Research Square

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Evaluation of Intra-articular Platelet-Rich Plasma with and without Meniscal Infiltration: A Retrospective Clinical Study

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Research Article

Keywords: Platelet rich plasma, meniscus, osteoarthritis

Posted Date: November 12th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10170077/v1

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Additional Declarations: No competing interests reported.

Abstract

Background: Despite its common application, the role of platelet-rich plasma in treating painful knee conditions like osteoarthritis and damaged menisci lacks full clarity. Although joint space injection shows results, adding precise delivery into the meniscus does not clearly improve outcomes. Effectiveness within the cavity is documented; enhancement through focused placement stays questionable. The current research aimed to compare clinical results between isolated intra-articular PRP administration and a regimen that includes both intra-articular and meniscal injections.

Methods: The present research was a retrospective study. A total of 200 individuals were divided equally into 2 groups. Group A, got both joint-space and imaging-assisted knee disc injections with platelet-rich plasma; the other, Group B, had only the joint injection. Pain levels, daily function, and overall well-being were checked at set points - baseline, 1 month, 3 months, 6 months, 1 year, 2 years, and 3 years. Tools used included number-based pain scores, line-scale ratings, a specific osteoarthritis survey, alongside broader health questionnaires. Measurements repeated across time allowed comparison between the two approaches. Each person stayed within their assigned category throughout. Data collection followed structured timelines without deviation.

Results: Despite progress in both, those assigned to Group A maintained a consistent lead in reduced discomfort. When contrasted directly, their movement capacity outpaced that of Group B at every assessment interval. By the third year, average pain measured by NRS reached 2.2 among Group A individuals - Group B recorded 3.4. On the VAS scale, values stood at 2.5 and 3.6 accordingly. Function-related metrics via WOMAC reflected stronger gains for Group A members. These disparities held statistical weight across extended observation periods.

Conclusion: It appears that pairing intra-articular with meniscal PRP leads to better results over long term follow up than using intra-articular PRP by itself. Such improvement may stem from more precise biological targeting within joint structures. While one method acts broadly, the addition of focused delivery could enhance tissue response. Over time, differences in symptom relief become noticeable. This pattern hints at location-specific benefits. Not every patient responds equally, yet trends support combined placement. Biological effects might depend on where exactly the solution is delivered. When both areas receive injection, outcomes shift slightly upward. Precision in application site may matter more than volume alone.

INTRODUCTION

Knee joint disorders such as initial-stage osteoarthritis or degenerated menisci are frequent causes of lasting discomfort, movement difficulties, and diminished daily functioning. Dysfunction of the joint arises through a combination of wearing-down cartilage, irritated lining tissues, along with damaged meniscus structures; these combine to cause ache when standing or walking, tightness, and limits in motion range. Usual treatments like NSAIDs, physical rehabilitation, steroid shots, or gel-like fluid infusions tend to ease symptoms temporarily instead of altering the internal conditions driving tissue

breakdown [1]. Against this background, treatments rooted in biologic regeneration now draw interest due to possible effects on reducing swelling while encouraging natural repair processes within joint areas.

Emerging quietly within musculoskeletal care, Platelet-Rich Plasma (PRP) therapy draws attention through minimal intrusion. It has platelets and growth factors like PDGF (Platelet-Derived Growth Factor), TGF-β (Transforming Growth Factor Beta), VEGF (Vascular Endothelial Growth Factor), IGF (Insulin-Like Growth Factor) [2]. These components shape tissue healing while influencing inflammation dynamics [3]. When used as intra-articular injections, particularly knees affected by degeneration, results often show shifts in discomfort levels and movement ability [4]. Outcomes tend to favor PRP when measured against inactive treatments or standard treatments in multiple studies. Data across trials reveal downward trends in pain ratings on VAS, alongside better WOMAC index values after treatment delivery [5, 6].

Meniscal pathology is seen often with early ostroarthirits, especially degenerative tears and add heavily to joint discomfort. Load sharing, impact buffering, and maintaining joint steadiness depend greatly on the meniscus. Once its structure weakens, cartilage deterioration speeds up along with heightened inflammation inside the joint space. Although injecting PRP into the joint targets synovium and cartilage surfaces, placing it directly into damaged meniscal areas might trigger focused biological activity [7]. Such precision could support healing processes and reduce symptoms. However, studies offer sparse and inconsistent evidence when comparing dual delivery - into both joint cavity and meniscus - against joint-only administration.

Even when research evaluated PRP for knee disorders, the main attention goes to injections inside the joint space [6, 7]. Still, limited review work checks if including meniscus targeting brings better results - less discomfort, improved movement, greater daily living ease. Consistent combined assessment across broad groups using tools like NRS, VAS, WOMAC, alongside trusted well-being markers is also limited in the literature.

With growing use of PRP in orthopedics and little agreement on best methods, real-world evidence gains importance. Where treatments diverged, results may suggest subtle distinctions. For this reason, the current research aimed to contrast clinical results between isolated intra-articular PRP administration and a regimen that includes both intra-articular and meniscal injections, focusing on levels of discomfort, movement ability, and daily funtional activities. The study aimed to evaluate variations in reduction of pain, improvement in functional activities, and quality of life through validated outcome measures over a 3 year period.

