

Original Research Article

Efficacy of autologous platelet-rich plasma versus corticosteroid injections in degenerative facet joint syndrome

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ABSTRACT

Background: Degenerative Facet Joint Syndrome (DFJS) is a common cause of chronic low back pain, particularly in the elderly. Current treatments, including intra-articular corticosteroid (CS) injections, offer short-term relief but are associated with adverse effects. Autologous platelet-rich plasma (PRP) injections have emerged as a potential alternative due to their regenerative properties and minimal side effects. This study compares the efficacy of single intra-articular PRP versus CS injections in managing DFJS. To evaluate and compare the short- and long-term functional outcomes of intra-articular PRP and CS injections in patients with DFJS.

Methods: This prospective, randomized controlled trial included 74 patients diagnosed with DFJS, randomly divided into two groups. Group A (n=37) received a single intra-articular PRP injection, while Group B (n=37) received a single intra-articular CS injection. Outcomes were assessed using the Visual Analog Scale, Present Pain Index, Modified Oswestry Disability Index, Roland-Morris Questionnaire, and Short Form Health-12 at 4 weeks, 8 weeks, 12 weeks, 6 months, and 1-year post-injection.

Results: Both groups showed significant reductions in pain and disability scores. In the short term, the CS group demonstrated greater improvement, though not statistically significant. However, at 1 year, the PRP group showed superior outcomes in pain reduction, functional ability, and quality of life, with long-term benefits surpassing those of CS.

Conclusions: Intra-articular PRP injections offer a safe and effective treatment option for DFJS, providing longer-lasting relief compared to CS. While both treatments are beneficial, PRP may be the preferable choice for patients seeking sustained improvement in pain and functionality.

Keywords: Degenerative facet joint syndrome, Platelet-rich plasma, Corticosteroid, Intra-articular injection, Low back pain

INTRODUCTION

Chronic low back pain (LBP) is a major global health issue, affecting nearly 40% of the population at some point in their lives, leading to the significant functional impairment and the economic burden.¹ Among the various aetiologies of the LBP, Degenerative Facet Joint Syndrome (DFJS) has emerged as a critical contributor, particularly in the elderly.² Degenerative changes in facet

joints (FJs), including cartilage erosion, synovial inflammation, and subchondral bone thickening, result in pain during movement, disability, and a diminished quality of life.³ Standard treatments for DFJS typically include physical therapy, pharmacological management, and intra-articular (IA) injections of corticosteroids (CS).⁴ While CS injections are widely used due to their anti-inflammatory properties, they are often associated with only short-term relief and a range of potential side effects, including

hyperglycemia, hypertension, and osteoporosis. These limitations highlight the need for more effective and safer long-term interventions. In recent years, platelet-rich plasma (PRP) has gained attention as a novel therapeutic option for musculoskeletal disorders, including osteoarthritis and degenerative disc disease.^{5,6}

PRP, an autologous product derived from the patient's own blood, contains high concentrations of growth factors that promote tissue regeneration, reduce inflammation, and accelerate healing.⁷ Unlike corticosteroids, PRP is minimally invasive, free from the systemic side effects associated with exogenous agents, and may offer longer-lasting pain relief and functional improvement in patients with DFJS.⁸

Despite the growing interest in PRP, there is a lack of high-quality, randomized controlled trials directly comparing the efficacy of PRP to corticosteroids in the management of DFJS. This study aims to address this gap by evaluating the short- and long-term effects of a single IA injection of autologous PRP versus CS in patients with DFJS. By rigorously comparing these two treatments, we hope to provide evidence that will inform clinical decision-making and potentially establish PRP as a superior long-term therapeutic option for this condition.

METHODS

This study was designed as a prospective, open-label, randomized controlled trial conducted at the Department of Orthopedics, R.L. Jalappa Hospital, Kolar, Karnataka, between July 2022 and May 2023. The primary objective was to evaluate and compare the efficacy of a single IA injection of autologous PRP and CS in patients with DFJS. Ethical clearance for the study was obtained from the Institutional Ethics Committee of Sri Devaraj Urs Academy of Higher Education and Research.

