

A STUDY ON CLINICAL OUTCOME OF VACUUM ASSISTED DRESSING VERSUS CONVENTIONAL SALINE DRESSING IN THE MANAGEMENT OF DIABETES ULCER AT THANJAVUR MEDICAL COLLEGE -RANDOMISED CONTROLLED STUDY

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ABSTRACT

Background: Diabetic foot presents a significant public health concern that could reach pandemic levels globally, particularly in India. The innovative VAC dressing technique shows promise in lowering the complications associated with diabetic foot ulcers. This study aims to evaluate the effectiveness of vacuum-assisted dressing compared to traditional saline dressing in treating diabetic ulcers, by analyzing changes in clinical wound measurements and the effect on hospital stay duration. **Materials and Methods:** Thirty patients participated in the study. Those in Group A received two applications of VAC dressing along with standard wound care, while Group B received only traditional wound care and debridements. Detailed patient histories were gathered, basic blood tests were conducted, and diabetic ulcers were assessed for surface area and Wagner grading. Both groups received uniform care, which included antibiotics, regular dressings, debridement, nutritional management, and blood sugar control. Key observations included the presence of red granulation tissue, wound contraction, and healing, with eligible patients also undergoing split skin grafting to address infections and contracture issues. **Results:** The VAC dressing group exhibited significantly enhanced wound healing in comparison to the debridement group, with 30% demonstrating over 75% granulation compared to 23.3% in the latter ($p < 0.0001$). The VAC group also showed a greater rate of infection resolution and more progress towards split skin grafting and closure (66.7% versus 26.7%; $p = 0.002$). Additionally, this group experienced improved graft uptake ($p = 0.011$) and a shorter hospital stay ($p < 0.0001$). **Conclusion:** Patients treated with VAC therapy experienced statistically significant improvements in wound healing, with enhanced granulation tissue formation, higher rates of wound contraction, increased candidacy for skin grafting, and better uptake of grafts after surgery.

INTRODUCTION

Diabetic foot ulcers (DFUs) are a common complication associated with diabetes mellitus, leading to considerable morbidity, mortality, and healthcare costs. It is estimated that between 19% to 34% of individuals with diabetes may experience a DFU during their lives, with the International Diabetes Federation projecting that 9.1 to 26.1 million people will develop such ulcers annually.^[1] What may appear to be a harmless ulcer on a diabetic patient can often result in amputation; a study conducted in the United States found that 38% of all amputations were linked to diabetes mellitus. This situation poses a significant health burden and financial strain on both patients and healthcare systems, despite the fact that DFUs are preventable.

Effective management of DFUs requires rigorous prevention, prompt assessment, and proactive treatment by a multidisciplinary team. The purpose of this review is to explore current diagnostic and treatment options for diabetic foot ulcers.^[2] While conventional dressings are the typical approach, they often struggle to maintain a moist wound environment. As a result, various treatment options, including hydrocolloid wound gels, growth factors, enzymatic treatments, hyperbaric oxygen therapy, cultured skin substitutes, and other modalities have been proposed. However, these treatments can be costly and lack sufficient scientific backing regarding their effectiveness.^[3] Evidence indicates that Vacuum-Assisted Closure (VAC) Therapy is a successful treatment for diabetic foot ulcers and is widely utilized in developed nations, though there is limited comparative data on its efficacy against

traditional dressing methods. Therefore, this study aims to be conducted at a large tertiary care center with a sufficient sample size to compare the effectiveness of VAC Therapy with conventional dressing in promoting the healing of diabetic foot ulcers.^[4] The VAC technique is straightforward; it involves placing an open-pore foam dressing onto the wound, sealing it with a transparent adhesive drape, and applying negative pressure through a drainage tube inserted in the foam.^[5]

Objective

To compare the outcome of vacuum-assisted wound closure (VAC) versus conventional wound dressing in diabetic foot ulcers.

