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# A Prospective Comparative Study of Efficacy of Autologous Platelet-Rich Fibrin Matrix in the Management of Diabetic and Trophic Ulcers

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**Type of Publication:** Original Research Article

**Conflicts of Interest:** Nil

## Abstract

**Background:** Chronic non-healing ulcers represent a significant burden to patients and healthcare systems, particularly in diabetic and trophic ulcers. Conventional dressings often require frequent changes and prolonged hospital stay. Autologous Platelet-Rich Fibrin Matrix (PRFM) has emerged as a regenerative modality promoting wound healing through sustained release of growth factors.

**Aim:** To compare the efficacy of autologous PRFM dressing with conventional povidone-iodine dressing in the management of diabetic and trophic ulcers.

**Materials and Methods:** This prospective comparative study was conducted over 18 months (2022–2024) in a tertiary care hospital. A total of 100 patients with chronic ulcers were randomly allocated into two groups:

**Group A (Cases):** PRFM dressing (n=50)

**Group B (Controls):** Conventional povidone-iodine dressing (n=50)

Patients were assessed for reduction in wound surface area, wound depth, duration of hospital stay, and total number of dressings required. Statistical analysis was performed using Student's t-test and Mann-Whitney U test.

**Results:** The mean percentage reduction in wound surface area was significantly higher in the PRFM group (64.2 ± 8.52%) compared to controls (49.7 ± 7.83%) ($p<0.001$). Mean wound depth reduction was also superior in the PRFM group (79.3 ± 10.1%) versus controls (60.4 ± 12.0%) ($p<0.001$). The PRFM group had significantly shorter hospital stay (10.5 ± 3.2 days vs 20.4 ± 6.19 days) and required fewer dressings (6.32 ± 1.22 vs 25.0 ± 3.86).

**Conclusion:** Autologous PRFM dressing is a safe, effective, and superior alternative to conventional

dressings in chronic diabetic and trophic ulcers, offering faster healing, reduced hospital stay, and improved patient compliance.

**Keywords**: Platelet-Rich Fibrin, Chronic Ulcers, Diabetic Foot, Trophic Ulcers, Wound Healing

## Introduction

Chronic wounds are defined as wounds that fail to progress through the normal phases of healing within three months. They are frequently associated with systemic conditions such as diabetes mellitus, neuropathy, ischemia, and infection, resulting in prolonged morbidity and impaired quality of life. Conventional wound care methods often fail due to inadequate growth factor delivery and hostile wound microenvironment.

Platelet-Rich Fibrin (PRF) is a second-generation platelet concentrate that forms a fibrin scaffold rich in platelets, leukocytes, and cytokines, facilitating angiogenesis, fibroblast proliferation, and epithelialization. This study evaluates the efficacy of autologous PRFM in accelerating wound healing compared to routine povidone-iodine dressings.

## Materials and Methods

### Study Design and Setting

Prospective comparative study conducted in the Department of General Surgery at a tertiary care hospital in Rajkot, Gujarat.

### Sample Size

100 patients with chronic ulcers.

### Inclusion Criteria

- Age 18–80 years
- Diabetic ulcers
- Trophic ulcers
- Chronic ulcers >3 months duration
- Ulcer depth >1 cm

### Exclusion Criteria

- Malignant or bleeding ulcers
- Active infection or septicemia
- Exposed vessels or organs
- Slough-filled wounds
- Diabetic ketoacidosis

### Methodology

Patients were randomized into two groups:

- Group A: PRFM dressing applied every 5 days
- Group B: Povidone-iodine dressing applied daily

PRFM was prepared by centrifuging autologous blood at 3000 rpm for 10 minutes without anticoagulant. The fibrin clot was applied after adequate wound debridement.

### Outcome Measures

- Percentage reduction in wound surface area
- Percentage reduction in wound depth
- Duration of hospital stay
- Number of dressings required

### Statistical Analysis

Data were analyzed using SPSS. Continuous variables were expressed as mean ± SD. A p-value $<0.05$ was considered statistically significant.

