



A COMPARATIVE STUDY OF MICRODACYN DRESSING VERSUS BETADINE DRESSING IN THE MANAGEMENT OF DIABETIC ULCERS

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ABSTRACT **Background:** Diabetic ulcers are one among the most common problems encountered in general surgical practice and have been a major public health problem with regards to financial factors and the burden of morbidity and the resulting socioeconomic setback. The objective of this study is to compare the efficacy of microdacyn dressings versus the conventional betadine dressings in the management of diabetic ulcers.

Materials and Methods: The study is a prospective comparative study conducted in Father Muller Medical College, Mangalore over a period of one year. A total of 100 patients were included in the study which was divided into two groups, each containing 50 patients. Group A patients were treated with Microdacyn dressings while group B patients were treated with conventional betadine dressings. All patients were followed up for a period of 4 weeks. The ulcers were evaluated for healing by assessing decrease in size of the ulcer, granulation tissue formation and discharge from ulcer at the end of 1st, 2nd, 3rd and 4th week. Ease of dressing, patient compliance and cost factors were also taken into consideration.

Results: Statistically significant differences were found in favour of group A where Microdacyn dressings were used with respect to wound healing measured by decrease in size of the ulcer, appearance of healthier granulation tissue, and decrease in discharge from the wound. Also cost at the end of 4 weeks, patient compliance and ease of use were significantly better with microdacyn dressings as compared to conventional povidone iodine dressing. Culture negativity was achieved in significantly more patients of group A.

Conclusion: Microdacyn dressings are a safe and effective method in treating diabetic ulcers with better patient compliance, faster healing, less pain and decreased morbidity.

KEYWORDS : wounds, ulcers, dressing, microdacyn, diabetes

INTRODUCTION

Diabetic ulcers are one among the most common encounter in day to day surgical practice. They form a major chunk of the ulcer cases and hence are of greater significance. Adequate treatment helps to decrease the high rate of amputations and the resulting morbidity and associated with these ulcers and improve the quality of life^{1,2}. The effective management of diabetic foot ulcers requires debridement, dressings to provide a moist wound environment, antibiotic therapy in infected ulcers/osteomyelitis/cellulitis, optimal control of blood glucose, offloading the wound by appropriate therapeutic footwear and evaluation and correction of peripheral arterial insufficiency³. One of the recent and most advanced strategies is the use of superoxidized solutions like microdacyn. It is a relatively new concept in wound management.

Microdacyn is a stable, non-flammable and non-corrosive solution which has bactericidal, virucidal, fungicidal and sporocidal actions which can be readily used without dilution or mixing. They are manufactured from pure water and sodium chloride and are rich in reactive oxygen species with neutral pH. The process of electrolysis involves breaking up of molecules giving rise to ions and free radicals. They rapidly react and cause denaturation of the bacterial cell wall proteins, have anti-inflammatory effect and produce an environment with altered osmolarity which damages single celled organisms. They act by moistening, lubricating, debriding and by reducing the microbial load of wounds. Ingredients are Oxidized Water 99.97%, Sodium Chloride (NaCl) 0.023%, Sodium Hypochlorite (NaOCl) 0.004% and Hypochlorous Acid (HOCl) 0.003%^{4,5}.

Very few studies have been done about the efficacy of these dressings in the treatment of diabetic ulcers in Indian population as it a fairly new concept. Hence the present study was undertaken to compare conventional dressings with saline and betadine with microdacyn dressing.

MATERIAL AND METHODS

The present study is a prospective randomized comparative study done to evaluate the effect of microdacyn dressing versus conventional betadine dressing on diabetic wounds. The study was conducted in Father Muller Medical College, Mangalore over a period of one year after taking ethical committee clearance. A total of 100 diabetic ulcers with Wagners grade 2 and 3 d were included in the study. Patients were divided into 2 groups of 50 patients. In group A, microdacyn dressings

and in group B, betadine dressings were done. Written informed consent was taken from all patients in this study.

Demographic data such as age, sex and ulcer details were obtained through an interview. Details such as duration and type of diabetes, diabetic treatment, ulcer site, discharge were noted. Furthermore these patients were subjected to clinical examination and the findings were noted on a predesigned proforma. Routine blood investigations and radiological investigations wherever indicated were carried out. Wound discharge was sent for culture and sensitivity. Empirical antibiotics usually 3rd generation cephalosporins were started from the first day unless contraindicated. Antibiotics were changed as per the sensitivity report. All patients received appropriate surgical treatment for their wounds e.g. incision/drainage for abscess and carbuncle, debridement for infected wounds, amputation/disarticulation for osteomyelitis. The solution was applied to the wounds through different methods like washing, sprinkling, gauze dressing, immersion and irrigation.