MATERIALS AND METHODS

This prospective comparative study at Thanjavur Medical College involved 60 patients with diabetic foot ulcers, who were randomly divided into two groups: Group A received VAC therapy, while Group B underwent only wound debridement. The objective was to assess the effectiveness of VAC therapy compared to conventional treatment methods. Inclusion criteria specified that the ulcers had to be larger than 5 cm, and participants had to be between the ages of 20 and 80. Both groups were provided with standard care, including antibiotics and blood sugar management, but Group A also had two VAC therapy sessions. The study evaluated key factors such as granulation tissue formation, the frequency of debridement, duration of hospital stays, and success rates of grafts. Data collected included patient history, ulcer size, Wagner's classification, and relevant blood tests. The primary focus was on determining how well VAC therapy improves wound healing compared to standard debridement techniques.

Ethical Considerations

Approval was obtained from the Institutional Ethics Committee of Thanjavur Medical College. Informed consent in writing was secured from all participants. Patient confidentiality was upheld throughout the study. Participants were allowed to withdraw at any time without impacting their standard treatment.

Statistical Analysis

Descriptive statistics, including mean \pm SD for continuous data and percentages for categorical data, were analyzed using SPSS (v21.0) and Microsoft Excel.

RESULTS

This study compared the effectiveness of Vacuum-Assisted Closure (VAC) therapy to conventional wound debridement in treating diabetic foot ulcers (DFUs). A total of 60 patients were enrolled, with 30 patients in each group. The demographic analysis revealed that the majority of patients in both groups were male (83.3%) and in the 41-60 age range (76% in the VAC group, 70% in the debridement group). The two groups had similar baseline characteristics regarding diabetes treatment, with 92.6% of VAC group patients on oral hypoglycaemic agents (OHAs) and 69% of debridement group patients on OHAs. Most ulcers were Wagner grade 2, with one patient in the debridement group having a grade 4 ulcer.

The VAC group demonstrated superior wound healing. Thirty percent of patients in the VAC group achieved more than 75% granulation, compared to only 6.7% in the debridement group ($p < 0.0001$). Furthermore, 66.7% of VAC patients progressed to split skin grafting compared to 26.7% in the debridement group ($p = 0.002$), with significantly better graft uptake in the VAC group ($p = 0.011$).

VAC therapy also resulted in a significantly shorter hospital stay, with 40% of patients discharged within 15 days, while 63.3% of debridement patients stayed longer than 21 days ($p < 0.0001$). The VAC group required fewer debridement (4.03 ± 1.07) compared to the debridement group (7.67 ± 2.14) ($p < 0.0001$).

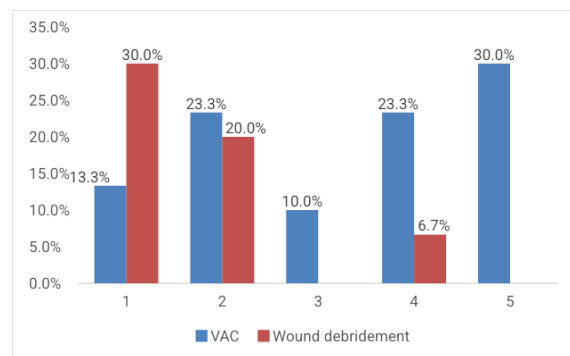
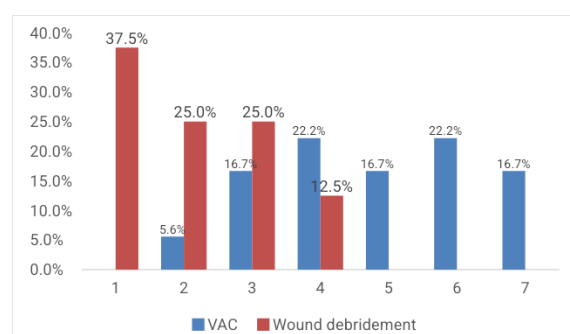
Although ulcer size, diabetes duration, and certain biochemical parameters (hemoglobin, random blood sugar, albumin) did not show significant differences between groups, the VAC group showed significantly better outcomes in terms of wound healing, infection resolution, and graft success. These results suggest that VAC therapy is a more effective treatment for diabetic foot ulcers, improving healing, reducing hospital stays, and minimizing the need for additional surgical interventions.

