Spin Bias in Randomized Controlled Trials of Intra Articular Platelet Rich Plasma for Knee Osteoarthritis

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Disclosures: Authors have nothing to disclose.

INTRODUCTION: Platelet-rich plasma (PRP) is widely used in orthopaedics, and intra-articular PRP is a popular option for knee osteoarthritis (OA). However, evidence remains mixed: meta-analyses sometimes favor PRP over hyaluronic acid or corticosteroids at 3-12 months yet highlight high risk of bias and substantial heterogeneity in PRP products, dosing, and comparators. Recent reviews of larger, lower-risk RCTs report small, often sub-threshold effects, and guidelines (AAOS, OARSI) reflect this uncertainty. In this context, spin, reporting strategies that overstate benefit (e.g., emphasizing significant secondary or within-group findings when the primary between-group outcome is nonsignificant, or interpreting nonsignificance as equivalence) can mislead readers. We systematically reviewed RCTs of intra-articular PRP for knee OA to quantify spin prevalence and types, and to examine associations with study/publication features (e.g., journal impact factor, funding disclosures). We hypothesized that spin is common often asserting benefit despite nonsignificant primaries and is more frequent in lower-impact journals and trials with features that increase interpretive flexibility.

METHODS: We systematically searched PubMed, Embase, and Web of Science for RCTs of intra-articular PRP in adults with knee OA. Two independent reviewers screened records and assessed eligibility; full texts were reviewed in duplicate against predefined criteria. Six reviewers extracted study features (design, setting, sample size, follow-up, interventions/controls, outcomes, abstract word limits, funding, journal impact factor, open-access status) and classified outcomes (primary/secondary; objective/subjective). Spin was coded using Boutron-adapted criteria for level (high/moderate/low/none) and strategy: (1) emphasizing significant secondary/within-group/subgroup results; (2) interpreting nonsignificant primary outcomes as equivalence; (3) claiming benefit despite nonsignificant primary outcomes. Discrepancies were resolved by discussion or third-party adjudication; interrater reliability was assessed with Cohen's κ. We summarized data descriptively and tested associations between spin and study features (χ²/Fisher's exact for categorical, Mann-Whitney U/Kruskal-Wallis for continuous). Significance: $p<0.05$. Analyses: Stata 17. A p-value < 0.05 was considered statistically significant. All analyses were conducted in Stata 17 (Stata Corp LLC).

RESULTS SECTION: A total of 193 randomized controlled trials (RCTs) evaluating platelet-rich plasma (PRP) for knee osteoarthritis (OA) were included. In full-text analysis, 180/193 (93.3%) reported ≥1 statistically significant result; 114 had significant primary outcomes and 79 had nonsignificant primaries. Recommendations to use PRP were common even when non significance was acknowledged: 41/75 (54.7%) of abstracts that did not acknowledge non significance still recommended PRP vs 34/101 (33.7%) that did (χ²=8.04, p=0.009); when acknowledgment was not applicable, 10/17 (58.8%) endorsed PRP. Spin was pervasive, with only 3/193 (1.6%) abstracts rated no spin. Overall distribution: high 27.0%, moderate 44.0%, low 27.5%, none 1.6%. Spin intensity was greater when primaries were significant: nonsignificant primaries high/moderate/low/none 17.7%/40.5%/39.2%/2.5%; significant primaries 33.3%/46.5%/19.3%/0.9% (χ²=14.48, p=0.007). By strategy (not mutually exclusive), 31.6% used Strategy 1 (emphasizing significant secondary/within-group/subgroup results), 32.1% Strategy 2 (equivalence interpretation), and 51.8% Strategy 3 (claiming benefit despite nonsignificant primaries); each was enriched in high-spin abstracts (p≤0.001). Funding disclosures were not associated with spin (χ²=4.78, p=0.29). Higher journal impact factor correlated with less spin (median 5.4 [IQR 1.4–7.0] in no-spin vs 1.75 [0.5–3.5] in high-spin; Kruskal–Wallis p=0.025).

