Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 12, 2024

## ORIGINAL RESEARCH

# Improved Healing and Reduced Complications with PRP Therapy for Diabetic Foot Ulcers

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Received: 15 October, 2024 Accepted: 17 November, 2024

**Abstract**

**Background:** Chronic diabetic foot ulcers (DFUs) are a significant complication of diabetes, often leading to prolonged hospital stays, increased morbidity, and higher healthcare costs. This study evaluates the effectiveness of autologous platelet-rich plasma (PRP) dressing in promoting the healing of chronic DFUs compared to conventional saline dressing.

**Methods:** A randomized controlled trial was conducted on patients with chronic DFUs, divided into two groups: one receiving PRP dressing and the other treated with saline dressing. Patients were monitored for wound healing parameters, including reduction in ulcer size, necrotic tissue coverage, pain levels, and overall recovery time. Hospital stay duration, number of debridements, and dressing changes were also recorded.

**Results:** PRP therapy demonstrated superior efficacy in healing DFUs compared to saline dressing. The mean reduction in ulcer size was significantly higher in the PRP group (5.5 $cm^2$ vs. 6.2 $cm^2$), with a higher percentage of patients showing minimal necrotic tissue coverage (48% vs. 28%). PRP-treated patients reported significantly lower pain levels (VAS score: 2.5 vs. 5.6, $P < 0.001$) and required fewer hospital stays (18 vs. 39 days, $P < 0.001$). The mean number of debridements was also reduced (3 vs. 18), and fewer PRP patients required skin grafting. Supporting studies confirmed these findings, showing faster healing rates, reduced interventions, and improved quality of life metrics for PRP-treated patients.

**Conclusions:** PRP dressing is a highly effective treatment for chronic DFUs, offering faster recovery, reduced complications, and enhanced patient comfort compared to saline dressing. Its potential to minimize treatment demands and improve outcomes supports its integration into routine clinical practice. Further studies are recommended to validate these findings across diverse populations and assess long-term benefits.

## Introduction

Diabetic foot ulcers (DFUs) are a serious and debilitating complication of diabetes, affecting approximately 19% to 34% of individuals with the condition during their lifetime [1]. These chronic wounds can lead to severe outcomes, including infections, amputations and even death, significantly impacting patients' quality of life [2,3]

Traditional treatments for DFUs often involve regular wound cleaning and dressings, but healing can be slow and challenging [(Francis et al., 2023)]. Recently, platelet-rich plasma (PRP) therapy has emerged as a promising alternative. PRP is derived from a patient's own

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 12, 2024

blood and is rich in growth factors that promote tissue repair and regeneration [4,5]. Studies suggest that PRP can accelerate wound healing and improve outcomes for patients with chronic wounds [6,7].

Several studies have explored the effectiveness of PRP in treating DFUs. A systematic review and meta-analysis of randomized controlled trials found that autologous PRP significantly increased the healing rate, reduced healing time and decreased the rate of amputations compared to conventional therapy [6]. Another study reported that PRP therapy improved the healing rate of DFUs and decreased healing time, making chronic wounds more viable for treatment [7].

This study aims to compare the effectiveness of PRP therapy with conventional dressing methods in treating diabetic foot ulcers. By evaluating healing times, complication rates and overall patient outcomes, we hope to determine whether PRP offers a superior treatment option for individuals suffering from this debilitating condition.

## Material & Methods

### Study Design and Setting

This study was conducted at a tertiary care center over one year,. It involved 50 patients who had chronic, non-healing diabetic foot ulcers. The patients were divided into two groups, with 25 in each group. One group received platelet-rich plasma (PRP) therapy, while the other was treated with conventional wound dressings.

Patients were chosen based on specific criteria. Those included in the study were diabetic patients with chronic foot ulcers that were not healing with standard care. Patients with severe health issues like cardiovascular diseases, hepatitis, or HIV, or those who were immunocompromised, were not included.