## Results

- No statistically significant difference in age, sex, or ulcer etiology between groups.
- PRFM group showed significantly greater reduction in wound surface area and depth ($p<0.001$).
- Mean hospital stay was significantly shorter in PRFM group ($p<0.001$).
- Total number of dressings required was markedly reduced in PRFM group ($p<0.001$).

## Discussion

PRFM provides a sustained release of growth factors such as PDGF, TGF-β, VEGF, and EGF, promoting rapid

granulation and epithelialization. The findings of this study are consistent with previous literature demonstrating enhanced healing rates and reduced treatment burden with PRF-based therapies.

Compared to conventional povidone-iodine dressings, PRFM significantly reduced hospital stay and dressing frequency, improving patient comfort and compliance.

Figure 1: Blood sample of patient and centrifugation machine

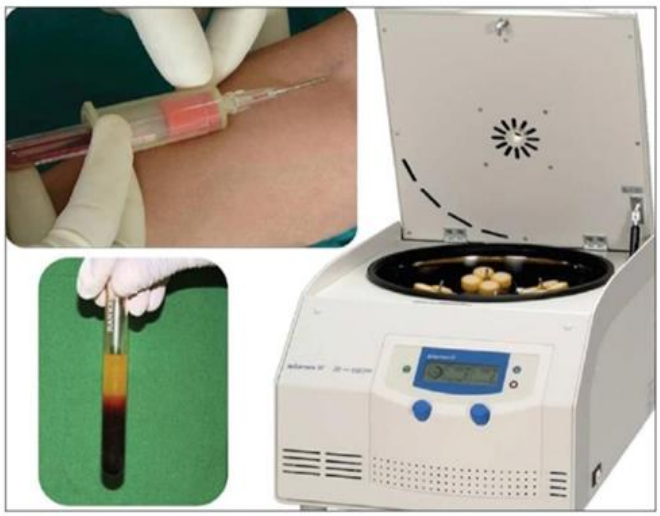


Figure 2: three layers of centrifuged blood, platelet rich buffy coat applied over wound

