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## A prospective study on efficacy of Platelet Rich Fibrin (PRF) in the management of trophic ulcers of leprosy

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### Abstract

**Introduction:** Trophic ulcers are the major cause of disability in leprosy patients. The disease imposes a social stigma and economic burden in these patients which interferes with regular treatment resulting in defaulters. Chronicity of the ulcer and complications like osteomyelitis and malignancy became an ever challenging task for the treating physician. Newer treatment modalities are on search for decreasing the treatment duration and preventing the recurrence of trophic ulcers. Platelet rich fibrin (PRF) is a platelet concentrate which provides rapid wound healing through the release of various growth factors.

**Aim:** To evaluate the efficacy of topical platelet rich fibrin gel in non-healing trophic ulcers of leprosy.

**Material and Methods:** Based on inclusion and exclusion criteria, 10 patients having leprosy trophic ulcers of more than six weeks duration were enrolled in the study. Following surgical debridement, autologous platelet rich fibrin gel was placed over the wound bed and covered with secondary dressing. Procedure is repeated weekly up to four weeks.

**Results:** At the end of four weeks, complete healing of ulcers was seen in five patients (50%). Other five patients achieved 80-90% reduction in volume of ulcer. The percentage of reduction in mean volume of ulcer was 96.31%.

**Conclusion:** Early diagnosis of the disease and proper management of neuritis will prevent the complications like trophic ulcer. Platelet rich fibrin has become an inexpensive, easily available treatment option with less side effects in the management of trophic ulcers.

**Keywords:** Platelet rich fibrin, trophic ulcer, wound healing

### Introduction

Trophic ulcer in leprosy is defined as a chronic ulceration of anaesthetic foot over pressure bearing areas occurring in both treated and untreated cases. They have a tendency to recur and are resistant to treatment. Among leprosy patients, 30% develop nerve damage. About 10-20% of leprosy patients develop trophic ulcers [1]. If not treated promptly they may lead to secondary infection, amputation and malignancy in longstanding ulcers. Most of the infections are polymicrobial, common organisms isolated are *Staphylococcus aureus* and *Pseudomonas*. Various methods like saline dressings, zinc oxide phenytoin dressings, topical epidermal growth factors, total plaster casting have been used in the management of trophic ulcers [2]. Platelet rich fibrin (PRF) is a novel second generation platelet concentrate used in the management of chronic non healing ulcers [3]. PRF forms a biodegradable scaffold for cell migration, proliferation, and differentiation through delivery of growth factors like transforming growth factor-beta, insulin like Growth Factor (IGF-1), Fibroblast Growth Factor (FGF), Vasculo Endothelial Growth Factor (VEGF) and Epidermal Growth Factor (EGF).

### Material and Methods

In the present study, we enrolled 10 patients who were willing to undergo the study and fulfilling the inclusion and exclusion criteria. The study was conducted between December 2020 and May 2022 after obtaining Institutional Ethical Committee clearance.

### Inclusion and Exclusion Criteria

Patients aged between 18 and 80 years of age with non-healing leprosy trophic ulcers of more than 6 weeks duration were included in the study. Patients having history of bleeding

disorders, patients on anticoagulant medications (aspirin, warfarin, heparin), ulcers with malignant changes, osteomyelitis, pregnant and lactating females were excluded from this study.