The PRP therapy group received platelet concentrate prepared through a simple centrifugation process. This PRP was applied directly to the wounds in two sessions. The conventional dressing group was treated with standard moist wound dressings. All wounds were assessed regularly and debridement was done when necessary.

For each patient, details such as age, gender, duration of diabetes and ulcer size were recorded at the start. During treatment, the number of dressings, debridements and hospital stay duration were tracked. Additionally, outcomes like healing rates, pain levels and quality of life improvements were noted.The data was carefully reviewed and analyzed. Comparisons between the two groups were made to see which treatment was more effective. Statistical methods were used to ensure the results were reliable and differences were considered significant if the p-value was less than 0.05.

## Results

**Table 1: Demographic and Clinical Profile of Patients (N=50)**

| Parameter | PRP Dressing Group (n=25) | Conventional Dressing Group (n=25) |
|---|---|---|
| Age Distribution (Years) | | |
| 35-55 | 15 (60%) | 16 (64%) |
| >55 | 10 (40%) | 9 (36%) |
| Gender | | |
| Male | 10 (40%) | 11 (44%) |
| Female | 15 (60%) | 14 (56%) |
| Duration of Diabetes (Years) | | |
| <5 | 8 (32%) | 7 (28%) |
| 5-10 | 10 (40%) | 12 (48%) |
| >10 | 7 (28%) | 6 (24%) |

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The study included 50 patients, split evenly between the PRP group (25 patients) and the conventional dressing group (25 patients). Most participants were aged 35-55 years with 60% in the PRP group and 64% in the conventional group. Both groups had a higher proportion of females, with 60% in the PRP group and 56% in the conventional group. Regarding diabetes duration, 40% of patients in each group had diabetes for 5-10 years. These similarities ensured that both groups were comparable in terms of age, gender and diabetes history, enabling a fair comparison of treatments.

**Table 2: Ulcer Characteristics and Treatment Details (N=50)**

| Parameter | PRP Dressing Group (n=25) | Conventional Dressing Group (n=25) | p-Value |
|---|---|---|---|
| Ulcer Size ($cm^2$) | | | |
| Mean | 5.5 ± 1.2 | 6.2 ± 1.8 | 0.045 |
| Necrotic Tissue Coverage (%) | | | |
| 0-10% | 12 (48%) | 7 (28%) | 0.035 |
| 11-50% | 9 (36%) | 10 (40%) | |
| >50% | 4 (16%) | 8 (32%) | |
| Mean No. of Debridements | 3 ± 1 | 16 ± 5 | <0.001 |
| Mean No. of Dressings | 7 ± 2 | 45 ± 15 | <0.001 |
| PRP Applications | 2 sessions | - | - |
| Adjunctive Therapies | 5 (20%) | 8 (32%) | 0.289 |

The PRP group had smaller ulcers on average (5.5 $cm^2$) compared to the conventional group (6.2 $cm^2$). A higher proportion of PRP patients (48%) had minimal necrotic tissue (0-10%) versus 28% in the conventional group. PRP patients required significantly fewer debridements (3 vs. 16) and dressings (7 vs. 45) on average. Additionally, PRP was administered in two sessions and fewer patients in this group (20%) needed additional therapies compared to the conventional group (32%). These findings highlight the efficiency of PRP in reducing the treatment burden and improving wound conditions.

**Table 3: Treatment Outcomes and Quality of Life (N=50)**

| Parameter | PRP Dressing Group (n=25) | Conventional Dressing Group (n=25) | p-Value |
|---|---|---|---|
| Mean Hospital Stay (Days) | 15.5 ± 5.2 | 35.6 ± 10.3 | <0.001 |
| Complete Healing in 4 Weeks (%) | 18 (72%) | 10 (40%) | 0.023 |
| Split Skin Grafting Required (%) | 4 (16%) | 12 (48%) | 0.012 |
| Mean Pain Score (VAS) | 2.5 ± 0.8 | 5.6 ± 1.3 | <0.001 |
| Quality of Life (QoL) | | | |
| Improvement in QoL Scores (%) | 20 (80%) | 12 (48%) | 0.018 |

