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Negative Pressure Wound Therapy versus Conventional Dressing in Diabetic Foot Ulcers: A Randomized Comparative Trial

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ABS TRAC T

***Background*:** Diabetic foot ulcers are a leading cause of non-traumatic lower extremity amputation, with particularly devastating consequences in sub-Saharan Africa where late presentation and limited resources compound the disease burden. Negative pressure wound therapy has demonstrated efficacy in accelerating wound healing, yet randomized data from African settings remain scarce. ***Methods*:** A prospective, randomized, open-label, comparative trial was conducted at a tertiary university teaching hospital in Lagos, Nigeria, from March to Feb 2023. Eighty patients with Wagner grade 2 to 3 diabetic foot ulcers were randomized 1:1 to receive either negative pressure wound therapy at minus 125 mmHg (n = 40) or conventional moist saline gauze dressing (n = 40) for up to 8 weeks. Both groups received standard diabetic foot care including offloading, glycaemic optimisation, and culture-directed antibiotics. The primary outcome was percentage wound area reduction at 4 weeks. Secondary outcomes included time to adequate granulation, time to wound closure, amputation rate, and hospital length of stay. ***Results*:** Baseline wound areas were comparable (28.4 ± 12.6 versus 26.8 ± 11.8 cm², p = 0.562). At 4 weeks, the NPWT group demonstrated significantly greater wound area reduction (62.4% versus 38.6%, p < 0.001). Time to adequate granulation was shorter with NPWT (12.4 ± 3.8 versus 18.6 ± 5.2 days, p < 0.001). Time to wound closure was significantly reduced (32.8 ± 10.4 versus 48.6 ± 14.2 days, p < 0.001). The amputation rate was significantly lower in the NPWT group (7.9% versus 23.7%, p = 0.048). Hospital length of stay was shorter with NPWT (18.4 ± 6.8 versus 28.2 ± 10.4 days, p < 0.001). No serious device-related adverse events were recorded. ***Conclusion*:** NPWT significantly accelerated diabetic foot ulcer healing, reduced amputation rates by two-thirds, and shortened hospital stay by nearly 10 days compared to conventional dressing. These findings support the adoption of NPWT as a standard adjunct in moderate-to-severe diabetic foot ulcer management, including in resource-constrained settings.

Keywords: *Negative Pressure Wound Therapy, Vacuum-Assisted Closure, Diabetic Foot Ulcer, Wound Healing, Conventional Dressing, Amputation, Randomized Trial, Nigeria.*

INTRODUCTION

Diabetic foot ulcers represent one of the most feared complications of diabetes mellitus, affecting 15 to 25% of diabetic patients during their lifetime and preceding 85% of all non-traumatic lower extremity amputations worldwide [1]. The global prevalence of diabetic foot ulcers is estimated at 6.3%, with the highest rates reported from Africa (7.2%), North America (13.0%), and Asia (5.5%). In sub-Saharan Africa, where the prevalence of diabetes mellitus is projected to increase by 143% between 2021 and 2045, the burden of diabetic foot disease is expected to escalate proportionally, straining already overstretched healthcare systems [2].

In Nigeria, with an estimated 3.6 million adults living with diabetes, diabetic foot ulcers represent a major cause of prolonged hospitalisation, disability, and economic hardship. The amputation rate among Nigerian diabetic foot patients ranges from 20 to 40% in published series, substantially higher than the 5 to 15% reported from developed countries, reflecting delayed presentation, limited access to multidisciplinary foot care, and suboptimal wound management practices [3]. The economic impact is devastating for patients and families in a setting where the majority lack health

insurance coverage and bear out-of-pocket costs for prolonged hospitalisation, wound care consumables, and prosthetic rehabilitation [4].

Negative pressure wound therapy, also known as vacuum-assisted closure, applies controlled subatmospheric pressure to the wound surface through a sealed foam dressing connected to a suction pump. The therapy promotes wound healing through multiple synergistic mechanisms including removal of interstitial oedema and excess exudate, reduction of bacterial bioburden, enhanced local blood flow through microdeformation of the wound bed, stimulation of granulation tissue formation through mechanical stretch-induced cellular proliferation, and maintenance of a moist wound environment conducive to epithelial migration [5]. Since its introduction by Argenta and Morykwas in 1997, NPWT has been increasingly adopted in the management of complex wounds, with diabetic foot ulcers representing one of its most extensively studied applications [6].