This study adds value to the literature by refining management strategies through evaluating if anatomically directed dual-site PRP injection improves outcomes in symptomatic knee disorders.

MATERIALS AND METHODS

The study was retrospective clinical study, conducted at at a tertiary care orthopedic and regenerative medicine center, examining how PRP treatment affected individuals experiencing knee disorders. Within that setting, medical files from subjects receiving care were reviewed after approval from the DBR & SK Super Speciality Hospital – Institutional Ethics Committee (DBR&SK-IEC), Tirupati, Andhra Pradesh, India (meeting held on 13 February 2023; approval letter dated 15 February 2023). The study was conducted in accordance with relevant guidelines and regulations, including the Declaration of Helsinki. Owing to the retrospective design, the requirement for informed consent to participate was waived by the DBR&SK-IEC. Confidentiality of patient data was maintained without exception.

Study population

Even though the study was designed to be retrospective in design, a post hoc calculation was done such that enough participants were selected. Given earlier studies indicating a significant change of 1.5 to 2 units in VAS pain scores between groups - assuming standard deviation around 2.5 - around 90 individuals per group would support to achieve 80% power. Considering potential data loss and to improve robustness, the current study had 100 participants per group, totaling 200 participants.

A sample of 200 individuals selected by retrospective consecutive sampling method, treated with PRP formed the basis of this analysis. Split evenly by therapeutic approach, they were 2 groups - each one with 100 samples. One set involved those given PRP in both joint cavity injections and focused meniscal delivery. The second contained subjects receiving only the joint PRP injection.

Selection criteria

Individuals 30 to 75 years old, diagnosed with knee osteoarthritis or degenerative meniscus pathology through clinical and imaging evaluation, qualified for inclusion in the study. Despite non-surgical care - such as medications and physical rehabilitation - knee discomfort lasting beyond ninety days was required. Inclusion depended on full documentation of initial assessments and later evaluations tracking pain levels and movement ability. Excluded were participants showing signs of joint inflammation from autoimmune conditions, past knee infections, fractured bones near the joint, cancer, or surgical procedures on the knee within half a year. Injecting cortisone or gel-like substances into the knee area during the three months before PRP application ruled out participation. Data sets missing essential details or lacking sufficient post-treatment observation periods did not enter the review process.

PRP preparation

From each patient, 20 to 30 milliliters of blood was drawn into tubes holding anticoagulant, done carefully to maintain sterile conditions. Centrifugation was done at around 1500 revolutions per minute for ten minutes, then again at about 3000 for the same duration - this method produced PRP low in white cells. Platelets concentrated to nearly four times normal levels, averaging between 1.0 and 1.2 million

per microliter. No external activators used. Platelet levels within it reached roughly triple to quintuple that seen in normal circulating blood. A skilled orthopedic practitioner delivered every dose, ensuring sterility throughout administration. Injection was done only once into the joint space with 3-5ml. Ultrasound helped guide an additional one to two milliliters precisely into targeted meniscus areas.

Administration of PRP

Within Group B, injections of PRP was done into the knee joint through an anterolateral route. For individuals assigned to Group A, administration began with intra-articular PRP placement, then continued under ultrasound guidance to reach affected areas of the meniscus. After treatment was done, limited physical activity remained recommended across both groups during the initial two days. A standardized rehabilitation protocol was followed by all study participants. Nonsteroidal anti-inflammatory agents were not used for seven days post-injection due to potential disruption of platelet function.

Measurement of results

Assessment of results relied on established clinical tools. Pain levels appeared through NRS scores and VAS readings. Functionality data was recorded from WOMAC evaluations filled out by participants. Quality of life was assessed from uniform self-reports collected directly from patients. Baseline records were taken before any treatment was done. Further follow ups were done at 1 month, 3 months, 6 months, 1 year, 2 years, and 3 years post treatment.

A consistent rehab plan after injection applied to each group. Forty-eight hours involved limited movement afterward activity increased slowly. Supervised therapy began, emphasizing range-of-motion exercises. Muscle support work targeted the quadriceps while gentle functional tasks were added. The full process lasted between four and six weeks generally. Movements involving force stayed limited early on. Pain medications such as NSAIDs remained excluded during the initial seven days.

Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequency and percentage distributions. Normality of data was assessed using the Shapiro–Wilk test. Intergroup comparison of continuous variables such as NRS, VAS, and WOMAC scores between Group A and Group B at each follow-up interval was performed using the Independent Samples t-test. Intragroup comparison of repeated measurements over different follow-up periods (baseline, 1 month, 3 months, 6 months, 1 year, 2 years, and 3 years) was analyzed using Repeated Measures Analysis of Variance (Repeated Measures ANOVA). Bonferroni post-hoc analysis was applied for pairwise comparison between time intervals. Categorical variables including gender distribution, patient satisfaction, improvement in daily activities, and incidence of post-injection pain were analysed using the Chi-square test or Fisher’s Exact test wherever applicable. A p-value of less than 0.05 was considered statistically significant. Statistical analysis was carried out using IBM SPSS Statistics 26.0.

