International Journal of Medicine & Health Research
www.internationalmedicalpublishing.com

Research Article

Section: Orthopedics

Efficacy of Platelet Rich Plasma vs Corticosteroid Injection in Chronic Plantar Fasciitis - A Comparative Study

Achu S Nair[1*], Samson S Edayalamuriyil[1] & Renju Mathew Thomas[1]

[1]Department of Orthopedics, Pushpagiri Institute of Medical Sciences & Research Centre, Tiruvalla, Kerala, India

HIGHLIGHTS

- Steroids gave better pain relief.
- Both treatments improved function.
- AOFAS scores significantly improved.
- VAS scores significantly reduced.
- Steroids showed better outcomes.

Key Words:
Plantar Fasciitis, Platelet-Rich Plasma, Corticosteroid, Injection, AOFAS Score

ABSTRACT

Introduction: Chronic plantar fasciitis is a prevalent and often disabling condition characterized by persistent heel pain, significantly affecting daily activities and quality of life. It commonly results from repetitive strain and microtears of the plantar fascia. Corticosteroid injections have long been used as a conventional treatment due to their anti-inflammatory effects. However, platelet-rich plasma (PRP) therapy has recently gained attention as a regenerative approach that may promote tissue healing rather than merely reducing inflammation. **Aims & Objectives:** The primary aim of this study was to compare the effectiveness of PRP injections and corticosteroid injections in patients suffering from chronic plantar fasciitis. Outcomes were evaluated using the American Orthopaedic Foot and Ankle Society (AOFAS) ankle-hindfoot score to assess functional improvement and the Visual Analog Scale (VAS) to measure pain intensity. **Materials & Methods:** This comparative study included 50 patients diagnosed with chronic plantar fasciitis. Participants were randomly divided into two groups: one group received three PRP injections (n=25), while the other received corticosteroid injections (n=25). Clinical outcomes were measured at baseline, 1 month, and 3 months post-treatment using AOFAS and VAS scoring systems. **Results:** Both treatment groups showed significant improvement from baseline values. At 1 month, the corticosteroid group demonstrated superior outcomes, with higher AOFAS scores and lower VAS scores compared to the PRP group. This trend continued at 3 months, with corticosteroid-treated patients maintaining better functional and pain scores. All observed differences at follow-up intervals were statistically significant ($p<0.05$). **Conclusion:** Corticosteroid injections provided significantly greater short-term benefits in reducing pain and improving function compared to PRP injections in patients with chronic plantar fasciitis.

*** Corresponding Author**: Achu S Nair, e-mail: asnair1994@gmail.com
Article History: Received 30 March 2026; Received in Revised form 02 May 2026; Accepted 09 May 2026
How To Cite: Achu S Nair, Samson S Edayalamuriyil & Renju Mathew Thomas. Efficacy of Platelet Rich Plasma vs Corticosteroid Injection In Chronic Plantar Fasciitis - A Comparative Study. *International Journal of Medicine & Health Research.* 2026;14(1):1-8. DOI: https://doi.org/10.71393/0rc8z019
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INTRODUCTION

Plantar fasciitis is one of the most common causes of heel pain, affecting nearly 10% of the population, particularly adults between 25 and 65 years, and accounting for over one million outpatient visits annually in the United States. The plantar fascia plays a crucial role in maintaining the medial longitudinal arch and absorbing mechanical stress during gait; thus, its dysfunction leads to characteristic heel pain, especially during the first steps after rest. Beyond pain, the condition significantly impairs daily activities and quality of life, particularly in individuals with occupations involving prolonged standing or repetitive loading. Studies have shown prevalence rates of plantar heel pain around 9.6% in older adults, with notable impacts on physical activity, mental health, and healthcare utilization. Athletes, workers, and individuals with higher body mass index are particularly at risk, often experiencing reduced productivity and functional limitations [1,2]. Current under-standing emphasizes that chronic plantar fasciitis is primarily a degenerative rather than inflammatory condition. Histological findings reveal collagen disorganization, microtears, & incresed and increased vascularity without significant inflammatory infiltrates leading to the preferred term "plantar fasciopathy". Repetitive mechanical stress and failed healing responses result in progressive degeneration at the plantar fascia's origin. Biomechanical factors such as limited ankle dorsiflexion, abnormal foot posture, obesity, and tight calf muscles further exacerbate the condition. Clinically, patients present with sharp heel pain during initial steps, localized tenderness at the medial calcaneal tubercle, and worsening discomfort with prolonged activity. Diagnosis is mainly clinical, supported by imaging modalities like ultrasonography or MRI when required [3,4].