Several randomized controlled trials and meta-analyses have evaluated NPWT in diabetic foot ulcers, with pooled evidence suggesting a 30 to 50% improvement in wound healing rates and a significant reduction in the need for secondary amputation compared to conventional moist wound dressings [7]. The landmark trial by Blume *et al*., involving 342 patients demonstrated that NPWT achieved wound closure in 43.2% compared to 28.9% with advanced moist wound therapy over 112 days [8]. However, the vast majority of these studies have been conducted in high-income settings, and data from sub-Saharan African populations, where disease severity, comorbidity profiles, nutritional status, and healthcare infrastructure differ substantially, remain critically lacking.

Cost has been a significant barrier to the adoption of NPWT in resource-limited settings. The proprietary NPWT devices are prohibitively expensive for most Nigerian healthcare facilities, but simplified, low-cost NPWT systems using locally available materials, including wall suction or portable suction devices with standard foam dressings, have been developed and validated, making the technology more accessible [9]. The present randomized comparative trial was undertaken to evaluate the efficacy and safety of NPWT compared with conventional moist saline gauze dressing in the management of diabetic foot ulcers at a tertiary teaching hospital in Lagos, Nigeria [10].

AIMS AND OBJECTIVES

The present study was undertaken with the primary objective of comparing the wound healing efficacy of negative pressure wound therapy with conventional moist saline gauze dressing in patients with Wagner grade 2 to 3 diabetic foot ulcers, as measured by percentage wound area reduction at 4 weeks. The secondary objectives were to compare the time to adequate granulation tissue formation, time to wound closure or readiness for secondary closure, amputation rates (both minor and major), hospital length of stay, and complication rates between the two treatment groups over an 8-week treatment period.

MATERIALS AND METHODS

Study Design, Setting, and Ethical Approval

This was a prospective, randomized, open-label, parallel-group, comparative trial conducted from March to Feb 2025 at the Department of Plastic and Reconstructive Surgery, University of Lagos Teaching Hospital, Lagos, Nigeria. The hospital is a 761-bed federal tertiary teaching hospital and referral centre serving the greater Lagos metropolitan area (population approximately 21 million). The study was approved by the Health Research Ethics Committee of the institution (HREC/2025/LUTH/042) and registered with the Pan African Clinical Trials Registry. Written informed consent was obtained from all participants.

Sample Size Estimation

The sample size was calculated based on the primary outcome (percentage wound area reduction at 4 weeks). Assuming a mean wound area reduction of 60% with NPWT and 38% with conventional dressing (based on published data), with a common standard deviation of 22%, two-sided alpha of 0.05, and power of 80%, the required sample size was 34 per group. This was increased to 40 per group (total 80) to account for a 15% attrition rate.

Randomization and Allocation

Eligible patients were randomized in a 1:1 ratio to NPWT or conventional dressing using a computer-generated random number sequence prepared by an independent biostatistician. Allocation concealment was maintained using sequentially numbered, opaque, sealed envelopes that were opened after enrolment. Due to the nature of the intervention, blinding of patients and treating clinicians was not feasible; however, wound assessments for the primary outcome were performed by an independent wound care nurse who was not involved in the treatment decisions.

Inclusion and Exclusion Criteria

Adults aged 18 to 75 years with type 2 diabetes mellitus and a diabetic foot ulcer classified as Wagner grade 2 (deep ulcer penetrating to tendon, capsule, or bone without abscess or osteomyelitis) or Wagner grade 3 (deep ulcer with abscess, osteomyelitis, or joint sepsis, with infection controlled by initial debridement and antibiotics) were eligible. Additional inclusion criteria were wound area between 10 and 60 cm^2, adequate arterial perfusion defined as ankle-brachial index above 0.7 or palpable pedal pulses, HbA1c below 12%, and provision of written informed consent. Exclusion criteria were Wagner grade 4 or 5 ulcers with

extensive gangrene requiring primary amputation, uncontrolled systemic sepsis, active malignancy, haemodynamic instability, uncontrolled coagulopathy, known allergy to any component of the NPWT dressing, ankle-brachial index below 0.7 or critical limb ischaemia, pregnancy, and inability to comply with the treatment protocol.