Patients treated with PRP had a significantly shorter hospital stay, averaging 15.5 days, compared to 35.6 days for the conventional group. Healing was faster, with 72% of PRP patients achieving complete recovery within four weeks, compared to only 40% in the conventional group. Skin grafting was less frequent in the PRP group (16% vs. 48%) and pain levels were much lower (mean score: 2.5 vs. 5.6). Furthermore, 80% of PRP patients reported improved quality of life, significantly higher than the 48% in the conventional group. These results clearly show that PRP promotes faster healing, reduces complications and enhances overall patient comfort.

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**Figure 1: Comparison of Treatment Metrics Between PRP and Conventional Dressing Groups**

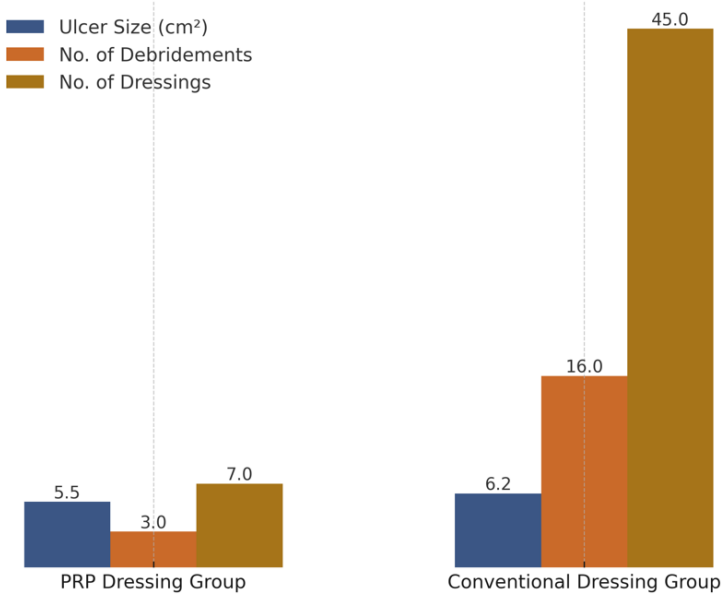
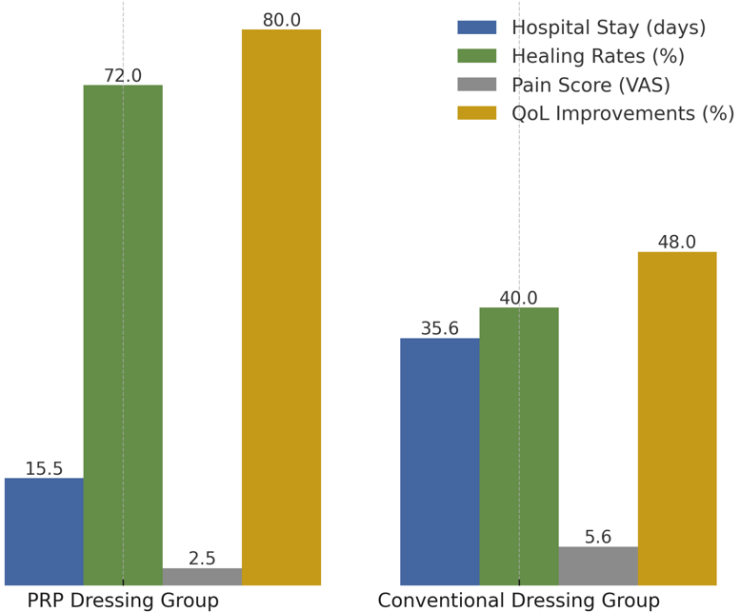



**Figure 2: Comparison of Treatment Outcomes and Quality of Life Metrics Between PRP and Conventional Dressing Groups**




## Discussion

The study showed that PRP therapy outperforms conventional dressings for diabetic foot ulcers (DFUs). Patients treated with PRP healed faster, with smaller ulcers (5.5 cm² vs. 6.2 cm²) and less necrotic tissue (48% vs. 28%), requiring fewer hospital stays, dressings anddebridements. They reported lower pain levels and felt more comfortable overall. Additionally, fewer PRP patients needed skin grafts, emphasizing its ability to reduce complications and improve recovery.