Conservative management, including NSAIDs, orthotics, stretching, and physiotherapy, is typically the first-line treatment. However, outcomes vary widely, and long-term effectiveness is often limited due to biomechanical abnormalities and patient non-compliance [5]. In cases persisting beyond six months, advanced interventions are considered. Corticosteroid injections are commonly used due to their potent anti-inflammatory effects, providing rapid pain relief by suppressing cytokine activity and nociceptive mediators. Nevertheless, their benefits are often short-lived and may impair tissue healing by inhibiting collagen synthesis, with risks such as fascia rupture and recurrence of symptoms [6].

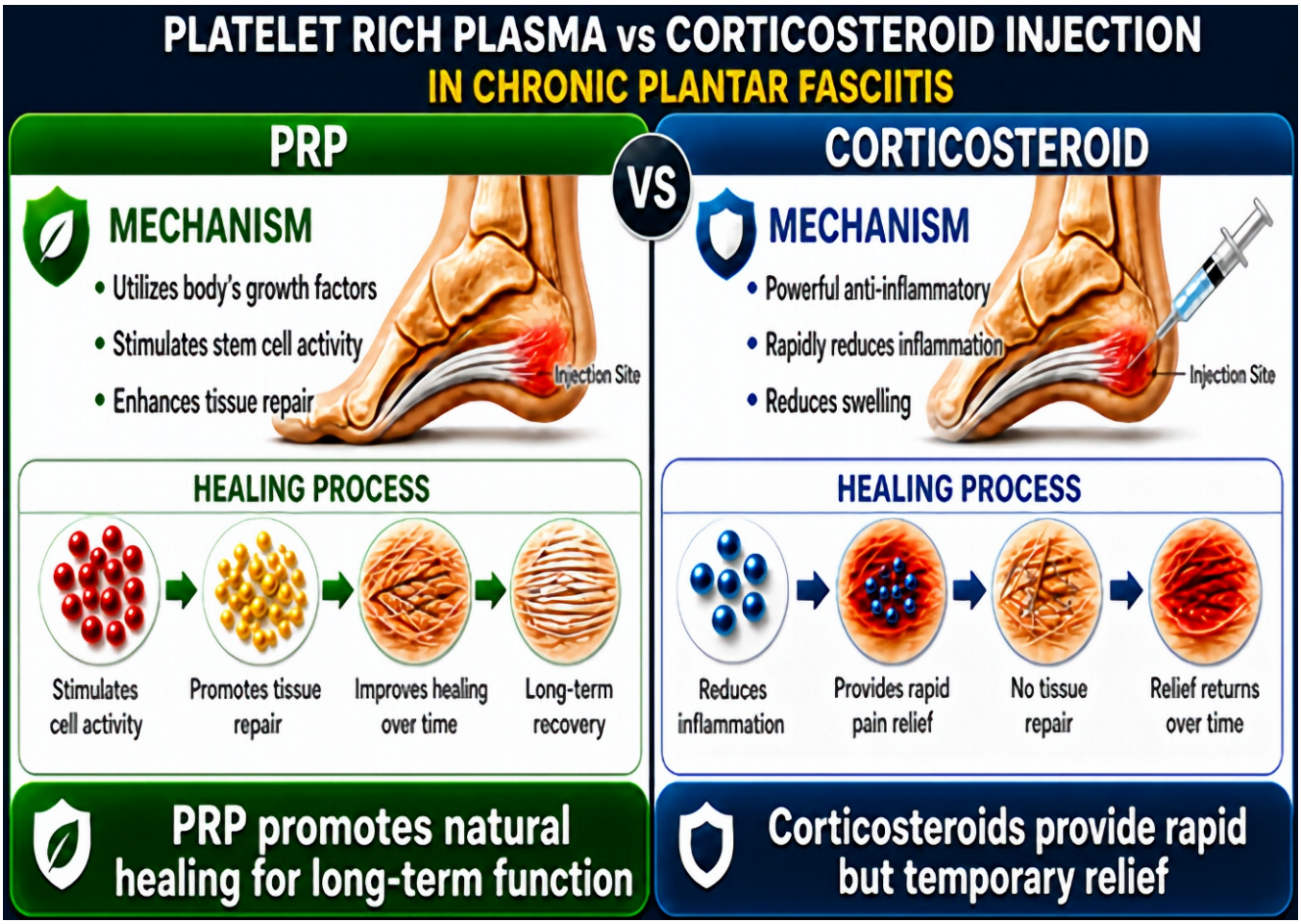

Figure 1: Comparative illustration of platelet-rich plasma and corticosteroid injections in the management of chronic plantar fasciitis.

In contrast, platelet-rich plasma (PRP) therapy has emerged as a regenerative treatment option. PRP contains concentrated growth factors that promote tissue healing, angiogenesis, and collagen synthesis, addressing the underlying degenerative pathology. Evidence suggests that while PRP and corticosteroids provide comparable short-term relief, PRP demonstrates superior long-term outcomes in pain reduction and functional improvement. The growing preference for PRP is also supported by its autologous nature and favourable safety profile, although variability in preparation techniques remains a limitation [7-9].

Comparatively, corticosteroids offer rapid but temporary symptom relief, whereas PRP aims for sustained tissue repair. Functional outcome measures such as the American Orthopaedic Foot and Ankle Society (AOFAS) score are essential for evaluating treatment efficacy beyond pain reduction [10]. In the South Indian context, the burden of plantar fasciitis is amplified by occupational factors, hard walking surfaces, and inadequate footwear, contributing to higher prevalence and severity [11]. Despite this, region-specific comparative data on PRP and corticosteroids remain limited, with existing studies suggesting better mid-term outcomes with PRP but lacking large-scale validation. Therefore, research in tertiary care settings is crucial to generate locally relevant evidence, guide treatment decisions, and improve patient outcomes in this population [12,13].

