

General

Platelet-Rich Plasma in the Treatment of Knee Osteoarthritis: A Bibliometric Analysis of Global Research Trends

Haichen Zhou, Latha Ganti, MD, MS, MBA, FACEP¹ 

¹ Warren Alpert Medical School of Brown University

Keywords: knee osteoarthritis, platelet-rich plasma, bibliometric analysis

<https://doi.org/10.52965/001c.159607>

Orthopedic Reviews

Vol. 18, 2026

Background

Knee osteoarthritis (OA) represents a major cause of pain and disability among older adults. Platelet-rich plasma (PRP) has emerged as a promising biologic therapy aimed at modulating inflammation and promoting cartilage repair. As the clinical use of PRP has expanded, a rapidly growing body of literature has developed examining its efficacy and mechanisms of action in knee OA. Bibliometric analysis provides a useful method to evaluate research productivity, collaborative networks, and emerging trends within a scientific field.

Methods

A bibliometric analysis was conducted using the Web of Science Core Collection database to identify publications related to PRP and knee osteoarthritis. The search strategy included the terms (“platelet-rich plasma” OR “PRP”) AND (“knee osteoarthritis” OR “knee OA”). No time restrictions were applied. Data regarding authorship, institutions, countries, journals, and funding sources were extracted. Network visualization of co-authorship relationships was performed using VOSviewer (version 1.6.20). Descriptive analyses and graphical summaries were generated using Microsoft Excel.

Results

A total of 2,116 publications were identified. The co-authorship network demonstrated several highly influential investigators, including Filardo, Kon, Cole, and Boffa. Arthroscopy: The Journal of Arthroscopic and Related Surgery and the American Journal of Sports Medicine were the most prolific journals, accounting for 95 and 93 publications respectively. The United States produced the highest number of publications (602), followed by China, Italy, and Spain. Institutional analysis demonstrated strong contributions from Harvard University and Rush University. Funding support was most frequently provided by the National Natural Science Foundation of China and the U.S. National Institutes of Health.

Conclusion

Research on PRP for knee osteoarthritis has expanded substantially over the past decade, with contributions concentrated in a small number of countries and academic institutions. Continued collaboration, methodological standardization, and high-quality clinical trials will be essential to clarify the therapeutic role of PRP in the management of knee osteoarthritis.

INTRODUCTION

Knee osteoarthritis (OA) is one of the most prevalent degenerative joint disorders worldwide, characterized by progressive cartilage loss, synovial inflammation, and alterations in subchondral bone. It occurs when the cartilage in the knee joint, which connects the femur to the tibia, gradually deteriorates, resulting in bone-on-bone contact

that produces pain, stiffness, and functional limitation.¹ Osteoarthritis of the knee represents a leading cause of disability globally and contributes substantially to health-care expenditures and reduced quality of life among older adults.²

The pathophysiology of knee OA is multifactorial, involving mechanical stress, inflammatory mediators, and metabolic changes that ultimately result in cartilage degradation and joint remodeling.³ Epidemiologic studies esti-

mate that symptomatic knee osteoarthritis affects nearly 10% of men and 13% of women over the age of 60, with prevalence expected to rise due to aging populations and increasing rates of obesity.⁴

Conventional management strategies include lifestyle modification, physical therapy, analgesics, corticosteroid injections, hyaluronic acid injections, prolotherapy, and non-steroidal anti-inflammatory drugs (NSAIDs).² While these therapies may reduce symptoms, they do not halt disease progression and largely focus on temporary symptom relief rather than structural repair of joint tissues.⁵ Consequently, there has been increasing interest in biologic and regenerative approaches to treating osteoarthritis.

