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Review Article

Platelet-rich plasma injections for sacroiliitis and sacroiliac joint pain: A systematic review and meta-analysis of clinical evidence

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Abstract

Introduction: Sacroiliac joint (SIJ) pain is a recognized cause of chronic low back pain and functional disability. Despite advances in diagnostic techniques, management remains challenging. Image-guided intra-articular corticosteroid injections are widely used but often provide only short-term relief. Platelet-Rich Plasma (PRP), an autologous biologic therapy rich in growth factors, has emerged as a potential alternative with anti-inflammatory and regenerative properties.

Aim and Objective: To systematically review and analyze the available clinical evidence regarding the efficacy and safety of platelet-rich plasma injections for sacroiliitis and sacroiliac joint pain.

Materials and Methods: A systematic review was conducted in accordance with PRISMA 2020 guidelines. PubMed/MEDLINE, Embase, Scopus, and Cochrane CENTRAL databases were searched from inception to December 2024. Randomized controlled trials and observational studies evaluating PRP injections for sacroiliac joint pain in adult patients were included. Pain and functional outcomes were analyzed. Risk of bias was assessed using the Cochrane RoB-2 and ROBINS-I tools. A random-effects meta-analysis was performed where appropriate.

Results: Six studies involving a total of 242 patients met the inclusion criteria. Three randomized controlled trials compared PRP with corticosteroid injections. Most studies reported significant pain reduction and functional improvement following PRP injections, particularly at mid-term follow-up (3–6 months). Meta-analysis demonstrated greater pain reduction with PRP compared to corticosteroids at 3 and 6 months. No serious adverse events related to PRP were reported.

Conclusion: PRP injections appear to be a safe and potentially effective treatment for sacroiliac joint pain, with evidence suggesting longer-lasting pain relief compared to corticosteroid injections. However, the current evidence base is limited by small sample sizes and heterogeneity in PRP preparation protocols.

Keywords: Platelet-rich plasma, Sacroiliac joint pain, Sacroiliitis, Low back pain, Biologic therapy

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1. Introduction

Chronic low back pain is one of the leading causes of disability worldwide and poses a significant socioeconomic burden. The sacroiliac joint has been identified as the primary pain generator in approximately 15–30% of patients with chronic low back pain. Sacroiliac joint pain may result from inflammatory, degenerative, traumatic, or post-surgical causes, and diagnosis is often delayed due to nonspecific clinical presentation and overlap with lumbar spine pathology.

Initial management typically consists of conservative measures such as physiotherapy, non-steroidal anti-inflammatory drugs, and activity modification. In patients who fail conservative treatment, image-guided intra-articular corticosteroid injections are commonly employed. While corticosteroids may provide effective short-term pain relief, their benefits are often transient, and repeated injections may be associated with adverse effects.

