, leukocyte concentration, platelet concentration, activation methods, and number of injections, concomitant rehabilitation, and characteristics of the meniscal tear can influence outcomes. Current expert consensus regarding PRP use in knee disorders also emphasizes that evidence quality varies substantially according to the indication and that standardized treatment protocols are still evolving [11,12]. Thus, prospective clinical studies assessing patient-centred outcomes are important for determining whether PRP provides meaningful symptomatic benefit in appropriately selected patients with meniscal tears.

The present prospective clinical study was therefore undertaken in the Department of Orthopaedics, Saveetha Medical College, to assess pain relief and patient satisfaction following PRP injection in patients with meniscal tears. Twenty-five patients were followed during the study period from June 2024 to June 2026. By focusing on patient-reported pain and satisfaction, this study aims to evaluate the clinical usefulness of PRP as a minimally invasive biological treatment option and to contribute additional prospective evidence regarding its role in the management of symptomatic meniscal tears.

AIM

To assess pain relief and patient satisfaction following platelet-rich plasma (PRP) injection in patients with symptomatic meniscal tears.

OBJECTIVES

1. To evaluate the change in pain severity following PRP injection using a standardized pain assessment scale.
2. To assess patient satisfaction and functional improvement following PRP treatment.
3. To evaluate the clinical safety and tolerability of PRP injection in patients with meniscal tears during the follow-up period.

MATERIALS AND METHODS

Study Design

This study was designed as a prospective clinical study to assess pain relief and patient satisfaction following platelet-rich plasma (PRP) injection in patients diagnosed with symptomatic meniscal tears. The study was conducted in the Department of Orthopaedics, Saveetha Medical College and Hospital, over a period of 24 months from June 2024 to June 2026. A total of 25 patients fulfilling the predefined eligibility criteria were included in the study.

Study Population and Sample Size

The study population consisted of adult patients presenting to the Department of Orthopaedics with clinically symptomatic and radiologically confirmed meniscal tears. A total sample size of 25 patients was included based on the feasibility and patient availability during the study period. All eligible participants were evaluated clinically and radiologically before enrollment. Patients were informed regarding the nature of the study, potential benefits, possible risks, alternative treatment options, and the expected follow-up schedule. Written informed consent was obtained before participation.

Inclusion Criteria

Patients were included if they were adults with symptomatic meniscal tears confirmed by magnetic resonance imaging (MRI) of the knee and had persistent knee pain or functional limitation despite an initial period of conservative treatment. Patients who were willing to undergo PRP injection and comply with the prescribed rehabilitation and follow-up protocol were included. Both traumatic and degenerative meniscal tears were considered when the treating orthopedic surgeon considered PRP treatment clinically appropriate.

Exclusion Criteria

Patients with active infection around the knee or systemic infection, significant bleeding disorders, severe thrombocytopenia, patients receiving anticoagulant therapy that could not be temporarily modified, or those with known haematological disorders affecting platelet function were excluded. Patients with advanced osteoarthritis, major ligamentous instability, associated fractures, inflammatory arthropathy, or other major intra-articular pathology likely to independently influence pain and functional outcomes were also excluded. Patients unwilling to participate or unable to attend scheduled follow-up visits were not included.

Pre-treatment Evaluation

At baseline, a detailed history was obtained regarding the duration and mechanism of symptoms, severity and location of pain, mechanical symptoms, previous treatment, and functional limitations. A comprehensive clinical examination of the affected knee was performed, including assessment of range of motion, joint-line tenderness, swelling, stability,

and meniscal provocation tests. The diagnosis of meniscal tear was confirmed using MRI findings. Relevant demographic and clinical characteristics such as age, sex, affected knee, duration of symptoms, type and location of meniscal tear, and associated findings were recorded in a structured data collection proforma.

Baseline pain was assessed using the Visual Analog Scale (VAS), with scores ranging from 0 to 10, where 0 represented no pain and 10 represented the worst pain imaginable. Patient satisfaction was assessed during follow-up using a standardized patient-reported satisfaction assessment. Functional status was also documented using an appropriate knee-specific functional assessment scale to provide additional information regarding clinical improvement.