In recent years, platelet-rich plasma (PRP) injections have emerged as a promising biologic intervention for knee OA. The procedure involves drawing a patient's blood and processing it via centrifugation to concentrate platelets within plasma. The platelet-rich plasma fraction is then injected into the affected joint.³ PRP contains numerous bioactive molecules, including platelet-derived growth factor (PDGF), transforming growth factor- β (TGF- β), vascular endothelial growth factor (VEGF), and insulin-like growth factor-1 (IGF-1), which may promote tissue repair and modulate inflammatory pathways.⁶

One advantage of PRP injections is its autologous nature, which reduces the risk of immune rejection or disease transmission.⁴ Experimental and clinical studies suggest that PRP may stimulate chondrocyte proliferation, enhance extracellular matrix synthesis, and inhibit inflammatory mediators implicated in osteoarthritis progression.⁷ Several randomized controlled trials and meta-analyses have reported improvements in pain and functional outcomes among patients with KOA treated with PRP compared with placebo or hyaluronic acid injections.⁸⁻¹⁰

However, there remains a lack of standardization in PRP preparation protocols. Variability in platelet concentration, leukocyte content, centrifugation techniques, and activation methods may contribute to inconsistent clinical outcomes across studies.⁵ Furthermore, PRP preparation is individualized and cannot be mass produced, which contributes to higher costs and limited accessibility in some clinical settings.

Given the rapid growth of research in this field, bibliometric analysis can provide valuable insights into publication trends, leading authors and institutions, and emerging research networks. Bibliometric approaches have increasingly been used to map scientific development within orthopedic and regenerative medicine research.¹¹ Accordingly, this study aims to analyze the global scientific landscape of platelet-rich plasma research in knee osteoarthritis.

METHODS

This bibliometric study was conducted and is reported in accordance with the BIBLIO (Bibliometric Reporting Guidelines for Bibliometric Analyses in Biomedical Research) framework. The BIBLIO guidelines provide recommendations for transparent reporting of bibliometric methodol-

ogy, including database selection, search strategy documentation, data extraction procedures, and visualization methods.¹² Consistent with these recommendations, this study reports the database source, search query, date of retrieval, bibliometric software used, and variables analyzed to facilitate reproducibility and transparency of the analysis.

A comprehensive bibliometric analysis was conducted using the Web of Science Core Collection database to identify publications related to platelet-rich plasma (PRP) in the treatment of knee osteoarthritis (KOA). Web of Science was selected due to its extensive indexing of peer-reviewed biomedical literature and its compatibility with bibliometric analysis software.

In accordance with BIBLIO reporting standards, the complete search strategy used for this bibliometric analysis is reported to ensure reproducibility. The search query was: ("platelet-rich plasma" OR "PRP") AND ("knee osteoarthritis" OR "knee OA")

No restrictions were applied to publication year or document type in order to capture the full evolution of the research field. The database was queried on a single date to ensure consistency in the dataset and avoid changes due to database updates. Bibliographic records were exported with full metadata including authors, affiliations, titles, journals, publication year, citations, and funding information. Records were screened for duplicates and formatting inconsistencies prior to analysis. Author names and institutional affiliations were standardized where possible to improve the accuracy of collaboration network visualization. Search results were exported in batches of up to 1,000 records as text-delimited files containing full records and cited references. Extracted variables included:

- Author names
- Institutional affiliations
- Country of origin
- Journal titles
- Funding agencies
- Publication year

The combined dataset was imported into Microsoft Excel (Version 16.106.2, Redmond, Washington, USA) for organization, cleaning, and descriptive statistical analysis. Duplicate records were reviewed and removed where identifiable.

Bibliometric network analysis was conducted using VOSviewer (version 1.6.20; Leiden University, Netherlands). VOSviewer is widely used for mapping bibliometric networks and allows visualization of relationships between authors, institutions, and keywords.¹³ In the co-authorship network analysis, nodes represent individual authors and links represent collaborative relationships between authors. Node size corresponds to the number of publications, while link thickness reflects the strength of collaboration.

Descriptive statistics were used to summarize publication output by journal, country, institution, and funding organization. Graphical visualizations were generated in Microsoft Excel to illustrate publication trends and distribution patterns.