The aim of this study is to compare the effectiveness of Platelet-Rich Plasma and corticosteroid injections in managing chronic plantar fasciitis by evaluating changes in AOFAS scores among patients treated at a tertiary care hospital in South India. The objective is to assess and compare the degree of functional improvement achieved with each treatment modality, determining which injection provides superior relief and functional recovery in individuals with long-standing plantar fasciitis.

MATERIAL & METHODS

This comparative study was conducted at the Department of Orthopaedics, Pushpagiri Institute of Medical Sciences & Research Centre, Thiruvalla, Kerala from 2023 to 2026 for 18 months. Ethical approval has been obtained from the Ethical Approval Committee of Pushpagiri Institute of Medical Sciences & Research Centre, Thiruvalla, Kerala.

Study Population

The study population included patients attending the hospital outpatient department between 2024 and 2025 who provided informed consent, were over 18 years of age, and had continuous heel pain over the plantar aspect for at least six months; in bilateral cases, the right foot was considered. Excluded were patients with diabetic foot, age below 18 years, prior foot fracture or infection, haematological disorders such as coagulopathy, & immunodeficiency conditions like rheumatoid arthritis.

Data Analysis

Patients were randomly allocated to corticosteroid or PRP groups, each receiving three injections at baseline, one month, & three months, with follow-up to six months. PRP was prepared using a double centrifugation technique and injected aseptically, while corticosteroids were administered locally. Patients were evaluated at regular intervals using functional scores and monitored for adverse effects. Data were coded and analyzed using SPSS, with means, percentages, and independent t-tests applied, considering $p<0.05$ as statistically significant.

