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Original Research

Evaluating The Efficacy Of Platelet Rich Fibrin (PRF) In The Management Of Trophic Ulcers Of Leprosy. A Study.

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Abstract
Background: Trophic ulcers in leprosy patients pose a significant challenge to effective wound management due to impaired healing mechanisms and chronic inflammation. Platelet-Rich Fibrin (PRF), a biomaterial derived from autologous blood, has shown potential in enhancing wound healing. This study evaluates the efficacy of PRF in the management of trophic ulcers associated with leprosy. **Materials and Methods:** A prospective, interventional study was conducted on 50 leprosy patients with trophic ulcers, randomly divided into two groups: Group A (PRF-treated) and Group B (standard care). PRF was prepared using centrifugation of venous blood and applied directly to ulcers in Group A, while Group B received saline dressings and conventional wound care. Wound size, depth, exudate level, and healing rate were assessed at baseline, 4 weeks, and 8 weeks. Statistical analysis was performed using paired t-tests and chi-square tests. **Results:** The mean wound size reduction in Group A was 45% at 4 weeks and 72% at 8 weeks, significantly higher than Group B, which showed a reduction of 20% and 38% at the same intervals ($p < 0.05$). Complete healing was observed in 60% of ulcers in Group A by 8 weeks, compared to 30% in Group B. PRF application also reduced exudate levels and enhanced granulation tissue formation, with patient-reported pain scores significantly lower in the PRF group (mean reduction: 3.2 vs. 1.5; $p < 0.01$). **Conclusion:** PRF demonstrates significant potential in accelerating healing and improving outcomes in trophic ulcers of leprosy patients. Its autologous nature and cost-effectiveness make it a viable alternative to conventional wound management strategies. Further research with larger sample sizes is recommended to validate these findings.
Keywords: Platelet-Rich Fibrin, trophic ulcers, leprosy, wound healing, regenerative medicine, chronic ulcers

Introduction

Trophic ulcers are a common and debilitating complication in patients with leprosy, resulting from sensory loss, autonomic dysfunction, and secondary infections (1). These chronic ulcers often resist conventional treatment approaches, including saline dressings and topical antibiotics, leading to prolonged morbidity and decreased quality of life (2). Effective wound healing in such cases requires an innovative approach that addresses underlying deficiencies in growth factors and tissue regeneration.

Platelet-Rich Fibrin (PRF), a second-generation platelet concentrate, has emerged as a promising tool for enhancing tissue repair due to its ability to release growth factors, such as vascular endothelial growth factor (VEGF) and platelet-derived growth factor (PDGF), over an extended period (3). Unlike earlier platelet concentrates, PRF is obtained without anticoagulants, resulting in a fibrin matrix rich in leukocytes, platelets, and growth factors that can support angiogenesis, collagen deposition, and epithelialization (4).

Previous studies have demonstrated the efficacy of PRF in managing various chronic wounds, including diabetic foot ulcers and pressure sores, but limited data exist regarding its application in trophic ulcers of leprosy (5,6). This study evaluates the clinical efficacy of PRF in the management of trophic ulcers among leprosy patients, aiming to provide an

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evidence-based approach to improving outcomes in this population.

Materials and Methods

Study Design: This was a prospective, interventional study conducted at a tertiary care center specializing in leprosy management over a period of 12 months.

Study Population: The study enrolled 50 patients with diagnosed leprosy who presented with trophic ulcers. Inclusion criteria included ulcers with a duration of at least 4 weeks, absence of active systemic infections, and normal coagulation profiles. Exclusion criteria included patients with uncontrolled diabetes, malignancies, or immunosuppressive conditions.

Randomization and Group Allocation

Patients were randomly divided into two groups:

- **Group A (PRF Group):** 25 patients received PRF applications.
- **Group B (Control Group):** 25 patients received standard wound care with saline dressings. Randomization was performed using computer-generated numbers.

Preparation of Platelet-Rich Fibrin (PRF)

PRF was prepared according to the protocol described by Choukroun et al. (1). Ten milliliters of venous blood was collected in sterile, plain test tubes without anticoagulants and immediately centrifuged at 3,000 rpm for 10 minutes. The resultant PRF clot was separated from the red blood cells and used directly for application.

Application Procedure: In Group A, the PRF clot was applied directly to the ulcer bed after thorough debridement. The ulcer was then covered with a sterile non-adherent dressing and bandaged. This procedure was repeated weekly for 8 weeks. In Group B, after debridement, ulcers were dressed with sterile saline-soaked gauze and bandaged. Dressings were changed every two days, following standard wound care protocols.

Outcome Measures

The following parameters were recorded at baseline, 4 weeks, and 8 weeks:

1. **Wound Size Reduction:** Measured in square centimeters using planimetry.
2. **Depth Reduction:** Measured with sterile probes.
3. **Granulation Tissue Formation:** Scored on a 4-point scale (0 = none, 3 = excellent).
4. **Exudate Level:** Assessed using a 5-point scale (0 = dry, 4 = severe).
5. **Pain Reduction:** Assessed using a Visual Analog Scale (VAS) from 0 (no pain) to 10 (worst pain).

Statistical Analysis: Data were analyzed using SPSS software version 25. Descriptive statistics were used to summarize baseline characteristics. The paired t-test and Wilcoxon signed-rank test were used for within-group comparisons, and independent t-tests were applied for between-group comparisons. A p-value of <0.05 was considered statistically significant.

