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Original Research Article

A Clinical Study on the Role of Autologous Platelet Rich Plasma in Patients of Chronic Ulcer

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Abstract

Background: Chronic non-healing ulcers are a major clinical problem associated with prolonged morbidity, especially in patients with diabetes and vascular disorders. Conventional treatment often shows delayed healing. Autologous platelet-rich plasma (PRP), rich in growth factors, has emerged as a promising modality to enhance wound healing.

Aim: To evaluate the role of autologous platelet-rich plasma in the treatment of chronic ulcers.

Materials and Methods: This prospective observational study was conducted on 30 cases with chronic ulcers at a tertiary care center from April 2024 to October 2025. Cases aged >18 years with ulcer duration >4 weeks were included. PRP was prepared by double-spin centrifugation and applied weekly for up to 6 weeks. Cases were followed on days 1, 7, 15, 30, and 45. Outcome measures included ulcer size reduction, granulation tissue formation, pain score (VAS), wound discharge, and number of dressings.

Results: Most cases belonged to 31–50 years age group 14(46.7%) with male predominance 21(70.0%). Diabetic ulcers were most common 14(46.7%) and foot was the commonest site 16(53.3%). Mean ulcer size reduced significantly from 9.8 ± 2.4 cm^2 to 1.8 ± 1.2 cm^2 ($p < 0.001$). Granulation tissue increased from 6(20.0%) to 29(96.7%). Pain score reduced from 7.2 ± 1.1 to 1.3 ± 0.6. Majority of cases 18(60.0%) showed healing within 30 days. Complete healing was observed in 20(66.7%) cases with overall success rate of 96.7%.

Conclusion: Autologous PRP was found to be a safe, effective, and cost-efficient treatment modality for chronic ulcers, leading to faster wound healing, reduced pain, and improved clinical outcomes.

Keywords: Chronic Ulcer, Platelet-Rich Plasma, Wound Healing, Diabetic Ulcer, Granulation Tissue.

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Introduction

Chronic non-healing ulcers are persistent skin defects that fail to heal despite appropriate treatment, commonly affecting the lower limbs due to disruption in normal wound healing phases (hemostasis, inflammation, proliferation, remodeling). [1–3] The major types include venous, diabetic, pressure, and arterial ulcers, with venous ulcers contributing nearly 70% and diabetic foot ulcers being highly prevalent due to neuropathy and vascular compromise. [4,5] In India, chronic wounds affect about 4.5 per 1,000 population, posing a significant healthcare burden and often termed a "silent epidemic." [6]

Risk factors such as advanced age, diabetes, smoking, obesity, malnutrition, and vascular insufficiency impair healing. Clinically, these ulcers present with exudate, pain, malodor, and reduced mobility, significantly affecting quality of life and causing psychological distress. [7] Management focuses on wound care, infection control, debridement, systemic optimization, and advanced therapies like negative pressure wound therapy. [8] Recently, autologous platelet-rich plasma (PRP), a concentration of platelets 2–6 times baseline, has gained attention due to its ability to release growth factors (PDGF, TGF-β, VEGF, EGF, IGF-1) that enhance angiogenesis, fibroblast activity, and tissue repair. [9–12] PRP is considered a safe, cost-effective option with promising results, though further controlled studies are needed to confirm its efficacy. [13]

The present study was therefore undertaken to evaluate the role of autologous platelet-rich plasma in the treatment of chronic ulcers, with particular

emphasis on wound healing, the number of dressings required, and local effects following PRP administration. By assessing these parameters, the study aims to contribute to the growing evidence regarding the usefulness of autologous PRP as an adjunctive treatment modality for chronic non-healing ulcers.

Methodology

This prospective observational study was conducted from April 2024 to October 2025 at a tertiary care center, People's Hospital, PCMS & RC, and Bhopal. A total of 30 cases with chronic ulcers attending the Departments of General Surgery and Endocrinology were included after fulfilling the inclusion and exclusion criteria and providing informed written consent. Cases aged >18 years with ulcer duration >4 weeks and wound area <15 cm^2 were included, while those with platelet disorders, thrombocytopenia (<1.5 lakh/mm^3), pregnancy, critical illness, recent use of anticoagulants or steroids, gangrenous wounds, exposed vital structures, or unwillingness to participate were excluded. Detailed demographic data, comorbidities, and ulcer characteristics such as type, size, site, infection status, and pain were recorded. Autologous platelet-rich plasma (PRP) was prepared using the double-spin centrifugation method under aseptic precautions by collecting 10–20 ml of venous blood in anticoagulant (ACD). The first spin (1500 rpm for 15 minutes) separated red blood cells, followed by a second spin (3000 rpm for 10 minutes) to concentrate platelets.