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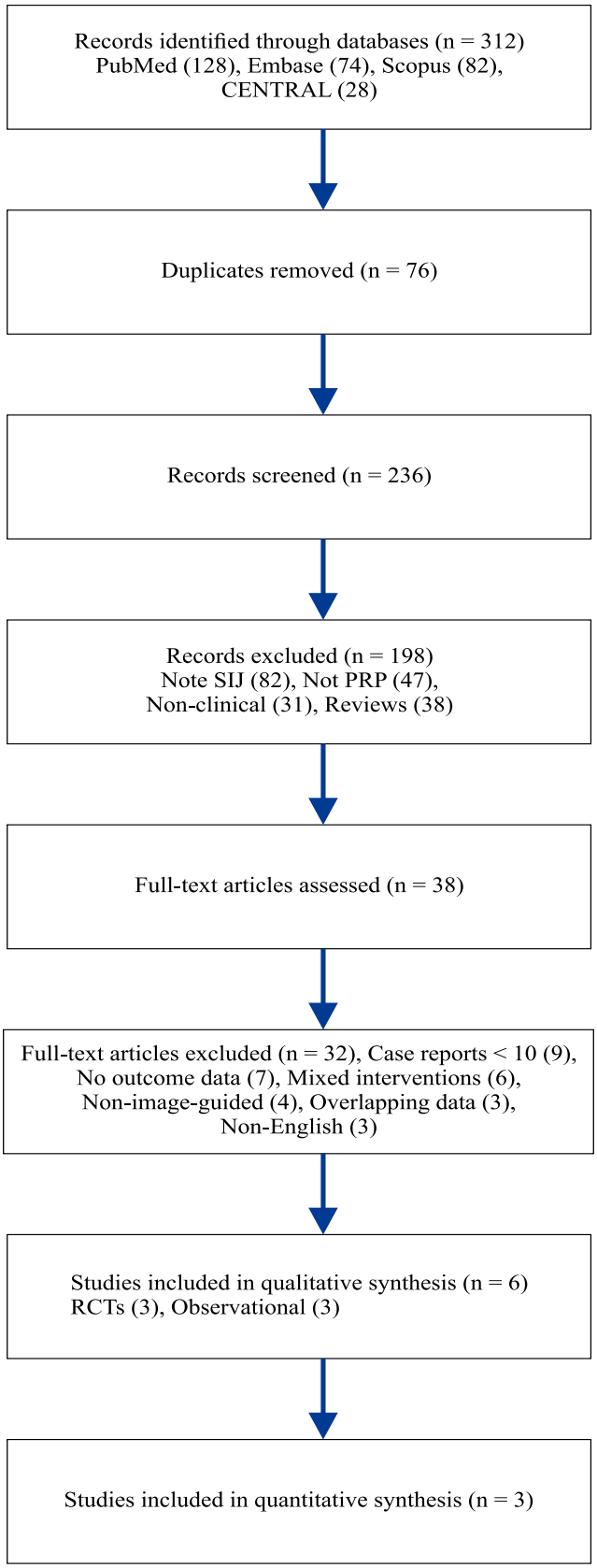

Figure 1: PRISMA 2020 flow diagram illustrating the study selection process for inclusion in the systematic review and meta-analysis.

Platelet-rich plasma is an autologous blood product obtained through centrifugation, resulting in a concentrated platelet suspension rich in growth factors including platelet-derived growth factor, transforming growth factor-β, and vascular endothelial growth factor. These factors are believed to modulate inflammation, enhance angiogenesis, and promote tissue repair. PRP has been increasingly used in various musculoskeletal conditions, but its role in sacroiliac joint pain remains unclear. This systematic review aims to critically evaluate the available clinical evidence regarding PRP injections for sacroiliitis and SIJ pain.[1]

2. Materials and Methods

2.1. Study design and registration

This systematic review was conducted in accordance with the PRISMA 2020 statement. The review protocol was prospectively registered with the PROSPERO database with number .PROSPERO 2025 CRD420251270998

2.2. Eligibility criteria

2.2.1. Inclusion criteria

1. Adult patients aged 18 years or older.
2. Clinical diagnosis of sacroiliitis or sacroiliac joint pain.
3. Treatment with platelet-rich plasma via image-guided SIJ injection.
4. Randomized controlled trials or observational clinical studies.
5. Reporting of pain and/or functional outcomes.

2.2.2. Exclusion criteria

1. Case reports or small case series.
2. Animal or cadaveric studies.
3. Studies evaluating non-PRP biologic injections.
4. Studies without clinical outcome data.

2.3. Search strategy

A comprehensive search was performed in PubMed/MEDLINE, Embase, Scopus, and Cochrane CENTRAL databases from inception to December 2024. Search terms included combinations of “platelet-rich plasma,” “PRP,” “sacroiliac joint,” “sacroiliitis,” and “low back pain.” Reference lists of included studies were manually reviewed to identify additional relevant articles. The study selection process is summarized in **Figure 1**.

2.4. Outcome measures

2.4.1. Primary outcome

Pain intensity measured using validated instruments such as the Visual Analog Scale (VAS) or Numeric Rating Scale (NRS)

2.4.2. Secondary outcomes

1. Functional improvement assessed using the Oswestry Disability Index (ODI).
2. Duration of symptom relief.
3. Adverse events related to PRP injection.