Patients aged between 35 and 80 years, presenting with persistent LBP attributed to DFJS, were screened for eligibility. The inclusion criteria included patients with radiologically confirmed degenerative changes in the lumbar facet joints and those who had failed to respond to conservative management, including physical therapy and oral analgesics, for a period of at least three months. Patients with a history of previous spinal surgeries, systemic autoimmune diseases, or malignancies were excluded. Other exclusion criteria included pregnancy, active infection, contraindications to injection therapy, and use of anticoagulants.

A total of 74 patients meeting the inclusion criteria were enrolled in the study. Randomization was performed using a block randomization technique with a block size of four, ensuring balanced allocation into two groups. Group A, comprising 37 patients, received a single intra-articular injection of autologous PRP, while Group B, also with 37 patients, received a single intra-articular corticosteroid

injection. Both procedures were performed under strict aseptic conditions and with fluoroscopic guidance.

In the PRP group, 10 mL of the patient's venous blood was collected and processed using a two-stage centrifugation process. The first centrifugation was conducted at 2630 rpm for three minutes, separating the plasma, which was then subjected to a second spin at 1500 rpm for 15 minutes to concentrate the platelets. The final 2 mL of PRP was injected into the affected lumbar facet joint. In the CS group, patients received a mixture of 1 mL of 4 mg/mL dexamethasone and 1 mL of 0.5% lidocaine, which was injected into the lumbar facet joint using the same fluoroscopic guidance technique as the PRP group. Patients were monitored for 30 minutes post-procedure for any immediate adverse reactions before being discharged.

The primary outcome measure was the reduction in pain intensity, assessed using the Visual Analog Scale (VAS) at 1-year follow-up. Secondary outcomes included changes in functional disability and quality of life, measured using the Modified Oswestry Disability Index (MODI), Roland-Morris Disability Questionnaire (RMQ), Present Pain Index (PPI), and the Short Form-12 (SF-12) Health Survey. These assessments were performed at baseline, and subsequently at 4 weeks, 8 weeks, 12 weeks, 6 months, and 1 year following the injection. The sample size for the study was calculated based on the expected differences in VAS scores between the PRP and CS groups, derived from previous studies. Assuming a mean difference of 21.1 in VAS scores and a pooled standard deviation of 27.45, with 90% power and a 95% confidence interval, the required sample size was determined to be 36 patients per group. To account for potential dropouts, a total of 74 patients were enrolled.

Statistical analysis

Statistical analyses were conducted using IBM SPSS version 23.0.⁹ Descriptive statistics were used to summarize patient demographics and baseline characteristics. Paired t-tests were employed to compare pre- and post-treatment outcomes within each group, while independent t-tests were used to evaluate differences between the two groups at each follow-up interval. Additionally, a repeated measures analysis of variance (ANOVA) was performed to analyse changes in outcome measures over time within and between groups. A p-value of less than 0.05 was considered statistically significant for all comparisons.

RESULTS

A total of 74 patients diagnosed with DFJS were enrolled in the study, with 37 patients assigned to the PRP group (Group A) and 37 to the CS group (Group B). Both groups were followed for one year, with assessments conducted at baseline, 4 weeks, 8 weeks, 12 weeks, 6 months, and 1-year post-injection. The primary outcomes evaluated were changes in pain intensity, functional disability, and quality

of life, measured using the VAS, MODI, RMQ, PPI, and SF-12 scores.

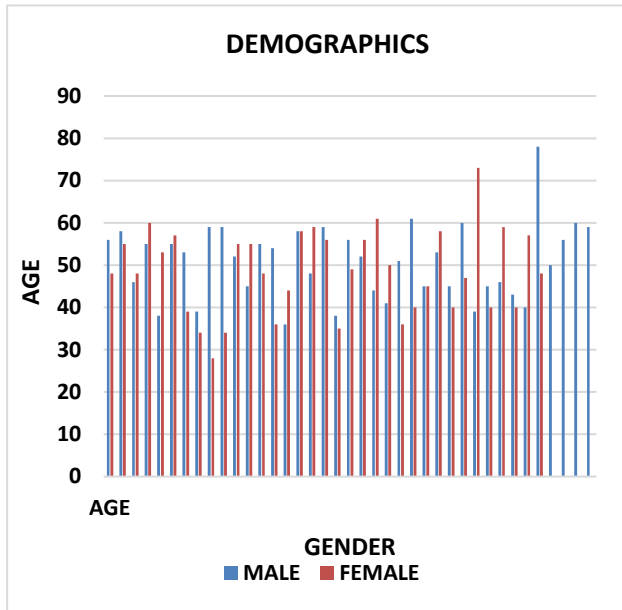


Figure 1: Patient demographics based on age and gender including group A and group B.

