

Efficacy of autologous platelet-rich plasma in reducing the surface area of chronic non-healing ulcers: A prospective observational study

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DOI: <https://doi.org/10.66856/ijssr.2026.8.3.8013>

Abstract

Background: Chronic non-healing ulcers are a major cause of morbidity and healthcare burden due to prolonged healing, recurrent infections, and reduced quality of life. Conventional wound care often fails to achieve satisfactory healing because of persistent inflammation and impaired tissue repair. Platelet-rich plasma (PRP), an autologous concentrate of platelets rich in growth factors, has emerged as a promising adjunctive therapy by promoting angiogenesis, collagen synthesis, and tissue regeneration. However, evidence regarding its effectiveness in chronic non-healing ulcers remains variable. Therefore, this study was undertaken to evaluate the efficacy of autologous PRP in reducing the surface area of chronic non-healing ulcers and promoting wound healing.

Methods: A prospective observational study was conducted at the Department of General Surgery, K H Patil Institute of Medical Sciences, Gadag, from March 2024 to March 2026. A total of 162 patients with chronic non-healing ulcers were included. Following clinical evaluation and wound debridement, autologous PRP was prepared using the double-centrifugation technique and applied topically at regular intervals. Ulcer surface area was measured at baseline and during follow-up over six weeks. The primary outcome was reduction in ulcer surface area, while secondary outcomes included complete ulcer healing and time to healing. Statistical significance was considered at $p < 0.05$.

Results: A significant reduction in mean ulcer surface area was observed throughout the six-week follow-up period ($p < 0.001$). Most patients demonstrated progressive wound contraction, with a substantial proportion achieving complete ulcer healing. Venous ulcers showed the highest healing rates, whereas trophic ulcers had the poorest response to treatment. No major adverse events related to PRP therapy were observed.

Conclusion: Topical autologous platelet-rich plasma is a safe, effective, and economical adjunct in the management of chronic non-healing ulcers. It significantly reduces ulcer surface area, accelerates wound healing, and may decrease the need for prolonged conventional wound care. PRP represents a valuable treatment option for appropriately selected patients with chronic non-healing ulcers.

Keywords: Platelet-rich plasma, chronic non-healing ulcer, wound healing, autologous prp, ulcer surface area, regenerative medicine

Introduction

Chronic non-healing ulcers are a significant surgical problem associated with prolonged morbidity, recurrent infections, and reduced quality of life. These wounds fail to progress through the normal stages of healing because of persistent inflammation, impaired angiogenesis, infection, and underlying conditions such as diabetes mellitus, chronic venous insufficiency, neuropathy, and trauma. Conventional treatment, including debridement, dressings, infection control, and optimization of systemic factors, often results in delayed healing and prolonged hospital care. ready to upload.pdf

Platelet-rich plasma (PRP) is an autologous concentrate of platelets containing growth factors such as platelet-derived growth factor (PDGF), vascular endothelial growth factor (VEGF), transforming growth factor-beta (TGF- β), epidermal growth factor (EGF), and fibroblast growth factor

(FGF). These bioactive molecules promote angiogenesis, fibroblast proliferation, collagen synthesis, granulation tissue formation, and epithelialization, thereby accelerating wound healing. Owing to its autologous nature, PRP is safe, cost-effective, and easy to prepare, making it an attractive adjunct in the management of chronic wounds. Despite encouraging results from previous studies, further evidence is required to establish its clinical efficacy across different etiologies of chronic ulcers. Therefore, this study was undertaken to evaluate the effectiveness of topical autologous PRP in the management of chronic non-healing ulcers.

Aim

To evaluate the efficacy of topical autologous platelet-rich plasma in the management of chronic non-healing ulcers.

Objectives

1. To assess the efficacy of autologous platelet-rich plasma in reducing the surface area of chronic non-healing ulcers.
2. To evaluate the rate and duration of ulcer healing following topical application of autologous platelet-rich plasma

Methods

- Study Design Prospective observational study.
- Study Setting Department of General Surgery, K H Patil Institute of Medical Sciences, Gadag, Karnataka, India.
- Study Duration: March 2024 to March 2026.
- Study Population: A total of 162 patients with chronic non-healing ulcers attending the General Surgery outpatient and inpatient departments were included in the study after obtaining informed written consent.

Inclusion Criteria

- Patients aged ≥ 18 years.
- Chronic non-healing ulcers of more than 4 weeks' duration.
- Patients willing to provide informed written consent.