RESULTS

The age distribution of the study population ranged from 30 to 60 years, with the majority of patients falling in the 48–54 years group (28%), followed by 42–48 years (22%) and 54–60 years (20%), while fewer patients were observed in the 36–42 years group (12%) and 30–36 years group (18%). The mean age was 46.72 ± 8.58 years with a median of 48 years, indicating that chronic plantar fasciitis was more prevalent among middle-aged individuals. Regarding sex distribution, males constituted a higher proportion with 29 patients (58%), whereas females accounted for 21 patients (42%). However, this difference was not statistically significant ($p = 0.2579$), suggesting that both genders were comparably affected. The side affected was equally distributed, with 25 patients (50%) having left-sided involvement and 25 patients (50%) having right-sided involvement. The p-value of 1.000 indicates no statistically significant difference, showing equal involvement of both sides **(Table 1)**. Both treatment groups were evenly distributed, with 25 patients (50%) receiving corticosteroid injections and 25 patients (50%) receiving platelet rich plasma injections. The p-value of 1.000 indicates a perfectly balanced allocation between the two injection types **(Table 2)**. The study population had a mean BMI of 26.48 ± 2.97 and a median of 27, indicating that most patients were overweight. The baseline AOFAS score had a mean of 50.21 ± 5.93, which improved significantly to 87.49 ± 4.94 at one month and further to 91.07 ± 5.45 at three months. Similarly, the mean VAS score reduced from 7.47 ± 0.90 at baseline to 2.54 ± 0.81 at one month and 1.49 ± 0.86 at three months, indicating significant functional improvement and pain reduction over time **(Table 3)**. The cross-tabulation shows the relationship between Injection Type and Sex. The largest group is Male with platelet Rich Plasma = 17 (34.00%). The smallest group is Female with Platelet Rich Plasma = 8 (16.00%). The chi-square test statistic is 1.3136 with a p-value of 0.2517, indicating no statistically significant difference between groups. Overall, the distribution shows any notable imbalances among the categories. Percentages in the table can be used to further understand group differences **(Table 4)**. The cross-tabulation shows the relationship between Injection Type and Side Affected. The largest group is Left with Platelet Rich Plasma = 14 (28.00%). The smallest group is Left with corticosteroid = 11 (22.00%). The chi-square test statistic is 0.3200 with a p-value of 0.5716, indicating no statistically significant difference between groups. Overall, the distribution shows any notable imbalances

among the categories. Percentages in the table can be used to further understand group differences **(Figure 2)**. Baseline variables including age, duration. Baseline variables including age, duration of symptoms, BMI, AOFAS, and VAS scores were comparable between the platelet-rich plasma and corticosteroid groups, with no statistically significant differences ($p > 0.05$). At one and three months, the corticosteroid group showedshowed significantly higher AOFAS scores, indicating better functional improvement. Similarly, VAS scores were significan-tly lower in the corticosteroid group at both followups reflectingsuperior pain relief. Overall, corticosteroids demonstrated better short-term outcomes compared to platelet-rich plasma **(Table 5).**

Table 1: Distribution of Side Affected

Side Affected	Count	Percentage
Left	25	50.0%
Right	25	50.0%
Total	50	100.0%

Table 2: Distribution of Injection Type

Injection Type	Count	Percentage
Corticosteroid	25	50.0%
Platelet Rich Plasma	25	50.0%
Total	50	100.0%

Table 3: Summary of Numerical Variables

Variable	Mean ± SD	Median	Range (Min-Max)
Age(years)	46.72 ± 8.58	48.00	30.00 - 60.00
BMI	26.48 ± 2.97	27.00	22.00 - 31.80
AOFAS Baseline	50.21 ± 5.93	50.80	40.10 - 59.60
AOFAS 1 Month	87.49 ± 4.94	88.75	71.10 - 96.10
AOFAS 3 Months	91.07 ± 5.45	92.95	73.20 - 98.50
VAS Baseline	7.47 ± 0.90	7.25	6.00 - 8.90
VAS 1 Month	2.54 ± 0.81	2.55	1.00 - 4.00
VAS 3 Months	1.49 ± 0.86	1.50	0.00 - 3.40

