

Efficacy of Platelet Rich Plasma Vs Conventional Dressing in Chronic Non-Healing Leg Ulcers**Boricha Mahavir Jayvantbhai¹, Parth Mittal², P.P. Sharma³**¹3rd Year Resident, Department of General Surgery, Pacific Institute of Medical Sciences, Udaipur, Rajasthan, India²3rd Year Resident, Department of General Surgery, Pacific Institute of Medical Sciences, Udaipur, Rajasthan, India³Professor, Department of General Surgery, Pacific Institute of Medical Sciences, Udaipur, Rajasthan, India

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Conflict of interest: Nil

Abstract**Background:** Chronic non-healing ulcers are defined as wounds that fail to progress through the normal stages of healing despite adequate treatment. They are commonly associated with diabetes mellitus, peripheral vascular disease, venous insufficiency, neuropathy, and trauma. These ulcers significantly impair quality of life due to prolonged treatment, recurrent infections, pain, reduced mobility, and risk of limb loss.**Aim:** To compare the efficacy of platelet-rich plasma (PRP) dressing with conventional dressing in chronic non-healing leg ulcers.**Method:** This prospective randomized controlled study was conducted in the Department of General Surgery, Pacific Institute of Medical Sciences, Udaipur (April 2024–September 2025). Fifty patients were randomized into two groups: conventional dressing (n=25) and PRP dressing (n=25). Both groups received standard antibiotics. PRP was prepared from autologous blood using a two-step centrifugation technique and applied twice weekly, while the control group received saline dressings. Wound healing was assessed by reduction in ulcer size, granulation, and epithelialization at serial intervals.**Results:** Both groups were comparable at baseline ($p>0.05$). The PRP group showed significantly greater reduction in ulcer size from Day 7 onwards ($p<0.001$), faster granulation, earlier epithelialization, and higher sterile culture rates ($p=0.01$). Healing rates were significantly faster in the PRP group ($p<0.0001$). Mean healing time was shorter with PRP (30.6 ± 0.02 vs 50.1 ± 0.04 days). Complete healing was achieved in 52% versus 16% in controls.**Conclusion:** PRP dressing is a safe and effective treatment for chronic non-healing leg ulcers, providing faster healing, improved granulation, earlier epithelialization, better infection control, fewer complications, and superior overall outcomes than conventional dressing.**Keywords:** Chronic non-healing ulcer, Platelet-rich plasma, PRP, conventional dressing, wound healing, diabetic foot ulcer, granulation tissue, epithelialization.**DOI:** 10.25258/ijcpr.18.7.176This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

An ulcer is defined as a break in the continuity of the skin or mucosal surface resulting from tissue necrosis and loss of the epithelial layer. A wound that fails to heal despite appropriate treatment for more than three months is considered a chronic or non-healing ulcer. [1]

Wound healing is a complex biological process involving inflammation, proliferation, angiogenesis, and tissue remodeling. Any disruption in these phases can delay healing and result in chronic wounds. Chronic non-healing leg

ulcers are among the most common and disabling chronic wounds. They are frequently associated with diabetes mellitus, venous insufficiency, peripheral arterial disease, neuropathy, trauma, and other vascular disorders. These ulcers cause pain, reduced mobility, recurrent infections, and psychological distress, significantly affecting quality of life. [2]

Their prevalence ranges from 0.18% to 1% globally, while in India it is approximately 4.5 per 1000 population, making them an important public

health concern. [3] Diabetic foot and leg ulcers contribute substantially to the burden of chronic wounds. More than 85% of lower limb amputations are preceded by chronic foot ulcers, with diabetes being the leading cause of non-traumatic amputations. [4] Approximately 60% of diabetic ulcers become infected, often progressing to deeper tissues and osteomyelitis, further complicating management. [5]

Conventional wound care includes debridement, infection control, pressure off-loading, vascular optimization, appropriate dressings, and patient education. However, healing remains unsatisfactory in many chronic ulcers because of persistent inflammation, impaired angiogenesis, reduced fibroblast activity, and deficiency of growth factors. Platelet-rich plasma (PRP) is a promising biological therapy for chronic wound management. It contains growth factors that promote angiogenesis, fibroblast proliferation, collagen synthesis, epithelialization, and tissue regeneration. [6] As an autologous product, PRP is safe, cost-effective, and easy to prepare, with minimal risk of adverse reactions. Studies have shown that PRP accelerates wound healing, reduces infection, decreases ulcer size, and lowers amputation rates compared with conventional therapy. [7] Therefore, this study compared PRP dressing with conventional dressing for chronic non-healing leg ulcers.