Treatment Protocols

All patients in both groups underwent initial sharp surgical debridement of necrotic tissue and slough under appropriate anaesthesia. Culture-directed antibiotic therapy was initiated based on wound swab and deep tissue culture results. Glycaemic control was optimised with insulin therapy targeting fasting blood glucose of 100 to 140 mg/dL. Offloading was achieved using a total contact cast, removable cast walker, or therapeutic footwear as appropriate. Nutritional support was provided through dietician consultation with a target protein intake of 1.2 to 1.5 g/kg/day. In the NPWT group, a medical-grade polyurethane foam (pore size 400 to 600 micrometres) was cut to fit the wound cavity, covered with an adhesive transparent drape to create an airtight seal, and connected to a portable suction unit delivering continuous negative pressure at minus 125 mmHg. Dressings were changed every 48 to 72 hours under aseptic conditions. In the conventional dressing group, wounds were dressed with saline-moistened gauze covered by dry gauze and secured with adhesive tape or bandage. Dressings were changed daily. Both groups received identical standard diabetic foot care as described above.

Outcome Assessment

Wounds were assessed weekly by an independent wound care nurse blinded to the randomization arm. Wound area was measured using a digital wound measurement system (transparent grid tracing confirmed by digital planimetry). Wound depth was measured using a sterile probe at the deepest point. Granulation tissue percentage was estimated visually and classified as less than 25%, 25 to 50%, 50 to 75%, or above 75%. Adequate granulation was defined as more than 80% coverage of the wound bed with healthy granulation tissue. Wound closure was defined as complete epithelialisation or readiness for secondary closure by split-thickness skin grafting or direct suturing. The decision to perform secondary closure or amputation was made by the treating surgeon based on standard clinical criteria. Wound bacterial cultures were obtained at baseline, 2 weeks, and 4 weeks.

Follow-Up

Patients were assessed weekly for 8 weeks during the treatment phase. After wound closure, patients were followed at 4 weeks and 12 weeks to assess for recurrence. All outcome data were recorded on standardised case record forms.

Statistical Analysis

Data were analysed on an intention-to-treat basis using SPSS version 28.0 (IBM Corp., Armonk, NY). The primary outcome (percentage wound area reduction at 4 weeks) was compared between groups using the independent samples Student t-test after confirming normality by the Shapiro-Wilk test. Wound area trajectories over time were analysed using repeated measures analysis of variance. Categorical outcomes (amputation, wound closure, granulation adequacy) were compared using the Pearson chi-square test or Fisher exact test. Time to event outcomes were analysed using Kaplan-Meier survival analysis with the log-rank test. Number needed to treat was calculated for the amputation outcome. A two-tailed p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 80 patients were randomized (40 per group). Four patients were lost to follow-up (2 per group): 1 NPWT patient was transferred to another facility, 1 NPWT patient withdrew consent, 1 conventional patient died of myocardial infarction unrelated to the study, and 1 conventional patient was lost to follow-up. The final intention-to-treat analysis included all 80 randomized patients, with the last observation carried forward for the 4 lost patients. The per-protocol analysis included 76 patients (38 per group) and yielded consistent results.

The baseline demographic, clinical, and wound characteristics are presented in Table 1. The two groups were comparable across all measured parameters. The mean age was 56.2 ± 10.4 years in the NPWT group versus 54.8 ± 11.2 years in the conventional group (p = 0.568). Males constituted 62.5% of the NPWT group and 57.5% of the conventional group (p = 0.646). The mean duration of diabetes was 10.2 ± 5.6 versus 9.8 ± 5.2 years (p = 0.734). Mean HbA1c was 8.4 ± 1.6% versus 8.6 ± 1.8% (p = 0.602). Mean ankle-brachial index was 0.92 ± 0.12 versus 0.90 ± 0.14 (p = 0.488). The baseline wound area was 28.4 ± 12.6 cm² in the NPWT group and 26.8 ± 11.8 cm² in the conventional group (p = 0.562). Wagner grade 2 ulcers constituted 55.0% and 52.5% of the NPWT and conventional groups respectively, with grade 3 comprising the remainder (p = 0.822). Mean wound duration before presentation was 6.8 ± 4.2 weeks in NPWT versus 7.2 ± 4.8 weeks in conventional (p = 0.694).