RESULTS

Baseline characteristics of the study population

Two hundred individuals made up the final dataset, split evenly into two arms. At an average, those in Group A were 56.8 years old and those in Group B stood slightly higher at 57.4. However, no difference emerged when these averages were tested statistically ($p = 0.68$). Males accounted for less than half in both groups. All other baseline characteristics between groups were not found to be significant ($p > 0.05$) (Table 1). Uniformity before treatment application appeared well supported by these figures.

Table 1
Baseline Demographic and Clinical Characteristics of Study Participants

Variable	Group A (Intra-articular + Meniscal PRP) (n = 100)	Group B (Intra-articular PRP Alone) (n = 100)	Test Statistic (t/ χ^2)	p-value
Age (years), mean ± SD	56.8 ± 8.9	57.4 ± 9.2	t = 0.41	0.68
Gender (Male/Female), n (%)	46 (46%) / 54 (54%)	49 (49%) / 51 (51%)	$\chi^2 = 0.22$	0.64
BMI (kg/m²), mean ± SD	27.9 ± 3.4	28.2 ± 3.6	t = 0.63	0.53
Duration of symptoms (months), mean ± SD	14.6 ± 6.8	15.1 ± 7.2	t = 0.51	0.61
Radiographic Grade (Grade II/III), n (%)	58 (58%) / 42 (42%)	61 (61%) / 39 (39%)	$\chi^2 = 0.18$	0.67
Baseline NRS Score, mean ± SD	7.6 ± 1.1	7.5 ± 1.2	t = 0.33	0.74
Baseline VAS Score, mean ± SD	7.8 ± 1.0	7.7 ± 1.1	t = 0.24	0.81
Baseline WOMAC Score, mean ± SD	68.2 ± 8.5	69.1 ± 9.0	t = 0.64	0.52

PRP – Platelet-Rich Plasma; BMI – Body Mass Index; SD – Standard Deviation; NRS – Numeric Rating Scale; VAS – Visual Analog Scale; WOMAC – Western Ontario and McMaster Universities Osteoarthritis Index; t = independent sample t-test; χ^2 = chi-square test

Pain Assessment Using NRS and VAS

Starting from baseline, average pain ratings were at 7.6 ± 1.1 for participants in Group A, alongside 7.5 ± 1.2 in those of Group B; statistical comparison showed no difference between them ($p = 0.74$). in 1 months follow up, a clear decline in discomfort emerged across both groups and held strong significance ($p < 0.001$).From month 3 onwards Group A had consistently better outcomes, including at 6

months, 1 year, 2 years and 3 years. At 3 years follow-up, mean NRS scores were 2.2 ± 1.3 in Group A and 3.4 ± 1.5 in Group B indicating continued superiority of combined therapy (Table 2).

Likewise, baseline scores on the Visual Analog Scale matched closely across both groups with no difference (Group A: 7.8 ± 1.0; Group B: 7.7 ± 1.1; p = 0.81). During 3 years follow up, readings were 2.6 ± 1.4 among those in Group A, whereas Group B showed a decline to 3.8 ± 1.6. this showed statistical significance between the groups (p < 0.001), pointing toward stronger lasting relief when injections were used together (group A) (Table 2, Figs. 1 & 2).

Table 2
Comparison of Pain Scores (NRS and VAS) Between Groups Over Time

Outcome Measure	Time Point	Group A (mean ± SD)	Group B (mean ± SD)	Test Statistic (t)	p-value
NRS	Baseline	7.6 ± 1.1	7.5 ± 1.2	0.33	0.74
	1 Month	4.8 ± 1.4	5.2 ± 1.5	1.74	0.09
	3 Months	3.1 ± 1.3	4.3 ± 1.6	5.53	< 0.001*
	6 Months	2.4 ± 1.3	3.6 ± 1.5	5.94	< 0.001*
	1 year	2.1 ± 1.2	3.2 ± 1.4	t = 5.79	< 0.001*
	2 years	2.0 ± 1.1	3.0 ± 1.3	t = 5.51	< 0.001*
	3 years	2.2 ± 1.3	3.4 ± 1.5	t = 5.96	< 0.001*
VAS	Baseline	7.8 ± 1.0	7.7 ± 1.1	0.24	0.81
	1 Month	5.0 ± 1.5	5.5 ± 1.6	1.78	0.08
	3 Months	3.3 ± 1.4	4.6 ± 1.7	5.90	< 0.001*
	6 Months	2.6 ± 1.4	3.8 ± 1.6	5.76	< 0.001*
	1 year	2.3 ± 1.2	3.4 ± 1.5	t = 5.67	< 0.001*
	2 years	2.2 ± 1.1	3.2 ± 1.4	t = 5.43	< 0.001*
	3 years	2.5 ± 1.3	3.6 ± 1.5	t = 5.61	< 0.001*

SD – Standard Deviation; NRS – Numeric Rating Scale; VAS – Visual Analog Scale; t = independent sample t-test; *p < 0.05 indicates statistical significance

Functional Results Measured by WOMAC

Group A showed a larger decrease in WOMAC scores than Group B by six months. With baseline values nearly identical – 68.2 versus 69.1 - the divergence emerged over time despite both showing progress. Improvement occurred consistently across time intervals, verified statistically within each cohort.