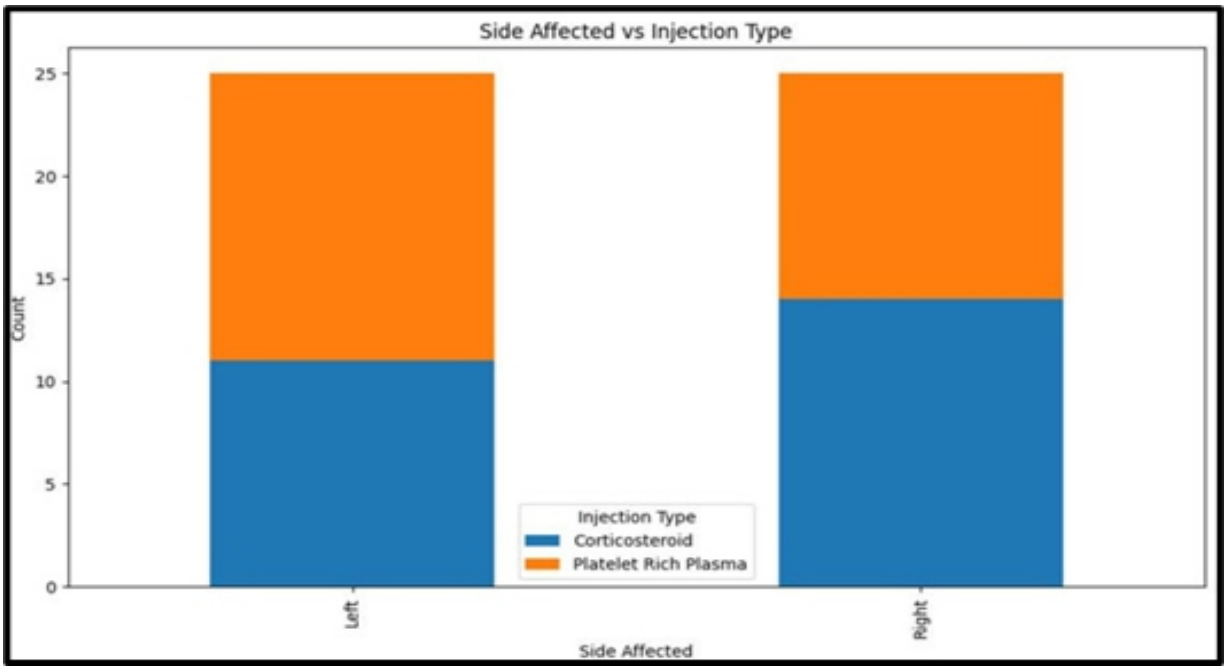

Figure 2: Distribution of Injection Type by Side Affected

Table 4: Distribution of Injection Type by Sex

	Injection Type		
Sex	**Corticosteroid**	**Platelet Rich Plasma**	**Total**
Female	13 (52.0%)	8 (32.0%)	21 (42.0%)
Male	12 (48.0%)	17 (68.0%)	29 (58.0%)
Total	25 (100.0%)	25 (100.0%)	50 (100.0%)

Table 5: Descriptive Statistics by Injection Type

	Injection Type			
Variable	**Platelet Plasma Rich**	**Corticosteroid**	**t-test Statistic**	**p-value**
	Mean ± SD	**Mean ± SD**		
Age (years)	44.96 ± 8.83	48.48 ± 8.11	-1.4673	0.1488
	46.0 (30-60)	50.0 (32-60)		
Duration	12.28 ± 4.69	12.32 ± 3.66	-0.0336	0.9733
Symptoms (months)	13.0 (6-18)	14.0 (6-18)		
BMI	26.75 ± 2.49	26.22 ± 3.43	0.6331	0.5297
	27.5 (22.3-31.3)	25.4 (22.0-31.8)		
AOFAS	50.76 ± 5.56	49.66 ± 6.35	0.6494	0.5192
Baseline	50.8 (41.1-59.6)	51.1 (40.1-58.5)		
AOFAS	85.8 ± 6.54	89.19 ± 1.01	-2.5643	0.0135
Month	85.7 (71.1-96.1)	89.2 (87.1-91.0)		
AOFAS	88.36 ± 6.51	93.78 ± 1.75	-4.0213	0.0002
Months	88.5 (73.2-98.5)	94.1 (89.9-96.1)		
VAS Baseline	7.3 ± 0.77	7.64 ± 1.0	-1.348	0.184
	7.1 (6.2-8.9)	8.0 (6.0-8.9)		
VAS 1 Month	3.09 ± 0.62	1.99 ± 0.57	6.4899	0.0
	3.1 (2.1-4.0)	2.0 (1.0-2.9)		
VAS 3 Months	2.08 ± 0.61	0.89 ± 0.63	6.8259	0.0
	2.0 (1.1-3.4)	0.9 (0.0-2.1)		

DISCUSSION

Chronic plantar fasciitis is a leading cause of heel pain in adults and contributes significantly to morbidity, reduced functional capacity, and impaired quality of life. It is characterized by degenerative changes and microtears at the calcaneal origin of the plantar fascia, commonly resulting from repetitive stress, prolonged standing, obesity, altered biomechanics, and aging. Clinically, patients experience insidious heel pain, typically worse during the first steps in the morning or after rest. While many cases resolve with time, a considerable proportion become chronic, persisting beyond six months and affecting work productivity and daily activities [14,15].

