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EFFICACY OF PLATELET-RICH PLASMA IN KNEE OSTEOARTHRITIS: A ONE-YEAR PROSPECTIVE FOLLOW-UP STUDY

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Abstract

Background: Knee osteoarthritis (OA) is a leading cause of pain and disability. Platelet-rich plasma (PRP) is an autologous biologic with regenerative potential. This study evaluated the efficacy and safety of intra-articular PRP in primary knee OA over one year.

Methods: Prospective, single-center study at Kamal Hospital, Tarn Taran (2017). Seventy-nine patients (102 knees) with Kellgren–Lawrence grade II–III OA received a single PRP injection. Assessments at baseline, 3, 6, and 12 months included VAS (pain) and WOMAC (function). Repeated-measures ANOVA tested changes over time ($p<0.05$ significant).

Results: VAS improved from 77.9 to 39.2 and WOMAC from 63.1 to 36.9 at 12 months (both $p<0.001$). At one year, 83.5% achieved ≥50% pain reduction. Adverse events were minor and transient (post-injection pain/stiffness in 24.1%).

Conclusion: Intra-articular PRP yielded clinically meaningful, sustained improvements in knee OA through one year, with an excellent safety profile.

Keywords Platelet-Rich Plasma; Knee Osteoarthritis; Intra-articular Injection; Regenerative Medicine; VAS; WOMAC; One-Year Follow-Up

Introduction

Osteoarthritis (OA) of the knee is a prevalent cause of chronic pain and disability. Conventional treatments such as exercise, NSAIDs, corticosteroids, and hyaluronic acid (HA) provide symptomatic relief but are not disease-modifying. Platelet-rich plasma (PRP) has emerged as an autologous biologic capable of modulating inflammation and supporting cartilage repair, with early studies demonstrating symptomatic benefits in degenerative cartilage pathology and knee OA.[1,2] Randomized trials subsequently reported encouraging outcomes in favor of PRP compared with HA and placebo.[3–6] Beyond the knee, PRP has shown benefits in other musculoskeletal disorders such as chronic tendinopathies and supraspinatus pathology,[15,16] supporting its biological plausibility.

This study prospectively evaluates the one-year efficacy and safety of intra-articular PRP in primary knee OA at our center.

Review of Literature (through mid-2018)

Kon et al. (2010) first reported favorable results of PRP in degenerative cartilage lesions.[1] Filardo et al. (2011) reinforced these findings with sustained benefits up to 12 months.[2] Sánchez et al. (2012) d emonstrated PRP superiority over HA,[3] while Filardo et al. (2012) showed improvements in both PRP and HA groups.[4] Cerza et al. (2012) found WOMAC scores lower in PRP patients,[5] and Patel et al. (2013) reported PRP to be superior to placebo.[6] Meta-analyses confirmed these findings: Chang et al. (2014) concluded PRP efficacy was sustained up to 12 months,[7] and Laudy et al. (2015) showed PRP reduced pain more effectively than placebo and was comparable or superior to HA.[8] Filardo et al. (2015) reported no consistent superiority vs HA, highlighting heterogeneity.[9] Later studies showed combined intra-articular and intraosseous PRP injections may benefit severe OA,[10] and reviews suggested leukocyte-poor PRP may be preferable.[11,12] Di Martino et al. (2018) found both PRP and HA improved outcomes at one year without overall superiority.[13] Our prior studies demonstrated PRP effectiveness in chronic tendinopathies[15] and supraspinatus pathology,[16] further supporting cross-tissue regenerative potential.

Materials and Methods

Study Design and Setting

This prospective, single-center study was conducted in the Department of Orthopaedics, Kamal Hospital, Tarn Taran, Punjab, between January 2017 and December 2017. Patients were followed for one year, and results were analyzed and published after the one-year follow-up period (2019).

Patient Selection

Inclusion: Age 40–70 years, primary knee OA (Kellgren–Lawrence grade II–III), persistent pain ≥6 months despite conservative therapy. Exclusion: Secondary arthritis, recent surgery, intra-articular steroid injection in past 3 months, systemic disease, platelet disorders, Hb <10 g/dL, BMI >35.

PRP Preparation Protocol

PRP was prepared using a two-step centrifugation protocol. From 40–50 mL of venous blood, the first spin (1800 rpm, 15 min) separated red cells. The second spin (3500 rpm, 10 min) concentrated platelets to 3–5× baseline. No exogenous activators were added; activation occurred within the joint.[1,14–16]

Injection Technique

Under aseptic precautions, 6–8 mL PRP was injected into the knee via superolateral approach using an 18G needle. Patients avoided NSAIDs for one week and followed a home exercise program of ROM and quadriceps strengthening.

Outcome Measures

VAS (0–100) and WOMAC were assessed at baseline, 3, 6, and 12 months. Global assessment and adverse events were also recorded.

Statistical Analysis

Data were analyzed with repeated-measures ANOVA and Bonferroni post-hoc testing. $p<0.05$ was considered significant.