Exclusion Criteria

- Malignant ulcers.
- Patients with active wound sepsis requiring emergency surgical intervention.
- Patients with bleeding disorders or receiving anticoagulant therapy.
- Patients with severe systemic illness or unwilling to participate.

Study Procedure

Following detailed clinical evaluation, ulcer etiology, duration, fasting blood sugar, and baseline ulcer surface area were recorded. Wounds were thoroughly debrided whenever necessary. Autologous platelet-rich plasma (PRP) was prepared using the double-centrifugation technique from the patient's venous blood and applied topically over the ulcer under aseptic precautions. Standard wound dressings were applied after PRP application. Patients were followed up weekly for six weeks, and ulcer surface area was measured at each visit to assess healing. ready to upload.pdf

Outcome Measures

The primary outcome was reduction in ulcer surface area over six weeks. Secondary outcomes included complete ulcer healing and time to complete healing.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using appropriate statistical software. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequencies and percentages. Changes in ulcer surface area over time were analyzed using appropriate statistical tests, and a p value <0.05 was considered statistically significant.

Methodology

A prospective observational study was conducted in the Department of General Surgery at K H Patil Institute of Medical Sciences, Gadag, from March 2024 to March 2026. A total of 162 patients with chronic non-healing ulcers meeting the inclusion criteria were enrolled. Following clinical evaluation and wound debridement, autologous

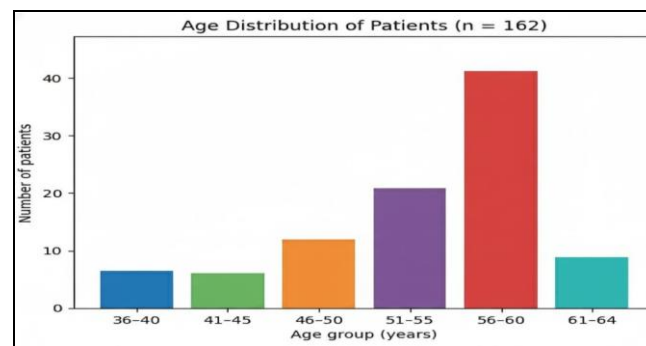
platelet-rich plasma was prepared using the double-centrifugation technique and applied topically at weekly intervals. Ulcer surface area was measured at baseline and during each follow-up visit for six weeks. The primary outcome was reduction in ulcer surface area, while secondary outcomes included complete ulcer healing and time to healing. Data were analyzed using appropriate statistical tests, and a p value <0.05 was considered statistically significant.

Results

Age Distribution of Patients

Age group (years)	Number of patients	Percentage (%)
36 – 40	14	8.6
41 – 45	22	13.6
46 – 50	34	21.0
51 – 55	38	23.5
56 – 60	32	19.8
61 – 64	22	13.6
Total	162	100

Mean $\pm$ SD: 51.06 $\pm$ 7.21 years



Graph: Age Distribution of Patients

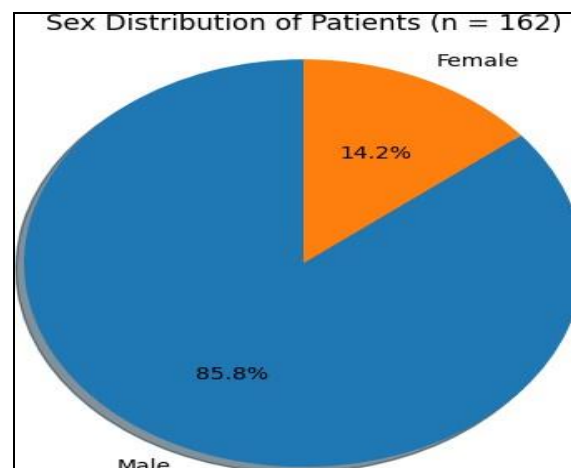
Age of the patients ranged from 36 to 64 years with mean age of 51.06 years (SD 7.21)

Gender Distribution of Patients Studied

Sex	Number of patients	Percentage (%)
Male	139	85.8
Female	23	14.2
Total	162	100

Gender Distribution of The Population Studied

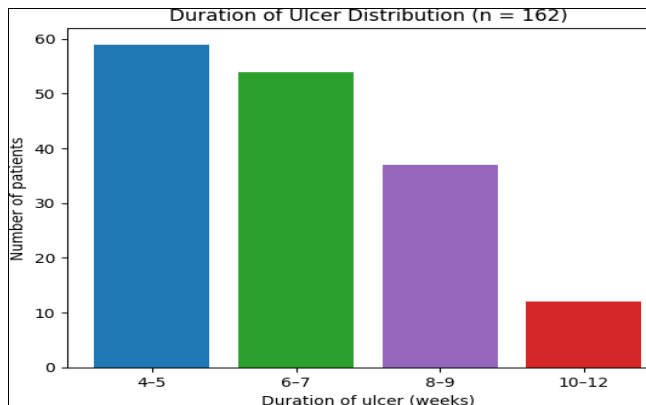
Out of 162 patients included in the study, 139 (85.8%) were males and 23 (14.2%) were females, showing a clear male predominance in incidence of chronic ulcers