Initial management focuses on conservative measures such as activity modification, stretching exercises, orthotic support, nonsteroidal anti-inflammatory drugs, and physiotherapy. However, treatment outcomes are variable, and refractory cases often require interventional therapies. Corticosteroid injections are widely used due to their strong anti-inflammatory action and rapid pain relief. Despite their effectiveness in the short term, concerns remain regarding recurrence, plantar fascia rupture, fat pad atrophy, and limited long-term benefits [16].

Platelet-rich plasma (PRP) has recently emerged as a promising biological alternative for chronic plantar fasciitis [17]. As an autologous concentration of platelets, PRP contains growth factors such as platelet-derived growth factor, transforming growth factor-β, and vascular endothelial growth factor, which facilitate tissue repair, angiogenesis, and collagen remodelling. Unlike corticosteroids, PRP targets the underlying degenerative pathology, offering the potential for sustained improvement rather than temporary symptom relief. Given these differences, comparative evaluation of PRP and corticosteroids is essential to determine optimal treatment strategies [18,19].

In the present study of 50 patients, the majority were middle-aged to older adults, with the highest proportion between 48–54 years (28%), followed by 42–48 years (22%) and 54–60 years (20%), indicating a predominance of older individuals compared to other studies reporting mean ages in the mid-40s [20]. The mean age in this study was 46.72 ± 8.58 years, consistent with previous literature. Gender distribution showed male predominance (58% males vs 42% females), contrasting with other studies where females constituted a higher proportion, often ranging from 53% to 80%. This variation may reflect demographic or occupational differences across populations [21]. The side affected was equally distributed in this study (50 % left and 50 %

right), unlike other studies reporting a higher prevalence of left-sided involvement (approximately 62%). Such differences suggest variability in patient characteristics, though laterality is generally not considered to influence treatment outcomes significantly. Equal allocation of treatment groups (25 PRP and 25 corticosteroid) ensured balanced comparison, consistent with methodologies used in similar randomized studies [22,23].

Clinical outcomes demonstrated significant improvement in both pain and function over time. The mean AOFAS score improved from 50.21 ± 5.93 at baseline to 91.07 ± 5.45 at three months, while the VAS score decreased from 7.47 ± 0.90 to 1.49 ± 0.86, indicating marked recovery. These findings align with previous studies showing substantial improvement with both PRP and corticosteroid treatments. However, in this study, corticosteroids showed superior short-term outcomes, with significantly higher AOFAS scores and lower VAS scores at one and three months compared to PRP ($p < 0.05$) [12,19].

When analysed by sex, the PRP group showed a higher proportion of males (68%), while the corticosteroid group had a more balanced distribution. This contrasts with existing literature where females predominate in both treatment groups. Similarly, distribution by side affected within each treatment group remained relatively balanced, differing from other studies showing asymmetrical laterality patterns [19,22].

Descriptive comparisons revealed no significant baseline differences between PRP and corticosteroid groups in terms of age, symptom duration, BMI, or initial AOFAS and VAS scores, supporting the validity of comparison. While corticosteroids demonstrated better early outcomes in this study, published evidence suggests that PRP may provide superior long-term benefits. Several studies report that PRP shows greater improvements in pain and function at six months and beyond, with sustained outcomes compared to corticosteroids, which tend to decline over time [22,23].

Both PRP and corticosteroid injections are effective in managing chronic plantar fasciitis. Corticosteroids offer rapid pain relief and functional improvement in the short term, whereas PRP appears to provide more durable benefits by promoting tissue healing. The findings highlight the importance of considering both immediate and long-term outcomes when selecting treatment, as well as patient-specific factors such as age, activity level, and chronicity of symptoms [20,23].

