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The Effectiveness of Wound Healing in Diabetic Foot with Feracrylum over the Conventional Povidone Dressing - A Prospective Comparative Study

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ABSTRACT

BACKGROUND

Diabetic foot ulcers are common and characterized by a classical triad of neuropathy, ischemia, and infection. Feracrylum is a biocompatible, biodegradable and hemostatic in nature. Feracrylum is superior to povidone iodine in diabetic wound for its antimicrobial properties acting against Gram-positive, Gram-negative bacteria & Fungal strains and its hygroscopic action maintains a moist environment at wound site resulting in faster healing and easy dressing removal.

AIMS AND OBJECTIVES

To compare the effectiveness of wound healing in Diabetic foot patients with Feracrylum gel application with conventional Povidone dressing.

MATERIALS AND METHODS:

This is a Prospective comparative study, done at Sri Venkateshwaraa medical college hospital and research centre, Ariyur, Puducherry, from April 2022 – October 2022. All patients admitted with diabetic foot in General Surgery ward in Sri Venkateshwaraa medical college hospital and research centre during this study period were included in this study. Study was conducted over 50 patients. Among 50 patients 25 patients were included in the study group with Feracrylum gel application and another 25 patients were included in control group with conventional betadine dressing. we compared the rate of wound healing in both groups.

RESULTS

The study was conducted with 50 patients of Diabetic foot ulcer. We observed that the rate of wound healing was faster in study group when compared to the control group in the sense of appearance of healthy granulation tissue and the wound should be fit for secondary suturing or skin grafting or flap.

CONCLUSION

To conclude in our study the rate of wound healing in Diabetic foot ulcer is faster in Feracrylum gel application when compared to the conventional betadine dressing, decreases the Hospital stay, decreases the financial burden and made the wound fit for skin grafting.

KEYWORD: Feracrylum, Diabetic foot, Wound healing.

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INTRODUCTION

Diabetes is a severe disease that can lead to microvascular and macrovascular complications. If left unchecked, it can bring morbidity and mortality. Fortunately, it is a disease that can be managed deliberately but at the same time most 4 of the people who have diabetes do not know that they have it and hence do not treat it till it becomes very late. People with diabetes are more likely to have foot problems because of nerve and blood vessel damage [1]. Small sores or breaks in the skin may turn into deep skin ulcers if not maintained normal blood sugar level it may go for gangrene. If these skin ulcers do heal properly, or become larger or go deeper, at this stage the patient may need an amputation of the affected limb.

Lower limb infection constitutes the primary cause of hospitalization of people with diabetes. Above 15% develop foot or leg ulcer [2]. Diabetic foot ulcers are common and characterized by a classical triad of neuropathy, ischemia, and infection. In India, the prevalence of diabetic foot ulcers in clinical population was estimated to be 3.6%. Socio cultural practices such as bare-foot walking, use of improper footwear and lack of knowledge regarding foot care contributes towards increase in the prevalence of foot complications in India. Lower limb infection is the most common reason for hospitalization accounts to up to 25% of admission. 15% of the patients develop foot ulcers during their lifetimes [3]. If untreated they end up in lower extremity amputation. Diabetic foot ulcers should be treated aggressively to improve the quality of life, control infections, maintain patient's health, prevent amputations and to reduce health care costs. Topical treatment is an important aspect of diabetic foot ulcers although secondary to surgical and systemic care [4].

Antiseptics, such as iodine-based preparations, are commonly used on ulcers, as they have high beneficial effect. Usually, they are applied to locally infected wounds, usually in combination with systemic antibiotics Povidone iodine consists of spherical hydrophilic beads of cadexomer-starch, which contain iodine, highly absorbent, and releases iodine slowly in the wound area and indeed very effective in reducing infection and improving wound healing [5].

