

Does the Combination of Platelet-rich Plasma and Supervised Exercise Yield Better Pain Relief and Enhanced Function in Knee Osteoarthritis? A Randomized Controlled Trial

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Abstract

Background: Knee osteoarthritis is a leading cause of disability with substantial healthcare costs, and efficient nonsurgical treatment methods are still needed. Platelet-rich plasma (PRP) injections and exercise therapy are used frequently in clinical practice. Whether PRP or PRP combined with exercise is more effective than exercise alone is unclear.

Questions/purposes: (1) Which treatment relieves knee osteoarthritis pain better: PRP alone, exercise, or PRP combined with exercise? (2) Does PRP alone, exercise, or PRP combined with exercise yield better results in terms of the WOMAC score, performance on the 40-m fast-paced walk test and stair climbing test, and the SF-12 health-related quality of life score?

Methods: In this randomized, controlled, three-arm clinical trial, we recruited patients with mild-to-moderate (Kellgren-Lawrence Grade II or III) knee osteoarthritis with a minimum of 3 points on the 11-point numeric rating scale for pain. During the study period, 157 patients with a diagnosis of knee osteoarthritis were screened and 84 eligible volunteers were enrolled in the study. Patients were randomly allocated (1:1:1) into either the exercise group (28), PRP group (28), or PRP + exercise group (28). Follow-up proportions were similar between the groups (exercise: 89% [25], PRP: 86% [24], PRP + exercise: 89% [25]; $p = 0.79$). All patients were analyzed in an intention-to-treat manner. There were no between-group differences in age, gender, arthritis severity, and baseline clinical scores (pain, WOMAC, functional performance tests, and health-related quality of life). The exercise group underwent a 6-week structured program consisting of 12 supervised individual sessions focused on strengthening and functional exercises. Meanwhile, the PRP group received three weekly injections of fresh, leukocyte-poor PRP. The PRP + exercise group received a combined treatment with both interventions. The primary outcome was knee pain over 24 weeks, measured on an 11-point numeric rating scale for pain (ranging from 0 to 10, where 0 represents no pain and 10 represents the worst pain, with a minimum clinically important difference [MCID] of 2). The secondary outcome measures included the WOMAC index (ranging from 0 to 100, with lower scores indicating a lower level of disability and an MCID of 12), the durations of the 40-meter fast-paced walk test and stair climbing test, and the SF-12 health-related quality of life score. For the a priori sample size calculation, we used the numeric rating scale score for pain at 24 weeks as the primary outcome variable. The MCID for the numeric rating scale was deemed to be 2 points, with an estimated standard deviation of 2.4. Based on sample size calculations, a sample of 24 patients per group would provide 80% power to detect an effect of this size between the groups at the significance level of $p = 0.05$.

Results: We found no clinically important differences in improvements in pain—defined as ≥ 2 points of 10—at 24 weeks when comparing exercise alone to PRP alone to PRP + exercise (1.9 ± 0.7 versus 3.8 ± 1.8 versus 1.4 ± 0.6 ; mean difference between PRP + exercise group and exercise group -0.5 [95% confidence interval -1.2 to 0.4]; $p = 0.69$). Likewise, we found no differences in WOMAC scores at 24 weeks of follow-up when comparing exercise alone to PRP alone to PRP + exercise (10 ± 9 versus 26 ± 20 versus 7 ± 6 ; mean difference between PRP + exercise group and exercise group -3 [95% CI -12 to -5]; $p = 0.97$). There were no differences in any of the other secondary outcome metrics among the PRP + exercise and exercise groups.

Conclusion: PRP did not improve pain at 24 weeks of follow-up in patients with mild-to-moderate knee osteoarthritis compared with exercise alone. Moreover, exercise alone was clinically superior to PRP alone, considering function and the physical component of health-related quality of life. Despite the additional costs and endeavors related to PRP products, the combination of PRP and exercise did not differ from exercise alone. The results of this randomized controlled trial do not support the use of PRP injections in the treatment of patients diagnosed with mild-to-moderate knee osteoarthritis. Consequently, exercise alone is the recommended treatment for reducing pain and enhancing function throughout this timeframe.

Level of evidence: Level I, therapeutic study.

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BMC Musculoskelet Disord. 2018 Jul 28;19(1):272. doi: 10.1186/s12891-018-2205-5.

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Efficacy of Platelet-Rich Plasma in the Treatment of Knee Osteoarthritis: A Meta-analysis of Randomized Controlled Trials.

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Arthroscopy. 2017 Mar;33(3):659-670.e1. doi: 10.1016/j.arthro.2016.09.024. Epub 2016 Dec 22.

PMID: 28012636 Review.

High-intensity versus low-intensity physical activity or exercise in people with hip or knee osteoarthritis.

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PMID: 38917056 Clinical Trial. No abstract available.

Reply to the Letter to the Editor: Does the Combination of Platelet-rich Plasma and Supervised Exercise Yield Better Pain Relief and Enhanced Function in Knee Osteoarthritis? A Randomized Controlled Trial.

Karaborklu Argut S, Celik D.

Clin Orthop Relat Res. 2024 Aug 1;482(8):1506-1507. doi: 10.1097/CORR.0000000000003164. Epub 2024 Jun 21.

PMID: 38917050 No abstract available.

References

- Altman R, Asch E, Bloch D, et al. Development of criteria for the classification and reporting of osteoarthritis. Classification of osteoarthritis of the knee. Diagnostic and Therapeutic Criteria Committee of the American Rheumatism Association. Arthritis Rheum. Aug 1986;29:1039-1049. - [PubMed](#)
- Andia I, Atilano L, Maffulli N. Moving toward targeting the right phenotype with the right platelet-rich plasma (PRP) formulation for knee osteoarthritis. Ther Adv Musculoskelet Dis. 2021;13:1759720x2111004336. - [PMC](#) - [PubMed](#)
- Bannuru RR, Osani MC, Vaysbrot EE, et al. OARSI guidelines for the non-surgical management of knee, hip, and polyarticular osteoarthritis. Osteoarthritis Cartilage. 2019;27:1578-1589. - [PubMed](#)
- Bennell K, Dobson F, Hinman R. Measures of physical performance assessments: Self-Paced Walk Test (SPWT), Stair Climb Test (SCT), Six-Minute Walk Test (6MWT), Chair Stand Test (CST), Timed Up & Go (TUG), Sock Test, Lift and Carry Test (LCT), and Car Task. Arthritis Care Res. 2011;63:S350-S370. - [PubMed](#)
- Bennell KL, Hunter DJ, Paterson KL. Platelet-rich plasma for the management of hip and knee osteoarthritis. Curr Rheumatol Rep. May 2017;19:24. - [PubMed](#)

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