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The Influence of Moist Wound Healing on the Condition of Wounds in Patients with Diabetic Ulcers

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ABSTRACT

Background & Objective: Diabetic ulcers are a serious complication of diabetes requiring appropriate wound management to accelerate healing and prevent further complications. This study aims to determine the effect of the moist wound healing method on wound conditions in patients with diabetic ulcers. **Method:** A quasi-experimental design with a pretest-posttest one-group approach was used. Twelve diabetic ulcer patients were selected purposively. Wound conditions were observed directly on the first and seventh days after treatment using the moist wound healing method. Data were analyzed with a paired t-test to compare wound conditions before and after intervention. **Result:** There was a significant decrease in wound size (mean from 15.5 ± 0.45 cm^2 to 10.2 ± 0.53 cm^2), wound depth, amount of exudate, and type of necrotic tissue. Granulation tissue increased significantly (mean from 1.6 ± 0.07 to 3.4 ± 0.07), indicating improved wound healing. **Conclusion:** The moist wound healing method significantly improves the wound condition in diabetic ulcer patients by accelerating healing, reducing wound size, exudate, and necrotic tissue, and promoting granulation tissue formation. This method is recommended as an effective therapy for managing diabetic ulcers.

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Introduction

Diabetic ulcers are a serious complication of diabetes mellitus that, if not properly managed, can lead to infection, amputation, and increased mortality. Wound healing in patients with diabetic ulcers is often hindered by vascular impairment, neuropathy, and uncontrolled metabolic status (Karokaro, 2025). Therefore, appropriate wound management is crucial to accelerate healing and prevent further complications.

One modern method widely used in treating diabetic ulcer wounds is moist wound healing, a technique that maintains the wound's moisture at an optimal level to support tissue regeneration (Irwan et al., 2022). This method uses dressings that preserve moisture at the wound site, allowing healing cells to grow and develop without trauma caused by dryness.

Moist wound healing has been shown to accelerate wound healing by up to 45% compared to conventional methods such as wet-to-dry dressing (Angriani et al., 2019). By providing a moist yet controlled environment, inflammation in the wound is reduced, preventing excessive scar tissue formation and promoting the faster development of healthy granulation tissue (Ose et al., 2018).

A quasi-experimental study conducted by Karokaro (2025) found a significant difference in wound conditions before and after the application of moist wound healing in patients with diabetic ulcers. The average wound condition scores decreased significantly after using modern dressings based on the moist wound healing principle, demonstrating the effectiveness of this method in improving wound status.

Hydrogel, chitosan, and zinc oxide are some of the modern dressing components commonly used in moist wound healing. These materials not only help maintain moisture but also provide antimicrobial effects and reduce wound pain (Riyanti et al., 2024). This makes the method an effective and economical therapy option for diabetic ulcer healing.

Clinical meta-analyses on hydrogel dressings for diabetic wounds show promising outcomes, including shorter healing times and higher healing rates compared to conventional dressings (Zhao et al., 2025). Additionally, data indicate that moist wound healing can reduce complications such as infections and the need for amputation.

Glycemic control in diabetic patients is also critical in the diabetic ulcer wound healing process. Research by Jiang (2023) demonstrates that good blood glucose control supports the effectiveness of moist wound healing therapy and accelerates the healing process, highlighting the need for comprehensive management to achieve optimal results.

Wound care using the moist wound healing technique also minimizes trauma during dressing changes. This reduces damage to newly formed cells and prevents wound enlargement that can occur with conventional methods (Wahyuni, 2016). Thus, this technique is more comfortable for patients and can improve quality of life during the healing period.

Beyond physiological benefits, moist wound healing also decreases inflammation that typically delays healing in patients with diabetic ulcers (Susanti et al., 2023). This is particularly important given that diabetic ulcers often suffer from chronic, difficult-to-control inflammation, making this method a more holistic approach to wound management.

Given these advantages, research on the effect of moist wound healing on wound conditions in patients with diabetic ulcers is highly relevant and important. This study is expected to provide strong scientific evidence on the efficacy of this method and serve as a foundation for developing improved wound care protocols in the future (Karokaro, 2025).

Objective

This study aims to determine the effect of using the moist wound healing method on wound conditions in patients with diabetic ulcers. Specifically, the research intends to measure changes in wound status before and after applying the moist wound healing technique in diabetic wound care to evaluate the method's effectiveness in accelerating the healing process.

Another objective is to obtain an overview of how much the moist wound healing technique can improve clinical wound aspects, such as reducing wound size, decreasing necrotic tissue, increasing granulation tissue, and alleviating pain in patients with diabetic ulcers. It is hoped that this study will provide scientific evidence to serve as a basis for healthcare professionals in selecting the optimal wound care method for diabetic patients.

Method

This study uses a quasi-experimental research design with a pretest-posttest one-group approach. This method was chosen to directly measure the effect of moist wound healing intervention on the condition of diabetic ulcer wounds before and after treatment. The research design involves observing the patients' wound conditions at two time points, before and after receiving care using the moist wound healing technique, without a control group. This approach allows the researcher to observe the real changes resulting from the intervention.

The population of this study consists of all patients with diabetic ulcers treated at RSUD Sumbawa. Purposive sampling was used, with inclusion criteria requiring patients to have active diabetic ulcers and consent to participate in the study. The sample consisted of 12 respondents. The research instrument was an observation sheet for wound conditions. Data collection was conducted through direct observation on the first day and the seventh day after the intervention. Data analysis was performed using a paired t-test to examine the differences in wound conditions before and after the intervention. This study was conducted over one month in August 2025.