Feracrylum which is biocompatible, biodegradable, and haemostatic in nature. Seems, Superior to povidone iodine in diabetic wound for its antimicrobial properties against Gram-positive, Gram-negative bacteria & fungal strains. And its hygroscopic action maintains a moist environment at wound site resulting in faster healing and easy dressing property [6]. The present study was to determine the effectiveness of wound healing in Diabetic foot patients with Feracrylum gel application with conventional Povidone dressing. This study also determines the time taken for the wound to fit for skin grafting or flap by assessing the duration of appearance of healthy granulation tissue, percentage of wound shrinkage and resolution of surrounding cellulitis.

Materials and methods

- Study design - Prospective comparative study
- Study place - Sri Venkateshwaraa medical college hospital and research centre, Ariyur, Puducherry

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- Study period - April 2022 – October 2022.
- Sample size - 50
    - Group A (25patients-povidone iodine dressing)
    - Group B. (25 patients-feracrylum dressing)

Inclusion criteria

- All patients admitted with diabetic foot in General Surgery ward in Sri Venkateshwaraa medical college hospital and research centre during this study period were included in this study.

Exclusion criteria

- Patient allergic to feracrylum and povidone
- Diabetic Patients with
    - Peripheral vascular disease
    - Venous diseases
    - Lymphatic diseases
    - Osteomyelitis
    - Malignancy
    - HIV and immunosuppressive diseases
    - Jaundice
    - Anaemia
    - Uraemia
    - Steroids and cytotoxic drugs
    - Neuropathies of different causes
    - Vitamin A and C deficiency

Data collection method

- Among 50 patients
    - 25 patients were included in the study group with Feracrylum gel application
    - another 25 patients were included in control group with conventional betadine dressing.
- We analyzed the data with the parameters
    - Appearance of healthy granulation tissue and percentage of wound shrinkage compared the rate of wound healing in both groups, at the end of the first, second, third and fourth week.
    - For every patient wound assessment duration started from the time of initial debridement.

Statistical analysis

- Data Will Be Entered In Excel Sheet.
- Analysis Will Be Done By Spss Version 23.0.
- Comparisons between the groups was done by chi square is a Independent T- Test
- P Value < 0.05 Will Be Consider As Statistically Significant.

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Results

We observed that the rate of wound healing was faster in study group when compared to the control group in the sense of appearance of healthy granulation tissue, faster wound shrinkage and rapid resolution of surrounding edema leads the wound fitted for secondary suturing or skin grafting or flap as early.

Table 1 – Distribution of demographic variables

Parameters		**Group A**	**Group B**
Age (mean)		41-85	43-70
sex	Male	22	21
	Female	3	4
Comorbid conditions	Hypertension	12	14
	CAD	2	4
Side of the lesion	Right lower limb	12	9
	Left lower limb	8	14
	Both limb	5	2
Site of the lesion	Foot(Dorsum)	8	7
	Foot (plantar aspect)	5	6
	Legs	5	4
	Toes	-	1
	Malleoli	2	1
	Heel	5	6