The platelet-rich pellet was re-suspended in 2–3 ml plasma and applied immediately to the ulcer bed and margins once weekly under sterile conditions for up to 6 weeks or until complete healing. Cases were followed up on days 1, 7, 15, 30, and 45, and outcomes were assessed in terms of reduction in wound area, granulation tissue formation, epithelization, pain score, discharge, and number of dressings, with all findings recorded in a structured proforma for analysis.

Result

A total of 30 patients with chronic ulcers were evaluated. The majority belonged to the 31–50-year age group (14, 46.7%), followed by those aged >50 years (10, 33.3%) and 18–30 years (6, 20.0%). Males predominated (21, 70.0%) over females (9, 30.0%). Smoking was reported in 12 (40.0%) patients and alcohol consumption in 10 (33.3%). Diabetic ulcers were the most frequent ulcer type (14, 46.7%), followed by venous (8, 26.7%), traumatic (5, 16.7%), and trophic ulcers (3, 10.0%). The foot was the predominant anatomical site (16, 53.3%), followed by the leg (9, 30.0%), ankle (3, 10.0%), and other sites (2, 6.7%). At baseline, wound size was 5–10 cm^2 in 14 (46.7%) patients, while 8 (26.7%) each had wounds <5 cm^2 and 10–15 cm^2. (Table 1)

Progressive improvement in wound healing was observed during follow-up. Mean ulcer size decreased from 9.8 ± 2.4 cm^2 on Day 1 to 1.8 ± 1.2 cm^2 on Day 45 ($p<0.001$).

Healthy granulation tissue increased from 6 (20.0%) patients at baseline to 29 (96.7%) by Day 45. Mean VAS pain score decreased significantly from 7.2 ± 1.1 to 1.3 ± 0.6 ($p<0.001$), while wound discharge, assessed by soaked gauze requirement, declined from 4.6 ± 1.2 to 0.5 ± 0.3 over the same period.

The mean number of dressings required decreased from 6.8 ± 1.4 during days 1–15 to 4.2 ± 1.1 during days 15–30 and 2.1 ± 0.7 during days 30–45. Wound reduction within ≤30 days was observed in 18 (60.0%) patients, whereas 10 (33.3%) required 31–45 days and 2 (6.7%) required >45 days. Complete healing was achieved in 20 (66.7%) patients, partial healing in 9 (30.0%), and poor response in 1 (3.3%).

Overall, autologous PRP administration was associated with progressive wound contraction, granulation, pain reduction, decreased discharge, and reduced dressing requirements. (Table2 & Table3)

Table 1: Demographic and Clinical Profile (n = 30)

Variable	Category	Frequency	Percentage (%)
Age Group	18–30 years	6	20.0
	31–50 years	14	46.7
	>50 years	10	33.3
Gender	Male	21	70.0
	Female	9	30.0
Smoking	Yes	12	40.0
	No	18	60.0
Alcohol	Yes	10	33.3
	No	20	66.7
Type of Ulcer	Diabetic	14	46.7
	Venous	8	26.7

	Traumatic	5	16.7
	Trophic	3	10.0
Site of Ulcer	Foot	16	53.3
	Leg	9	30.0
	Ankle	3	10.0
	Other	2	6.7
Baseline Wound Size	<5 cm²	8	26.7
	5–10 cm²	14	46.7
	10–15 cm²	8	26.7

Table 2: Wound Healing Progress over Follow-up

Parameter	Day 1	Day 7	Day 15	Day 30	Day 45	p-value
Mean Ulcer Size (cm²) (Mean ± SD)	9.8 ± 2.4	8.1 ± 2.1	6.2 ± 1.9	3.9 ± 1.6	1.8 ± 1.2	<0.001
Granulation Tissue n (%)	6 (20.0)	14 (46.7)	22(73.3)	26 (86.7)	29 (96.7)	
Pain Score (VAS) (Mean ± SD)	7.2 ± 1.1	5.8 ± 1.0	4.3 ± 0.9	2.6 ± 0.8	1.3 ± 0.6	<0.001
Wound Discharge (Gauze)	4.6 ± 1.2	3.5 ± 1.0	2.4 ± 0.8	1.3 ± 0.6	0.5 ± 0.3	