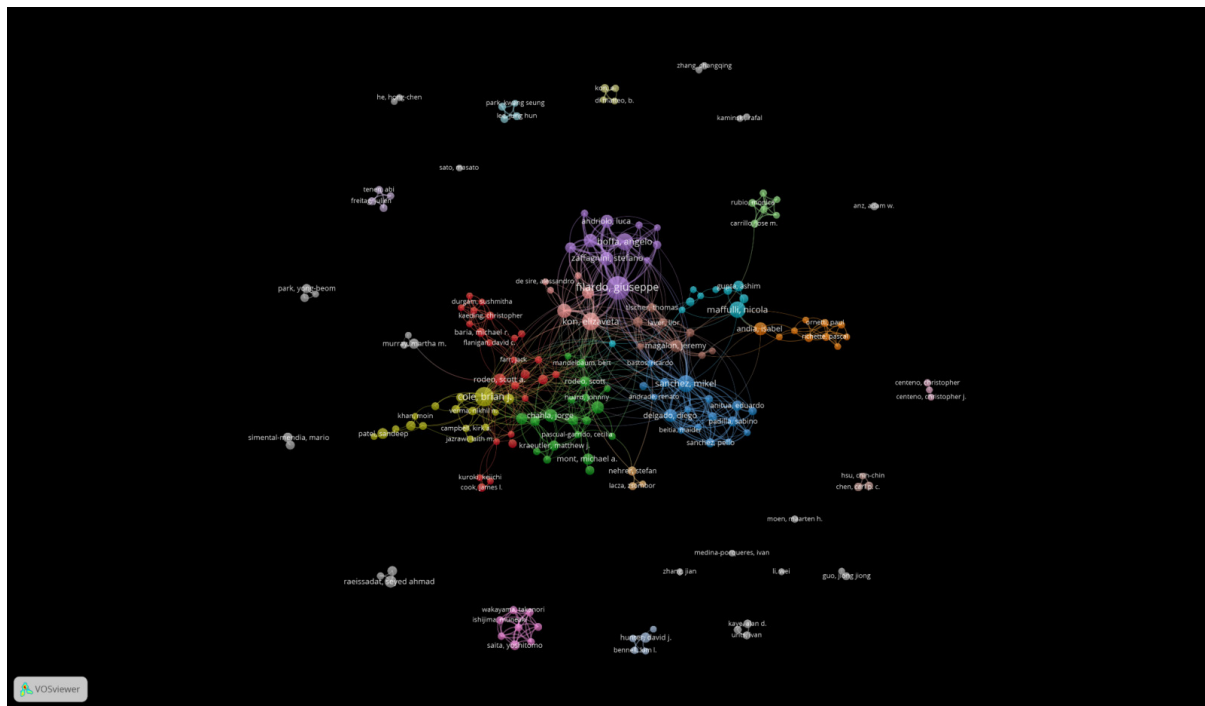


Figure 1. The author publication network regarding platelet-rich plasma (PRP) treatment in knee osteoarthritis

RESULTS

[Figure 1](#) displays the collaborative network among authors publishing on platelet-rich plasma (PRP) treatment for knee osteoarthritis. Nodes represent individual authors, while connecting lines indicate co-authorship relationships. Larger nodes correspond to authors with a higher number of publications, and thicker connecting lines reflect stronger collaborative relationships. The network emphasizes the significance of authors such as Filardo, Kon, Cole, and Boffa, who appear as large, central nodes within the network. Notably, there are many disconnected, smaller clusters, suggesting that PRP research in knee OA is still in an early developing stage, with many isolated investigators or groups.

[Figure 2](#) illustrates the distribution of publications across academic journals. Arthroscopy: The Journal of Arthroscopic and Related Surgery and the American Journal of Sports Medicine lead with 95 and 93 publications, respectively. This figure shows 816 publications out of a total of 2116.

[Figure 3](#) presents the distribution of publications by country. Most publications originate from the United States, with 602 publications, with substantial contributions from the People's Republic of China, Italy and Spain. This likely reflects their strong orthopedic research communities and growing investment in regenerative medicine.

[Figure 4](#) identifies leading institutions contributing to PRP research in knee osteoarthritis. Harvard University and Rush University demonstrate the highest publication counts with 59 and 55, respectively. Research appears to be primarily be concentrated in the United States. Institutions in Italy, France, and England also make notable contributions.