Improvements remained sustained throughout the 3-year follow-up period. The difference between the groups were statistically favoring Group A (Table 3 & Fig. 3).

Table 3
Comparison of Functional Outcome (WOMAC Score) Over Time

Time Point	Group A (mean ± SD)	Group B (mean ± SD)	Mean Reduction (A vs B)	Test Statistic (t)	p-value
Baseline	68.2 ± 8.5	69.1 ± 9.0	–	0.64	0.52
1 Month	49.6 ± 9.8	54.3 ± 10.5	18.6 vs 14.8	2.63	0.01*
3 Months	35.2 ± 8.6	45.8 ± 9.9	33.0 vs 23.3	7.93	< 0.001*
6 Months	28.5 ± 7.9	38.7 ± 9.4	39.7 vs 30.4	8.36	< 0.001*
1 Year	24.8 ± 7.1	35.6 ± 8.7	43.4 vs 33.5	8.44	< 0.001*
2 Years	23.9 ± 6.8	34.8 ± 8.3	44.3 vs 34.3	8.63	< 0.001*
3 Years	25.6 ± 7.4	37.1 ± 8.9	42.6 vs 32.0	8.08	< 0.001*
t = independent sample t-test; *p < 0.05 indicates statistical significance					

Quality of Life Indicators

Throughout the follow up period, life-quality ratings improved for each cohort. At 3 years follow up, a clear shift emerged in terms of reduction in VAS, improvement in daily activities. In the long-term follow-up, the patients' satisfaction and improvement of daily activities were still higher in Group A. All differences between both groups were statistically significant ($p < 0.001$) except for post-pain injection (Table 4).

Table 4
Quality of Life and Clinical Response

Outcome	Group A (n = 100)	Group B (n = 100)	Test Statistic (χ^2)	p-value
≥ 50% Reduction in VAS, n (%)	72 (72%)	49 (49%)	$\chi^2 = 10.82$	0.001*
Marked Improvement in Daily Activities, n (%)	80 (80%)	61 (61%)	$\chi^2 = 8.54$	0.003*
Patient Satisfaction, n (%)	83 (83%)	67 (67%)	$\chi^2 = 6.92$	0.009*
Mild Post-Injection Pain, n (%)	9 (9%)	7 (7%)	$\chi^2 = 0.28$	0.59
χ^2 = Chi-square test; *p < 0.05 indicates statistical significance				

In both study groups, Repeated Measures ANOVA showed statistically significant intragroup improvement for all outcome measures at different follow-up intervals. The reduction in NRS scores was significant in relation to time in Group A ($F = 186.42$, $p < 0.001$) and Group B ($F = 154.37$, $p < 0.001$). The VAS scores also showed significant improvement during the follow-up period in Group A ($F = 179.56$, $p < 0.001$) and Group B ($F = 148.29$, $p < 0.001$). Functional assessment by WOMAC scores also showed significant change over time in both groups. Group A showed a higher F value ($F = 201.73$, $p < 0.001$) in comparison to Group B ($F = 169.81$, $p < 0.001$) which indicates a greater overall improvement of patients receiving combined intra-articular and meniscal PRP injections (Table 5).

Table 5
Repeated Measures ANOVA for Intragroup Comparison of NRS, VAS and WOMAC Scores

Outcome Variable	Group	F Value	p-value
NRS	Group A	F = 186.42	< 0.001*
	Group B	F = 154.37	< 0.001*
VAS	Group A	F = 179.56	< 0.001*
	Group B	F = 148.29	< 0.001*
WOMAC	Group A	F = 201.73	< 0.001*
	Group B	F = 169.81	< 0.001*

Both groups showed significant pairwise improvements from baseline to each follow-up interval, as determined by a Bonferroni post-hoc analysis. Mean differences in group A increased from 2.8 at 1 month to 5.6 at 2 years, with a persistent improvement of 5.4 sustained at 3 years ($p < 0.001$ for all comparisons). In Group B, significant reductions from baseline were also seen at all time points (mean differences 2.3 at 1 month to 4.5 at 2 years and 4.1 at 3 years, $p < 0.001$ for all comparisons). While both groups showed continuous clinical improvement over time, the magnitude of change was consistently

greater in Group A, supporting the superior long-term effectiveness of combined intra-articular and meniscal PRP administration (Table 6).