Table 3: Treatment Outcome and Healing Pattern

Variable	Category	Mean Number of Dressings ± SD	
Dressings Required	0–15 days	6.8 ± 1.4	
	15–30 days	4.2 ± 1.1	
	30–45 days	2.1 ± 0.7	
Variable	**Category**	**Frequency**	**Percentage (%)**
Healing Time	≤30 days	18	60.0
	31–45 days	10	33.3
	>45 days	2	6.7
Treatment Outcome	Complete healing	20	66.7
	Partial healing	9	30.0
	Poor response	1	3.3

Discussion

Chronic non-healing ulcers remain a challenging clinical problem because of prolonged healing, recurrent infection, impaired mobility, and increased healthcare burden. In the present study, most patients were aged 31–50 years (46.7%), followed by >50 years (33.3%), with male predominance (70.0%). Diabetic ulcers were the most frequent type (46.7%), and the foot was the most commonly involved site (53.3%), emphasizing the importance of metabolic and vascular factors in chronic lower-extremity wounds.

A significant improvement in wound healing was observed following autologous PRP therapy. Mean ulcer size decreased progressively from 9.8 ± 2.4 cm² on Day 1 to 1.8 ± 1.2 cm² on Day 45 ($p<0.001$). This finding is consistent with Suthar et al., who reported progressive wound healing in 24 patients with chronic non-healing ulcers treated with autologous PRP, with a mean healing time of 8.2 weeks. [5] Sarvajnamurthy et al. similarly demonstrated significant improvement in ulcer area and volume among 17 patients with chronic venous ulcers treated with PRP. [6] Healthy granulation tissue increased markedly from 6 (20.0%) patients at baseline to 29 (96.7%) by Day 45. This improvement may be attributed to the release of platelet-derived growth factors, including platelet-derived growth factor, transforming growth factor-β, vascular endothelial growth factor, epidermal growth factor, and insulin-like growth factor-1. These mediators promote angiogenesis, fibroblast proliferation, collagen synthesis, extracellular matrix formation, epithelialization, and tissue remodeling. [1,10,11] The marked granulation response observed in the present study is consistent with the favorable wound-healing outcomes reported by Rao and Fathima [14] and Suryanarayan et al. [15] Pain also decreased significantly, with mean VAS scores declining from 7.2 ± 1.1 to 1.3 ± 0.6 ($p<0.001$). Similarly, wound discharge decreased from 4.6 ± 1.2 to 0.5 ± 0.3, accompanied by a progressive reduction in dressing requirements. The mean number of dressings decreased from 6.8 ± 1.4 during days 1–15 to 2.1 ± 0.7 during days 30–45, suggesting progressive wound stabilization and reduced treatment burden. Overall, 60.0% of patients demonstrated significant wound reduction within 30 days, while complete healing occurred in 66.7%

and partial healing in 30.0%, giving an overall favorable response of 96.7%. These findings are comparable with previous reports demonstrating beneficial effects of PRP in chronic ulcers. [5, 6, 13, 16, 17] Tsachiridi et al. also reported improved healing outcomes with autologous PRP compared with conventional treatment, supporting its potential role as an adjunctive therapy for non-healing ulcers. [12] Bishnoi et al. [17], in a comparative study of autologous PRP and conventional dressing, also reported favorable outcomes with PRP, supporting its potential advantage over conventional wound care. Sakaria and Alva [16] likewise described PRP as a promising therapeutic option for chronic wounds.

The favorable outcomes observed in the present study suggest that autologous PRP may enhance multiple stages of wound repair through its concentrated growth factors and regenerative effects. However, the relatively small sample size and lack of a control group are important limitations. Larger randomized controlled trials with standardized PRP preparation protocols and longer follow-up are required to establish its efficacy and long-term benefits.

Conclusion

Autologous platelet-rich plasma was associated with significant improvement in wound healing, granulation tissue formation, pain, wound discharge, and dressing requirements in patients with chronic non-healing ulcers. PRP appears to be a promising, safe, and effective adjunctive therapy for accelerating ulcer healing and improving clinical outcomes.

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