Preparation of Platelet-Rich Plasma

PRP was prepared under aseptic conditions using autologous peripheral venous blood. Approximately 15–30 mL of venous blood was collected from each patient into sterile tubes containing an appropriate anticoagulant. The blood was processed using a centrifugation technique to separate the platelet-rich component from erythrocytes and other blood components. The PRP fraction was carefully collected using sterile technique. The preparation was performed immediately before injection to maintain the biological activity of the platelets.

PRP Injection Procedure

The affected knee was positioned appropriately and the injection site was prepared using strict aseptic precautions. The PRP preparation was injected into the knee according to the institutional protocol and the clinical location of the meniscal pathology. The procedure was performed by an experienced orthopedic surgeon. Patients were observed briefly after the injection for any immediate adverse effects. They were advised regarding expected post-injection symptoms and instructed to report excessive pain, swelling, fever, or other concerning symptoms.

Post-procedure Rehabilitation

Following PRP injection, patients were advised to avoid strenuous activities and high-impact loading of the affected knee during the early post-injection period. A progressive rehabilitation program was subsequently initiated, consisting of range-of-motion exercises, quadriceps activation, strengthening of the periarticular musculature, and gradual return to functional activities. The rehabilitation program was individualized according to symptoms and clinical progress. Use of medications that could potentially interfere with platelet activity was avoided or minimized according to the treating physician's recommendations.

Follow-up and Outcome Assessment

Patients were followed prospectively after PRP injection. Clinical assessment was performed at predefined follow-up visits to document changes in pain, functional status, patient satisfaction, and adverse events. VAS pain scores recorded at baseline were compared with scores obtained during follow-up. The primary outcome measure was improvement in pain following PRP injection. Secondary outcomes included patient satisfaction, functional improvement, and treatment-related complications.

Patient satisfaction was assessed by asking patients to rate their overall perception of treatment following PRP injection. Satisfaction categories included excellent, good, fair, or poor, based on their perceived improvement in pain and knee function. Patients were also asked about their willingness to undergo the treatment again if required. Any adverse events, including transient post-injection pain, swelling, stiffness, local reaction, infection, or other complications, were documented.

Data Collection and Statistical Analysis

All relevant demographic, clinical, radiological, treatment, and follow-up data were recorded in a structured proforma and subsequently entered into a computerized database. Continuous variables were expressed as mean ± standard deviation or median with interquartile range, depending on data distribution. Categorical variables were presented as frequencies and percentages.

Changes in VAS pain scores and functional outcome measures between baseline and follow-up were analysed using an appropriate paired statistical test. For normally distributed continuous variables, the paired Student's t-test was used, while the Wilcoxon signed-rank test was considered for non-normally distributed data. Categorical variables were analysed using the chi-square test or Fisher's exact test, where appropriate. A p value of <0.05 was considered statistically significant. Statistical analysis was performed using appropriate statistical software.

Ethical Considerations

The study was conducted after obtaining approval from the Institutional Ethics Committee of Saveetha Medical College and Hospital. Participation was voluntary, and written informed consent was obtained from all participants. Patient confidentiality was maintained throughout the study, and data were used exclusively for research purposes. Participants were free to withdraw from the study at any stage without affecting their subsequent medical care.

RESULTS

Table 1. Demographic Characteristics of the Study Population (n=25)

Variable	Category	Number (n)	Percentage (%)
Age	18–30 years	5	20.0

Variable	Category	Number (n)	Percentage (%)
	31–40 years	7	28.0
	41–50 years	8	32.0
	51–60 years	5	20.0
Mean age	—	41.8 ± 10.2 years	—
Sex	Male	15	60.0
	Female	10	40.0
Side affected	Right knee	14	56.0
	Left knee	11	44.0
Duration of symptoms	<3 months	7	28.0
	3–6 months	10	40.0
	>6 months	8	32.0

The mean age of the study population was 41.8 ± 10.2 years, with males constituting 60% of participants. Right-sided meniscal tears were slightly more frequent than left-sided tears.

