

ORIGINAL RESEARCH

**A PROSPECTIVE STUDY OF ROLE OF PAPAYA (CARICA PAPAYA) DRESSING IN THE MANAGEMENT OF DIABETIC ULCER IN A TERTIARY HOSPITAL**

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**ABSTRACT**

**Background:** Diabetic foot ulcers are among the most common complications of patients who have uncontrolled diabetes mellitus. Around 15% to 25% of patients with diabetes mellitus will develop a diabetic foot ulcer during their lifetime. This study assesses the effect of papaya dressing in the management of diabetic foot ulcer.

**Methods:** A Prospective longitudinal study was conducted at Rajiv Gandhi Government General Hospitals Chennai, in 60 patients with diabetic foot ulcer. Raw papaya slices were applied to the wounds over sterilized gauze pieces for dressing.

**Results:** In this study, results reveal that majority (80%) of the patients were males. After the initial surgical treatment eighteen patients (30%) required further debridement and dressings done with papaya. In 48 patients (80%) surface area of wound decreased, slough was absent, healthy granulation tissue present, no growth in culture sensitivity. Mean healing duration was 12 days.

**Conclusion:** Papaya dressing in the management of Diabetic ulcer shows cost effective, with favourable outcomes in terms of duration of healing, less surgical debridement and enzymatic sloughectomy.

**Keywords:** Diabetic foot ulcer, Papaya dressing, Duration of healing

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**INTRODUCTION**

Diabetes is a chronic, metabolic disease characterized by elevated levels of blood glucose, which leads over time to serious damage to the heart, blood vessels, eyes, kidneys and nerves<sup>(1)</sup>. About 422 million people worldwide have diabetes, the majority living in low-and middle-income countries. Diabetic foot ulcers are among the most common complications of patients who have uncontrolled diabetes mellitus. It is usually the result of poor glycaemic control, underlying neuropathy, peripheral vascular disease, or poor foot care<sup>(2)</sup>. The annual incidence of diabetic foot ulcer worldwide is between 9.1 to 26.1 million. Around 15 to 25% of patients with diabetes mellitus will develop a diabetic foot ulcer during their lifetime<sup>(2)</sup>

Different strategies including honey dressings, medicated dressings, povidone iodine dressings, platelet rich plasma dressings, saline dressings, vacuum dressings, and papaya dressings are available in the management of diabetic foot ulcers<sup>(3)</sup>. Carica papaya is well known for its nutritional and medicinal properties throughout the world. Several observations point to the hypothesis that treatment with papaya preparations may help facilitate wound-healing responses. This study assesses the effect of papaya dressing in the management of diabetic foot ulcer.

## MATERIALS & METHOD

A Prospective longitudinal study was conducted at Rajiv Gandhi Government General Hospital. The present study was conducted in 60 patients with diabetic foot ulcer. Raw papaya slices were applied to the wounds over sterilized gauze pieces for dressing. Patients and attendants were also educated for the dressing. Dressings were changed every 24 hours. Patients were discharged after initial wound management. Pus was taken for culture sensitivity and blood sugars were controlled appropriately. Every week the wounds were examined for healthy granulation tissue and reduction in surface area.

### Inclusion Criteria

- Patients between 12 to 75 years of age.
- Duration of the diabetic ulcer more than 2 weeks.
- Size of ulcer less than 15 x 15 cm
- Patients giving consent for papaya dressing