Pain intensity (VAS score)

The VAS score in both groups decreased significantly after treatment. In the PRP group, the mean baseline VAS score was 6.65, which progressively decreased to 5.05 at 4 weeks, 3.92 at 8 weeks, 2.89 at 12 weeks, 1.84 at 6 months, and 1.05 at 1 year. In the CS group, the baseline VAS score was 6.76, which dropped to 4.35 at 4 weeks, 3.27 at 8 weeks, 2.32 at 12 weeks, 1.30 at 6 months, and slightly increased to 2.65 at 1 year. PRP showed superior long-term efficacy in pain reduction, while CS provided more immediate short-term relief.

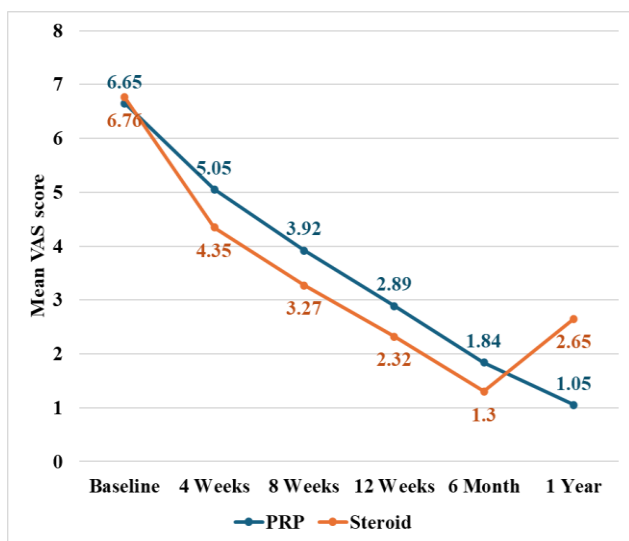


Figure 2: Line diagram showing mean VAS score at different time of assessment in both the study groups.

Functional disability (MODI and RMQ scores)

Functional disability, as assessed by the MODI and RMQ scores, improved in both groups, though the PRP group demonstrated more sustained long-term benefits. The baseline MODI score in the PRP group was 54.97, which decreased to 50.14 at 4 weeks, 44.49 at 8 weeks, 38.38 at 12 weeks, 29.92 at 6 months, and 21.19 at 1 year. In the CS group, the baseline MODI score of 55.97 reduced to 49.57 at 4 weeks, 43.62 at 8 weeks, 37.08 at 12 weeks, 27.51 at 6 months, and slightly increased to 30.86 at 1 year. Similarly, the RMQ score decreased from 11.03 at baseline to 8.86 at 4 weeks, 6.86 at 8 weeks, 5.11 at 12 weeks, 3.32 at 6 months, and 2.08 at 1 year in the PRP group. In the CS group, the baseline RMQ score of 10.97 decreased to 7.92 at 4 weeks, 6.27 at 8 weeks, 4.51 at 12 weeks, 2.54 at 6 months, but increased to 3.97 at 1 year.

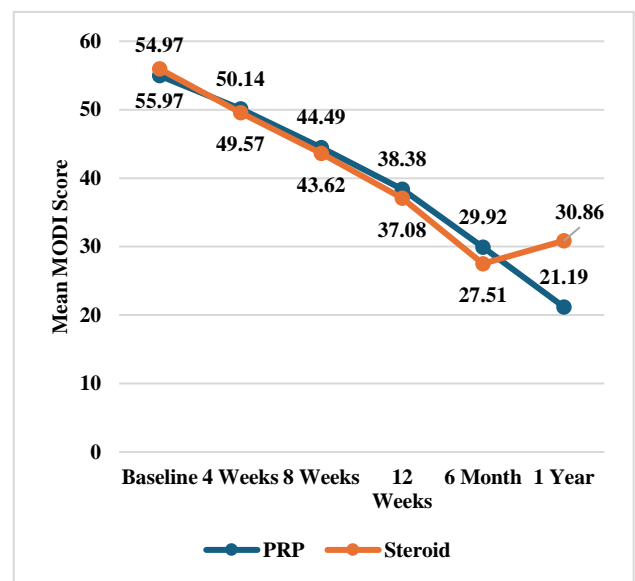


Figure 3: Line diagram showing mean MODI score at different time of assessment in both the study groups.