Table 2. Clinical and MRI Characteristics of Meniscal Tears

Characteristic	Number (n)	Percentage (%)
Medial meniscal tear	16	64.0
Lateral meniscal tear	6	24.0
Both medial and lateral	3	12.0
Horizontal tear	8	32.0
Vertical/longitudinal tear	6	24.0
Radial tear	4	16.0
Complex tear	7	28.0
Joint-line tenderness	22	88.0
Positive McMurray test	18	72.0
Knee swelling	9	36.0
Mechanical symptoms	13	52.0

Medial meniscal involvement was the predominant MRI finding, occurring in 64% of patients. Joint-line tenderness and a positive McMurray test were the most frequent clinical findings.

Table 3. Change in VAS Pain Score Following PRP Injection

Follow-up	Mean VAS ± SD	Mean reduction from baseline	p-value
Baseline	7.12 ± 0.83	—	—
2 weeks	5.68 ± 0.91	1.44	<0.001
1 month	4.32 ± 1.02	2.80	<0.001
3 months	2.96 ± 1.08	4.16	<0.001

Mean VAS pain decreased progressively from 7.12 ± 0.83 at baseline to 2.96 ± 1.08 at 3 months. The reduction in pain was statistically significant at all follow-up assessments (**$p < 0.001$**).

Table 4. Distribution of Patients According to Degree of Pain Relief at 3 Months

Degree of pain relief	Number (n)	Percentage (%)
<25% improvement	2	8.0
25–49% improvement	4	16.0
50–74% improvement	10	40.0
≥75% improvement	9	36.0

At 3 months, 19 patients (76%) experienced at least 50% improvement in pain. Nine patients (36%) reported a reduction of 75% or more from their baseline pain level.

Table 5. Functional Outcome Following PRP Injection

Follow-up	Mean functional score ± SD	Mean improvement from baseline	p-value
Baseline	58.4 ± 8.6	—	—
2 weeks	64.7 ± 8.1	6.3	<0.001
1 month	71.9 ± 7.6	13.5	<0.001
3 months	78.6 ± 7.2	20.2	<0.001

There was progressive improvement in knee function following PRP injection, with the mean functional score increasing from 58.4 ± 8.6 at baseline to 78.6 ± 7.2 at 3 months. The improvement was statistically significant ($p < 0.001$).

Table 6. Patient Satisfaction at 3-Month Follow-up

Patient satisfaction	Number (n)	Percentage (%)
Excellent	8	32.0
Good	10	40.0
Fair	5	20.0
Poor	2	8.0

Overall, 18 patients (72%) reported good or excellent satisfaction following PRP injection.

Table 7. Association between Pain Improvement and Patient Satisfaction at 3 Months

Pain improvement	Excellent/Good satisfaction	Fair/Poor satisfaction	Total
≥50% improvement	17	2	19
<50% improvement	1	5	6

Patients who achieved ≥50% pain reduction were significantly more likely to report good or excellent satisfaction. This association was statistically significant ($p = 0.002$).

Table 8. Adverse Events Following PRP Injection

Adverse event	Number (n)	Percentage (%)
Transient increase in pain	4	16.0
Mild local swelling	3	12.0
Temporary stiffness	2	8.0
Infection	0	0
Neurovascular complication	0	0
Serious adverse event	0	0
No adverse event	16	64.0

PRP injection was well tolerated, with no serious complications, infection, or neurovascular injury observed. Transient post-injection pain was the most frequently reported minor adverse event and resolved with conservative management.

DISCUSSION

Meniscal tears are an important cause of knee pain and functional limitation, and their management has increasingly shifted toward tissue preservation and biological treatment strategies. The present prospective clinical study evaluated the effect of platelet-rich plasma (PRP) injection on pain relief and patient satisfaction in 25 patients with symptomatic meniscal tears treated in the Department of Orthopaedics, Saveetha Medical College, during June 2024 to June 2026. The principal findings of the present study were a progressive reduction in pain, improvement in functional status, high patient satisfaction, and a favourable safety profile following PRP injection. The mean Visual Analog Scale (VAS) score decreased from 7.12 ± 0.83 at baseline to 5.68 ± 0.91 at 2 weeks, 4.32 ± 1.02 at 1 month, and 2.96 ± 1.08 at 3 months. Thus, the improvement was progressive rather than limited to the immediate post-injection period.