Ulcer mapping was made and the size recorded by assessing the largest dimensions of the ulcer. Size was measured twice and the mean of the both measurements was considered as the size of the wound. Patients were followed on weekly basis to assess complete wound healing or until deemed fit to undergo closure via skin grafting or secondary closure. In the event of non healing of ulcer by end of 4 weeks, reduction in size of ulcer in cm (mean of longest 2 diameters) will be assessed and compared. Wound was observed for decrease in size of the ulcer, type of granulation, tissue quality and discharge from the wound at 7th, 14th, 21st and 28th day from the start of the dressings. The appearance, presence or absence of discharge, slough, formation of new granulation tissue and epithelisation or decrease in wound size were assessed and formed the basis of the assessment of the efficacy of the 2 types of dressings. The patients were also assessed based on symptoms such as pain during dressings, patient compliance and the cost factors.

Inclusion criteria: All patients above 20 years of age diagnosed to have Wagners grade 2 or 3 ulcer as a complication of Diabetes Mellitus (type 1 or type 2), patients with ulcers having HbA1c of over 6.5 and patients admitted for a minimum period of 1 month

Exclusion criteria: Patients with Wagners grade 1, 4 or 5 ulcers, patients having HbA1c lesser than 6.5, patients with proven

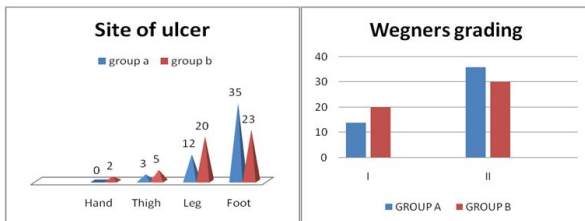
malignancy, patients with peripheral vascular diseases, venous ulcers and patients not consenting

Statistical analysis was done by SPSS software 23.0 version p value <0.05 was significant

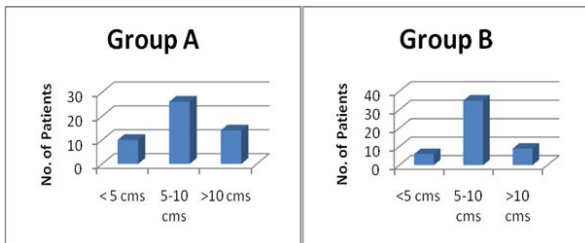
RESULTS

Majority(62%) of the patients in group A were in the age group of 60 to 80 years with an average of 61.84±11.29 years while 52% of population in group B were in the 40-60 year range with an average of 60.94±12.44 years. 53 were men and 47 were women. In group A, 20 patients (20%) had ulcer size less than 5 cm, 26 patients (52%) had ulcer size between 5-10 cm and 14 patients (28%) had ulcer size greater than 10 cm at time of initial assessment. In group B, 6 patients (12%) had ulcer size less than 5 cm, 35 patients (70%) had ulcer size between 5-10 cm and 9 patients (18%) had ulcer size greater than 10 cm at the time of dressing. In group A, 28 patients presented with infected ulcers which required debridement before application of microdacyn, whereas in group B 34 ulcers required debridement.

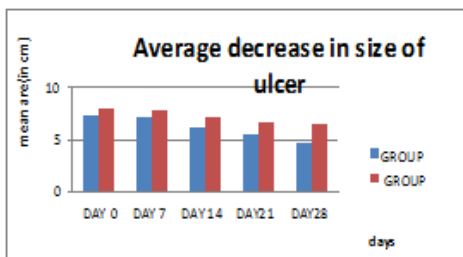
- Site of ulcer and Grade of ulcer



- Ulcer size(in cm) and Mean ulcer size(in cm)



	DAY 0		DAY 0		DAY 0		DAY 21		DAY 28	
	A	B	A	B	A	B	A	B	A	B
Mean	7.40	7.98	7.16	7.84	6.28	7.26	5.54	6.78	4.82	6.52
SD	3.23	3.00	3.22	2.97	3.31	2.57	2.84	2.31	2.69	1.82
p value	0.346		0.0036		<0.0001		<0.0001		<0.0001	



In the present study, patients were evaluated over a period of 4 weeks. Only 4 patients in Group A showed complete ulcer healing compared to the 2 patients in Group B. The mean area of the ulcer in the two groups was comparable to Group A with an average ulcer area of 7.40 cm that of group B of 7.98 cm. the present study of diabetic foot ulcers treated with microdacyn shows early granulation and rapid epithelialization with respect to the betadine group. There was a significant decrease in ulcer size after the microdacyn medications from the first evaluation to the end of the first week. The median follow-up of 28 days showed that the mean wound reduction in the microdacyn group was 35% versus 18% in the betadine group. This parameter also reflected the improvement of epithelialization. In addition, irritation and pain during application of Microdacyn was inferior to betadine, hence better patient compliance with Microdacyn dressing. The appearance of the granulation tissue was healthy with evidence of improved microcirculation. The total cost of dressings per cm² wound area was slightly higher, but was statistically negligible compared to conventional dressings but could not be accurately

determined because it was operator dependent. Significantly less periwound edema / erythema was observed in Group A patients. The discharge amount decreased significantly in Group A patients during the subsequent condiments.

