

# Application of Moist Wound Healing with Hydrogel on Diabetic Wounds at Asri Wound Care Center Medan

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## ABSTRACT

Diabetic foot ulcer is a common and serious complication of diabetes mellitus that requires effective wound management to accelerate healing and prevent further complications. Objective: This study aimed to evaluate the effectiveness of moist wound healing using hydrogel in improving wound healing outcomes among patients with diabetic foot ulcers at Asri Wound Care Center Medan. Methods: This study employed a *case study design* with *purposive sampling*. A total of five patients with diabetic foot ulcers stage 4 were included, consisting of three patients in the treatment group and two patients in the control group. Wound healing outcomes were assessed using the Bates-Jensen Wound Assessment Tool (BWAT) over seven wound care sessions. Results: The treatment group demonstrated a more significant improvement in wound healing compared to the control group. BWAT scores in the treatment group decreased from 43 to 24 (R1), 40 to 20 (R2), and 39 to 20 (R3), indicating marked reductions in necrotic tissue, slough, biofilm, and exudate, along with improved wound base and granulation tissue formation. In contrast, the control group showed smaller reductions in BWAT scores, from 40 to 34 (R4) and 41 to 33 (R5), reflecting a slower healing process with residual necrotic tissue and exudate. Conclusion: Moist wound healing using hydrogel was more effective than conventional wound care in accelerating the healing of diabetic foot ulcers, as evidenced by greater BWAT score reductions and improved wound characteristics. These findings support the use of hydrogel as an effective dressing in diabetic wound management.

**Keywords: Moist Wound Healing, Hydrogel, Diabetes Mellitus Wounds, Asri Wound Care Center Medan**

## INTRODUCTION

Diabetes mellitus is a condition where there is an imbalance in blood sugar levels caused by a disorder in the pancreas, which is responsible for producing the insulin hormone, so that it is unable to meet the body's needs (Purwanti et al., 2023). Diabetic foot ulcers are a complication that occurs in people with diabetes mellitus (Armstrong, 2024). Diabetic foot ulcers are usually caused by someone with diabetes having two or more risk factors at the same time, with diabetic peripheral neuropathy and peripheral arterial disease usually playing a key role (Hidayat & Widowati, 2024).

The high prevalence of diabetes mellitus globally, nationally, and regionally is accompanied by an increasing incidence of diabetic wounds as a serious complication. Data on diabetes mellitus sufferers at the Asri Wound Care Center Medan shows a significant number of 415

cases in 2024, with 30 cases in the last two months, which indicates the need to evaluate the applied wound care methods. The application of moist wound healing with hydrogel is believed to create an optimal wound environment to accelerate the healing process, reduce the risk of infection, and prevent further complications. However, surveys and research are needed to obtain a real picture of the effectiveness of this method in daily nursing practice, so that the results can be used as a basis for developing standards for diabetic wound care at the Asri Wound Care Center Medan.

Moist wound healing treatment is more effective than conventional methods because it is easy to install, can adjust to the shape of the wound, easy to remove, comfortable to wear, does not require frequent dressing changes, absorbs drainage, presses and immobilizes wounds, prevents new wounds from mechanical injury, prevents infection, improves hemostasis by pressing the dressing (Primadani & Nurrahmantika, 2021). One topical treatment for diabetic wounds is hydrogel (Annisa & Kristinawati, 2025). Hydrogel is a highly hydrated polymer material made from natural polymers such as alginate and collagen, designed to support wound healing (Hossain, 2024). With its ability to absorb wound fluid, maintain moisture, and facilitate gas exchange, hydrogel creates an optimal environment for tissue regeneration (Brumberg et al., 2021).

Based on research results Karina et al. (2024) stated that there was a significant effect of the use of modern hydrogel dressings and antimicrobial dressings on reducing wound healing scores and improving peripheral sensation in patients with gangrene pedis. This is in line with research Hidayat and Widowati (2024) stated that the use of hydrogel is very effective in accelerating the autolysis process and healing of diabetic foot wounds.

The use of hydrogel in wound care has been proven to play an important role in accelerating the healing process through various mechanisms, including maintaining the humidity of the wound environment, facilitating optimal autolytic debridement, reducing pain levels, stimulating the formation of granulation tissue, and increasing peripheral perfusion. Based on these mechanisms, the author is interested in implementing the moist wound healing method with hydrogel in diabetic wound patients at the Asri Wound Care Center Medan as an effort to improve the quality and results of wound care.