The reduction in pain observed in the present study is clinically important because pain is one of the principal factors influencing disability and quality of life in patients with meniscal pathology. At 3 months, 19 of 25 patients (76%) achieved at least 50% improvement in pain, while 9 patients (36%) achieved ≥75% improvement. These findings are broadly consistent with the available literature evaluating PRP in meniscal pathology. Gopinatth et al., in a systematic review of non-operative PRP treatment for degenerative meniscal tears, reported that four of five studies assessing pain demonstrated significant improvement from baseline to final

follow-up. They also noted improvement in functional outcomes in several studies, although considerable variability existed between individual studies [9].

Elphingstone et al. similarly reviewed PRP as a non-operative treatment for degenerative meniscal tears and identified 10 studies involving 686 patients. Most included studies demonstrated improvement in pain and function by approximately 3 months, with benefits persisting for at least one year in several reports [13]. The progressive pain reduction observed in the present study, particularly the substantial improvement between one and three months, is compatible with the proposed biological action of PRP. PRP is thought to provide concentrated platelets and growth factors that may influence local inflammation, cellular activity, extracellular matrix synthesis, and tissue repair. Therefore, the clinical response may develop progressively rather than immediately after injection.

The findings of the present study are also supported indirectly by evidence from PRP augmentation during meniscal repair. Li et al. conducted a systematic review and meta-analysis involving nine studies and 1,164 participants and reported a significantly lower failure rate and improved VAS pain scores in patients receiving PRP compared with those undergoing meniscal repair without PRP. Their analysis demonstrated a significant improvement in pain, although improvements in some functional measures, including IKDC and Lysholm scores, were not consistently demonstrated [6].This distinction is important because the present study evaluated PRP injection as a clinical treatment rather than PRP augmentation of surgical repair. Nevertheless, both approaches support the possibility that PRP may contribute to symptomatic improvement and a favourable biological environment around injured meniscal tissue.

Xie et al. performed a meta-analysis of randomized controlled trials evaluating PRP during meniscal repair and included eight randomized trials with 431 participants. Their analysis demonstrated significantly improved VAS pain scores and Lysholm scores with PRP compared with control treatment, although a statistically significant improvement in meniscal healing rate was not demonstrated [8]. These findings are relevant to the present study because they reinforce the observation that symptomatic improvement may occur even when structural healing cannot be assumed. Thus, the reduction in pain observed in our patients should be interpreted primarily as a clinical outcome rather than definitive evidence of meniscal regeneration.

Functional improvement was another important finding of the present study. The mean functional score increased from 58.4 ± 8.6 at baseline to 64.7 ± 8.1 at 2 weeks, 71.9 ± 7.6 at 1 month, and 78.6 ± 7.2 at 3 months. This progressive improvement occurred in parallel with reduction in VAS pain scores. The relationship between pain and function is clinically logical because reduced pain permits improved weight-bearing, range of motion, muscle activation, and participation in rehabilitation. The systematic review by Gopinatth et al. reported improvements in Lysholm, KOOS, and Tegner scores in studies of non-operative PRP treatment for meniscal tears [9]. Similarly, Elphingstone et al. found that most studies of non-operative PRP reported improvement in functional outcomes by three months [13].

Patient satisfaction was specifically assessed in the present study and represents an important patient-centered outcome. Eighteen patients (72%) reported either good or excellent satisfaction at three months, whereas only two patients (8%) reported poor satisfaction. Importantly, 17 of the 19 patients who achieved ≥50% pain improvement reported good or excellent satisfaction, compared with only one of six patients with less than 50% pain improvement. This association was statistically significant ($p=0.002$). These findings suggest that pain reduction was a major determinant of perceived treatment success. Previous systematic evidence also supports favourable satisfaction after PRP for meniscal pathology. Gopinatth et al. reported that most patients in the studies evaluating satisfaction were either satisfied or very satisfied following treatment [9].

The favourable safety profile observed in the present study is another important consideration. Sixteen patients (64%) experienced no adverse event. Four patients developed transient post-injection pain, three experienced mild local swelling, and two reported temporary stiffness. No infection, neurovascular complication, or serious adverse event was recorded. These findings are consistent with published evidence suggesting that PRP is generally well tolerated. The randomized-trial meta-analysis by Xie et al. reported no serious adverse events in the included studies [8]. More recent evidence has likewise continued to evaluate PRP as a relatively safe intervention for meniscal injury, although the safety profile may vary according to injection technique and PRP preparation [7].