Results

The study included 50 patients with trophic ulcers secondary to leprosy, divided equally into two groups. The baseline characteristics were comparable between Group A (PRF group) and Group B (control group), with no statistically significant differences ($p > 0.05$).

Table 1: Baseline Characteristics of Study Participants

Characteristic	Group A (PRF)	Group B (Control)	p-value
Mean Age (years)	46.5 ± 8.2	47.1 ± 7.8	0.72
Male-to-Female Ratio	16:9	17:8	0.81
Mean Ulcer Size (cm^2)	6.8 ± 1.5	7.0 ± 1.7	0.65
Mean Ulcer Duration (weeks)	12.5 ± 3.2	12.7 ± 3.1	0.87

Wound Healing Outcomes: Group A showed significantly greater wound size reduction compared to Group B over 8 weeks ($p < 0.01$). Similarly, depth reduction, granulation tissue formation, and pain reduction were significantly improved in the PRF group.

Table 2: Wound Healing Parameters

Parameter	Timepoint	Group A (PRF)	Group B (Control)	p-value
Wound Size Reduction (cm^2)	4 weeks	3.1 ± 0.9 (45%)	1.4 ± 0.6 (20%)	<0.01
	8 weeks	4.9 ± 1.1 (72%)	2.7 ± 0.8 (38%)	<0.01
Depth Reduction (cm)	4 weeks	1.1 ± 0.3	0.5 ± 0.2	<0.01
	8 weeks	1.9 ± 0.4	1.1 ± 0.3	<0.01
Granulation Score	4 weeks	2.5 ± 0.6	1.3 ± 0.4	<0.01
	8 weeks	3.0 ± 0.5	2.0 ± 0.6	<0.01
Exudate Score	4 weeks	1.5 ± 0.4	2.3 ± 0.5	<0.01
	8 weeks	0.8 ± 0.3	1.9 ± 0.4	<0.01

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Pain (VAS Score)	4 weeks	4.2 ± 1.1	6.5 ± 1.3	<0.01
	8 weeks	2.1 ± 0.8	4.8 ± 1.2	<0.01

Healing Outcomes: Complete ulcer healing was achieved in 60% of patients in Group A by 8 weeks, compared to 30% in Group B (p = 0.03).

Table 3: Complete Healing Rates

Group	4 weeks (%)	8 weeks (%)	p-value
Group A (PRF)	25	60	0.03
Group B (Control)	10	30	0.03

Adverse Events: No significant adverse events were observed in either group, confirming the safety of PRF application.

Discussion

This study highlights the significant potential of Platelet-Rich Fibrin (PRF) in enhancing wound healing among leprosy patients with trophic ulcers. The findings demonstrate that PRF application resulted in superior wound size reduction, depth reduction, and granulation tissue formation compared to conventional saline dressings. These outcomes align with previous research on the efficacy of PRF in chronic wounds, such as diabetic foot ulcers and venous leg ulcers, where it has shown accelerated healing and improved tissue regeneration (1,2).

Mechanisms of PRF in Wound Healing: The observed improvements in the PRF group can be attributed to its unique biological properties. PRF provides a fibrin matrix that acts as a scaffold for cell migration and supports the sustained release of growth factors, including vascular endothelial growth factor (VEGF) and platelet-derived growth factor (PDGF). These factors are critical for angiogenesis, fibroblast proliferation, and extracellular matrix remodeling (3). Furthermore, the leukocyte content in PRF contributes to anti-inflammatory effects and reduces infection risks, which are particularly beneficial in trophic ulcers where secondary infections are common (4).

Comparison with Previous Studies: The healing outcomes in this study are consistent with earlier reports. Ahmed et al. (5) demonstrated a significant reduction in wound size and pain scores in diabetic foot ulcers treated with PRF, findings that mirror the improvements observed in the present study. Additionally, a study by Miron et al. (6) emphasized the role of PRF in enhancing granulation tissue formation, corroborating the higher granulation scores recorded in our PRF group.

However, the complete healing rate of 60% in the PRF group at 8 weeks is slightly lower than the rates reported in diabetic wound studies, which could be attributed to the unique challenges associated with leprosy ulcers. These ulcers are often complicated by sensory neuropathy, delayed presentation, and recurrent trauma, factors that may prolong the healing process (7,8).

Clinical Implications: The clinical implications of this study are significant, particularly for resource-constrained settings where advanced wound care technologies may not be readily accessible. PRF is cost-effective and can be prepared using simple centrifugation techniques, making it a viable alternative to expensive wound healing therapies. Additionally, its autologous nature minimizes the risk of immune reactions, ensuring safety and patient compliance.

Limitations and Future Directions: Despite its promising findings, this study has limitations. The sample size was relatively small, and the follow-up period was limited to 8 weeks. Future studies should consider larger cohorts and longer follow-up periods to assess the durability of healing and recurrence rates. Moreover, comparative studies evaluating PRF against other advanced wound care modalities, such as vacuum-assisted closure (VAC) or bioengineered skin substitutes, are warranted to establish its relative efficacy.

Conclusion

PRF is a safe, effective, and economical option for managing trophic ulcers in leprosy patients. It significantly enhances wound healing by promoting granulation tissue formation and reducing ulcer size and pain. Incorporating PRF into routine wound care protocols has the potential to improve outcomes and quality of life for patients with chronic ulcers.

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