Results

Seventy-nine patients (102 knees) were included. Mean age: 55.8 ± 7.2 years; females: 60.8%. Grade II OA: 62.7%; Grade III: 37.3%. Mean BMI: 28.6 ± 3.4 kg/m².

VAS improved from 77.9 ± 8.5 at baseline to 47.6 ± 9.0 at 3 months, 42.1 ± 8.3 at 6 months, and 39.2 ± 7.1 at 12 months ($p<0.001$). WOMAC improved from 63.1 ± 7.8 at baseline to 44.8 ± 6.7 at 3 months, 39.4 ± 6.3 at 6 months, and 36.9 ± 6.0 at 12 months ($p<0.001$). At one year, 83.5% achieved ≥50% pain reduction. Grade II OA patients showed greater improvements than Grade III ($p=0.01$).

Table 1. Baseline Demographic and Clinical Characteristics

Variable	Value
Mean age (years)	55.8 ± 7.2 (42–70)
Sex (M:F)	31:48
BMI (kg/m²)	28.6 ± 3.4
K-L Grade II	64 knees (62.7%)
K-L Grade III	38 knees (37.3%)
Baseline VAS	77.9 ± 8.5
Baseline WOMAC	63.1 ± 7.8

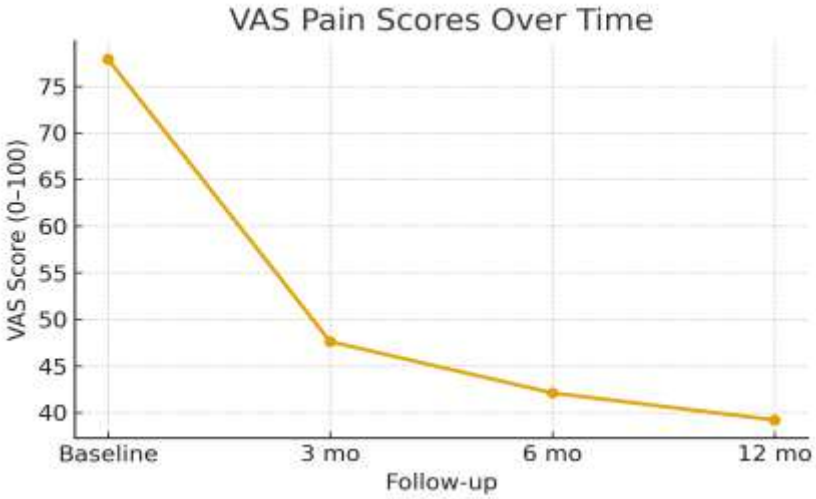

Figure 1. VAS pain scores over time (Baseline, 3, 6, 12 months). Lower scores indicate less pain.

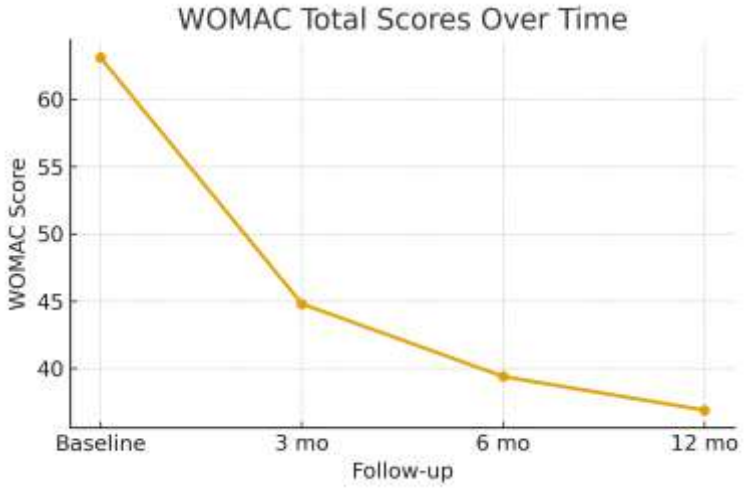

Figure 2. WOMAC total scores over time (Baseline, 3, 6, 12 months). Lower scores indicate better function.

Discussion

A single PRP injection provided significant improvements in pain and function over one year, consistent with prior evidence.[1,2,3–6] Meta-analyses have confirmed efficacy up to 12 months,[7,8] though some RCTs reported no consistent superiority vs HA.[9,13] PRP delivers growth factors such as PDGF, TGF-β, and IGF-1, which reduce inflammation and stimulate chondrocyte activity,[11,14] explaining the durability observed. Grade II OA showed better response, aligning with earlier disease being more responsive.[2,8,12] Our prior work also demonstrated PRP benefits in

tendinopathies[15] and supraspinatus pathology.[16] Limitations include lack of control arm, single-center design, and modest sample size.

Conclusion

Intra-articular PRP significantly improved pain and function in knee OA, with benefits sustained for one year. It is a safe, minimally invasive biologic option, particularly effective in early-to-moderate disease.

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