CONCLUSION

Chronic plantar fasciitis is a common and disabling condition characterized by medial heel pain due to repetitive microtrauma & degenerative changes. Although most cases respond to conservative treatment, a subset becomes chronic, requiring interventions such as corticosteroid injections, which provide rapid relief but carry risks & limited long-term benefit. Platelet-rich plasma (PRP), rich in growth factors, offers a regenerative approach targeting underlying pathology. This study does not conclude that PRP is ineffective, as both groups showed dramatic improvement from baseline, affirming PRP as an active therapeutic intervention. However, in direct comparison using this specific protocol, corticosteroids outperformed PRP in short to medium term. This may imply that the natural history of healing with PRP requires a longer period to manifest advantages, or that the protocol may need optimisation to unlock its full potential. This study aimed to compare their efficacy using AOFAS and VAS scores, with comparable baseline characteristics and statistical analysis performed at multiple follow-up intervals.

LIMITATIONS & FUTURE PERSPECTIVES

The study was limited by its single-centre design, relatively small sample size, and short duration, which may restrict generalizability. Future research could focus on multicenter studies with larger cohorts to validate findings, evaluate long-term outcomes, and explore innovative diagnostic and management strategies for appendicular perforation, improving patient prognosis and reducing complications.

CLINICAL SIGNIFICANCE

Timely detection and management of acute appendicitis are crucial to prevent perforation, reducing morbidity and mortality. The study identifies high-risk groups, such as males and individuals at age extremes, highlighting the need for targeted preventive strategies and clinical vigilance. Delayed presentation significantly increases perforation risk, underscoring the importance of early healthcare access and awareness campaigns. Postoperative complications, including surgical site infections and prolonged, emphasize the need for thorough preoperative risk assessment and tailored postoperative care. Recognizing the distal third of the appendix as the most common perforation site aids surgeons in effective intraoperative planning and management.

ABBREVIATIONS

PRP: Platelet-Rich Plasma
AOFAS: American Orthopaedic Foot and Ankle Society
VAS: Visual Analog Scale
n: Number of participants
p: Probability value (statistical significance)

AUTHOR INFORMATION

Dr. Achu S Nair: PG Resident
Dr. Samson S Edayalamuriyil: Professor & Head
Dr. Renju Mathew Thomas: Assistant Professor

AUTHOR CONTRIBUTIONS

All authors significantly contributed to the study conception & design, data acquisition, or data analysis and interpretation. They participated in drafting the manuscript, critically revising

it for important intellectual content, consented to its submission to the current journal, provided final approval for the version to be published, and accepted responsibility for all aspects of the work. Additionally, all authors meet the authorship criteria outlined by the International Committee of Medical Journal Editors (ICMJE) guidelines.

ACKNOWLEDGEMENT

The authors sincerely acknowledge the seniors of the Department of Orthopedics, Pushpagiri Institute of Medical Sciences and Research Centre, Thiruvalla, India. We are grateful to our research centre for providing the necessary resources to carry out this work. We also extend our heartfelt thanks to our colleagues and technical staff for their valuable assistance during the study.

CONFLICT OF INTEREST

Authors declared that there is no conflict of interest.

FUNDING

None

ETHICAL APPROVAL & CONSENT TO PARTICIPATE

All necessary consent & approval was obtained by authors.

CONSENT FOR PUBLICATION

All necessary consent for publication was obtained by authors.

DATA AVAILABILITY

All data generated and analyzed are included within this research article. The datasets utilized and/or analyzed in this study can be obtained from the corresponding author upon a reasonable request.

USE OF ARTIFICIAL INTELLIGENCE (AI) & LARGE LANGUAGE MODEL (LLM)

The authors confirm that no AI & LLM tools were used in the writing or editing of the manuscript, and no images were altered or manipulated using AI & LLM.

AUTHOR'S NOTE

This article serves as an important educational tool for the scientific community, offering insights that may inspire future research directions. However, they should not be relied upon independently when making treatment decisions or developing public health policies.

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Vinay Kumar Yadav[1,2,3]

[1]CSIR-Indian Institute of Toxicology Research (IITR), Lucknow, India

[2]Academy of Scientific and Innovative Research (AcSIR), Ghaziabad, U.P., India

[3]Biological E Ltd, Hyderabad, Telangana, India

HANDLING EDITOR

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[1]Ph.D. in Cancer Research from CDRI-JNU New Delhi, India & [2]Post-Doctoral Fellow from University of Illinois at Chicago, USA

[3]Department of Zoology, P.M. College of Excellence, Government Postgraduate College in Sheopur, Madhya Pradesh, India

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