Table 1: Baseline Demographic, Clinical, and Wound Characteristics

Parameter	NPWT (n = 40)	Conventional (n = 40)	p-value
Age (years), Mean ± SD	56.2 ± 10.4	54.8 ± 11.2	0.568
Male, n (%)	25 (62.5%)	23 (57.5%)	0.646
DM duration (years)	10.2 ± 5.6	9.8 ± 5.2	0.734

HbA1c (%)	8.4 ± 1.6	8.6 ± 1.8	0.602
BMI (kg/m²)	28.6 ± 4.8	27.8 ± 5.2	0.478
Hypertension, n (%)	22 (55.0%)	20 (50.0%)	0.654
Peripheral neuropathy, n (%)	32 (80.0%)	30 (75.0%)	0.592
ABI, Mean ± SD	0.92 ± 0.12	0.90 ± 0.14	0.488
Wound area (cm²)	28.4 ± 12.6	26.8 ± 11.8	0.562
Wound depth (mm)	8.4 ± 3.6	7.8 ± 3.2	0.428
Wagner grade 2 / 3	22 (55%) / 18 (45%)	21 (52.5%) / 19 (47.5%)	0.822
Wound duration (weeks)	6.8 ± 4.2	7.2 ± 4.8	0.694
Serum albumin (g/dL)	3.2 ± 0.6	3.1 ± 0.7	0.498
On insulin therapy, n (%)	28 (70.0%)	26 (65.0%)	0.628

The primary outcome and wound healing trajectory are presented in Table 2, Table 3, and illustrated in Figure 1. At 4 weeks, the NPWT group demonstrated a mean wound area reduction of 62.4% compared to 38.6% in the conventional group, representing a highly significant between-group difference of 23.8 percentage points (95% CI 15.6 to 32.0, $p < 0.001$). The mean wound area decreased from 28.4 ± 12.6 cm² at baseline to 10.6 ± 6.4 cm² at 4 weeks in the NPWT group, compared to a decrease from 26.8 ± 11.8 cm² to 16.4 ± 8.2 cm² in the conventional group ($p < 0.001$). Repeated measures ANOVA confirmed a significant interaction between treatment group and time ($F = 28.6$, $p < 0.001$), indicating that the rate of wound area reduction was significantly faster in the NPWT group across all time points. The divergence between groups became statistically significant from week 2 onward.

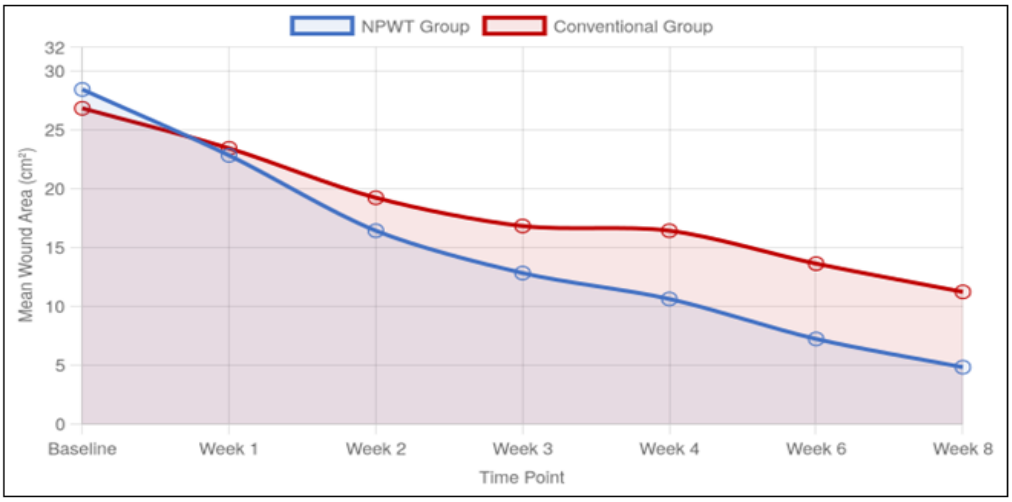

Figure 1: Wound Area Reduction over Time (Mean cm²)