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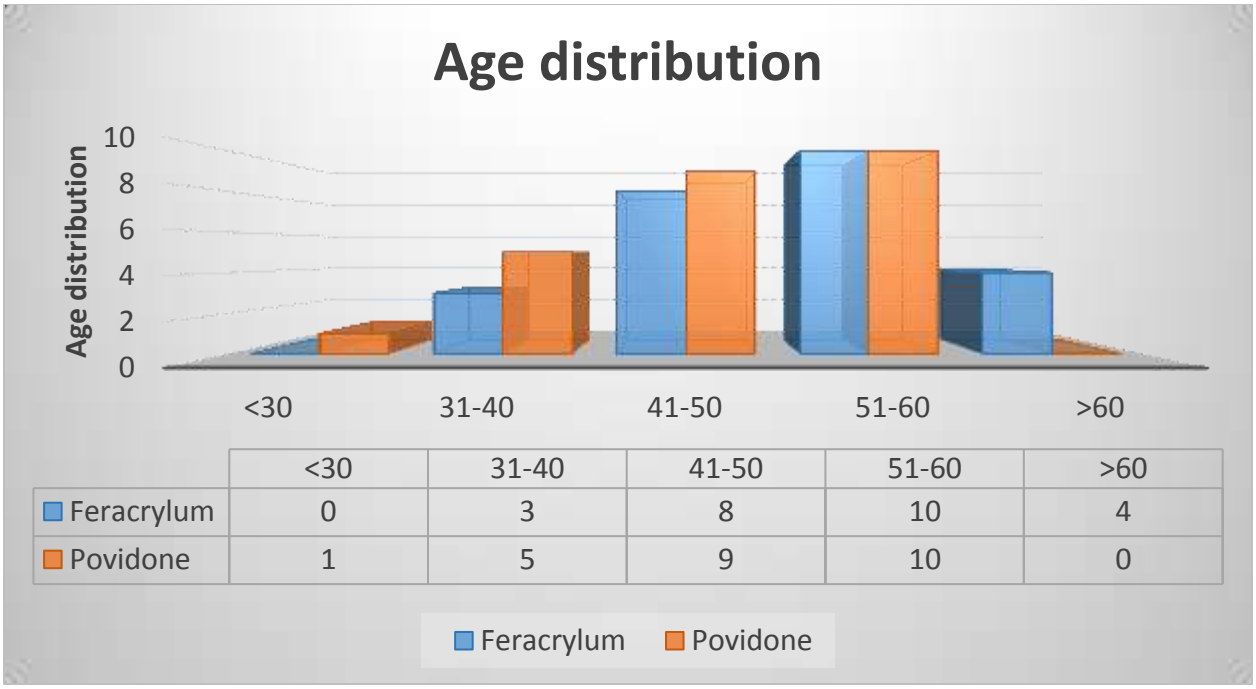
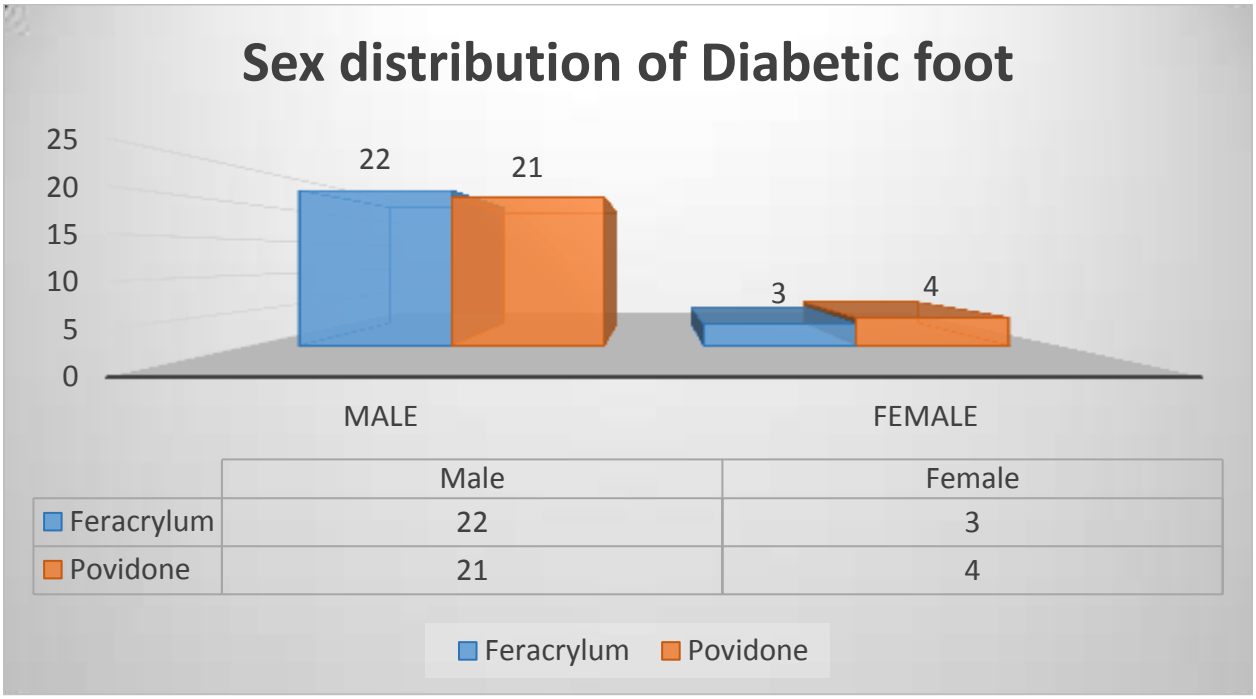


