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Introduction

Chronic low back pain and radicular pain are leading causes of disability, affecting ~40 million U.S. workers and contributing over \$130 billion annually to healthcare costs. Corticosteroid epidural injections are widely used but offer short-term relief (≤ 3 months) and pose risks: immunosuppression, osteoporosis, hyperglycemia. Platelet-Rich Plasma (PRP) is an autologous biologic rich in growth factors (e.g., TGF- β , PDGF) that promotes anti-inflammatory and regenerative processes. PRP is FDA-compliant (as autologous minimally manipulated product) and has shown promise in orthopedics—now being explored for epidural applications.

Methods

Review Type: Narrative review
Databases Searched: PubMed, Scopus (2019–2024)
Studies Included: 19 (RCTs, systematic reviews, meta-analyses)
Inclusion: Human studies, English language, >10 participants
Exclusion: Animal studies, case reports, outdated articles

EXPLORING PLATELET-RICH PLASMA AS A REGENERATIVE THERAPY FOR SPINAL PAIN: EVIDENCE AND FUTURE DIRECTIONS

Ahmed Basharat M.D¹, Omar Hamza M.D², Robert Chow M.D³

¹Department of Emergency Medicine, Yale New Haven Hospital, Yale School of Medicine, New Haven, CT

²Department of Psychiatry, Cambridge Health Alliance, Harvard Medical School, Cambridge, MA

³Department of Pain Medicine, Anesthesia, Yale New Haven Hospital, Yale School of Medicine, New Haven, CT

Figures

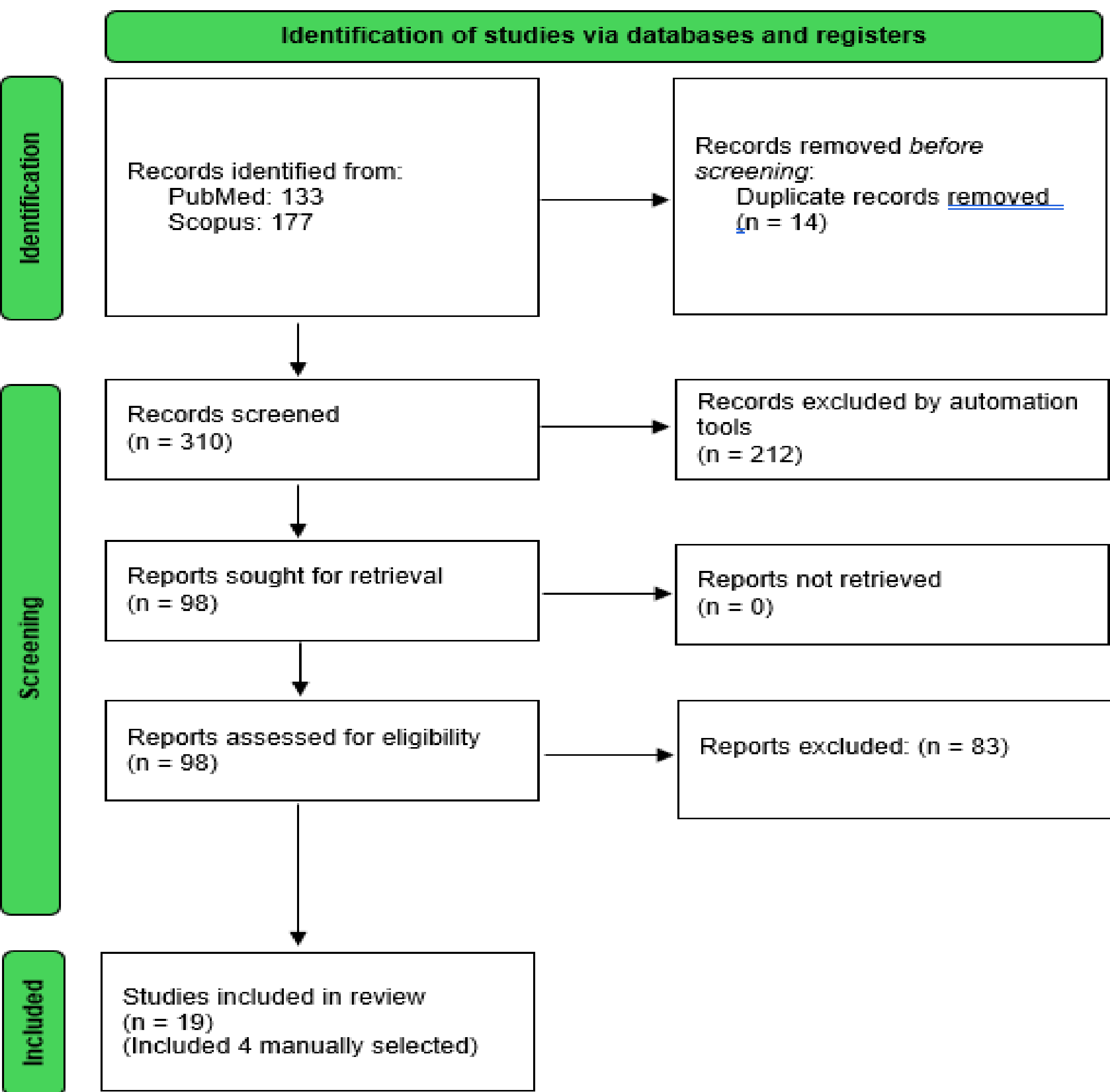


Figure 1. Flow Diagram

Results

Efficacy Short-term (6–24 weeks): PRP consistently demonstrated equivalent or superior improvements in pain and function compared to corticosteroids. Outcomes at multiple time points favored PRP for durability of effect.

Long-term (up to 9 years): Sustained functional improvements and pain reduction were observed post-injection. High-concentration PRP appeared to yield better long-term outcomes in discogenic pain compared to lower concentrations.

PRP vs. Steroids: While corticosteroids provided faster relief in the first month, PRP showed greater durability and fewer relapses in pain. PRP's benefits were especially notable beyond the 3-month period, with significantly fewer side effects.

Mechanisms

- Anti-inflammatory cytokines (TGF- β , PDGF)
- Promotes disc regeneration and matrix repair by restoring extracellular matrix integrity and modulating inflammatory pathways

Factors Influencing Outcomes

- Platelet concentration (optimal $\geq 4.7\times$ baseline) is associated with better clinical response
- Leucocyte-rich PRP (LR-PRP) formulations may enhance long-term results but may lead to transient inflammation
- Differences in activation methods, injection volume, and imaging guidance techniques contribute to outcome variability

Safety

- No major complications were reported across all studies
- Transient post-injection soreness was occasionally observed but resolved spontaneously
- PRP avoids systemic risks seen with corticosteroids (e.g., hyperglycemia, adrenal suppression, osteoporosis)



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Conclusion

PRP epidural injections demonstrate significant potential as a safe, regenerative, and effective intervention for chronic low back and radicular pain. Evidence suggests that PRP provides long-lasting benefits with fewer systemic side effects than corticosteroids. While early results are promising, the lack of standardized preparation protocols and heterogeneous study methodologies limit widespread adoption. Future large-scale, multicenter randomized trials with clearly defined protocols are essential to validate findings, optimize treatment strategies, and facilitate integration into routine clinical practice.

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