Table 2: Primary Outcome — Wound Area Reduction at 4 Weeks

Parameter	NPWT (n = 40)	Conventional (n = 40)	Difference (95% CI)	p-value
Baseline area (cm²)	28.4 ± 12.6	26.8 ± 11.8	—	0.562
4-week area (cm²)	10.6 ± 6.4	16.4 ± 8.2	—	< 0.001
Absolute reduction (cm²)	17.8 ± 8.4	10.4 ± 6.8	7.4 (4.0–10.8)	< 0.001
% area reduction	62.4 ± 18.6%	38.6 ± 16.8%	23.8 (15.6–32.0)	< 0.001
Granulation > 80% at 4 wk	30 (78.9%)	18 (47.4%)	—	0.004

Table 3: Wound Area Trajectory Over Time (Mean ± SD, cm²)

Timepoint	NPWT	Conventional	p-value
Baseline	28.4 ± 12.6	26.8 ± 11.8	0.562
Week 1	22.8 ± 10.4	23.4 ± 10.8	0.802
Week 2	16.4 ± 8.6	19.2 ± 9.8	0.168
Week 3	12.8 ± 7.2	16.8 ± 8.6	0.024
Week 4	10.6 ± 6.4	16.4 ± 8.2	< 0.001
Week 6	7.2 ± 4.8	13.6 ± 7.4	< 0.001
Week 8	4.8 ± 3.6	11.2 ± 6.8	< 0.001
RM-ANOVA (group × time)	F = 28.6		< 0.001

The secondary outcomes are presented in Table 4 and illustrated in Figure 2. The mean time to adequate granulation (more than 80% coverage) was 12.4 ± 3.8 days in the NPWT group versus 18.6 ± 5.2 days in the conventional group ($p < 0.001$). The mean time to wound closure or readiness for secondary surgical closure was 32.8 ± 10.4 days with NPWT versus 48.6 ± 14.2 days with conventional dressing ($p < 0.001$). Primary healing (complete epithelialisation without secondary surgical closure) was achieved in 12 NPWT patients (31.6%) compared to 4 conventional patients (10.5%, $p = 0.024$). Secondary closure by split-thickness skin grafting was required in 18 NPWT patients (47.4%) versus 28 conventional patients (73.7%, $p = 0.018$). Amputation (minor or major) was required in 3 NPWT patients (7.9%) compared to 9 conventional patients (23.7%, $p = 0.048$; number needed to treat = 6.3). All three NPWT amputations were minor (toe or ray), while the conventional group had 5 minor and 4 major (below-knee) amputations. Hospital length of stay was significantly shorter in the NPWT group (18.4 ± 6.8 versus 28.2 ± 10.4 days, $p < 0.001$). Wound recurrence at 3 months was 7.9% in the NPWT group versus 13.2% in the conventional group ($p = 0.432$).