[Figure 5](#) outlines the major funding bodies supporting research in this field. The National Natural Science Foundation of China (NSFC) leads with 89 publications funded, followed by the National Institutes of Health (NIH) and the US Department

DISCUSSION

The findings of this bibliometric analysis demonstrate a substantial increase in scientific publications evaluating platelet-rich plasma for knee osteoarthritis over recent years. This growth reflects increasing global interest in regenerative medicine approaches aimed at addressing the underlying pathophysiology of osteoarthritis rather than simply managing symptoms.

The author collaboration network identified several highly influential researchers within the field, including Filardo, Kon, Cole, and Boffa. These investigators have contributed extensively to clinical trials and systematic reviews examining PRP for cartilage repair and osteoarthritis management. Prior clinical studies led by these groups have demonstrated promising improvements in patient-reported pain scores and functional outcomes following intra-articular PRP injections.¹⁴

Despite the presence of several major research hubs, the co-authorship network revealed multiple smaller, disconnected clusters. This suggests that while strong collaboration exists within certain research groups, broader international collaboration remains somewhat limited. Increased global collaboration may help harmonize PRP preparation protocols and improve the reproducibility of clinical findings.

Publication title analysis revealed that the majority of PRP-related knee OA research is published in orthopedic

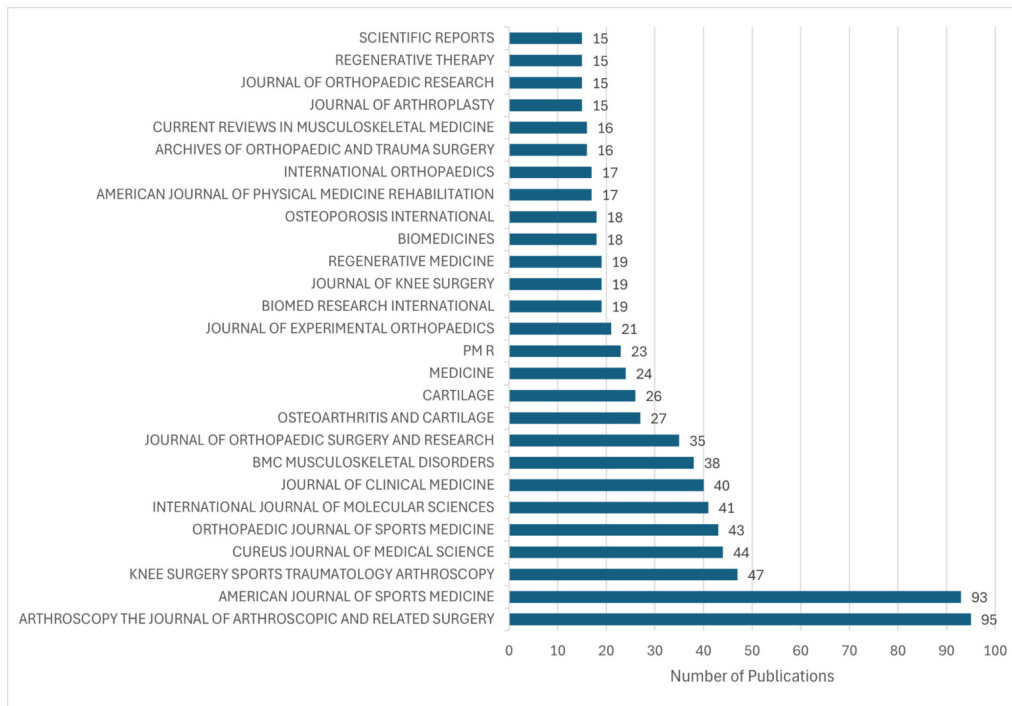


Figure 2. Number of published articles by journal

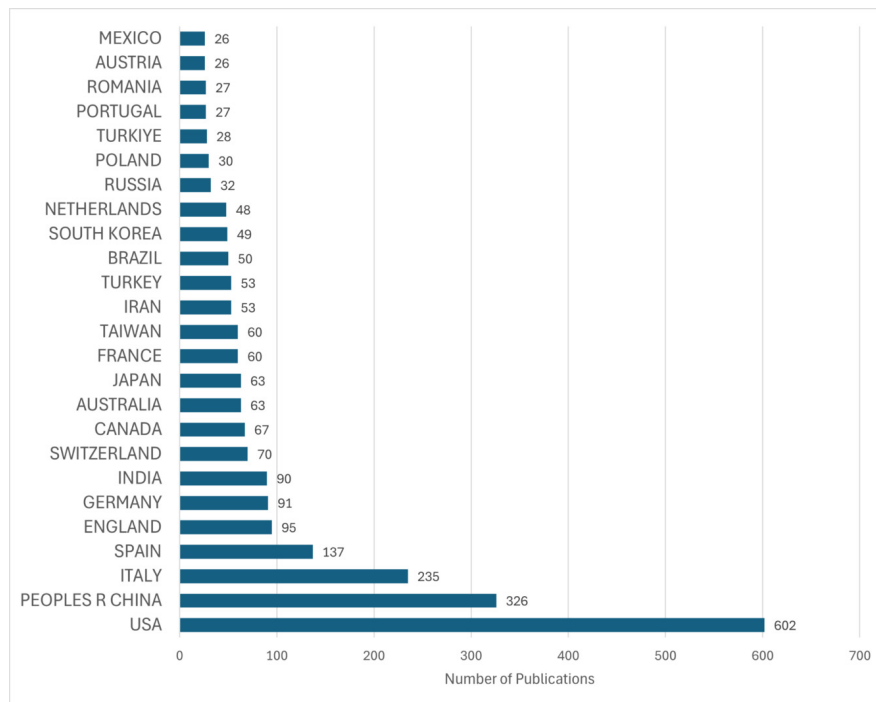


Figure 3. Number of published articles by country

and sports medicine journals, particularly *Arthroscopy* and the *American Journal of Sports Medicine*. This reflects the clinical relevance of PRP within sports medicine and orthopedic practice, particularly among patients seeking minimally invasive treatments for degenerative joint conditions.

Geographic analysis demonstrated that the United States produced the highest number of publications, followed by China, Italy, and Spain. The prominence of these countries likely reflects strong orthopedic research infra-

structure, access to funding, and active clinical research programs in regenerative medicine. China's strong presence may also reflect increasing governmental support for biomedical innovation through organizations such as the National Natural Science Foundation of China.

From a clinical perspective, the growing research interest in PRP reflects the limitations of traditional osteoarthritis therapies. Corticosteroid and hyaluronic acid injections may provide short-term pain relief but do not address un-