### Exclusion Criteria

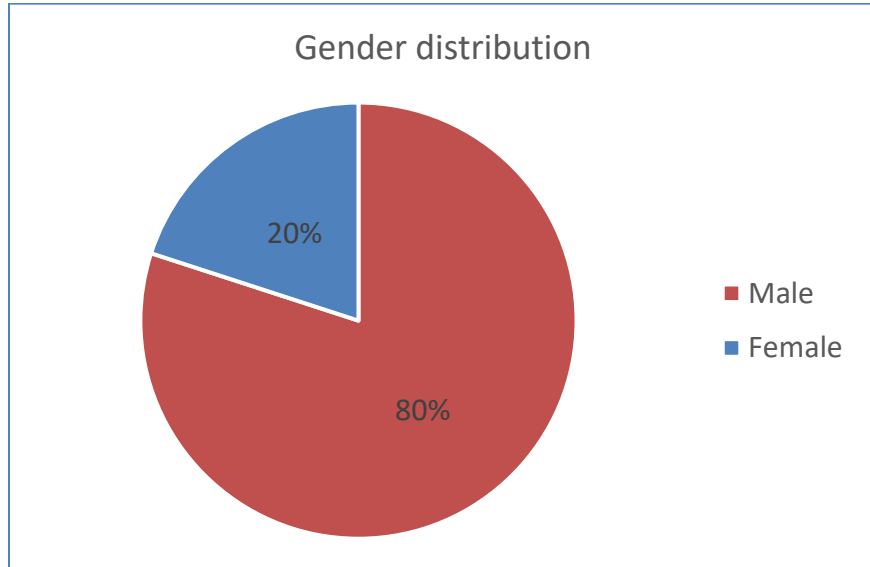
- Immunocompromised patients
- Associated septicaemia and osteomyelitis.
- Skin malignancies
- Diabetic Ketoacidosis.
- Exposed bones, tendon

### Sample Size

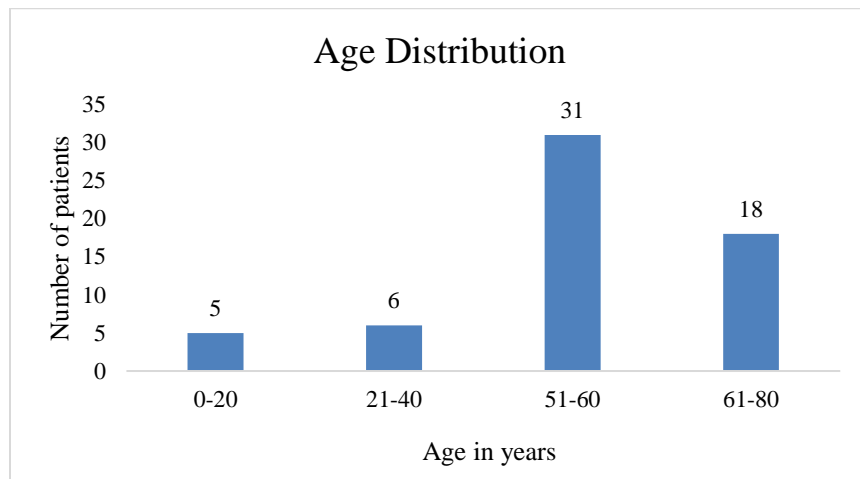
1. The sample size was calculated based on previous study conducted by Maddila Sai Harish et al<sup>(4)</sup>, in which the mean and standard deviation of healing duration was found to be 19.23 and 3.624 respectively. With 95% of confidence level with absolute precision as 5% of the mean, the sample size derived was 60 including the non-response.

## RESULTS

Among 60 patients, 80% were males and 20% were females. Site of diabetic ulcer was present in Left foot (30%), right foot (26%), and remaining wounds were present in left and right gluteal region, left great toe, right leg, left hand and forearm, right hand, and forearm. In the initial surgical treatment eighteen patients (30%) required further debridement and 42 patients (70%) did not need debridement. After the initial surgical treatment, dressings were done with papaya. In 48 patients (80%) surface area of wound decreased, slough was absent, healthy granulation tissue was present, no growth in culture sensitivity. 12 patients (20%) showed no change in surface area, granulation tissue was absent, slough present and culture sensitivity showed growth. Mean duration of healing was 12 days with standard deviation of 4.94. Majority of the patients had healing duration of 8 to 12 days.