Table 6
Bonferroni Post-hoc Analysis for Pairwise Comparison Within Groups

Comparison Interval	Mean Difference (Group A)	p-value	Mean Difference (Group B)	p-value
Baseline vs 1 Month	2.8	< 0.001*	2.3	< 0.001*
Baseline vs 3 Months	4.5	< 0.001*	3.2	< 0.001*
Baseline vs 6 Months	5.2	< 0.001*	3.9	< 0.001*
Baseline vs 1 Year	5.5	< 0.001*	4.3	< 0.001*
Baseline vs 2 Years	5.6	< 0.001*	4.5	< 0.001*
Baseline vs 3 Years	5.4	< 0.001*	4.1	< 0.001*

Summary of Findings

Though pain, movement ability, and daily living quality were improved in group B, results were stronger when PRP was injected in the meniscus area in group A. Three years follow up showed clearer advantages where treatment reached both joint and meniscus, suggesting layered placement might extend benefits beyond single-point delivery.

DISCUSSION

The present study comparison examined if targeting the meniscus during PRP therapy leads to superior results than standard joint injections for people with knee discomfort. Although both methods reduced discomfort, increased mobility, and enhanced daily living, injecting into joint and meniscus brought stronger benefits that llasting throughout the 3-year follow-up period- especially seen through NRS, VAS, and WOMAC measurements. Those receiving treatment in group A showed notably deeper drops in pain intensity, with more individuals reaching at least half the maximum possible relief on the VAS scale; such patterns may point toward extra credits when including the meniscus.

Though studied extensively, PRP remains one of several biologic options explored for managing knee osteoarthritis and related degeneration. Superior outcomes in pain reduction and movement ability emerge when comparing injected PRP against inert solutions or hyaluronic acid - especially among individuals with mild to mid-stage disease [7–9]. Action may stem from reducing joint inflammation via substances like PDGF, TGF-β, and VEGF, while also reducing key inflammatory signals such as IL-1β and

TNF-α [10, 11]. Because of these characteristics, significant differences within treatment groups are commonly seen across trials.

Despite this, damage to the meniscus often occurs alongside mild osteoarthritis, each adding to discomfort and movement issues. Load sharing and steady joint function depend heavily on the meniscus; minor tissue breakdown here can worsen cartilage loss and irritate the joint lining [12]. Although PRP injected into the joint mainly influences synovium and cartilage, its reach into damaged meniscal areas remains limited. By comparison, placing PRP directly into the meniscus could increase growth factor levels right where needed, possibly encouraging repair within the dense fibrous structure.

Recent medical trials have examined PRP use in meniscus damage, especially alongside arthroscopic procedures, showing better tissue restoration and fewer drawbacks than surgery by itself [13, 14]. Despite centering mainly on surgical settings, such work confirms that PRP could reasonably influence regenerative processes within the meniscus. This idea gains further weight from our results, which point toward benefits even without surgery - targeted delivery via ultrasound guidance, together with joint cavity administration, appears linked to stronger symptom relief and movement improvement.

Improvement size in WOMAC scores among those receiving treatment at two sites matches earlier findings where focused biological intervention led to better function in individuals dealing with both cartilage and meniscus damage [8, 9]. the results obtained in the present study were found to be stable throughout for 3 years; certain studies have shown platelet-rich plasma benefits diminishing after three to six months [15, 16]. A reason for longer-lasting results might lie in the added meniscal involvement - this could mean addressing a structural pain generator was reached that simple joint injections by themselves often miss.

Despite similar baseline characteristics, those receiving both interventions described better function during routine tasks. Although single treatments showed benefits, the addition of adjunctive application correlated with stronger self-rated health scores. Because joint dysfunction affects movement, work productivity, and emotional state, gains in subjective wellness indicators matter in medical practice. Following dual intervention, participants noted fewer limitations at home or work. Enhanced structural support along with decreased tissue irritation might explain the greater benefit seen with simultaneous targeting.

One key takeaway from the data is how the choice of patient and the focus on specific anatomy shape outcomes in biologic treatments. A one-size-fits-all method involving standard joint injections appears less suitable when compared to tailored plans shaped by clear ultrasound evidence of meniscus issues. With imaging support, delivery guided by real-time ultrasound reaches targeted areas more accurately, possibly lifting response rates while keeping risks unchanged. Safety remains consistent across methods - adverse effects show up rarely, appear mild, and distribute evenly among participants regardless of technique used.

Even with encouraging data, certain constraints require attention. One key issue lies in the study's retrospective structure, which can allow uneven participant selection and offers little oversight on disruptive influences. While baseline patient characteristics matched closely through statistics, unmeasured aspects - like movement habits, joint positioning issues, or existing cartilage damage - might still affect results. Another concern emerges from not assigning subjects at random, making it hard to confirm cause-and-effect links. Confirmation will depend on future studies that follow patients prospectively in time using structured comparison methods. It is worth noting that in the present study, imaging methods played no role; clinical indicators were only concentrated. Structural insights, such as those revealed by MRI scans tracking meniscus repair or shifts in cartilage, might have given more knowledge on symptom reports in measurable change. Although symptom relief emerged within weeks, questions arise about how effects last across years. Despite following an established procedure at our facility, generalization of the results remain uncertain. Follow-up was extended to 3 years, although still longer prospective studies may be needed to evaluate durability of outcomes.