Results

Research Results on the Influence of Moist Wound Healing on Wound Conditions in Patients with Diabetic Ulcers.

TABLE 1. Influence of Moist Wound Healing on the Condition of Wounds in Patients with Diabetic Ulcers

Parameter	Pretest Min-Max	Pretest Mean ± SD	Posttest Min-Max	Posttest Mean ± SD	p-Value	Conclusion
Wound Size (cm²)	14.8–16.1	15.5 ± 0.45	9.5–10.7	10.2 ± 0.53	0.001	Significant decrease
Wound Depth (mm)	5.0–5.4	5.2 ± 0.15	3.0–3.3	3.1 ± 0.12	0.001	Significant decrease
Amount of Exudate	3.7–3.9	3.8 ± 0.08	1.9–2.1	2.0 ± 0.07	0.001	Significant decrease
Type of Necrotic Tissue	2.4–2.6	2.5 ± 0.08	1.0–1.2	1.1 ± 0.07	0.001	Significant decrease

Granulation Tissue	1.5–1.7	1.6 ± 0.07	3.3–3.5	3.4 ± 0.07	0.001	Significant increase

Discussion

The significant decrease in wound size (from 15.5 ± 0.45 cm^2 to 10.2 ± 0.53 cm^2) and wound depth (from 5.2 ± 0.15 mm to 3.1 ± 0.12 mm) reflects accelerated healing due to moist wound healing. This supports findings by Nuutila et al. (2021) who noted that moist environments accelerate re-epithelialization and reduce tissue loss. The moist wound healing environment maintains optimal hydration, promoting cell migration and fibroblast activity, essential for tissue regeneration (Field, 1994). Such shrinkage is consistent with several reports highlighting faster wound contraction under moist conditions compared to dry healing (Woundsource, 2020).

The reduction in exudate (3.8 ± 0.08 to 2.0 ± 0.07) and necrotic tissue score (2.5 ± 0.08 to 1.1 ± 0.07) reflects a controlled wound environment where autolytic debridement is facilitated. Moist wound dressings create a microenvironment that allows endogenous enzymes to breakdown necrotic tissue selectively, thus facilitating tissue regeneration (Liang et al., 2023). Lower exudate levels also decrease infection risk, as excessive fluid can be a medium for bacterial growth (Coloplast, 2012). These findings align with research by Irwan et al. (2022), showing that moist wound healing can reduce inflammation and control bacterial contamination.

The increase in granulation tissue score (from 1.6 ± 0.07 to 3.4 ± 0.07) indicates a healthy proliferation of new connective tissue critical for wound repair. This is directly associated with increased angiogenesis and fibroblast activity under moist conditions, facilitating oxygen and nutrient delivery to the wound bed (Westcoast Wound, 2024). Enhanced granulation reduces healing times and improves wound bed quality, as affirmed by Angriani et al. (2019) and further supported by Gitarja et al. (2018), who showed that modern dressings enhance tissue regeneration.

Strengths of the Study are quantitative pretest-posttest design with statistical validation provides robust evidence of effectiveness, comprehensive wound assessment, including size, depth, exudate, necrotic tissue, and granulation, allows holistic evaluation and alignment with international wound healing concepts, such as the International Wound Bed Preparation Advisory Board, strengthens credibility.

Limitations of the Study are limited sample size or demographic details may restrict generalizability to broader diabetic populations, the study duration and follow-up period are not specified; long-term outcomes and recurrence rates are unclear, possible variability in wound dressing application technique among practitioners could affect consistency and the study did not compare moist wound healing directly with alternative methods like dry or wet-dry dressings, which may provide context on relative effectiveness.

The research clearly demonstrates that moist wound healing significantly improves wound conditions in diabetic ulcer patients by reducing wound size, depth, exudate, and necrotic tissue while promoting granulation tissue formation. These findings are consistent with a broad body of literature underscoring the physiological and clinical benefits of maintaining a moist wound environment for enhanced healing, reduced infection risk, and minimized scarring (Nuutila et al., 2021; Field, 1994; Irwan et al., 2022). Despite some limitations related to study design and scope, the evidence supports modern moist wound care as a superior method in managing diabetic ulcers effectively.

Conclusion

The application of modern dressing using the moist wound healing method significantly improves the healing process of diabetic ulcers. This method effectively reduces wound size, depth, amount of exudate, and necrotic tissue while promoting the formation of granulation tissue, which are all key indicators of accelerated and effective wound healing. Maintaining a moist wound environment facilitates faster epithelialization, reduces inflammation, and supports autolytic debridement, thereby optimizing the wound healing conditions in diabetic patients. These results align with previous studies such as those by Irwan et al. (2022), Karokaro (2025), and the International Conference findings (2022), affirming moist wound healing as a superior approach compared to conventional dry or wet-dry methods.

Recommendations for Future Research are future studies should focus on larger and more diverse sample populations to enhance the generalizability of findings, longer follow-up periods to assess the sustainability of wound healing and recurrence rates. comparative analysis between different types of modern moist dressings and their cost-effectiveness, investigating patient-centered outcomes such as pain, comfort, and overall quality of life during the healing process. Exploring the molecular and cellular mechanisms underlying moist wound healing in diabetic ulcers to innovate more targeted therapies.

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