**Fig-1 Gender distribution**



**Fig -2 Age in distribution**

**Table-1 Distribution of site of wound**

Site of wound	Frequency (n=60)	Percentage
Left foot	18	30%
Left gluteal region	1	1.7%
Left great toe	11	18.3%
Left hand & forearm	1	1.7%
Left leg	1	1.7%
Right foot	16	26.7%
Right hand & forearm	1	1.7%
Right leg	10	16.7%
Right gluteal region	1	1.7%

**Table-2 Papaya dressing – Duration in days**

Number of days	Frequency (n=60)	Percentage %
5	1	1.7%
6	4	6.8%
7	3	5.1%
8	6	10.2%
9	4	6.8%
10	5	8.5%
11	8	13.6%
12	6	10.2%
13	1	1.7%
14	4	6.8%
15	1	1.7%
16	4	6.8%
17	3	5.1%
18	3	5.1%
20	1	1.7%
21	1	1.7%
22	1	1.7%
23	1	1.7%
24	1	1.7%
25	1	1.7%
26	1	1.7%

**Table-3**

Wound debridement	Frequency (n=60)	Percentage %
Yes (done)	18	30%
No (not done)	42	70%

Slough was present in 90% of patients and slough was absent in 10% of patients before treatment. From table-4, after dressing with papaya, surface area of wound has decreased in 80% of patients, healthy granulation tissue was found in 80%. Among the study participants only 20% of patients had growth in culture sensitivity. Majority of the organism found in culture was Klebsiella.

**Table-4**

Parameter		No. of patients	Percentage
Surface area of wound	Decreased	48	80%
	Same	12	20%
Granulation tissue	Present	48	80%
	Absent	12	20%
Wound culture sensitivity	No growth	48	80%
	Growth +	12	20%

## **DISCUSSION**

In the current study, males predominated accounting for 80% and only 20% were females. Median age is 55 years. The mean age was 53 years with Standard Deviation of 15.686. Ch et al<sup>(5)</sup> reported ages from 40 to 70. Most patients were in their 50s and 60s. There were more men than women by a ratio of 2.6 to 1. Participants' ages were reported to be between 40 and 65 in the study conducted by Rajaram et al<sup>(3)</sup>. Mean age in another study conducted by Ch and Shaikh was 54.84 years<sup>(6)</sup>

In the present study, number of days of dressing was 11 for 13% of the population followed by 8 and 12 for 10% of the population. Majority of them needed dressing from one week to two weeks. The mean duration of healing was 12 days. According to a study done by Rabari Yash et al<sup>(7)</sup> the time taken for patients to recover varied between 14 and 29 days. The average time to recover was 19.65 days, with the SD being -3.47. Those wounds were considered healed if they had established granulation tissue and epithelium that was actively growing at the wound's edges. According to Rajaram et al study<sup>(3)</sup>, the time taken for patients to fully recover varied between 17 and 28 days. In a study conducted by Shaikh et al healing time ranged from 18 to 29 days. Mean healing duration was 19.23 days with Standard Deviation (SD) of  $\pm 3.624(8)$ . In a study done by Vasuki et al<sup>(9)</sup> there was a significant difference ( $p$ -value $<0.001$ ) in granulation tissue formation with papaya dressing when compared to normal saline dressing in third and fourth weeks. Healing time was shortened because of the enzymatic micro debridement and antibacterial activity, as reported by Mehjabeen Fatimah et al<sup>(5)</sup>.

In a study conducted by Rakesh et al<sup>(10)</sup> papain urea dressings has helped in wound healing by decreasing the duration of healing time and by faster slough removal. In a meta-analysis study done by Siva et al protease enzymes found in the Indian papaya, are known to have de-sloughing and wound healing properties. It was found that Carica papaya applied to a lesion enhanced phagocytic cell killing of bacteria<sup>(11)</sup>

The papaya-derived enzyme papain, when applied topically, facilitate enzymatic wound debridement. Papain is also useful in reducing the bacterial burden, decreasing exudates, and increasing granulation tissue formation<sup>(12)</sup>.

## **CONCLUSION**

The present study concludes that use of Papaya dressing in the management of Diabetic ulcer is cost effective, with favourable outcomes in terms of duration of healing and less surgical debridement.

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