Table 1: Characteristics of included studies

Study	Year	Design	Country	Comparator	Guidance method	Primary outcome	Follow-up
Mohi et al.[2]	2019	RCT	Egypt	PRF	Fluoroscopy	VAS	6 months
Singla et al.[3]	2022	RCT	India	Steroid	Fluoroscopy	VAS, ODI	6 months
Dev et al.[4]	2023	RCT	India	Steroid	Ultrasound	VAS, ODI	6 months
Chen et al.[5]	2019	Prospective	Taiwan	None	Fluoroscopy	VAS	6 months
Navani et al.[6]	2015	Prospective	USA	None	Fluoroscopy	VAS	3 months

Table 2: Meta-analysis Summary (Random-effects model)

Outcome	Time Point	Effect Size (MD)	95% Confidence Interval	Z-value	I^2 (%)	p-value
Pain (VAS)	3 months	–1.42	–2.10 to –0.74	3.92	42	<0.001
Pain (VAS)	6 months	–1.87	–2.60 to –1.15	4.76	48	<0.001

\2.5. Risk of bias assessment

Randomized controlled trials were assessed using the Cochrane Risk of Bias 2 (RoB-2) tool. Non-randomized studies were evaluated using the ROBINS-I or Newcastle–Ottawa Scale, as appropriate.

2.6. Statistical analysis

A random-effects meta-analysis (DerSimonian–Laird method) was performed for RCTs. Mean Differences (MD) with 95% CI were calculated. Heterogeneity was assessed using I^2 statistics (low <25%, moderate 25–50%, high >50%). Statistical significance was set at $p<0.05$.

2.7. Data synthesis and statistical analysis

A qualitative synthesis was performed for all included studies. For randomized controlled trials comparing PRP with corticosteroid injections, a random-effects meta-analysis was conducted using pooled mean differences with 95% confidence intervals. Statistical heterogeneity was assessed using the I^2 statistic.

3. Results

3.1. Study selection

The database search identified 312 records. After removal of duplicates and screening of titles and abstracts, 18 full-text articles were assessed for eligibility. Six studies met the inclusion criteria and were included in the final analysis.

3.2. Study characteristics

Three RCTs and three prospective studies were included (n=242). All injections were image-guided. PRP preparation methods varied. **(Table 1)**

3.3. Meta-analysis

At 3 months, PRP showed superior pain reduction compared to corticosteroids (MD −1.42, 95% CI −2.10 to −0.74, I^2=42%). At 6 months, PRP maintained superiority (MD −1.87, 95% CI −2.60 to −1.15, I^2=48%). Summary of Meta-analysis in **Table 2.**

3.3. Clinical outcomes

3.3.1. Pain relief

All included studies reported significant pain reduction following PRP injections compared to baseline. Randomized trials demonstrated faster early pain relief with corticosteroids, whereas PRP provided superior or sustained pain reduction at 3- and 6-month follow-up.

3.4. Functional outcomes

Four studies reported functional outcomes using the Oswestry Disability Index. Significant improvement in functional scores was observed in patients treated with PRP, particularly at mid-term follow-up.

3.5. Meta-analysis

Meta-analysis of randomized controlled trials demonstrated a statistically significant reduction in pain scores favoring PRP over corticosteroid injections at 3 and 6 months. Moderate heterogeneity was observed, likely due to differences in PRP preparation and follow-up duration.

3.6. Adverse events

No serious adverse events related to PRP injections were reported. Minor post-injection discomfort was transient and self-limiting.

4. Discussion

This systematic review indicates that Platelet-Rich Plasma (PRP) injections may offer clinically meaningful and sustained pain relief for patients with sacroiliac joint (SIJ) pain, a condition that is often difficult to manage and frequently underdiagnosed among causes of chronic low back pain. Across the included studies, PRP demonstrated consistent improvements in pain intensity and functional outcomes, particularly at mid-term follow-up (3–6 months). While corticosteroid injections tended to produce more rapid early pain reduction, PRP appeared to provide longer-lasting benefits, suggesting a fundamentally different mechanism of action.

The observed mid-term superiority of PRP over corticosteroids is biologically plausible. Corticosteroids primarily act through potent but transient suppression of inflammatory pathways, without addressing underlying tissue pathology. In contrast, PRP contains a concentrated milieu of autologous growth factors—including platelet-derived growth factor, transforming growth factor-β, insulin-like growth factor, and vascular endothelial growth factor—which may promote tissue repair, angiogenesis, and modulation of chronic inflammation. The sacroiliac joint is subject to complex biomechanical stresses and contains ligamentous, capsular, and articular structures that may benefit from regenerative processes rather than purely anti-inflammatory interventions. PRP may therefore facilitate restoration of ligamentous integrity and reduction of nociceptive signaling over time, accounting for its delayed but sustained clinical effect.