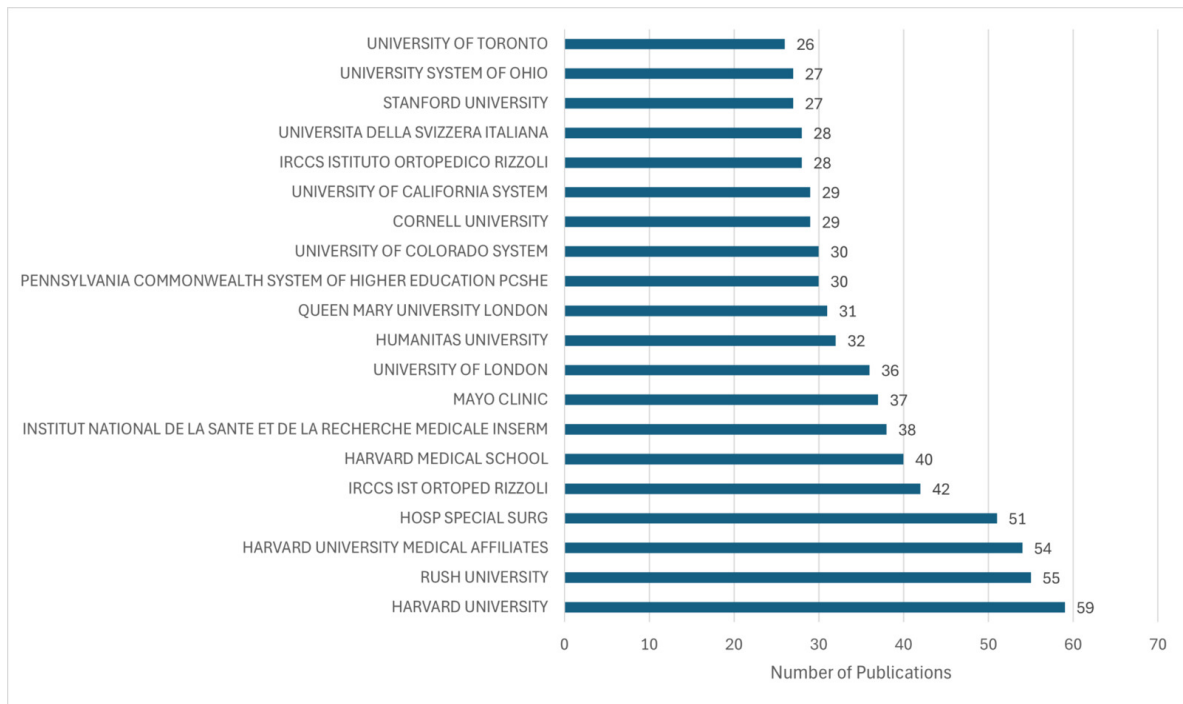


Figure 4. Number of published articles by organizations

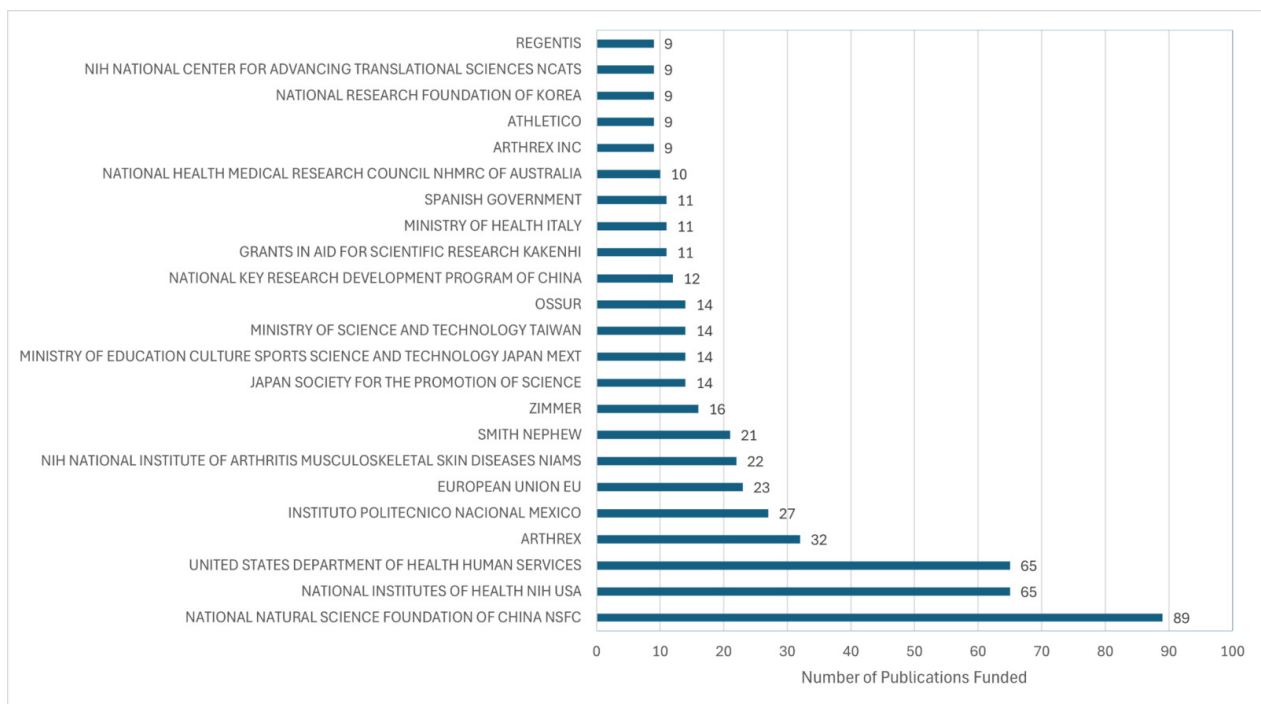


Figure 5. Number of published articles funded by each organization

derlying cartilage degeneration.¹⁵ PRP, by contrast, contains growth factors capable of modulating inflammation and promoting tissue regeneration. Experimental studies suggest that PRP may enhance chondrocyte proliferation and reduce inflammatory cytokine activity within the osteoarthritic joint.¹⁶

Several randomized controlled trials and meta-analyses have reported improved functional outcomes and reduced pain following PRP injections compared with placebo or

hyaluronic acid.¹⁷ However, results remain heterogeneous due to variability in PRP preparation methods, injection protocols, and patient populations. Consequently, further high-quality clinical trials are necessary to establish standardized protocols and identify patient populations most likely to benefit from PRP therapy.

LIMITATIONS

Several limitations should be considered when interpreting the findings of this bibliometric analysis. First, the study relied solely on the Web of Science database. Although Web of Science provides extensive coverage of peer-reviewed literature, relevant publications indexed in other databases such as Scopus or PubMed may not have been captured. Second, bibliometric analyses are dependent on the accuracy of database indexing and author affiliation information, which may introduce minor inaccuracies in institutional or country classifications.

Additionally, duplicate publications or variations in author name formatting may influence bibliometric network analysis despite attempts to clean the dataset. The analysis also evaluates publication quantity rather than study quality; therefore, highly cited or methodologically rigorous

studies cannot be distinguished from lower-quality publications within the dataset. Finally, the study reflects the literature available at the time of database retrieval and does not account for publications released subsequently.

CONCLUSION

Overall, while PRP demonstrates promising regenerative potential, the bibliometric trends indicate that the field is still evolving. Greater methodological standardization and increased international collaboration may help strengthen research and clarify the therapeutic role of PRP in knee osteoarthritis management.

Submitted: March 12, 2026 EDT. Accepted: March 26, 2026 EDT. Published: April 01, 2026 EDT.