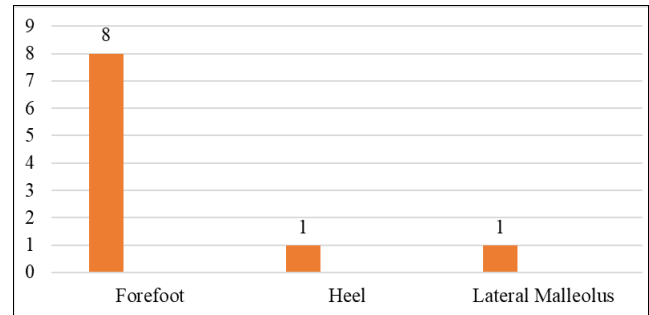
**Procedure**

After obtaining informed consent, a detailed history was taken and complete clinical examination was done. Basic blood investigations were done. X ray of affected foot was done to rule out bony involvement. We ruled out malignant changes in the chronic ulcer by histopathological examination of tissue obtained from the edge of ulcer. Infected ulcers were treated with antibiotics based on culture and sensitivity. Under strict aseptic precautions, 10 ml of venous blood was withdrawn and added to a sterile centrifugation tube without anticoagulant. Centrifugation was done at 3000 rpm (REMI centrifuge) for ten minutes. Three layers were obtained, the upper platelet poor plasma, the middle platelet rich fibrin gel (PRF) and lower fraction containing red blood cells (RBCs) [4]. PRF was separated from red blood cells at the base using a sterile forceps and scissor, preserving a small RBC layer of around one mm in length, which was transferred onto a sterile gauze (Fig.1). The gel obtained was compressed between two gauze pieces gently and applied on a healthy wound bed following surgical debridement [5]. Secondary dressing was done. All the patients were admitted as inpatients during the course of treatment. They were advised to take adequate rest. The dressing of the patient was removed after a period of 7 days. This procedure was repeated on weekly basis for 4 weeks. During each visit the volume of the ulcer was calculated by measuring length, width and depth of the ulcer.

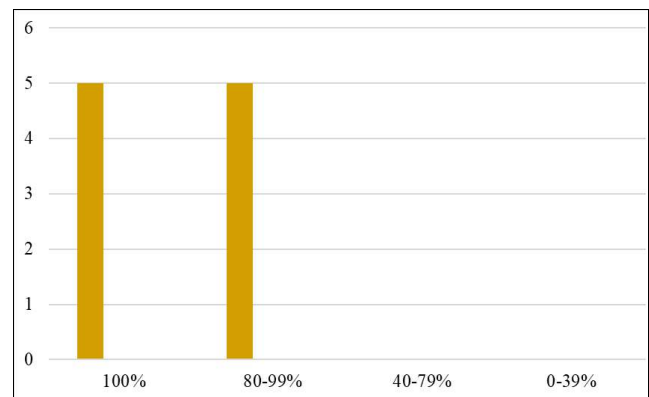
patient achieved complete healing at the end of two sittings itself, two patients at the end of third sitting and two patients at the end of four sittings. The percentage of reduction in mean volume of ulcer was 96.31% at the end of four weeks.

**Table 1:** Showing age distribution

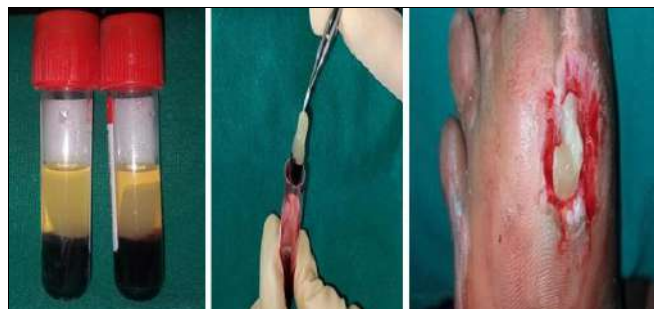
Age group (years)	Number	Percentage
20-40	3	30
41-60	6	60
61-80	1	10
Total	10	100



**Fig 2:** Distribution of site of trophic ulcer



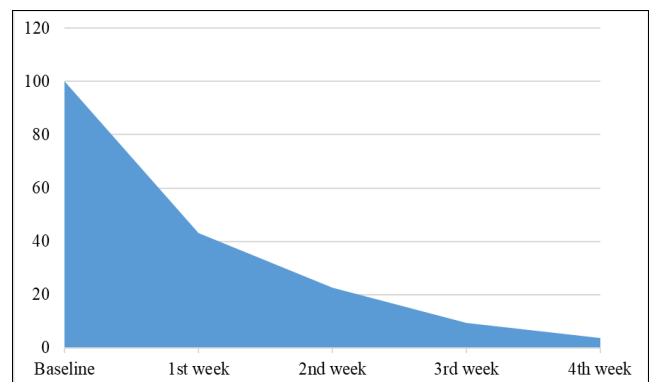
**Fig 3:** Percentage of volume reduction



**Fig 1:** Preparation of platelet rich fibrin gel (PRF) and its application

**Evaluation**

Volume of the ulcer was calculated by the formula Length × width × depth × 0.7854 (ulcer resembles ellipse). Percentage of reduction in volume of ulcer was calculated every week up to four weeks.