Duration (Weeks) of Ulcer

Duration of ulcer (weeks)	Number of patients	Percentage (%)
4 – 5	59	36.4
6 – 7	54	33.3
8 – 9	37	22.8
10 – 12	12	7.5
Total	162	100

Mean $\pm$ SD: 6.56 ± 1.97

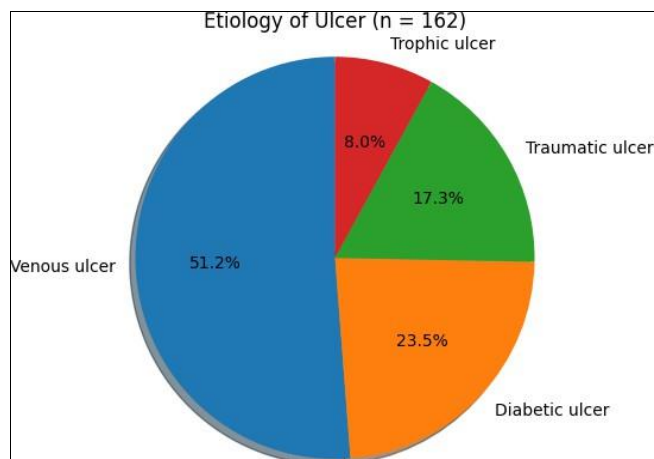


Duration of Weeks of Ulcer

The duration of ulcer among the study population ranged from 4 to 12 weeks, with a mean duration of 6.56 ± 1.97 weeks. Majority of the patients had ulcer duration of 4–5 weeks (36.4%), followed by 6–7 weeks (33.3%). Only 7.5% of patients had ulcer duration of more than 10 weeks.

Distribution of Aetiology Of Ulcer

Aetiology of ulcer	Number of ulcers	Percentage (%)
Venous ulcer	83	51.2
Diabetic ulcer	38	23.5
Traumatic ulcer	28	17.3
Trophic ulcer	13	8.0
Total	162	100



Aetiology of Ulcer

Venous ulcers were the most common aetiology in the present study, accounting for 83 cases (51.2%), followed by diabetic ulcers in 38 cases (23.5%). Traumatic ulcers accounted for 28 cases (17.3%), while trophic ulcers accounted for 13 cases (8.0%).

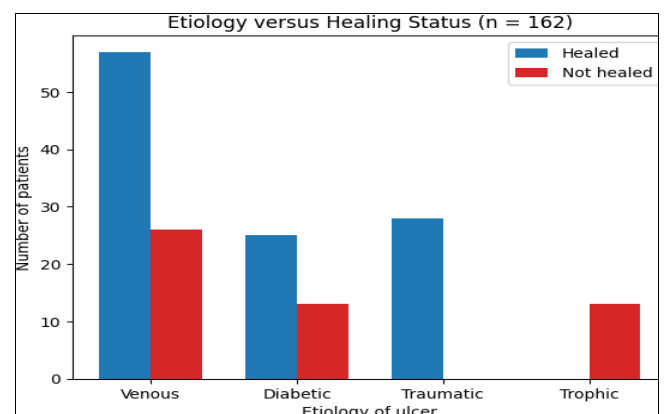
Distribution of Initial Platelet Count

Platelet count (lakhs/cu mm)	Number of patients	Percentage (%)
1 – 2	33	20.4
2 – 3	48	29.6
3 – 4	21	13.0
4 – 5	24	14.8
5 – 6	36	22.2
Total	162	100

Mean $\pm$ SD: 3.37 ± 1.49

Healing of Ulcer Based on Aetiology

Etiology of ulcer	Total ulcers	Healed n (%)	Not healed n (%)
Venous ulcer	83	57 (68.7%)	26 (31.3%)
Diabetic ulcer	38	25 (65.8%)	13 (34.2%)
Traumatic ulcer	28	28 (100%)	0 (0%)
Trophic ulcer	13	0 (0%)	13 (100%)
Total	162	110 (67.9%)	52 (32.1%)