REFERENCES

1. Zhang Y, Han Y, Sun Y, et al. Osteoarthritis: molecular pathogenesis and potential therapeutic options. *Signal Transduct Target Ther*. 2026;11(1):81. doi:[10.1038/s41392-025-02556-6](https://doi.org/10.1038/s41392-025-02556-6)
2. Kanu C, Aldhouse NVJ, Seçinti E, et al. The Patient Experience of Living With Knee Osteoarthritis Pain: Development of a Conceptual Model. *Musculoskeletal Care*. 2025;23(2):e70133. doi:[10.1002/msc.70133](https://doi.org/10.1002/msc.70133)
3. Mora JC, Przkora R, Cruz-Almeida Y. Knee osteoarthritis: pathophysiology and current treatment modalities. *J Pain Res*. 2018;11:2189-2196. doi:[10.2147/JPR.S154002](https://doi.org/10.2147/JPR.S154002). PMID:30323653
4. Allen KD, Thoma LM, Golightly YM. Epidemiology of osteoarthritis. *Osteoarthritis and Cartilage*. 2021;30(2):184-195. doi:[10.1016/j.joca.2021.04.020](https://doi.org/10.1016/j.joca.2021.04.020)
5. Im GI, Kim TK. Regenerative Therapy for Osteoarthritis: A Perspective. *Int J Stem Cells*. 2020;13(2):177-181. doi:[10.15283/ijsc20069](https://doi.org/10.15283/ijsc20069). PMID:32587137
6. Crowley JL, Soti V. Platelet-Rich Plasma Therapy: An Effective Approach for Managing Knee Osteoarthritis. *Cureus*. 2023;15(12):e50774. doi:[10.7759/cureus.50774](https://doi.org/10.7759/cureus.50774). PMID:38116024
7. Andia I, Maffulli N. Platelet-rich plasma for managing pain and inflammation in osteoarthritis. *Nat Rev Rheumatol*. 2013;9(12):721-730. doi:[10.1038/nrrheum.2013.141](https://doi.org/10.1038/nrrheum.2013.141)
8. Filardo G, Previtali D, Napoli F, Candrian C, Zaffagnini S, Grassi A. PRP Injections for the Treatment of Knee Osteoarthritis: A Meta-Analysis of Randomized Controlled Trials. *Cartilage*. 2020;13(1_suppl):364S-375S. doi:[10.1177/1947603520931170](https://doi.org/10.1177/1947603520931170)
9. Foster TE, Puskas BL, Mandelbaum BR, Gerhardt MB, Rodeo SA. Platelet-rich plasma: from basic science to clinical applications. *Am J Sports Med*. 2009;37(11):2259-2272. doi:[10.1177/0363546509349921](https://doi.org/10.1177/0363546509349921)
10. Dai WL, Zhou AG, Zhang H, Zhang J. Efficacy of Platelet-Rich Plasma in the Treatment of Knee Osteoarthritis: A Meta-analysis of Randomized Controlled Trials. *Arthroscopy*. 2017;33(3):659-670.e1. doi:[10.1016/j.arthro.2016.09.024](https://doi.org/10.1016/j.arthro.2016.09.024)
11. Ganti L, Persaud NA, Stead TS. Bibliometric analysis methods for the medical literature. *Academic Medicine & Surgery*. Published online January 30, 2025. doi:[10.62186/001c.129134](https://doi.org/10.62186/001c.129134)
12. Montazeri A, Mohammadi S, M Hesari P, Ghaemi M, Riazhi H, Sheikhi-Mobarakeh Z. Preliminary guideline for reporting bibliometric reviews of the biomedical literature (BIBLIO): a minimum requirements. *Syst Rev*. 2023;12(1):239. doi:[10.1186/s13643-023-02410-2](https://doi.org/10.1186/s13643-023-02410-2)
13. van Eck NJ, Waltman L. Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*. 2010;84(2):523-538. doi:[10.1007/s11192-009-0146-3](https://doi.org/10.1007/s11192-009-0146-3)
14. Belk JW, Kraeutler MJ, Houck DA, Goodrich JA, Dragoo JL, McCarty EC. Platelet-Rich Plasma Versus Hyaluronic Acid for Knee Osteoarthritis: A Systematic Review and Meta-analysis of Randomized Controlled Trials. *Am J Sports Med*. 2021;49(1):249-260. doi:[10.1177/0363546520909397](https://doi.org/10.1177/0363546520909397)
15. Murali A, Khan I, Tiwari S. Navigating the treatment landscape: Choosing between platelet-rich plasma (PRP) and hyaluronic acid (HA) for knee osteoarthritis management – A narrative review. *Journal of Orthopaedic Reports*. 2023;3(1):100248. doi:[10.1016/j.jorep.2023.100248](https://doi.org/10.1016/j.jorep.2023.100248)
16. Bannuru RR, Schmid CH, Kent DM, Vaysbrot EE, Wong JB, McAlindon TE. Comparative effectiveness of pharmacologic interventions for knee osteoarthritis. *Annals of Internal Medicine*. 2015;162(1):46-54. doi:[10.7326/m14-1231](https://doi.org/10.7326/m14-1231)
17. Jubert NJ, Rodríguez L, Reverté-Vinaixa MM, Navarro A. Platelet-Rich plasma injections for Advanced knee osteoarthritis: A Prospective, Randomized, Double-Blinded Clinical Trial. *Orthopaedic Journal of Sports Medicine*. 2017;5(2):2325967116689386. doi:[10.1177/2325967116689386](https://doi.org/10.1177/2325967116689386)