**Fig 4:** Reduction in the mean volume of ulcer

**Results**

In our study, majority of the patients were in elderly age group with mean age of 54.06 years (38 to 70 years). Among the ten patients studied, five patients (50%) were male. Forefoot ulcers were seen in 80% of the patients. Mean ulcer duration was 5.8 months (3- 12 months). Almost all patients were in multibacillary spectrum and completed treatment. Three patients had bilateral ulcers. Four patients showed bony changes like pointed metatarsals, osteopenia in X ray foot. At the end of four weeks, complete healing of ulcers was seen in five patients (50%). Other five patients achieved 80-90% reduction in the volume of ulcer. One



**Fig 5:** Complete healing at the end of 3 weeks



**Fig 6:** Complete healing at end of 2 weeks

## Discussion

Trophic ulcers are trouble complications of various neuropathic disorders. In leprosy they are inevitable as *Mycobacterium leprae* causes progressive destruction of sensory, motor and autonomic nerves inspite of adequate treatment. Anaesthetic patch is the hallmark of leprosy whereas anaesthetic extremities occurs as its sequelae. Longstanding ulcers are larger in size and deeper involving bones and joints.

In our study, majority were in elderly group with mean age of 54.06 years. Vinay *et al.* [6] observed trophic ulcers in much younger age group (45.4years). Forefoot ulcers were seen in 80% of the patients. A study conducted by Anandan *et al.* [2] in trophic ulcer showed that half of their patients had ulcers in forefoot. In our study almost all patients were in multibacillary spectrum and completed treatment. Raju SP *et al.* [4] found that only 25% patients had completed the multi-drug therapy. Multibacillary spectrum was commonly observed in a study conducted by Vinay *et al.* [6]. We observed that most of the ulcers were infected with polymicrobial organisms. In the present study the largest volume of the ulcer was 7.21 cu.cm (4.1\*3.2\*0.7 cm) whereas smallest volume of the ulcer was 0.6 cu.cm (1.7\*1.5\*0.3 cm). Mean volume of ulcer in our study group before starting treatment was 2.65 cu.cm.

Mean reduction in volume of ulcer in our study was 96.31% at the end of four weeks. Similar observations were made by Raju SP *et al.* [4] (98.04%) at the end of six weeks. Nagaraju *et al.* [7] also noticed 97.74% improvement in patients treated with weekly PRF dressings for non-healing trophic ulcers. In our study complete healing of the ulcers was observed in 50% (n=5) of the patients. Similar results were observed by Somani *et al.* [8] (55.55%). and Vinay *et al.* [6] (53.3%). But these studies have not cleared about the addition of surgical debridement, bacteriological assessment and offloading measures.

## Conclusion

The dream and desire of every leprologist will be the cure of trophic ulcers within a shorter period without any stigma. Multidisciplinary dynamic approach using advanced wound healing agents is the need of hour. Wound debridement alone can induce 30-40% healing but when used along with growth factors derived from autologous platelet rich plasma (PRP) and PRF, we can achieve greater than 80% of wound closure. In complicated trophic ulcers with bony involvement, underlying bone and sequestrum has to be excised. Large scale studies with PRF along with control group are required to assess the efficacy of PRF. Further studies has to be conducted to assess the role of PRF in management of trophic ulcers among treated versus untreated leprosy patients. PRF is a safe, convenient and

less expensive treatment modality, free of adverse effects. By producing rapid healing we can improve the patient's quality of life both economically and socially.

**Limitation:** Smaller sample size

## Conflict of Interest

Not available

## Financial Support

Not available

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