	<30	31-40	41-50	51-60	>60
Feracrylum	0	3	8	10	4
Povidone	1	5	9	10	0

Figure 1 – Age distribution

There is no significant difference observed between group A and group B in age.



	Male	Female
Feracrylum	22	3
Povidone	21	4

Figure 2 – sex distribution

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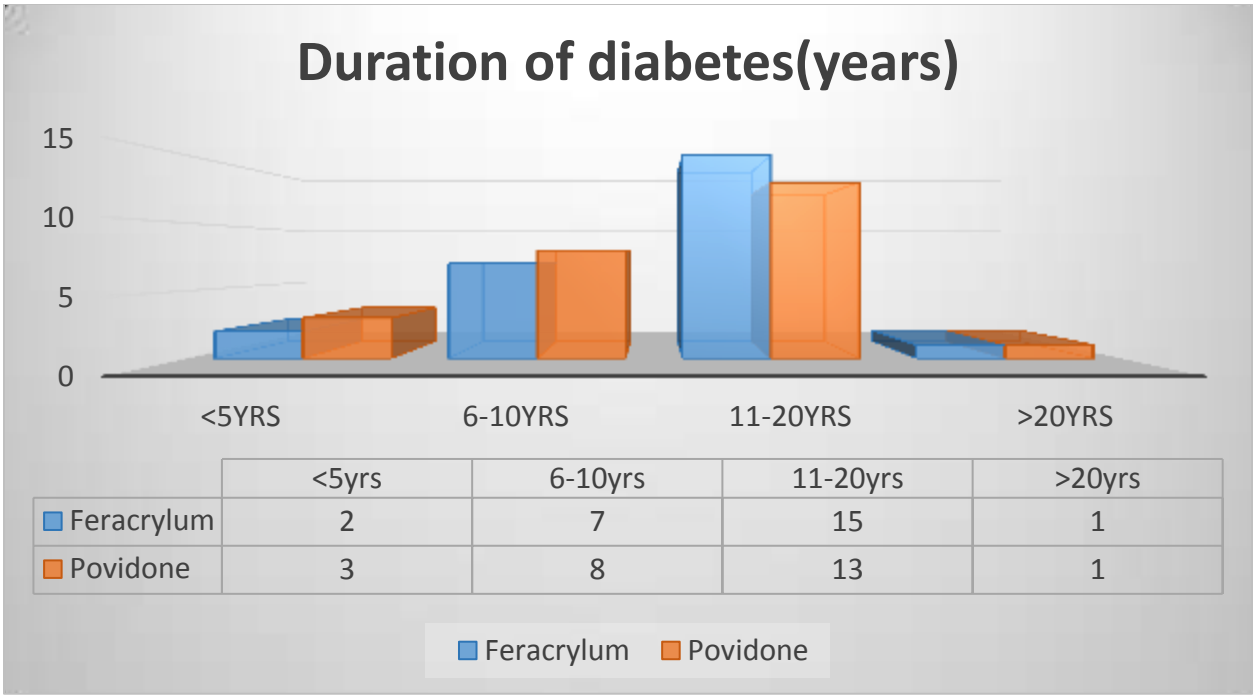