This study Aim's to compare the Effectiveness of platelet-rich plasma dressing with conventional povidone iodine dressing in chronic non-healing leg ulcer.

Materials and Methods

Study Location: The study was conducted in the Department of General Surgery, Pacific Institute of Medical Sciences (PIMS), Umarda, Udaipur, Rajasthan.

Study Design: This was a prospective, comparative, randomized controlled trial conducted to compare the efficacy of platelet-rich plasma (PRP) dressing with conventional dressing in the management of chronic non-healing leg ulcers after obtaining approval from the Institutional Ethics Committee.

Study Period: The study was carried out over 18 months, from June 2024 to December 2025.

Sample Size: A total of 50 patients fulfilling the eligibility criteria were enrolled and equally allocated into two groups. The sample size was calculated using the standard statistical formula.

Randomization: Eligible participants were randomized into two equal groups. Group A received conventional dressing, while Group B received platelet-rich plasma dressing. Both groups were treated with the same antibiotic protocol throughout the study.

Inclusion Criteria: Patients aged 14–75 years with diabetic foot ulcers, bedsores (pressure sores), or traumatic wounds were included in the study.

Exclusion Criteria: Patients younger than 14 years or older than 75 years, those with osteomyelitis, locally malignant wounds, or those receiving corticosteroids or immunosuppressive therapy were excluded.

Preparation of Platelet-Rich Plasma: Under aseptic precautions, 20 mL of venous blood was collected into acid citrate dextrose anticoagulant (9:1 ratio). The sample underwent two-step centrifugation to separate platelet-rich plasma from other blood components before application.

Dressing Technique: In the conventional group, ulcers were cleaned with normal saline and dressed with saline-soaked gauze. In the PRP group, ulcers were cleaned similarly, followed by autologous platelet-rich plasma injection around the wound margins twice weekly.

Outcome Assessment: The primary endpoint was complete epithelialization or healthy granulation tissue. Ulcer size was assessed on Days 1, 7, 15, and 30, with wound area calculated from the two largest perpendicular diameters.

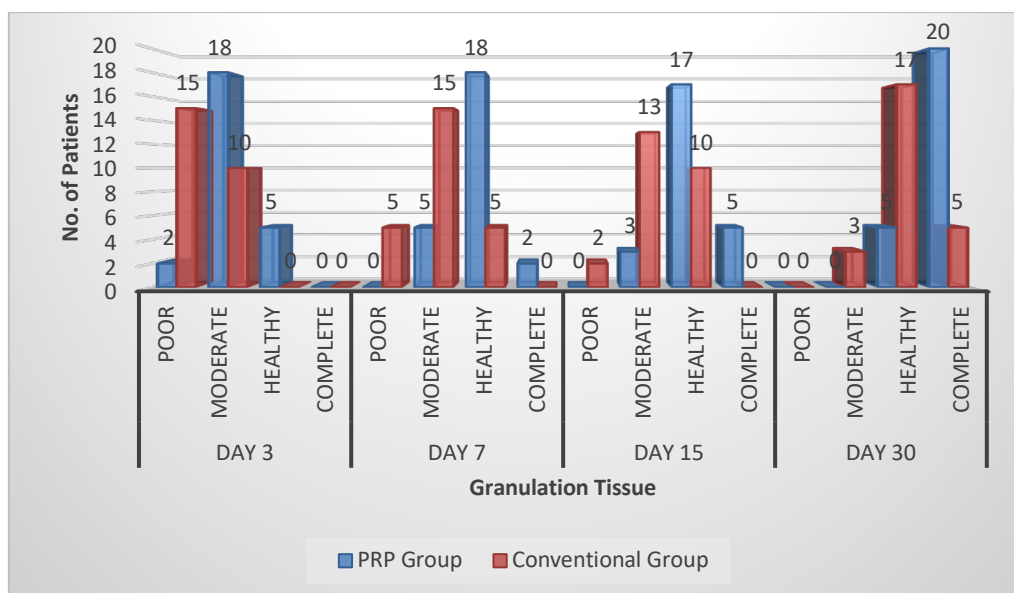
Results and Observations

Baseline characteristics were comparable between the PRP and conventional groups. No significant differences were observed in age, ulcer aetiology, microbial profile, or antibiotic usage ($p>0.05$). However, sterile wound cultures were significantly more frequent in the PRP group (32% vs 4%; $p=0.01$), indicating better infection control while maintaining similar antimicrobial therapy in both groups.