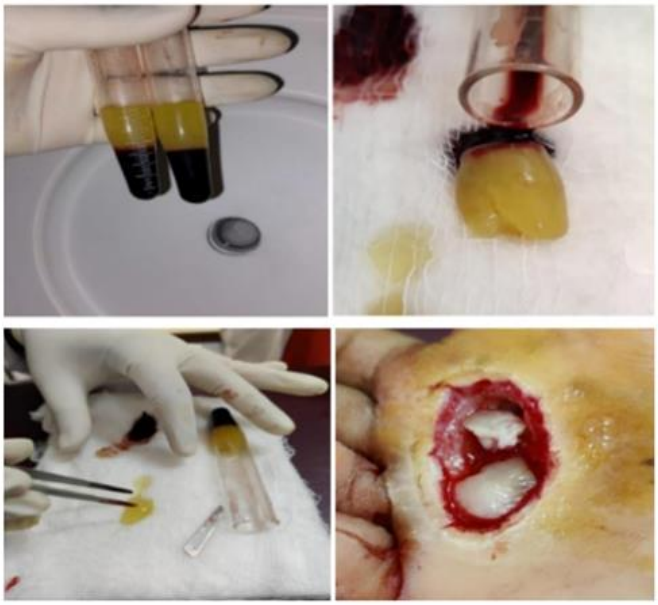


Figure 3: Improvement in wound healing after intervals

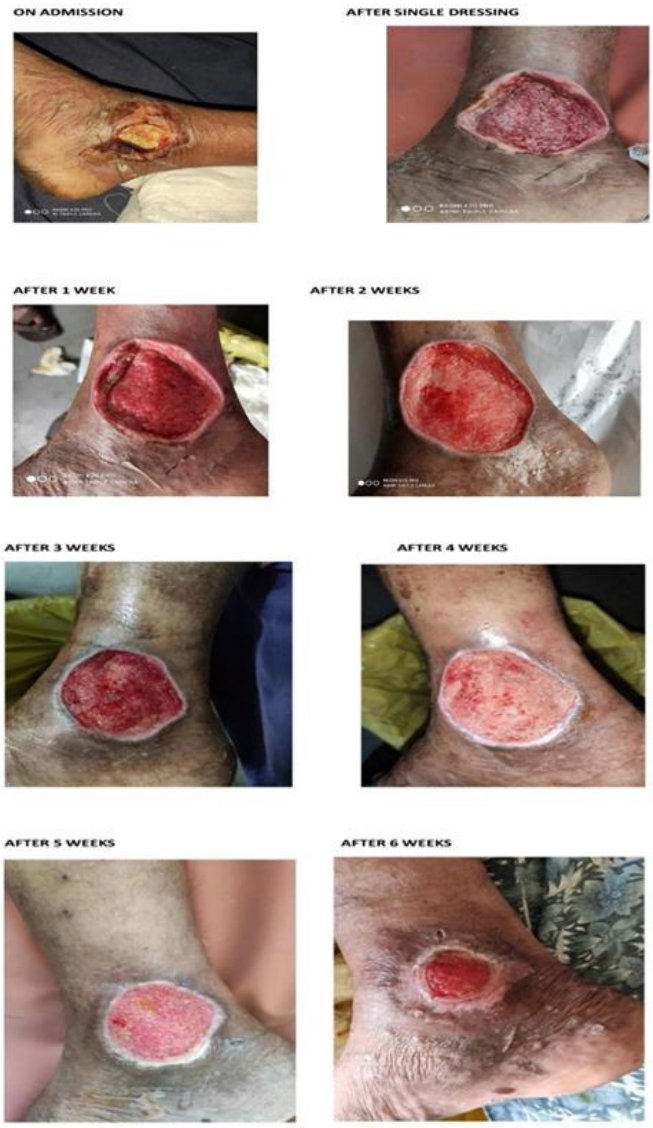



Figure 4: table as mentioned below

Table 4: Duration of Hospital Stay (in weeks)

| DURATION(WEEKS) | CASE | CONTROL |
|---|---|---|
| 0-1 WEEK | 10 | 0 |
| 1-2 WEEKS | 34 | 11 |
| 2-3 WEEKS | 6 | 17 |
| 3-4 WEEKS | 0 | 17 |
| 4-5 WEEKS | 0 | 5 |

| | Mean ± sd |
|---|---|
| Cases | 10.5 ± 3.2 |
| Control | 20.4 ± 6.19 |

Mann-whitney u test used between two groups cases and controls and P value is <0.001 ($p<0.05$), so difference is significant between two groups.

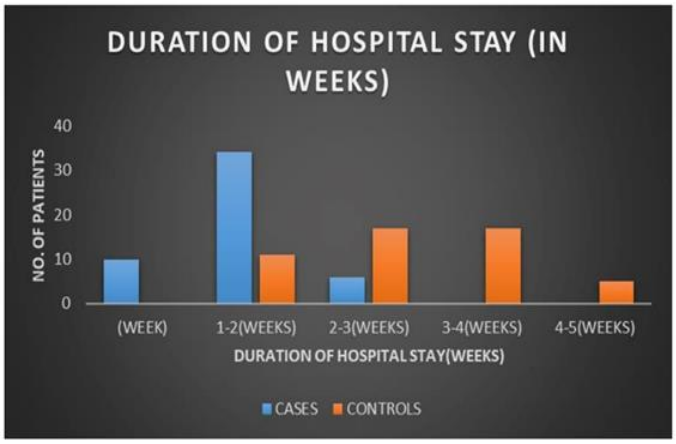



Figure 5: table as mentioned below

Table 6: Reduction in wound surface area at the end of 3 months (PERCENTAGE)

| REDUCTION IN WOUND SURFACE ARE(%) | CASE | CONTROL |
|---|---|---|
| 31-40 | 0 | 3 |
| 41-50 | 4 | 26 |
| 51-60 | 13 | 16 |
| 61-70 | 17 | 4 |
| 71-80 | 16 | 1 |

| | Mean ± SD |
|---|---|
| Cases | 64.2 ± 8.52 |
| controls | 49.7 ± 7.83 |

Mann-whitney u test used between two groups cases and controls and P value is <0.001 (p<0.05), so difference is significant between two groups.