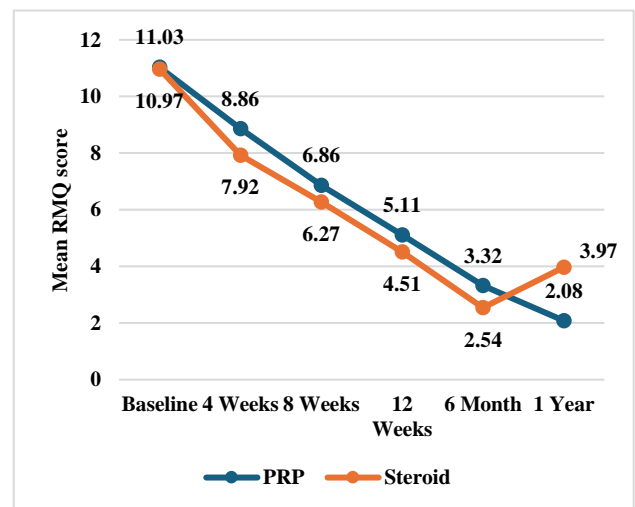


Figure 4: Line diagram showing mean RMQ score at different time of assessment in both the study groups.

Present pain index

The present pain index (PPI) scores in both groups also decreased after treatment, with PRP showing sustained benefits. The baseline PPI score for the PRP group was 3.89, decreasing to 2.92 at 4 weeks, 2.11 at 8 weeks, 1.73 at 12 weeks, 1.03 at 6 months, and remaining at 1.03 at 1 year. In the CS group, the baseline PPI was 3.89, decreasing to 2.68 at 4 weeks, 1.86 at 8 weeks, 1.19 at 12 weeks, 1.05 at 6 months, and increasing to 2.03 at 1 year.

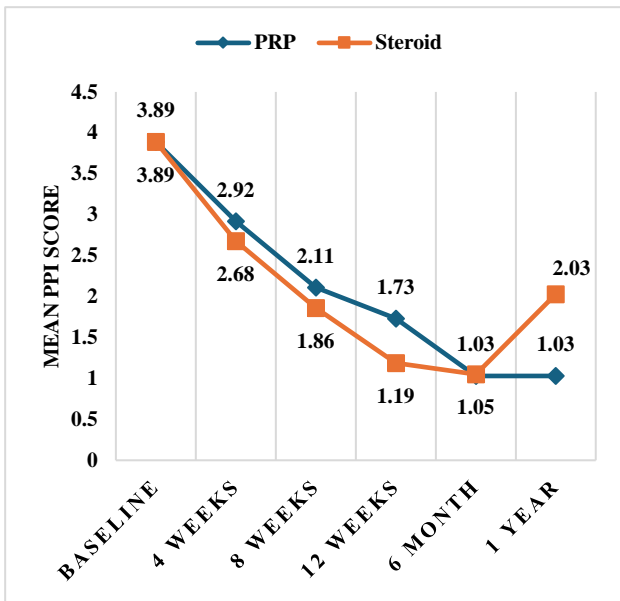


Figure 5: Line diagram showing mean PPI score at different time of assessment in both the study groups.

Quality of life (SF-12 score)

The SF-12 score improved in both groups, though more markedly in the PRP group over time. In the PRP group, the baseline SF-12 score was 50.76, improving to 55.35 at 4 weeks, 60.11 at 8 weeks, 64.97 at 12 weeks, 70.54 at 6 months, and 75.35 at 1 year. In the CS group, the baseline SF-12 score was 49.08, improving to 55.3 at 4 weeks, 60.19 at 8 weeks, 65.05 at 12 weeks, 71.03 at 6 months, and 66.65 at 1 year.

months, and 75.35 at 1 year. In the CS group, the SF-12 score improved from 49.08 at baseline to 55.30 at 4 weeks, 60.19 at 8 weeks, 65.05 at 12 weeks, 71.03 at 6 months, and then declined to 66.65 at 1 year.