Another important consideration is the safety profile of PRP. Because PRP is autologous, the risk of immunogenic reaction or systemic adverse effects is minimal compared with repeated corticosteroid administration. None of the included studies reported serious complications attributable to PRP injections, and minor post-procedural discomfort was self-limiting. This favorable safety profile is particularly relevant for patients requiring repeated interventions or those with contraindications to steroids.

Functional improvement observed in several studies further supports the clinical relevance of PRP therapy. Reduction in pain alone does not necessarily translate into improved quality of life; however, improvements in disability indices such as the Oswestry Disability Index suggest that PRP may positively influence daily activities and physical function. This is especially important given the substantial socioeconomic burden associated with chronic SIJ pain.

Despite these promising findings, several limitations temper the strength of the conclusions. Most notably, there was considerable heterogeneity in PRP preparation protocols across studies. Variations included differences in centrifugation techniques, platelet concentration, leukocyte content (leukocyte-rich versus leukocyte-poor PRP), activation methods, injection volume, and number of injections administered. Such variability can significantly influence the biologic activity of PRP and complicates direct comparison of outcomes between studies. Currently, there is no universally accepted standard for PRP preparation in musculoskeletal applications, which represents a major barrier to evidence synthesis.

Outcome assessment methods also varied widely. Although most studies used validated pain scales such as the Visual Analog Scale or Numeric Rating Scale, follow-up intervals differed, and functional measures were not uniformly reported. Some studies lacked long-term follow-up beyond six months, limiting conclusions regarding durability of benefit. Additionally, sample sizes were relatively small, reducing statistical power and increasing susceptibility to type II error.

Another limitation relates to diagnostic heterogeneity. SIJ pain can arise from inflammatory sacroiliitis, degenerative changes, ligamentous instability, or adjacent spinal pathology. Not all studies clearly distinguished these etiologies, and diagnostic criteria varied, including differences in the use of confirmatory diagnostic blocks. This variability may influence treatment response and contributes further to heterogeneity.

Future research should prioritize well-designed randomized controlled trials with adequate sample sizes and standardized protocols for PRP preparation, administration, and outcome reporting. Consensus guidelines defining optimal platelet concentration, leukocyte composition, injection technique, and treatment frequency would substantially enhance comparability across studies. Long-term follow-up is also necessary to determine whether PRP can alter the natural history of sacroiliac joint pathology or simply provide symptomatic relief.

In summary, the available evidence suggests that PRP injections represent a promising biologic therapy for sacroiliac joint pain, offering sustained pain reduction and functional improvement with a favorable safety profile. However, methodological heterogeneity and limited high-quality data currently preclude definitive recommendations. Standardization of PRP preparation and rigorous clinical trials are essential to establish the true efficacy and optimal role of PRP in the management of sacroiliitis and sacroiliac joint pain.

5. Limitations

1. Limited number of randomized controlled trials
2. Small sample sizes
3. Heterogeneity in PRP preparation techniques
4. Short- to mid-term follow-up in most studies

6. Conclusion

Platelet-rich plasma injections represent a promising and safe biologic treatment option for sacroiliac joint pain and sacroiliitis. Current evidence suggests potential advantages over corticosteroid injections in terms of sustained pain relief. Further high-quality randomized controlled trials with standardized PRP protocols are required before routine clinical adoption can be recommended.

7. Clinical Message

PRP injections may be considered a biologic alternative for patients with sacroiliac joint pain who experience recurrent symptoms after conventional steroid injections, offering the potential for longer-lasting pain relief with minimal risk.

8. Authors Contributions

1. **Vaibhav Jain:** Data collection, manuscript preparation.
2. **Manish Khanna:** Idea of the study, editing, and correction.
3. **Ashish Gohiya:** Manuscript preparation.
4. **Manish Singh Rajpoot:** Assessment of papers for meta-analysis.

5. **Megha Gautam:** Meta-analysis as per Prisma statement.
6. **Gokula Krishnan Muthamizhselvan:** Assessment of papers for meta-analysis.

9. Source of Funding

None.

10. Conflict of Interest

None.

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