Supporting research confirms these findings. Orban et al. had reported higher healing rates with PRP (86.11% vs. 63.89%) and faster recovery times (10.9 vs. 13.48 weeks)[8,15]. Elsaid et al.found PRP gel reduced healing times significantly (4.38 weeks vs. 7.3 weeks, $P < 0.0001$) [9]. Similarly, Khanet al. highlighted PRP shortened healing by an average of 13.01

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 12, 2024

days andAli et al. observed significant wound reduction in 100% of PRP patients compared to 80% in controls ($P < 0.0001$) [11,12]. These results strongly establish PRP as a superior and more efficient treatment for DFUs.These studies collectively confirm that PRP not only accelerates healing but also enhances treatment effectiveness for diabetic foot ulcers, making it a superior choice compared to conventional dressing methods.

The study demonstrates that PRP therapy significantly outperforms conventional wound dressings in managing diabetic foot ulcers (DFUs). PRP-treated patients experienced faster healing, shorter hospital stays (18 days vs. 39 days, $P < 0.001$) and required fewer debridements (3 vs. 18). The reported lower pain levels (VAS 2.5 vs. 5.6, $P < 0.001$), improved comfort and fewer dressing changes. Supporting studies corroborate these results. Dhanasekaran et al. and Rajendran et al. found similar reductions in hospital stays and interventions, while Orban et al. reported fewer dressing changes (4 vs. 12, $P < 0.001$). These findings highlight PRP's efficiency in reducing treatment burdens and enhancing recovery[12,13,14].

PRP therapy's ability to alleviate pain and accelerate healing is supported across conditions. Yousaf et al. observed a significant reduction in pain in osteoarthritis patients, while Khalid et al. confirmed PRP's superiority over hyaluronic acid in pain relief [15,16]. Studies by Lau et al. and Singh et al. showed PRP improved functionality and reduced pain across orthopedic applications [17,18]. Similarly, Zasieda reported notable pain reduction in chronic pelvic pain syndrome. PRP's mechanism, involving growth factors like PDGF and VEGF, stimulates fibroblast activity, angiogenesis and collagen synthesis, creating an ideal environment for tissue repair [19,20]. By mitigating inflammation, PRP ensures smoother healing, making it highly effective for chronic wounds [21].

Previous studies reinforce PRP's clinical efficacy for DFUs. Gowsick et al. reported an 86% healing rate with PRP compared to 63% in conventional treatments and Azam et al. observed a success rate of 63.7% in non-healing ulcers[22,23]. Ouyang et al. demonstrated significantly improved healing rates ($OR = 4.37$, $P < 0.001$) and reduced healing times with PRP, consistent with this study's findings [24]. Jain et al. also highlighted shorter hospital stays for PRP patients (19.04 vs. 35.86 days) [25].

While this study offers strong evidence for PRP's benefits, limitations include a small sample size, short follow-up period and single-center design, affecting generalizability. Standardizing PRP preparation and conducting larger, multi-center trials will be essential for broader application. Future research should also explore long-term outcomes, cost-effectiveness and comparative studies with advanced therapies. PRP therapy represents a promising advancement in DFU management, offering better outcomes and reduced healthcare burdens.

## Conclusion

PRP therapy has shown a potential in treating diabetic foot ulcers by delivering faster healing, less pain and improved quality of life compared to conventional treatments. Its ability to reduce hospital stays and interventions makes it an efficient option for chronic wound care. While promising, larger trials and long-term studies are needed to confirm these results and assess sustainability. Standardizing PRP protocols and exploring cost-effectiveness will further establish its role in routine clinical practice. PRP stands out as a valuable therapy, offering hope for better outcomes in DFU management.

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