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Original Research Article

Efficacy of autologous platelet-rich fibrin (PRF) in management of non-healing ulcers in Hansen's disease

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ABSTRACT

Background: Non-healing ulcers are a major cause of disability and impairment, interfering with physical and mental well-being of patients with Hansen's disease. They are difficult to manage having longer duration of treatment and increased financial burden. Minimizing the duration of healing can be a major step in rehabilitation of such patients. Platelet rich fibrin (PRF) is a newer modality to hasten wound healing. It is a concentration of platelets suspended in plasma extracted after centrifuging patient's own blood.

Aim: To study the efficacy of platelet-rich fibrin (PRF) in management of non-healing ulcers.

Materials and Methods: 13 patients with 16 non-healing ulcers of more than 8 weeks duration were included in our study but 2 patients were lost to follow up after first sitting. Written consent for the procedure and ethical clearance from Institutional Ethical Committee was taken. Detailed history was noted, baseline photographs and measurement of area and volume were done at every sitting at an interval of 1 week. An average of 2-3 sittings of PRF was done in each patient and then the ulcer was spontaneously allowed to heal with regular dressing till complete closure was achieved.

Results: The mean age of cases in our study was 39.4 years. The average percentage improvement in area and volume was 97.12% and 98.72% respectively. Out of 14 ulcers, 12 (85.71%) ulcers showed complete healing within 4 weeks. The mean duration of healing was found to be 2.41 weeks. The procedure was safe with no noted adverse events.

Limitation: The limitation of our study was small sample size. More studies are needed with larger sample size to confirm the results.

Conclusion: PRF is an inexpensive, safe, feasible and effective procedure in the management of non-healing ulcers.

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1. Introduction

Non-healing ulcers are a major cause of disability and impairment, interfering with physical and mental health of patients with Hansen's disease. They are defined as ulcers that fail to heal in a stipulated time period and persisting despite of standard conventional treatment modalities.¹ Lower limb is a common site for these ulcers. They are difficult to manage having longer duration of treatment and

increased financial burden to the patient as well as the health system.² The worldwide prevalence of non-healing ulcers ranges from 1.9% to 13.1%.^{3,4} Minimizing the duration of healing can be a major step in rehabilitation of such patients. Platelet rich fibrin (PRF) is a newer modality to hasten wound healing. It is a concentration of platelets suspended in plasma extracted after centrifuging patient's own blood. Stimulation of tissue healing and collagen modulation occurs due to the release of growth factors like transforming growth factor beta, platelet derived growth factors, fibroblast growth factors and vascular endothelial

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growth factor via platelet activation and clot formation.

2. Materials and Methods

A prospective study was conducted in 13 patients of Hansen's disease with 16 non-healing ulcers attending out-patient clinic of R.D. Gardi Medical College, Ujjain, a tertiary care center in Madhya Pradesh, India. Ulcers persisting for more than 8 weeks duration were included in our study. Written consent for the procedure and ethical clearance from Institutional Ethical Committee was taken. Detailed history regarding onset, duration, progression, past history of any treatment for ulcer, completion of MDT and ongoing medication (use of anti-coagulants) was noted. Routine investigations including HBsAg and HIV were done.

2.1. Inclusion criteria

1. Patients of Hansen's disease with non-healing ulcers of more than 8 weeks duration not responding to conventional therapy.
2. Patients above 18 years of age and willing to participate in the study.

2.2. Exclusion criteria

1. Patients with uncontrolled diabetes, bleeding disorders, thrombocytopenia and malignancy.
2. Patients on anti-platelet or anti-coagulant drugs.
3. Pregnant and lactating females.
4. Patients not willing to participate in the study.

After applying inclusion and exclusion criteria, ulcers were thoroughly examined for number, site, size, shape, margin, edges, base and surrounding tissue. Under strict aseptic precautions, 10 ml of venous blood was withdrawn and added to a sterile centrifugation tube without anti-coagulants. Centrifugation was performed using Remi 8C model at 3000 rpm for 15 minutes. Three layers were formed, upper layer of platelet-poor plasma (PPP), middle layer of platelet rich fibrin (PRF) and lower layer containing red blood cells. (Figure 1)

The upper layer was discarded, middle layer was separated using sterile blade, placed on a sterile gauze and subsequently on the healthy wound which was then covered with secondary non-absorbable dressing. Patient was advised restriction of activities for 7 days and procedure was repeated every week for 5 weeks or till healing of ulcer was attained whichever is earlier. Measurement of area and volume was done at every sitting and clinical photographs were taken.

The data was collected and analyzed using SPSS software.

3. Results

Total 13 patients with 16 non-healing ulcers were treated with platelet rich fibrin (PRF). Two patients were lost to follow up after the first sitting. The study consisted of 4(30.7%) female and 9(69.2%) male patients. (Table 1)

The mean age in our study was 39.4 years.

Majority of patients complained of ulcers for 2-4 months. Mean duration of ulcers was found to be 5.46 months. (Table 2)

Out of 13 patients, 2 patients with single ulcer were lost to follow up after the first sitting. PRF sittings with routine follow up was done in remaining 14 non-healing ulcers.

Out of 14 non-healing ulcers, 12 (85.71%) ulcers showed complete healing while 2 patients were referred to surgery department in view of poor response.