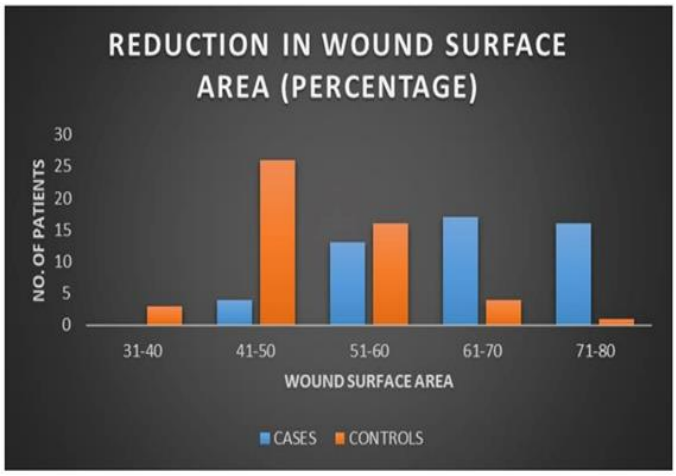



Figure 6: table as mentioned below

Table 7: Reduction in wound depth at the end of 3 months (percentage)

| REDUCTION IN WOUND DEPTH(%) | CASE | CONTROL |
|---|---|---|
| 41-50 | 0 | 12 |
| 51-60 | 2 | 17 |
| 61-70 | 9 | 10 |
| 71-80 | 14 | 7 |
| 81-90 | 19 | 4 |
| >91 | 6 | 0 |

| | Mean ± SD |
|---|---|
| Cases | 79.3 ± 10.1 |
| controls | 60.4 ± 12.0 |

Mann-whitney u test used between two groups cases and controls and P value is <0.001 (p<0.05), so difference is significant between two groups.