Figure 3 – Duration of diabetes

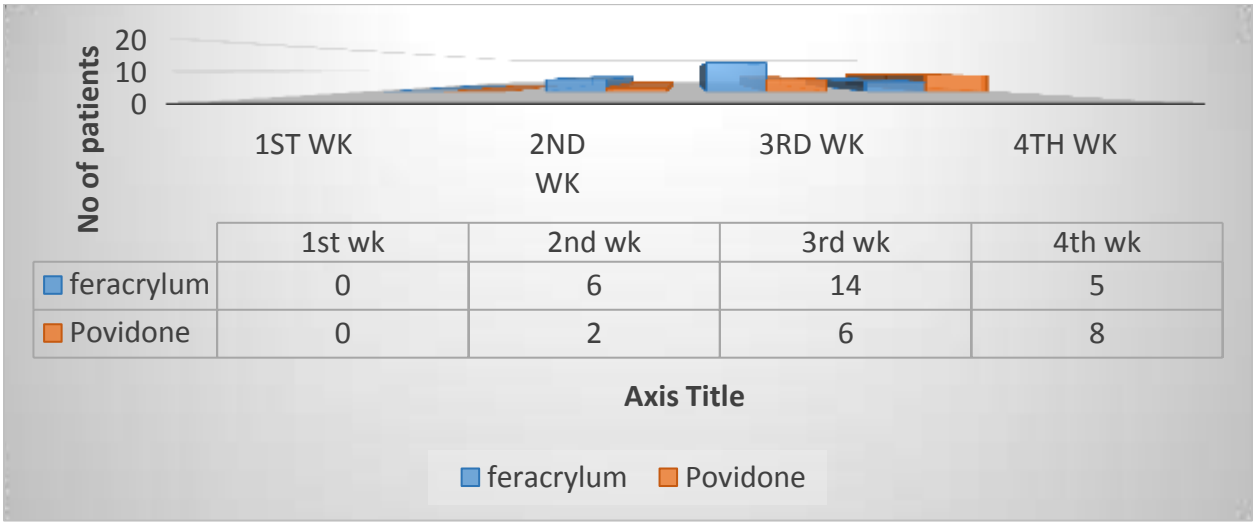

Figure 4 - Comparison of appearance of healthy granulation tissue in both groups

Figure 5 - Comparison of complete resolution of surrounding cellulitis in both groups