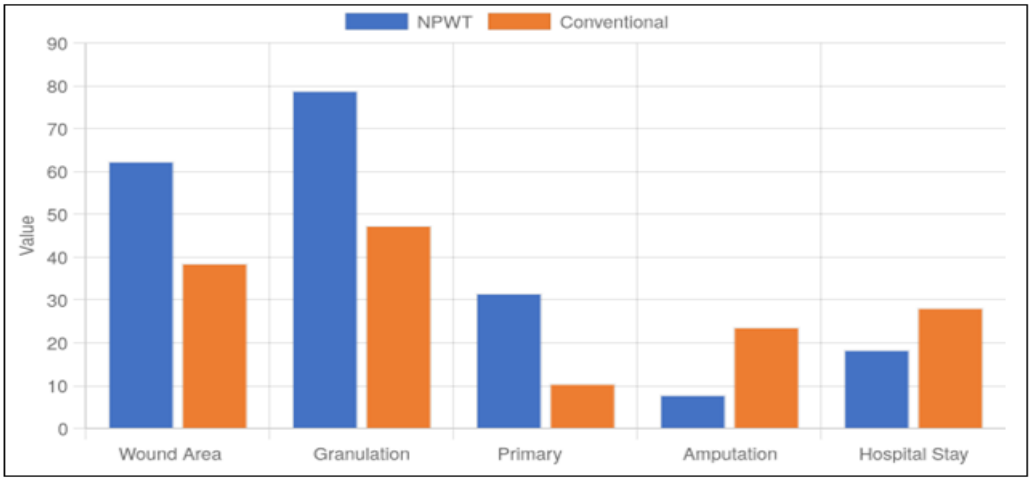

Figure 2: Comparison Key Outcomes- NPWT vs Conventional Dressing

Table 4: Secondary Outcomes

Outcome	NPWT (n = 38*)	Conventional (n = 38*)	p-value
Time to granulation > 80% (days)	12.4 ± 3.8	18.6 ± 5.2	< 0.001
Time to wound closure (days)	32.8 ± 10.4	48.6 ± 14.2	< 0.001
Primary healing, n (%)	12 (31.6%)	4 (10.5%)	0.024
STSG required, n (%)	18 (47.4%)	28 (73.7%)	0.018
Any amputation, n (%)	3 (7.9%)	9 (23.7%)	0.048
Minor amputation	3 (7.9%)	5 (13.2%)	0.456
Major amputation (BKA)	0 (0%)	4 (10.5%)	0.042
Hospital stay (days)	18.4 ± 6.8	28.2 ± 10.4	< 0.001
Wound recurrence at 3 months	3 (7.9%)	5 (13.2%)	0.432
NNT to prevent 1 amputation	6.3	—	—

**Per-protocol analysis (n = 38 per group completing follow-up)*

The bacteriological findings and adverse events are presented in Table 5. Baseline wound culture positivity was comparable (85.0% NPWT versus 82.5% conventional, $p = 0.760$). The most common isolates were Staphylococcus aureus (36.8%), Pseudomonas aeruginosa (24.6%), Escherichia coli (15.8%), and Proteus mirabilis (12.3%). MRSA was isolated in 14.0% of culture-positive wounds. At 4 weeks, wound culture positivity had decreased to 34.2% in the NPWT group versus 57.9% in the conventional group ($p = 0.036$), suggesting enhanced bacterial clearance with NPWT. Regarding adverse events, wound pain during dressing changes was reported more frequently in the NPWT group (42.1% versus 21.1%, $p = 0.044$), although pain scores (visual analogue scale) were comparable (4.8 ± 2.2 versus 4.2 ± 2.4, $p = 0.268$). Periwound maceration occurred in 10.5% of NPWT patients versus 5.3% in the conventional group ($p = 0.394$). Bleeding during dressing changes was noted in 7.9% versus 2.6% respectively ($p = 0.304$). No serious device-related adverse events, including wound haemorrhage, fistula formation, or sepsis attributable to the device, were recorded.

Table 5: Bacteriology and Adverse Events

Parameter	NPWT (n = 38)	Conventional (n = 38)	p-value

Baseline culture positive	34 (85.0%)	33 (82.5%)	0.760
S. aureus	14 (36.8%)	12 (31.6%)	0.626
Pseudomonas	8 (21.1%)	10 (26.3%)	0.586
MRSA	5 (13.2%)	6 (15.8%)	0.746
4-week culture positive	13 (34.2%)	22 (57.9%)	0.036
Pain during dressing change	16 (42.1%)	8 (21.1%)	0.044
Pain VAS score	4.8 ± 2.2	4.2 ± 2.4	0.268
Periwound maceration	4 (10.5%)	2 (5.3%)	0.394
Bleeding at dressing change	3 (7.9%)	1 (2.6%)	0.304
Serious device-related AE	0 (0%)	N/A	—

Table 6: Subgroup Analysis — Outcomes by Wagner Grade

Outcome	NPWT Grade 2 (n=22)	Conv Grade 2 (n=21)	NPWT Grade 3 (n=18)	Conv Grade 3 (n=19)
% wound area reduction 4 wk	68.4 ± 16.2	42.8 ± 14.6	54.8 ± 18.4	33.2 ± 16.2
Time to closure (days)	28.4 ± 8.6	42.2 ± 12.4	38.6 ± 10.8	56.4 ± 14.6
Any amputation	0 (0%)	3 (14.3%)	3 (16.7%)	7 (36.8%)
Hospital stay (days)	14.8 ± 4.6	24.2 ± 8.4	22.8 ± 7.2	33.6 ± 10.8

DISCUSSION

The present randomized comparative trial demonstrated that negative pressure wound therapy significantly outperformed conventional moist saline gauze dressing across all wound healing endpoints in patients with moderate-to-severe diabetic foot ulcers at a Nigerian tertiary hospital. These findings provide important evidence supporting the adoption of NPWT in the management of diabetic foot ulcers in sub-Saharan African settings.