Summary of findings

Both PRP and CS were effective in reducing pain and improving functionality in patients with DFJS. However, PRP provided more significant and longer-lasting benefits, particularly in pain reduction and functional disability, as evidenced by the 1-year follow-up. While corticosteroid injections offered more immediate relief, the effect diminished after six months, with some patients experiencing a slight increase in symptoms by 1 year. PRP, on the other hand, consistently improved pain, disability, and quality of life over time.

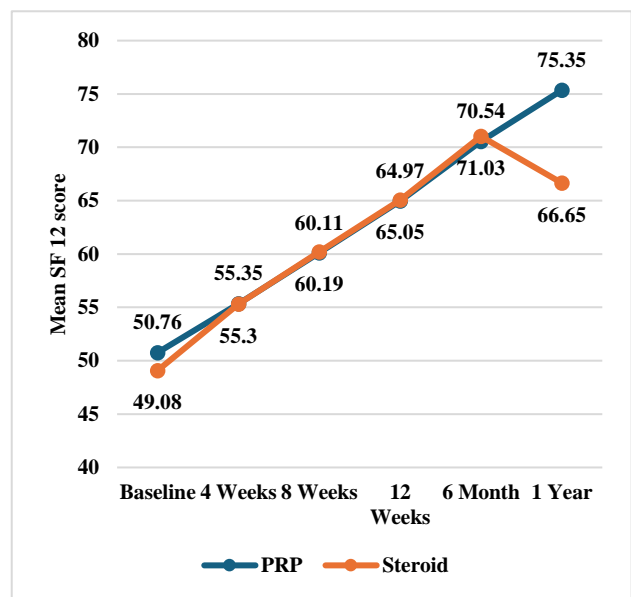


Figure 6: Line diagram showing mean SF 12 score at different time of assessment in both the study groups.

Table 1: Comparison of differences in VAS score before and after the procedure in both the study groups at 1 month, 2 months, 3 months, 6 months and 1 year by Paired T test.

Group	VAS score	Mean	SD	Mean diff.	P value	
PRP	Pair 1	Baseline	6.65	0.676	1.595	0.0001
	4 weeks	5.05	0.575			
	Pair 2	Baseline	6.65	0.676	2.730	0.0001
	8 weeks	3.92	0.493			
	Pair 3	Baseline	6.65	0.676	3.757	0.0001
12 weeks	2.89	0.516				
Pair 4	Baseline	6.65	0.676	4.811	0.0001	
6 months	1.84	0.501				
Pair 5	Baseline	6.65	0.676	5.595	0.0001	
1 year	1.05	0.229				
Steroid	Pair 1	Baseline	6.76	0.76	2.405	0.0001
	4 weeks	4.35	0.676			
Pair 2	Baseline	6.76	0.76	3.486	0.0001	

Continued.

Group	VAS score	Mean	SD	Mean diff.	P value
Pair 3	8 weeks	3.27	0.56	4.432	0.0001
	Baseline	6.76	0.76		
	12 weeks	2.32	0.58		
Pair 4	Baseline	6.76	0.76	5.459	0.0001
	6 months	1.3	0.52		
Pair 5	Baseline	6.76	0.76	4.108	0.0001
	1 year	2.65	0.676		

Table 2: Comparison of differences in MODI and RMQ scores before and after the procedure in both the study groups at 1 month, 2 months, 3 months, 6 months and 1 year by Paired T test.

Group	Time	MODI mean ± SD	MODI mean diff	MODI p	RMQ mean ± SD	RMQ mean diff	RMQ p
PRP	Baseline	54.97 ± 4.63	-	-	11.03 ± 1.67	-	-
	4 weeks	50.14 ± 4.70	4.838	0.0001	8.86 ± 1.67	2.162	0.0001
	8 weeks	44.49 ± 5.34	10.486	0.0001	6.86 ± 1.53	4.162	0.0001
	12 weeks	38.38 ± 6.05	16.595	0.0001	5.11 ± 1.52	5.919	0.0001
	6 months	29.92 ± 6.28	25.054	0.0001	3.32 ± 1.25	7.703	0.0001
	1 year	21.19 ± 5.91	33.784	0.0001	2.08 ± 0.72	8.946	0.0001
Steroid	Baseline	55.97 ± 4.62	-	-	10.97 ± 1.95	-	-
	4 weeks	49.57 ± 5.25	6.405	0.0001	7.92 ± 1.59	3.054	0.0001
	8 weeks	43.62 ± 7.18	12.351	0.0001	6.27 ± 1.84	4.703	0.0001
	12 weeks	37.08 ± 10.06	18.892	0.0001	4.51 ± 1.73	6.459	0.0001
	6 months	27.51 ± 11.40	28.459	0.0001	2.54 ± 1.46	8.432	0.0001
	1 year	30.86 ± 8.83	25.108	0.0001	3.97 ± 1.69	7.000	0.0001