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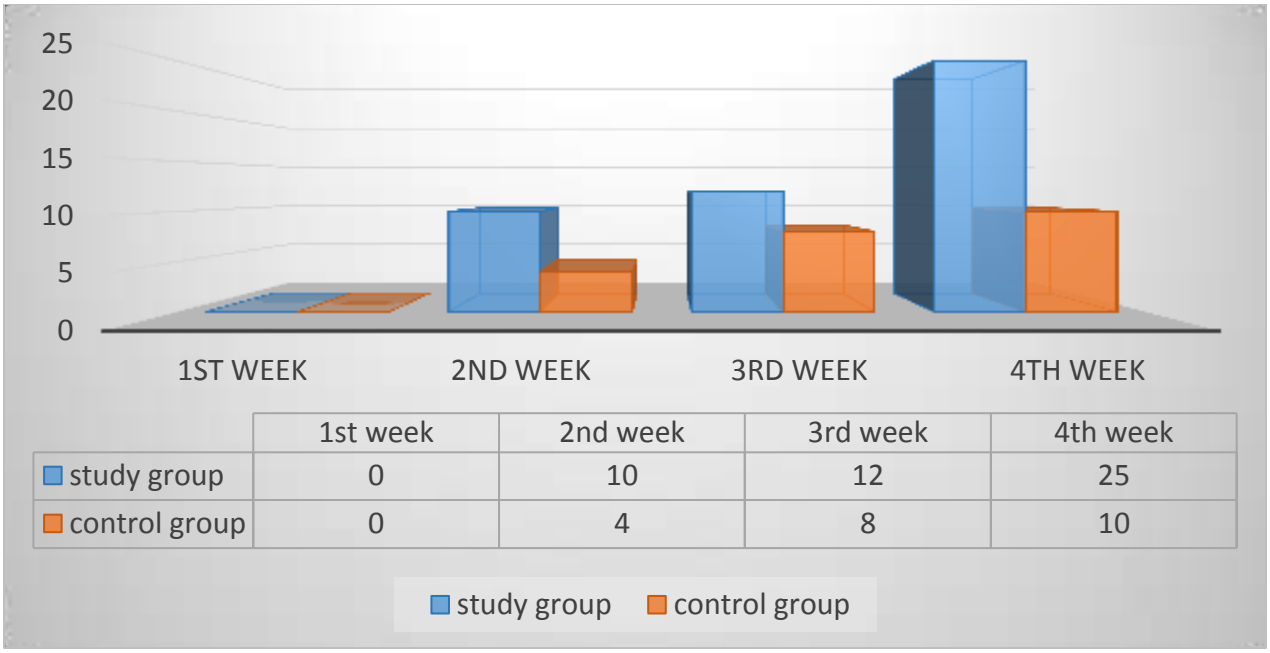
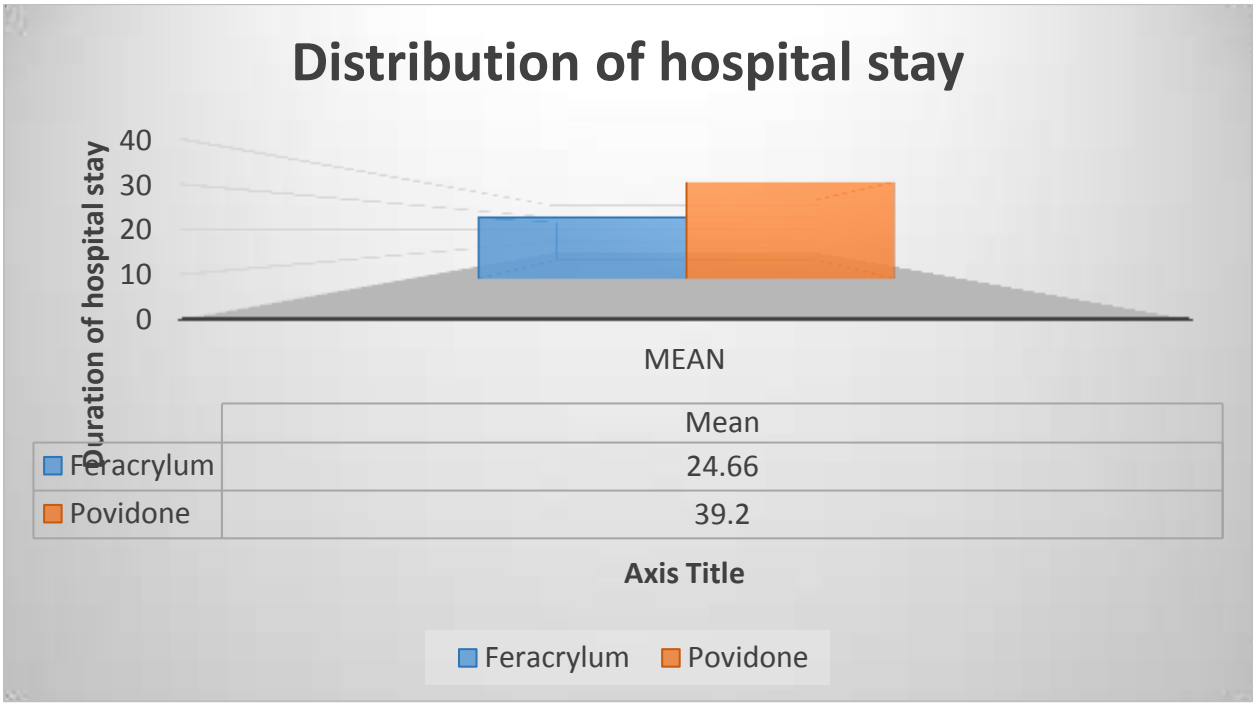


	1st week	2nd week	3rd week	4th week
study group	0	10	12	25
control group	0	4	8	10