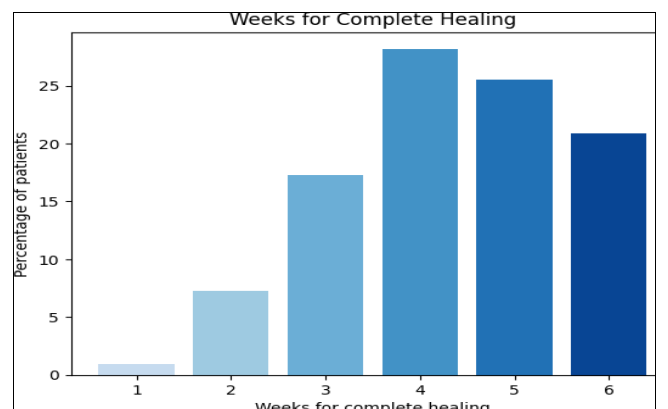
Healing of Ulcer Based on Aetiology

Healing outcome varied with the etiology of ulcer. All traumatic ulcers (100%) healed completely, while 68.7% of venous ulcers and 65.8% of diabetic ulcers showed complete healing. None of the trophic ulcers healed during the study period. Overall, 110 ulcers (67.9%) achieved complete healing, while 52 ulcers (32.1%) did not heal.

Weeks for Complete Healing

Weeks for complete healing	No. of patients	Percentage (%)
1	1	0.9
2	8	7.3
3	19	17.3
4	31	28.2
5	28	25.5
6	23	20.9
Total	110	100.0

Mean $\pm$ SD: 4.33 ± 1.24 weeks



Weeks for Complete Healing

Out of 110 healed ulcers, the majority achieved complete healing by the 4th week (28.2%), followed by the 5th week (25.5%) and 6th week (20.9%). The mean duration for complete healing was 4.33 ± 1.24 weeks

A total of 162 patients with chronic non-healing ulcers were included in the study. The mean age of the participants was 51.06 ± 7.21 years, with 139 (85.8%) males and 23 (14.2%) females. Venous ulcers were the most common etiology (51.2%), followed by diabetic (23.5%), traumatic (17.3%), and trophic ulcers (8.0%).

Topical autologous PRP resulted in significant improvement in wound healing, with an overall complete healing rate of 67.9%. Healing varied according to ulcer etiology, with 100% of traumatic ulcers, 68.7% of venous ulcers, and 65.8% of diabetic ulcers achieving complete healing, whereas no trophic ulcers healed completely during the study period.

Among the healed ulcers, 28.2% healed by the fourth week, 25.5% by the fifth week, and 20.9% by the sixth week, with a mean healing time of 4.33 ± 1.24 weeks. No major PRP-related adverse events were observed during the study.

Discussion

The present prospective observational study evaluated the efficacy of topical autologous platelet-rich plasma (PRP) in the management of chronic non-healing ulcers. The findings demonstrated that PRP significantly enhanced wound healing, with 67.9% of ulcers achieving complete healing during the six-week follow-up period. Traumatic ulcers showed the best response, followed by venous and diabetic ulcers, whereas trophic ulcers exhibited poor healing, likely due to persistent neuropathy and compromised vascularity. Most healed ulcers achieved complete healing between the fourth and sixth weeks, highlighting the ability of PRP to accelerate tissue repair.

The beneficial effects of PRP are attributed to its high concentration of growth factors, including PDGF, VEGF, TGF- β , and EGF, which promote angiogenesis, fibroblast proliferation, collagen synthesis, granulation tissue formation, and epithelialization. The findings of this study are consistent with previous reports by Suthar *et al.*, Huber *et al.*, and Sakaria *et al.*, all of whom demonstrated improved healing rates and faster wound closure with PRP therapy. These results support the role of autologous PRP as a safe, effective, and economical adjunct to conventional wound care in the treatment of chronic non-healing ulcers.

Conclusion

Topical autologous platelet-rich plasma is a safe, effective, and cost-effective adjunct in the management of chronic non-healing ulcers. PRP promotes faster wound healing, with the majority of ulcers achieving complete healing within six weeks, particularly traumatic, venous, and diabetic ulcers. Its autologous nature, ease of preparation, and favorable safety profile make it a promising therapeutic option in routine clinical practice. Further multicentric randomized controlled trials with larger sample sizes are recommended to establish standardized PRP treatment protocols and validate these findings.

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