It remains uncertain how much placebo responses or patient expectations might have shaped results. Although each cohort obtained intervention, the extra step applied to one group could shift how improvement was experienced. Future evidence would gain reliability if coming from studies using blinding outcome assessment.

Despite certain constraints, this research adds practical insights into a developing field within joint regeneration. As far as is known, limited comparison-based studies have assessed intra-articular platelet-rich plasma, both with and without focused delivery into the meniscus, across a substantial group of individuals relying on consistent measures for discomfort, movement ability, and daily living experience.

Longer-term randomized trials deserve attention, moving forward, with consistent methods to describe PRP. Imaging tools could measure results more precisely than current approaches. Decisions in practice might improve if cost effectiveness are weighed alongside benefits over time. Certain patient groups, defined by joint damage type or severity, may respond differently - a pattern worth exploring. Responses at both treatment sites might depend on unseen biological signals, revealed through targeted lab tests.

Ultimately, though intra-articular PRP by itself leads to reductions in pain and better function for painful knee conditions, including focused delivery into the meniscus results in stronger, longer-lasting outcomes. Such results point toward adjusting treatment based on specific joint anatomy, inviting future study via rigorous prospective studies.

CONCLUSION

Despite constraints inherent to this retrospective analysis, notable improvement in pain relief, movement ability, and quality of life emerged following either isolated joint or joint-plus-meniscus PRP administration among individuals experiencing knee discomfort. Still, those receiving extra focus on the meniscus showed stronger outcomes, lasting for 3 year period, along with more consistent progress

across key symptoms. Future studies, prospective by design, extending further in time, incorporating detailed scans are needed before firm conclusions form around optimal methods.

Abbreviations

PRP
Platelet–Rich Plasma
PDGF
Platelet–Derived Growth Factor
TGF
β–Transforming Growth Factor Beta
VEGF
Vascular Endothelial Growth Factor
IGF
Insulin–Like Growth Factor
NRS
Numeric Rating Scale
VAS
Visual Analog Scale
WOMAC
Western Ontario and McMaster Universities Osteoarthritis Index
BMI
Body Mass Index
SD
Standard Deviation
NSAIDs
Nonsteroidal Anti–Inflammatory Drugs
IL
1β–Interleukin–1 Beta
TNF
α–Tumor Necrosis Factor Alpha
MRI
Magnetic Resonance Imaging

Declarations

Funding: Nil

Acknowledgement- nil

Conflict of interest- nil

Consent for publication: Not applicable. This manuscript does not contain any identifiable images or personal or clinical details of individual participants.

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Clinical trial number: not applicable

Ethics approval and consent to participate: This study was reviewed and approved by the DBR & SK Super Speciality Hospital – Institutional Ethics Committee (DBR&SK-IEC), Tirupati, Andhra Pradesh, India, at its meeting held on 13 February 2023 (approval letter dated 15 February 2023). All procedures were performed in accordance with relevant guidelines and regulations, including the ethical principles of the Declaration of Helsinki. As this was a retrospective study based on the review of existing medical records, the requirement for informed consent to participate was waived by the DBR&SK-IEC. Patient data were anonymised and kept confidential throughout the study.

Consent for publication: Not applicable. This manuscript does not contain any identifiable images or personal or clinical details of individual participants.