Figure 6 – Distribution of hospital stay



	Mean
Feracrylum	24.66
Povidone	39.2

DISCUSSION

The study showed that prevalence of diabetic foot ulcer among rural area 66% belonged to male and 33% belonged to urban areas. Age, duration of diabetes, oral hypoglycemic treatment/insulin use and rural location were identified as important risk factors. According to a study of prevalence of DFU and associated risk factors in diabetic patients by **Shailesh**

K et al males were affected more than females, mean age of 55.25 years, more common in rural areas compared to urban areas, average duration of diabetes 11.50 years, etiological factors were unknown in most of the subjects, followed by minor trauma, mostly located below ankle over plantar aspect, owing to sensory neuropathy as the prominent risk factor [7].

Various types of non-adherentor Saline-soaked gauze dressings are often regarded as standard treatment for diabetic ulcers and have usually been used as the control in studies of dressings. These dressings are designed to be atraumatic and provide a moist wound environment. These simple, relatively inexpensive dressings are not designed specifically for managing infection but can be safely used in conjunction with antibiotic treatments [8,9].

The presents study is befitting with the study conducted by Shetty, Gautham J (2012) on a prospective, comparative study on conventional dressing (normal saline) versus povidone iodine dressing in non-healing lower limb [10]. 200 patients with non-healing lower limb ulcers were included in the study, they were visually analysed at intervals of 7, 14 and 21 days for epithelialization, infection, exudation and biodegradation and response evaluated by scoring criteria. The results proved that in 88% of the cases there was complete epithelialization (p value 0.05*) in test group compared to control group which was 54%, povidone iodine is an effective dressing in full thickness skin wounds and acts as an efficient to prevent adhesions than the conventional dressing.

The present study is concurrent with the study to assess the effectiveness of Feracrylum Dressing on Wound Healing Process through quantitative approach by Simple random sampling technique. The major findings of the study showed that 50% of the patients are in the age group of 36- 50 years. Regarding gender, majority of the samples were males 96% application of Feracrylum dressing on diabetic wounds is highly effective with controlled glycemic levels. The present study is befitting with the prospective, comparative study conducted on conventional dressing (normal saline) versus povidone iodine dressing in non-healing lower limb ulcers in 200 patients with non-healing lower limb ulcers. Feracrylum is a haemostatic, antimicrobial and hygroscopic agent [11]. Feracrylum having local haemostatic action arrests oozing from the wound site and thus causes haemostasis. Feracrylum has a wide range of antimicrobial activity against both gram positive and gram-negative bacteria and pathogenic fungi. Even after using different modalities of treatment, results are not always gratifying [12]. An ideal dressing should be comfortable, pain relieving, harmless to tissue, encourage removable of slough and promote vascularisation and optimal growth of granulation tissue [13]. There is no dressing till date which is ideal, but collagen particles are very close to it [14,15]. Appearance of healthy granulation tissue and percentage of wound shrinkage compared the rate of wound healing, reduction in signs of surrounding cellulitis in both groups, at the end of the first, second, third and fourth week [16]. The results proved that in 88% of the cases there was complete epithelialization in test group compared to control group which was 54%, Feracrylum an effective dressing in full

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thickness skin wounds and acts as an efficient to prevent adhesions than the conventional dressing.

Conclusion

To conclude in our study the rate of wound healing in Diabetic foot ulcer is faster in Feracrylum gel application when compared to the conventional betadine dressing, decreases the Hospital stay, decreases the financial burden, and made the wound fit for skin grafting or flap early. No doubt till today such kind of dressings is very costly affair in our country, but if we consider the cost of hospitalization and if we can prevent amputation in diabetes and peripheral vascular disease, then these therapies seem to be very logical. Hence such a kind of dressing with Feracrylum gel application is good option for diabetic foot ulcer. The advantage of early healing and mobilization with early return to work, saving man-hours and finances, outweigh the disadvantage of cost factor. Thus, we advocate the routine use of Feracrylum gel application in dressing of diabetic foot ulcer.

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