Table 1: Comparison of Mean Ulcer Size (cm²) Over Time between PRP and Conventional Dressing Groups

Ulcer Size (cm ²)	PRP Group		Conventional Group		P-Value
	Mean	SD	Mean	SD	
Day 3	9.75	2.05	9.8	2.1	0.93
Day 7	6.6	1.7	8.45	1.95	0.0008
Day 15	3.95	1.3	6.9	1.72	<0.0001
Day 30	1.7	0.9	5.1	1.48	<0.0001

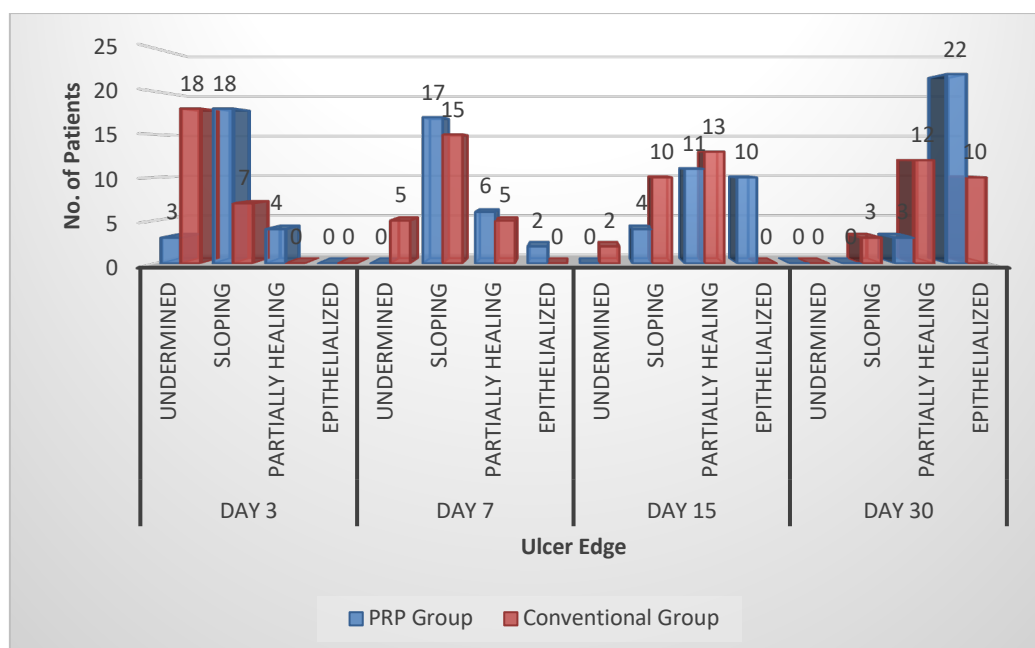
The mean ulcer size was comparable on Day 3 ($p=0.93$). From Day 7 onwards, the PRP group showed significantly greater ulcer size reduction than the conventional group, with markedly smaller ulcers on Days 7, 15, and 30 ($p\leq 0.0008$), demonstrating faster and more effective wound healing with PRP.



Graph 1: Comparison of Granulation Tissue Formation at Different Time Intervals Between PRP and Conventional Dressing Groups.

Granulation tissue formation was significantly better in the PRP group throughout follow-up. The PRP group showed earlier progression from poor to healthy and complete granulation, with 80%

achieving complete granulation by Day 30 compared with 20% in the conventional group. The differences were statistically significant at all time points ($p<0.05$).



Graph 2: Comparison of Ulcer Edge Characteristics at Different Time Intervals between PRP and Conventional Dressing Groups.

The PRP group demonstrated significantly faster improvement in ulcer edge characteristics than the conventional group. Epithelialization increased progressively, reaching 88% by Day 30 compared

with 40% in the conventional group. Undermined edges resolved earlier, indicating enhanced wound healing with PRP. Differences were statistically significant except on Day 7 ($p=0.35$).

Table 2: Comparison of Average Rate of Healing per Day (cm²/day) Between PRP and Conventional Dressing Groups.

Average Rate of Healing per Day (cm ² /day)	PRP Group		Conventional Group		P-Value
	Mean	SD	Mean	SD	
Day 3	0.32	0.06	0.18	0.05	<0.0001
Day 7	0.38	0.07	0.2	0.06	<0.0001
Day 15	0.45	0.08	0.24	0.07	<0.0001
Day 30	0.52	0.09	0.28	0.08	<0.0

The PRP group demonstrated a significantly higher average daily healing rate than the conventional group throughout the study. Healing progressively increased from 0.32 to 0.52 cm²/day in the PRP group compared with 0.18 to 0.28 cm²/day in the conventional group, with highly significant differences at all time points ($p < 0.0001$).