Average duration of healing was found to be 2.41 weeks. In our study, 2 patients had completed MDT whereas 11 patients were on MDT during the procedure. (Table 3)

Area and volume of the non-healing ulcer showed reduction in subsequent sittings. The average reduction in area and volume was 97.12% and 98.72% respectively. (Graph 1) (Figures 2, 3, 4 and 5)



Fig. 1: Steps of procedure.

Table 1: Age distribution of patients with Hansen's disease having non-healing ulcers

Age (in years)	Number of patients	Percentage
20-30	2	15.3%
31-40	6	46.1%
41-50	3	23.07%
>50	2	15.3%

Table 2: Distribution of duration of non-healing ulcers in patients of Hansen's disease

Duration of ulcer (in months)	Number of patients	Percentage
2-4	7	53.8%
5-7	3	23.07%
8-10	2	15.3%
11-13	-	-
>13	1	7.6%

Table 3: Distribution of cases according to duration of healing

Duration of healing (in weeks)	Number of patients	Percentage
1	2	16.66%
2	4	33.33%
3	5	41.66%
4	1	8.33%

Table 4: Comparison of results with various studies

Parameter	Our study	Raju SP et al . ⁵	Nagaraju et al . ⁶	Gole PV et al . ¹
Number of non-healing ulcers	16	26	9	15
Mean age (in years)	39.4	41.37	38.33	46.06
Duration range of ulcer (in months)	2-14	2-12	2-12	3-24
Number of ulcers that achieved complete healing	12	19	9	15
Mean duration of healing (in weeks)	2.41	2.07	-	-
% reduction in area of ulcer	97.12	92.57	93.52	95.84
% reduction in volume of ulcer	98.72	98.04	97.74	98.18

**Fig. 2:****Fig. 3:**



Fig. 4:

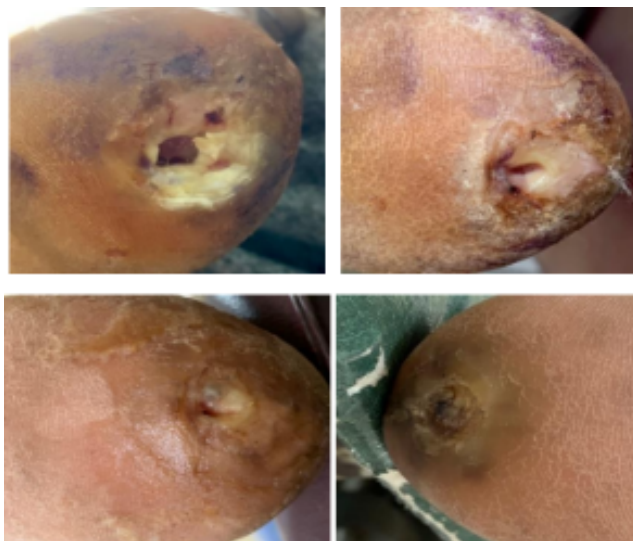
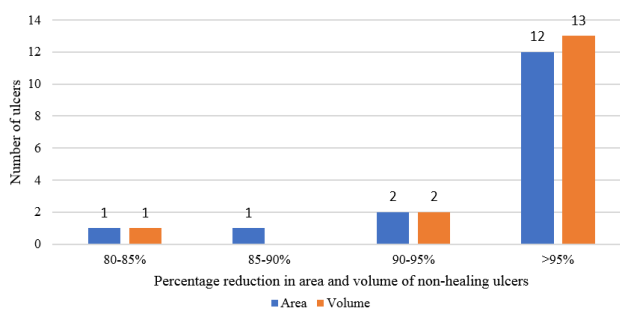


Fig. 5: Healing of ulcers in first, second, third and fourth week



Graph 1: Distribution of percentage reduction in area and volume of non-healing ulcers.

4. Discussion

Non-healing ulcers are the major cause of disability in patients of Hansen’s disease. They significantly increase the duration of treatment, hospital stay and financial burden to the patient. They are result of nerve damage and anaesthesia therefore conventional therapy may not be able to provide the right amount of growth factors required for their healing.⁷ PRF hastens the wound healing process by providing these growth factors and helping in cell recruitment, proliferation, differentiation and finally leading to tissue regeneration.

PRF was introduced by Choukroun et al.⁸ for use in oral and maxillofacial surgeries. It serves as a better option compared to PRP (Platelet-rich plasma) since the average concentration of platelets in PRF is three times than that of PRP.⁹ The growth factors are released from platelet concentrates slowly over a period of one week.

The mean reduction in area and volume of non-healing ulcers in our study was 97.12% and 98.72% respectively in an average duration of 2.41 weeks whereas comparable results were obtained in the study of Sarvajnamurthy et al.¹⁰ and Gole PV et al.¹ at the end of six sittings showing that inspite of the chronic nature of the ulcers included in our study, the percentage improvement and duration of healing was quite significant. The success of this procedure depends on speed of blood collection and transfer to centrifuge which was taken care of in our study.

5. Limitations

Limitation of our study was its small sample size. Studies with larger sample size are needed to analyse the results precisely.

6. Conclusion

Non-healing ulcers pose a major therapeutic challenge to dermatologists in patients of Hansen’s disease due to their chronicity and resistance to conventional therapies. They are an important cause of physical and psychological morbidity. PRF is a simple, effective, safe, cheap and day care procedure that can even be done single-handedly in small clinics with minimal equipment but the patient should be counselled to take appropriate measures and required medication as it does not address the cause of the disease.

7. Source of Funding

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8. Conflict of Interest

None declared.

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