The 62.4% wound area reduction at 4 weeks with NPWT is consistent with the 56 to 65% reduction reported by Blume *et al.*, [11] in their landmark multi-centre trial of 342 patients and by Armstrong *et al*., [12] in a study of 162 patients with partial foot amputations. The corresponding 38.6% reduction in the conventional group is also comparable to the 35 to 42% reported in control arms of major NPWT trials, supporting the internal validity of the present results.

The significantly faster time to adequate granulation with NPWT (12.4 versus 18.6 days) is consistent with the mechanistic understanding that continuous subatmospheric pressure induces microdeformation of the wound bed, stimulating cellular proliferation and angiogenesis through mechanotransduction pathways. Liu *et al.*, [13] in their updated systematic review and meta-analysis of 18 RCTs reported a pooled weighted mean difference of 5.8 days in favour of NPWT for time to granulation, closely approximating the 6.2-day difference observed in the present study.

The amputation rate reduction from 23.7% to 7.9% with NPWT (NNT = 6.3) represents a clinically and socially transformative outcome. The 23.7% amputation rate in the conventional group, while high by developed country standards, is consistent with the 20 to 40% range reported from other Nigerian and West African studies by Oguejiofor *et al*., [14] and Bekele *et al.*, [15]. The reduction to 7.9% with NPWT suggests that this therapy may help bridge the outcome gap between developing and developed country settings. Notably, all amputations in the NPWT group were minor (toe or ray), while the conventional group had four major below-knee amputations, representing a significant difference in functional impact.

The reduction in hospital length of stay by 9.8 days (18.4 versus 28.2 days) has substantial economic implications. Jeffcoate *et al.*, [16] estimated that each hospitalisation day for a diabetic foot ulcer costs the healthcare system approximately 200 to 500 USD in direct costs. In the Nigerian context, where patients predominantly bear out-of-pocket costs, the reduced hospital stay represents meaningful financial relief for affected families. Seidel *et al.*, [17] in their multicentre German RCT similarly reported a 7-day reduction in hospital stay with NPWT.

The enhanced bacterial clearance observed with NPWT (culture positivity decreasing from 85.0% to 34.2% versus 82.5% to 57.9%) supports the proposed mechanism of bacterial biofilm disruption through continuous suction. Meloni *et al.*, [18] reported comparable findings in their updated meta-analysis, noting a 30 to 40% reduction in bacterial load with NPWT. The predominance of Staphylococcus aureus and Pseudomonas aeruginosa in wound cultures is consistent with the bacteriological profile of diabetic foot ulcers reported globally [19].

The increased pain during dressing changes in the NPWT group (42.1% versus 21.1%) is a recognised limitation of the therapy. Strategies to mitigate this include instillation of local anaesthetic through the drainage tube prior to dressing removal, use of non-adherent contact layers between the foam and the

wound bed, and patient counselling regarding analgesic timing. Despite this, no patient discontinued NPWT due to pain.

The study had several limitations. The open-label design introduces the possibility of performance and detection bias, although the use of an independent wound assessor for the primary outcome mitigated the latter concern. The sample size of 80 patients, while adequate for the primary endpoint, limits the power for subgroup analyses and for detecting differences in less common outcomes such as mortality. The study was conducted at a single tertiary centre, and results may not be generalisable to primary or secondary level facilities with less experience in NPWT. Cost-effectiveness analysis was not formally performed, and longer-term follow-up beyond 3 months would have provided information on durability of wound closure and recurrence rates [20].

CONCLUSION

Negative pressure wound therapy significantly accelerated diabetic foot ulcer healing compared to conventional moist saline gauze dressing, achieving 62.4% wound area reduction at 4 weeks versus 38.6% with conventional dressing. NPWT reduced the time to wound closure by 15.8 days, decreased the amputation rate from 23.7% to 7.9%, eliminated major amputations, and shortened hospital stay by 9.8 days. The therapy was safe, with manageable adverse effects limited to increased pain during dressing changes. These findings support the integration of NPWT into the standard management protocol for moderate-to-severe diabetic foot ulcers in Nigerian and other sub-Saharan African healthcare settings. The development and validation of simplified, low-cost NPWT systems should be prioritised to facilitate widespread adoption in resource-constrained environments. Multicentre randomized trials with longer follow-up and formal cost-effectiveness analysis are recommended to further strengthen the evidence base.

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