Initial culture positivity was seen in 46 patients in group A and 49 patients in group B. Cultures were repeated at the end of each week till 4 weeks. By the end of 4 weeks 28 patients in group A and 20 patients in Group B did not show any growth on culture.

GALLERY



Decrease in size of wound and epithelialisation after microdacyn dressings



Wound Before and after debridement and microdacyn dressings with Appearance of healthy granulation tissue after 1 week of microdacyn dressings

DISCUSSION

Diabetic ulcers being the most common complication associated with Diabetes and the same being a major cause of morbidity in such patients, ulcer management is a crucial step in any diabetic patient with an ulcer. A number of wound dressing techniques with use of variety of materials have been devised and this field is ever evolving. The concept of use of Super-Oxide Solution in wound dressings came into reality in the year 2003 when it achieved a status of "Disinfectant and Antiseptic" in Mexico⁶. Since then multiple studies have been carried out proving its efficacy in the treatment of varieties of ulcers.

In the current study the efficacy of Microdacyn dressings v/s betadine dressings in diabetic wound management was studied. Adequate glycaemic control was achieved in all the patients by physician/diabetologist.

Pandey P et al⁷ in their study consisting 100 patients found that the decrease in wound area at the end of the 1st, 2nd, 3rd and 4th week, which was statistically significant, was more in the new group than the iodo-povidone group (p = 0.005, 0.002, <0.001 and 0.001 respectively) which was consistent with the findings of our study. Further granulation tissue formation was earlier. Abhyankar et al⁸ in their study comparing oxum versus betadine dressing of chronic wounds conducted in 30 Indian patients, with 15 patients in each group showed a significant reduction in parameters such as wound area and

microbial colony count in oxum treated group reaching consensus with the observation of our study.

Similar results were obtained in a study by Kapur et al⁵ wherein in 200 patients with ulcers of variable etiology on a 21-day average follow-up showed that the mean decrease in the size of diabetes wounds treated with Oxum(70% vs 50%). Decrease in purulent discharge (100% versus 90% at day 12 for Oxum) and early occurrence of granulation and epithelialization (100% versus 85% per day 18) was evident. Also there was marked reduction in inflammation and healing was faster.

A study by Meera et al⁹ in 100 patients with diabetic foot ulcers showed that superoxide was superior over Povidone Iodine in terms of time taken for the lesion to heal and disinfection of wound and concluded that early detection, prompt debridement and wound care with Superoxide along with proper glycaemic control as a holistic approach definitely prevents morbid amputations.

Prabhakar et al¹⁰ in a study on 60 subjects with 30 in each group showed. The mean final area in oxum treated group was significantly low compared to betadine group ($p=0.009$) and the mean percentage reduction in ulcer area among patients with group A was significantly high ($p=0.024$).

Martínez-De Jesús et al¹¹ in their study also took into consideration duration of diabetes, obesity, HbA1c, initial fasting glycaemia, ulcer duration/week, depth and extent of infection/periwound cellulitis as well as aetiology. Surrounding cellulitis diminished ($P < 0.001$) in 17 patients (80.9% versus 43.7%). Nineteen patients showed advancement to granulating tissue stage (90.4% versus 62.5%; $P = 0.05$) with significantly less tissue toxicity (94% versus 31.2%; $P < 0.01$)

Studies by Paolo Dalla et al¹², Piaggese et al¹³ and Nevrekar et al¹⁴ showed early healing of ulcers and average reduction in wound size and periwound odema/erythema with oxum. Decrease in purulent discharge with early appearance of granulation and epithelisation proved oxum to be safe and efficient as a wound care product and superior to povidone iodine.

Most of the studies done show a significant reduction in the primary parameters like ulcer size/area, appearance of healthy granulation tissue, healing time, culture negativity and also prove that superoxide treated groups lead to significant reduction in the secondary parameters like wound discharge, peri-wound edema, erythema and odour thus suggesting that it can be a much better alternative to the conventional dressing materials used.

CONCLUSION

Use of Microdacyn dressings resulted in significant decrease in size of the ulcer and early epithelialisation. Also it has an advantage in decreasing the microbial load. Further ease of dressing, better patient compliance and the cost differences between the microdacyn and betadine dressings being negligible makes it novel technological innovation in the therapy of diabetic wounds with a better tolerance profile.

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