Table 1: Distribution of Age, Sex, Diabetic treatment profile and wagners grade between both groups

		INTERVENTION GROUP		P VALUE
		VAC COUNT	WOUND DEBRIDEMENT COUNT	
AGE	<40	2	3	0.614
	41-50	14	9	
	51-60	9	12	
	>61	5	6	
SEX	FEMALE	5	5	1
	MALE	25	25	
Rx for DM	INSULIN BASAL	2	5	0.145
	INSULIN PLAIN	0	1	
	IRREGULAR	0	3	
	OHA	25	20	
WAGNER'S GRADE	1	1	0	0.254
	2	27	29	
	3	2	0	
	4	0	1	

Table 2: Comparison of hospital stay between both groups

	VAC	WOUND DEBRIDEMENT	P VALUE
No of days stay in hospital			<0.0001
<15	12	2	
16-21	18	9	
>21	0	19	

**Figure 1: Comparison of percentage of granulation achieved between both groups****Figure 2: Comparison of Graft Uptake between both groups**

DISCUSSION

This study compared the effectiveness of Vacuum-Assisted Closure (VAC) therapy and traditional wound debridement in treating diabetic foot ulcers (DFUs). A total of 60 patients were enrolled, with 30 in each group. Both groups had similar demographics, with a predominance of male patients (83.3%) and most aged 41-60 years.

The VAC group showed significantly better outcomes in granulation tissue formation, with 30% of patients achieving more than 75% granulation compared to just 6.7% in the debridement group ($p < 0.0001$). This was in line with previous studies showing that VAC accelerates wound healing. The VAC group also required fewer surgical debridement (4.03 ± 1.07) compared to the debridement group (7.67 ± 2.14) ($p < 0.0001$), reducing the need for invasive interventions and associated pain.

VAC therapy also improved skin graft outcomes, with 66.7% of patients progressing to grafting, compared to 26.7% in the debridement group ($p = 0.002$). Among those who received grafts, the VAC group had significantly better graft uptake ($p = 0.011$), with no patients exhibiting less than 50% uptake.

Additionally, the VAC group had a significantly shorter hospital stay. All patients were discharged

within 21 days, with 40% leaving within 15 days. In contrast, 63.3% of debridement patients stayed longer than 21 days ($p < 0.0001$). Despite similar levels of glycaemic control and other secondary parameters like haemoglobin and albumin, the VAC group demonstrated superior wound healing outcomes, suggesting that VAC's benefits extend beyond glycaemic control.

Overall, VAC therapy significantly outperformed traditional debridement in improving healing, reducing hospital stays, and enhancing graft success, supporting its use as a standard treatment for DFUs.

Limitations

Our study involved a small sample size of patients from a single centre. Moreover, the comparison between VAC therapy and debridement alone was not standardized for ulcer size and duration. We have also not studied the effect of the number of VAC applications on the results obtained and chose to observe the uniformity of the two dressings. Further large-scale and multi-centric studies should be conducted to accurately determine the efficacy of VAC dressings and establish guidelines.

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CONCLUSION

Patients who received VAC therapy had statistically better wound healing, with better development of granulation tissue, better rates of wound contracture, more patients becoming candidates for skin grafting, and better uptake of skin graft post-surgery. It also reduced morbidity by reducing the length of hospital stay and the number of formal debridement's required. VAC therapy can be drafted into regular protocols for the treatment of chronic diabetic wounds and to reduce associated morbidity.

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