Table 3: Comparison of Mean Healing Time (in Days) Between PRP and Conventional Dressing Groups.

Parameter	PRP Group		Conventional Group		P-Value
	Mean	SD	Mean	SD	
Healing Time (in Days)	30.6	0.02	50.1	0.04	<0.0001

The mean healing time was significantly shorter in the PRP group than in the conventional group (30.6±0.02 vs 50.1±0.04 days; $p < 0.0001$). These findings indicate that platelet-rich plasma dressing

accelerates wound healing and achieves complete recovery considerably earlier than conventional dressing in patients with chronic non-healing leg ulcers.

Table 4: Comparison of Final Outcomes of Ulcer Management between PRP and Conventional Dressing Groups.

Final Outcome	PRP Group		Conventional Group		Total		P-Value
	No. of Patients	Percent age	No. of Patients	Percentage	No. of Patients	Percent age	
Full granulation	6	24	3	12	9	18	0.01
Healed	13	52	4	16	17	34	
Non-healing	1	4	6	24	7	14	
Partial granulation	3	12	7	28	10	20	
SSG	1	4	3	12	4	8	
Amputation	1	4	2	8	3	6	
Total	25	100	25	100	50	100	

The final outcomes were significantly better in the PRP group ($p = 0.01$). Complete healing was achieved in 52% of patients compared with 16% in the conventional group. Non-healing, partial granulation, split-skin grafting, and amputation were less frequent in the PRP group, indicating superior overall clinical effectiveness of PRP dressing.

Discussion

Chronic non-healing leg ulcers are difficult to treat and often result in prolonged healing, recurrent infection, and increased morbidity. Platelet-rich plasma (PRP), rich in growth factors, promotes angiogenesis and tissue regeneration. This study compared PRP with conventional dressing to evaluate differences in ulcer healing, reduction in ulcer size, and overall clinical outcomes.

Similarly, Wanniang N et al [8] reported faster ulcer size reduction with PRP, decreasing from approximately 8.4 cm² to 3.4 cm² compared with 6.9 cm² to 5.0 cm² in the conventional group. Likewise, Deshmukh NS et al [9] observed a

marked reduction in mean ulcer size from 3.07 cm² at baseline to 0.94 cm² at 8 weeks, confirming the superior effectiveness of PRP in wound healing.

Similarly, Unnithan P et al [10] reported significantly better granulation in the PRP group, with mean granulation scores improving to 4.1±0.9 and 2.3±0.8 at weeks 2 and 4 compared with 5.6±1.1 and 4.5±1.0 in controls ($p < 0.001$). Likewise, Dildar D et al [11] observed granulation increasing from 32% to 86% with PRP versus 10% to 20% in the conventional group ($p < 0.001$). Similarly, Sakaria AD et al [8] reported superior healing with PRP, where 56% of patients achieved >90% ulcer reduction and 20% showed 81–90% improvement. Likewise, Unnithan P et al [10] demonstrated significantly greater wound reduction with PRP, increasing from 20.3±5.4% at week 1 to 74.6±9.5% at week 4, compared with 11.2±4.1% to 45.3±7.1% in controls ($p < 0.001$). Similarly, Sakaria AD et al [8] reported faster healing with PRP, with ulcers healing as early as 4 weeks and a mean healing time of 7.1±2.1 weeks (≈49.7 days). Likewise, Du X et al [12] observed mean healing

times of 20.15 ± 2.16 days in the PRP group and 12.84 ± 1.08 days in the flap group ($p < 0.0001$), demonstrating significant differences in healing duration across treatment modalities.

Similarly, Wanniang N et al [8] reported superior outcomes with PRP, demonstrating greater ulcer area reduction (4.96 cm^2 vs 1.91 cm^2), higher percentage reduction (66.4% vs 28.6%), improved volume reduction, and lower diabetic foot infection scores ($p < 0.05$).

Likewise, WOŹNIAK W et al [13] found that PRP reduced bacterial load, showed antibacterial activity against *Staphylococcus aureus* and *Escherichia coli*, and enhanced overall wound healing outcomes.

Conclusion

This study concludes that platelet-rich plasma (PRP) dressing is more effective than conventional dressing for chronic non-healing leg ulcers.

PRP promoted faster ulcer size reduction, enhanced granulation tissue formation, earlier epithelialization, improved infection control, higher healing rates, and shorter healing time.

It also achieved better final outcomes with fewer complications, making PRP a safe and effective treatment modality.

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