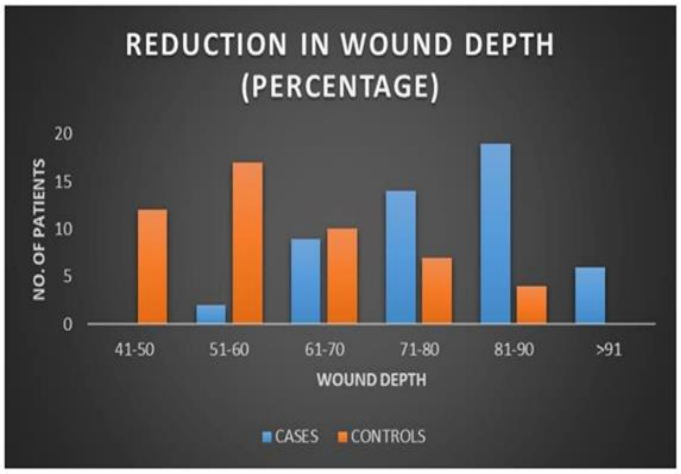


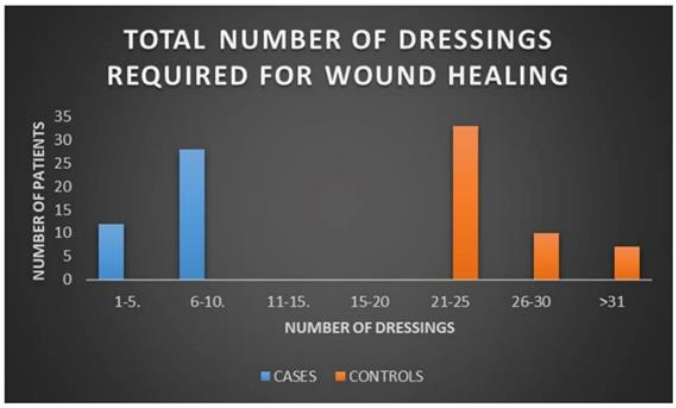

Figure: 7 table as mentioned below

Table 8: Total numbers of dressing required for wound healing

| NUMBER OF DRESSINGS | CASE | CONTROL |
|---|---|---|
| 1-5 | 12 | 0 |
| 6-10 | 38 | 0 |
| 11-15 | 0 | 0 |
| 16-20 | 0 | 0 |
| 21-25 | 0 | 33 |
| 26-30 | 0 | 10 |
| >31 | 0 | 7 |

| | Mean ± SD |
|---|---|
| Cases | 6.32 ± 1.22 |
| controls | 25.0 ± 3.86 |

Mann-whitney u test used between two groups cases and controls and P value is <0.001 ($p<0.05$), so difference is significant between two groups.




## Conclusion

Autologous Platelet-Rich Fibrin Matrix dressing is a cost-effective, biologically active, and clinically superior modality for treating chronic diabetic and trophic ulcers. Its use should be encouraged in routine surgical practice for chronic wound management.

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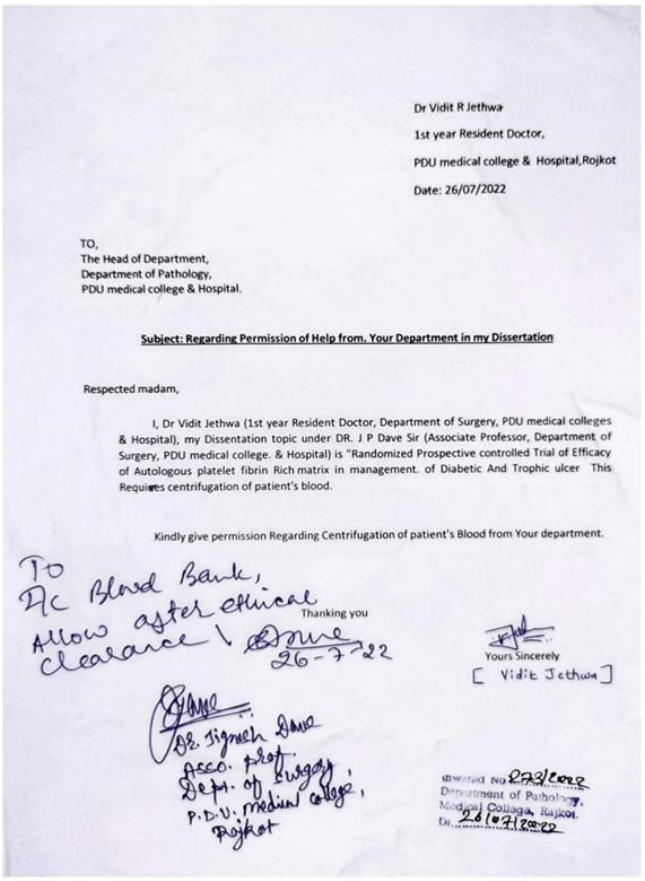
Figure 8: Ethical committee approval certificate



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TO,
The Head of Department,
Department of Pathology,
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Subject: Regarding Permission of Help from. Your Department in my Dissertation

Respected madam,

I, Dr Vidit Jethwa (1st year Resident Doctor, Department of Surgery, PDU medical colleges & Hospital), my Dissentation topic under DR. J P Dave Sir (Associate Professor, Department of Surgery, PDU medical college. & Hospital) is "Randomized Prospective controlled Trial of Efficacy of Autologous platelet fibrin Rich matrix in management. of Diabetic And Trophic ulcer This Requires centrifugation of patient's blood.

Kindly give permission Regarding Centrifugation of patient's Blood from Your department.

To
Dr Blood Bank,
Allow after ethical clearance
Thanking you
26-7-22
Yours Sincerely
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