Animal Studies-no

Author contributions

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Figures

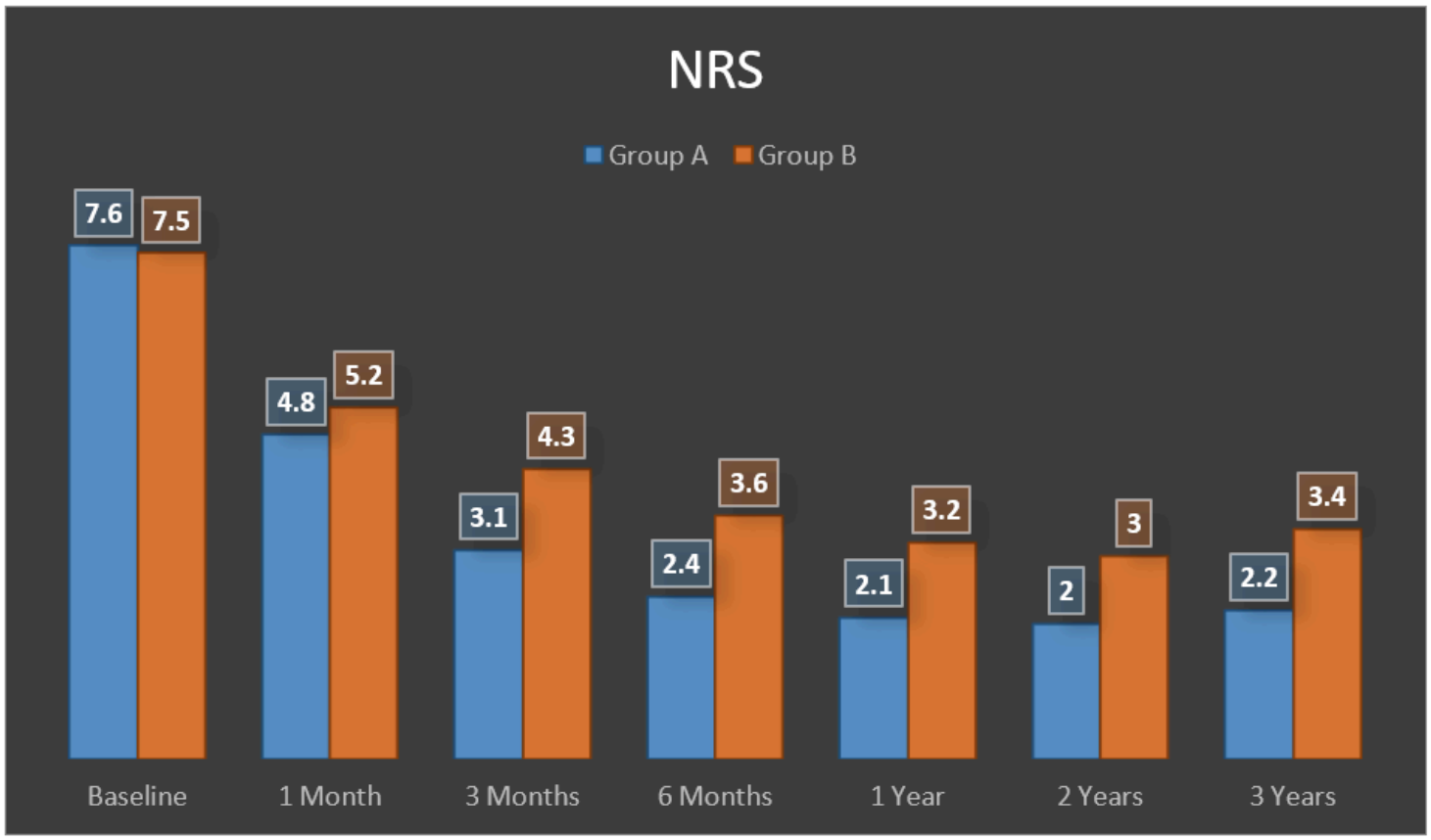


Figure 1

Comparison of NRS scores between group at various time intervals