DISCUSSION: In this systematic review of 193 randomized controlled trials investigating intra-articular PRP for knee osteoarthritis, spin was highly prevalent, observed in 98.4% of abstracts and distributed across high (26.9%), moderate (44.9%), and low (27.5%) levels. Notably, high spin was more frequent in studies reporting statistically significant primary outcomes compared to those with nonsignificant results (33.3% vs. 17.7%, p = 0.007). The most common spin strategy (51.8%) involved reporting benefit despite a nonsignificant primary outcome, often accompanied by emphasis on secondary or subgroup analyses, or by reframing nonsignificance as evidence of equivalent efficacy. Additionally, spin was significantly more common in lower-impact journals, with high-spin studies having a median impact factor of 1.75 compared to 5.4 among no-spin studies (p = 0.025). In contrast, spin frequency was not significantly associated with funding source (p = 0.29). High and moderate spin can overstate benefits or downplay uncertainty, potentially accelerating the adoption of unproven treatments and distorting systematic reviews, guidelines, and reimbursement decisions. To reduce spin, authors should clearly report primary outcomes and avoid overstating secondary or nonsignificant findings. Editors and reviewers must ensure cautious interpretation, especially in results and discussion sections, to prevent distorted conclusions from influencing clinical care.

SIGNIFICANCE/CLINICAL RELEVANCE: Use of spin in RCT abstracts on PRP for knee osteoarthritis is highly prevalent and may mislead clinicians, influence guidelines, and distort clinical and policy decisions. Improving transparency and interpretation is essential for evidence-based care.
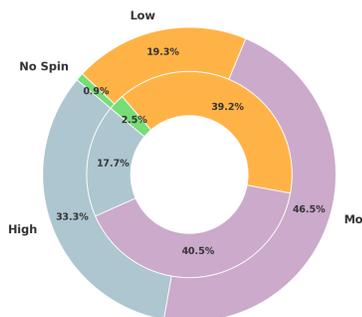

Figure 1. Outer ring: trials with significant primary outcomes (n = 114); inner ring: nonsignificant outcomes (n = 79). Wedges show High, Moderate, Low, and No spin (percentages labeled). High spin was more frequent with significant outcomes (33.3% vs 17.7%), while Low spin was more common with nonsignificant outcomes (39.2% vs 19.3%); χ² = 14.48, p = 0.007.
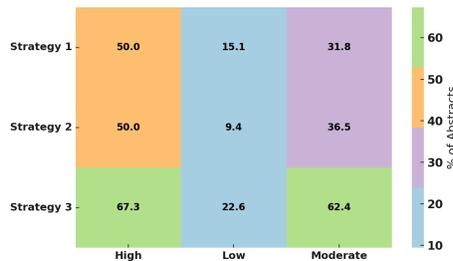

Figure 2. Heatmap showing prevalence of spin strategies (Strategy 1-3) across spin levels. Values indicate % of abstracts; all strategies were more common in high-spin studies (Strategy 1 p = 0.001; Strategy 2 p < 0.001; Strategy 3 p < 0.001). Strategies were not mutually exclusive, and a single study could employ multiple strategies.

Category	Definition
Spin Levels	
High	Strong overstatement or misleading interpretation, typically ignoring nonsignificant primaries and drawing firm claims of benefit.
Moderate	Some exaggeration or emphasis on secondary/subgroup findings, while acknowledging uncertainty partially.
Low	Mild overstatement; conclusions generally aligned with data but language slightly optimistic.
None	Abstract conclusions accurately reflect study findings without overinterpretation.
Spin Strategies	
Strategy 1	Emphasizing significant secondary, within-group, or subgroup results.
Strategy 2	Interpreting nonsignificant primary outcomes as evidence of equivalence or comparable effectiveness.
Strategy 3	Claiming or implying treatment benefit despite nonsignificant primary outcomes.

Table 1. Brief definitions of spin levels and spin strategies used to code PRP knee OA RCT abstracts.