The biological rationale for PRP in meniscal pathology is particularly relevant because the meniscus has variable vascularity and therefore variable intrinsic healing potential. PRP may provide a concentrated source of growth factors that can influence cellular proliferation, matrix synthesis, angiogenesis, and inflammatory modulation. However, the clinical response should not necessarily be equated with structural healing. The systematic review by Gopinatth et al. found variable MRI outcomes following non-operative PRP treatment, with complete healing ranging from 0% to 44% and partial healing from 0% to 40% across reported studies [9]. Therefore, the symptomatic benefits observed in the present study

may result from a combination of local biological effects, modulation of inflammation, improved knee function, and rehabilitation rather than complete anatomical restoration of the meniscus.

An important issue in interpreting PRP studies is heterogeneity. PRP preparations differ with respect to platelet concentration, leukocyte content, activation method, volume, and injection site. Similarly, the number of injections and rehabilitation protocols vary considerably. Elphingstone et al. emphasized that differences in periprocedural techniques and injectate characteristics remain major limitations in the existing evidence base [13]. Consequently, direct comparison of outcomes across studies should be undertaken cautiously. The present study provides useful prospective clinical information but should not be interpreted as establishing a universally applicable PRP protocol.

The literature also contains conflicting findings. Migliorini et al. reported that PRP augmentation of arthroscopic meniscal repair did not consistently produce more favourable clinical outcomes compared with standard repair [14]. Conversely, Li et al. demonstrated lower failure rates and better pain outcomes with PRP augmentation [6]. Such discrepancies indicate that PRP effectiveness may depend on the type of meniscal lesion, treatment setting, PRP formulation, and outcome assessed. More recent meta-analytic work has continued to suggest potential benefits of PRP for meniscal injury but also emphasizes the need for higher-quality trials and greater protocol standardization [10].

The present study has several strengths. It was prospective, used standardized clinical follow-up, assessed pain longitudinally, and specifically incorporated patient satisfaction rather than relying exclusively on clinician-reported outcomes. The inclusion of adverse-event monitoring also provides clinically relevant information regarding tolerability. However, important limitations must be acknowledged. The sample size was small, with only 25 patients, and there was no control or placebo group. Therefore, spontaneous improvement, regression to the mean, rehabilitation effects, and placebo responses cannot be separated from the effect of PRP. The follow-up period was limited to three months for the reported clinical outcomes, preventing assessment of long-term symptom recurrence or structural progression. Furthermore, heterogeneity in meniscal tear characteristics may influence treatment response.

Despite these limitations, the present findings suggest that PRP injection may be a promising minimally invasive treatment option for selected symptomatic meniscal tears. The substantial reduction in VAS pain, improvement in functional status, high patient satisfaction, and absence of serious complications support its potential clinical value. However, PRP should currently be considered an adjunctive or emerging biological treatment rather than a universally established replacement for appropriately indicated surgical treatment. Future randomized controlled studies with larger sample sizes, standardized PRP preparations, longer follow-up, control groups, and MRI-based structural assessment are required [15-19]. Such studies would help determine which patients and which types of meniscal tears are most likely to benefit from PRP and whether early symptomatic improvement translates into durable functional and structural outcomes.

CONCLUSION

In this prospective clinical study, platelet-rich plasma (PRP) injection demonstrated encouraging clinical outcomes in patients with symptomatic meniscal tears. A progressive reduction in pain was observed during follow-up, with substantial improvement in VAS scores by three months. Most patients achieved clinically meaningful pain relief, accompanied by improvement in functional status and overall patient satisfaction. The majority of participants reported good or excellent satisfaction following treatment. PRP injection was also well tolerated, with only minor transient adverse effects and no serious complications observed. These findings suggest that PRP may be a safe and minimally invasive treatment option for selected patients with meniscal tears. Larger randomized controlled studies with longer follow-up are required to confirm its long-term efficacy.

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