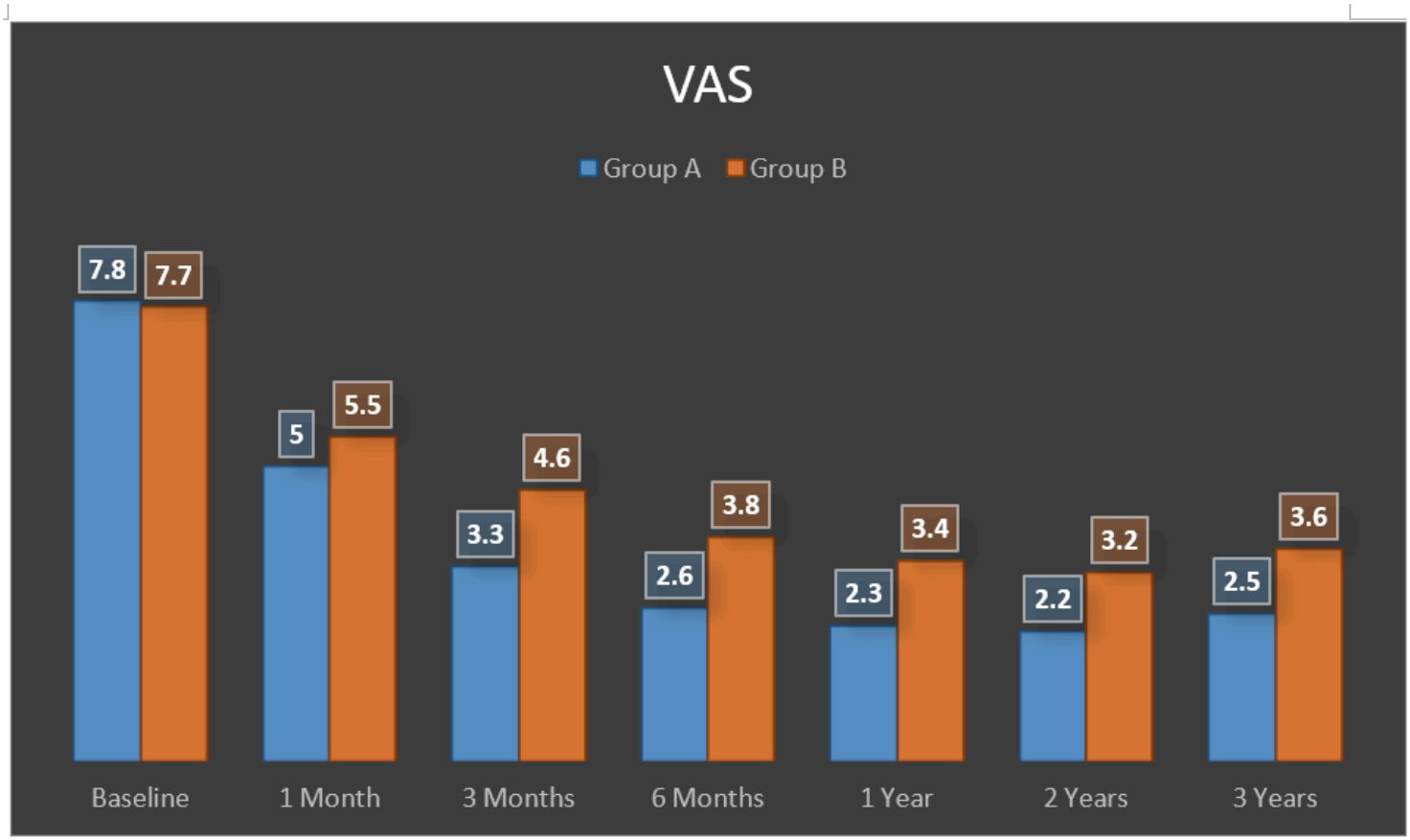


Figure 2

Comparison of VAS scores between group at various time intervals

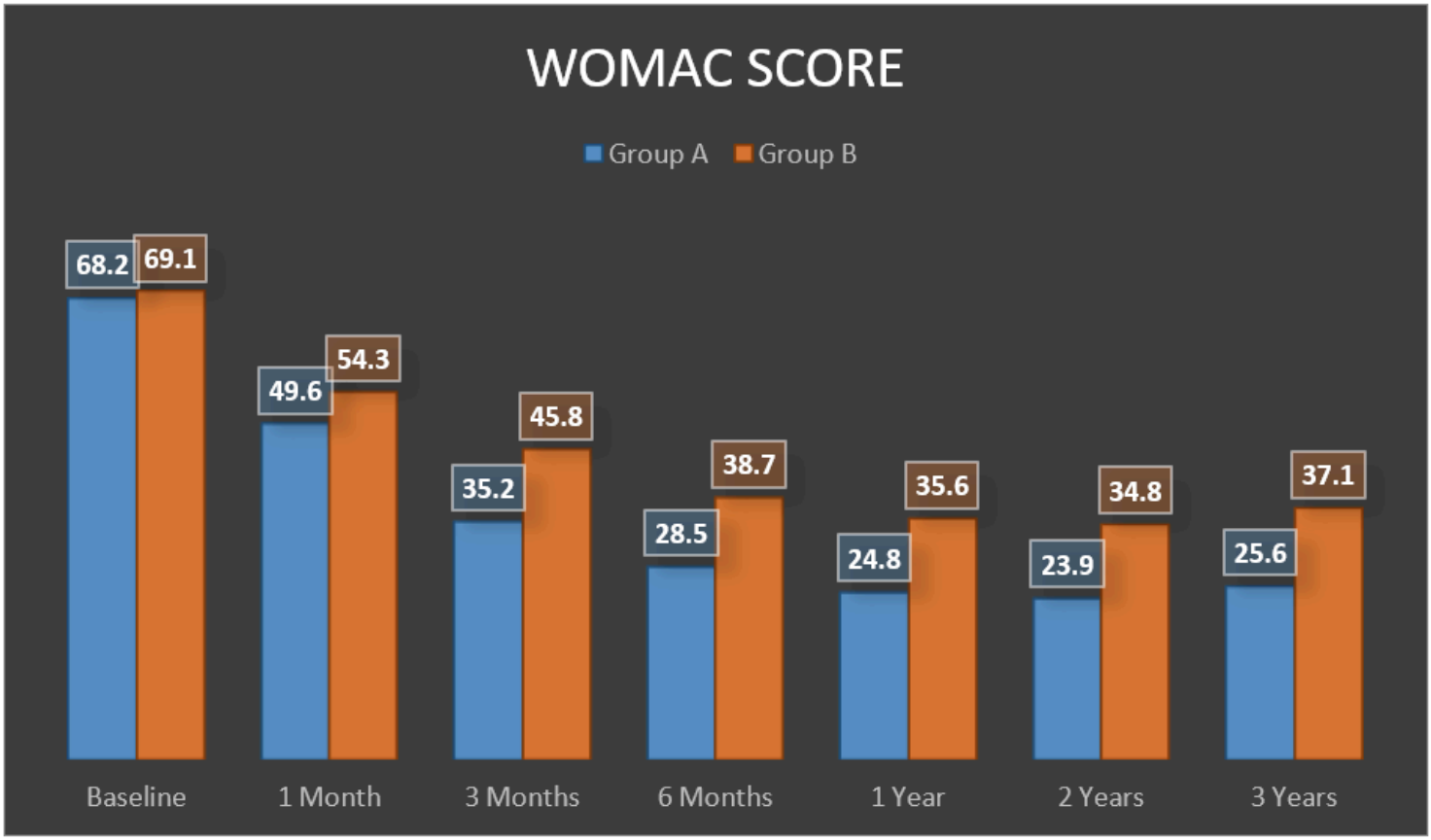


Figure 3

Comparison of WOMAC scores between groups