Table 3: Comparison of differences in PPI score before and after the procedure in both the study groups at 1 month, 2 months, 3 months, 6 months and 1 year by Paired T test.

Group	PPI score	Mean	SD	Mean diff.	p value	
PRP	Pair 1	Baseline	3.89	0.393	0.973	0.0001
		4 weeks	2.92	0.363		
	Pair 2	Baseline	3.89	0.393	1.784	0.0001
		8 weeks	2.11	0.315		
	Pair 3	Baseline	3.89	0.393	2.162	0.0001
		12 weeks	1.73	0.45		
	Pair 4	Baseline	3.89	0.393	2.865	0.0001
		6 months	1.03	0.164		
	Pair 5	Baseline	3.89	0.393	2.865	0.0001
		1 year	1.03	0.164		
Steroid	Pair 1	Baseline	3.89	0.516	1.216	0.0001
		4 weeks	2.68	0.58		
	Pair 2	Baseline	3.89	0.516	2.027	0.0001
		8 weeks	1.86	0.419		
	Pair 3	Baseline	3.89	0.516	2.703	0.0001
		12 weeks	1.19	0.397		
	Pair 4	Baseline	3.89	0.516	2.838	0.0001
		6 months	1.05	0.229		
	Pair 5	Baseline	3.89	0.516	1.865	0.0001
		1 year	2.03	0.44		

Table 4: Comparison of differences in SF 12 score before and after the procedure in both the study groups at 1 month, 2 months, 3 months, 6 months and 1 year by Paired T test.

Group	SF 12	Mean	SD	Mean diff.	p value	
PRP	Pair 1	Baseline	50.76	5.193	-4.595	0.0001
		4 weeks	55.35	5.165		
	Pair 2	Baseline	50.76	5.193	-9.351	0.0001
		8 weeks	60.11	5.076		
	Pair 3	Baseline	50.76	5.193	-14.216	0.0001
		12 weeks	64.97	4.387		
	Pair 4	Baseline	50.76	5.193	-19.784	0.0001
		6 months	70.54	3.877		
	Pair 5	Baseline	50.76	5.193	-24.595	0.0001
		1 year	75.35	4.191		
Steroid	Pair 1	Baseline	49.08	7.143	-6.216	0.0001
		4 weeks	55.3	6.737		
	Pair 2	Baseline	49.08	7.143	-11.108	0.0001
		8 weeks	60.19	6.732		
	Pair 3	Baseline	49.08	7.143	-15.973	0.0001
		12 weeks	65.05	6.888		
	Pair 4	Baseline	49.08	7.143	-21.946	0.0001
		6 months	71.03	5.747		
	Pair 5	Baseline	49.08	7.143	-17.568	0.0001
		1 year	66.65	5.926		

DISCUSSION

This randomized controlled trial provides comparative data on the efficacy of autologous PRP versus CS injections in the management of DFJS, a prevalent cause of chronic LBP. Both PRP and CS demonstrated significant improvements in pain relief, functional disability, and quality of life. However, PRP showed sustained benefits over the long term, while CS was more effective in the short term. These findings contribute to a growing body of evidence supporting PRP as a viable long-term treatment option for degenerative spinal conditions.

Comparison with previous studies

Our study corroborates the findings of several earlier trials that have explored the role of PRP in musculoskeletal conditions. For instance, in a study by Wu et al (2016), PRP was compared with corticosteroids in patients with facet joint syndrome.¹⁰

The authors reported that while CS provided faster short-term relief, PRP showed significantly better outcomes in the long term, particularly in reducing pain and improving function, consistent with our results. Similarly, Singh et al (2019) found that PRP injections led to superior improvements in the RMQ and the VAS scores at 6 months and 1 year, compared to CS.¹¹

This reinforces the regenerative potential of PRP, which facilitates tissue healing and repair through the release of

growth factors, as opposed to CS, which primarily reduce inflammation. In our trial, the PRP group demonstrated a sustained reduction in VAS scores, which dropped from 6.65 at baseline to 1.05 at 1 year. These findings align with the results of Navani et al (2023), who found that PRP injections significantly reduced pain over 12 months in patients with discogenic back pain.¹²

In contrast, CS injections, while reducing VAS scores from 6.76 at baseline to 1.30 at 6 months, showed a rebound in pain intensity at 1 year (2.65), emphasizing the short-lived nature of CS efficacy. This is further supported by the work of Lutz et al (2020), who demonstrated that the pain-relieving effects of CS diminish significantly after 6 months, which mirrors our findings.¹³

Functional outcomes

In terms of functional improvement, as measured by the MODI and RMQ, our study demonstrated that PRP was more effective than CS in reducing disability at the 1-year mark. The PRP group had a reduction in MODI scores from 54.97 at baseline to 21.19 at 1 year, compared to the CS group, which saw a reduction from 55.97 to 30.86. These results are consistent with those reported by Kotb et al (2022), who showed that PRP produced a more significant reduction in disability scores compared to corticosteroids at 6 and 12 months in patients with facet joint arthropathy.¹ The improvement in RMQ scores in the PRP group from 11.03 to 2.08 at 1 year further emphasizes PRP's superior capacity to restore function over time, consistent with the findings of Patel et al (2022).¹⁴

Long-term benefits of PRP

The sustained benefits of PRP can be attributed to its biological mechanism of action. PRP contains a high concentration of growth factors, such as platelet-derived growth factor (PDGF), transforming growth factor-beta (TGF- β), and vascular endothelial growth factor (VEGF), which promote tissue repair, reduce inflammation, and facilitate angiogenesis. Studies have shown that these factors play a critical role in regenerating degenerated tissues, which may explain why PRP provides more durable relief in conditions like DFJS. In contrast, CS, while effective in reducing inflammation, do not promote tissue regeneration and are known to cause adverse effects with long-term use, such as joint cartilage damage and systemic side effects, as noted by Hellmich et al (2021).¹⁵

Quality of life and patient satisfaction

Our study also demonstrated a more substantial improvement in quality of life (SF-12 scores) in the PRP group at 1 year, with scores rising from 50.76 to 75.35. In comparison, the CS group showed an initial improvement from 49.08 to 71.03 at 6 months, but this was followed by a decline to 66.65 at 1 year. This decline in the CS group reflects the waning efficacy of CS over time. The long-term improvement in the PRP group echoes the findings of Kawabata et al (2023), who observed that PRP injections significantly enhanced patients' physical and mental well-being in the long-term management of degenerative spinal conditions.¹⁶

Clinical implications

The clinical implications of this study are significant. CS remain a useful option for short-term pain relief in acute settings, especially when immediate symptom management is necessary. However, for patients with chronic DFJS seeking long-term relief, PRP emerges as the better option, with its ability to promote healing and provide sustained improvements in both pain and functionality. Additionally, the safety profile of PRP, which is derived from the patient's own blood, minimizes the risk of adverse effects and makes it a favourable treatment option in a broader patient population.

Study limitations

Despite these promising findings, our study has several limitations. The open-label design introduces the potential for bias, as neither the patients nor the treating physicians were blinded to the treatment allocations. A double-blind design would have reduced the risk of bias. Additionally, our follow-up period was limited to one year. While PRP demonstrated superior outcomes over this period, longer-term follow-up is required to determine the durability of these effects beyond 12 months. Furthermore, the study was conducted at a single centre, which may limit the generalizability of the results. Multicentre trials with larger

sample sizes would provide more robust evidence on the comparative efficacy of PRP and CS in managing DFJS.

CONCLUSION

IA injections of autologous PRP demonstrate superior long-term efficacy compared to CS injections in managing DFJS. While both treatments effectively reduced pain and improved functionality, PRP provided sustained benefits, with significant improvements in pain reduction, functional ability, and quality of life at the one-year follow-up. These findings suggest that PRP is a promising treatment option for patients with DFJS seeking long-lasting relief from chronic low back pain.

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