## METHODS

This type of research is a case study design research, which is a form of research (inquiry) or case study and intervention on an intervention on a problem that has a specific nature with the aim of studying intensively about social units such as associations, families and even the wider community (Polit & Beck, 2021). The population type in the purposive sampling study is patients at the Asri Wound Care Center Clinic Medan with inclusion criteria namely age >40 years, suffering from Diabetes Mellitus and having Grade 4 foot wounds with classification Wound Size: Wound Length 36-<80 cm, Wound Depth: skin and deep tissue lost to bone/muscle/tendon, Wound Edge: not fused with the wound base, Undermining: Cave 2-4 cm, Exudate Type: Serous, Skin Color around the wound: dark red, Edema Tissue in the Wound: Pitting Edema <4 cm around the wound, Granulated wound tissue: 25%, Epithelialization: 25%-50% epithelialization (Belagali et al., 2024). And the exclusive criteria are patients with necrotic wounds and patients have comorbidities. In the study before implementing Moist Wound Healing with hydrogel in diabetic wound patients, the researcher provided an explanation of the purpose, process, benefits and stated their willingness through Informed Consent. All data and information of respondents were kept confidential and anonymous without including the personal identity of respondents in accordance with applicable research ethics principles. The number of samples was 5 people, consisting of 3 respondents in the treatment group and 2 respondents in the control group. The difference in the number of respondents between groups was adjusted to the availability of subjects and the characteristics of the case study research, which emphasizes in-depth observation of individual responses rather than generalization of research results.

## RESULTS

### Respondent Characteristics

Distribution of Respondent Characteristics

Respondents	Group	Age (Years)	Gender	Wound Stage
R1	treatment group	62	Male	Stadium 4
R2	treatment group	56	Male	Stadium 4
R3	treatment group	55	Female	Stadium 4
R4	control group	48	Male	Stadium 4
R5	control group	50	Male	Stadium 4

**Based on Table 1.** it shows that the study respondents consisted of 5 people, consisting of 3 respondents in the treatment group and 2 respondents in the control group. The age range of

respondents was between 48-62 years, with the majority of respondents being male. All respondents had stage 4 diabetes mellitus wounds, so the basic characteristics of the respondents were relatively homogeneous and descriptive comparisons between the treatment and control groups could be made

### Comparison of BWAT Scores of Treatment Group and Control Group

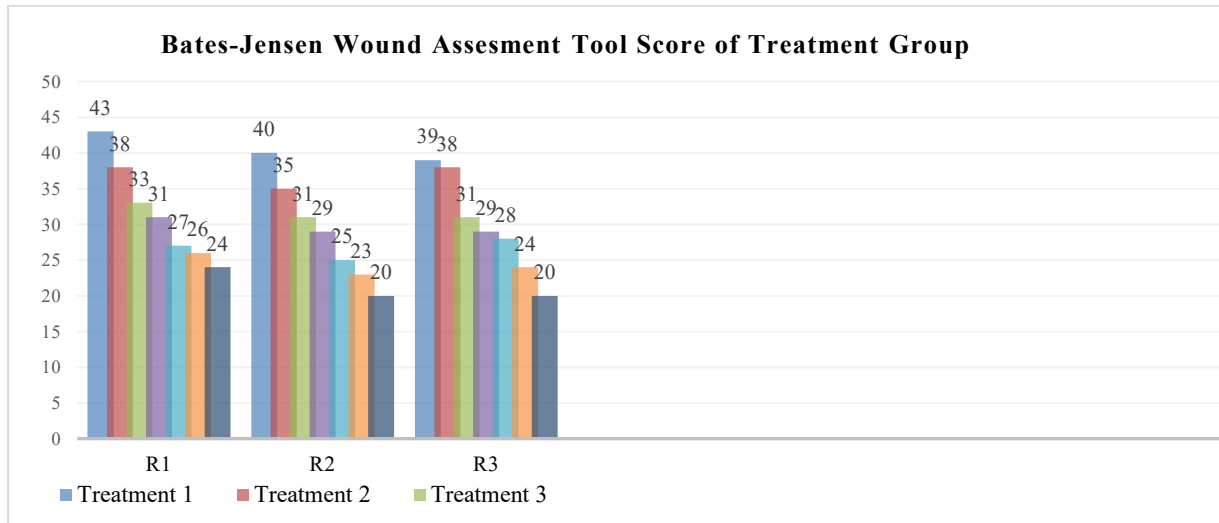


Figure 1. Decrease in Bates-Jensen Wound Assessment Tool scores in the treatment groups, namely R1, R2 and R3, which shows that the intervention given can improve wound conditions.

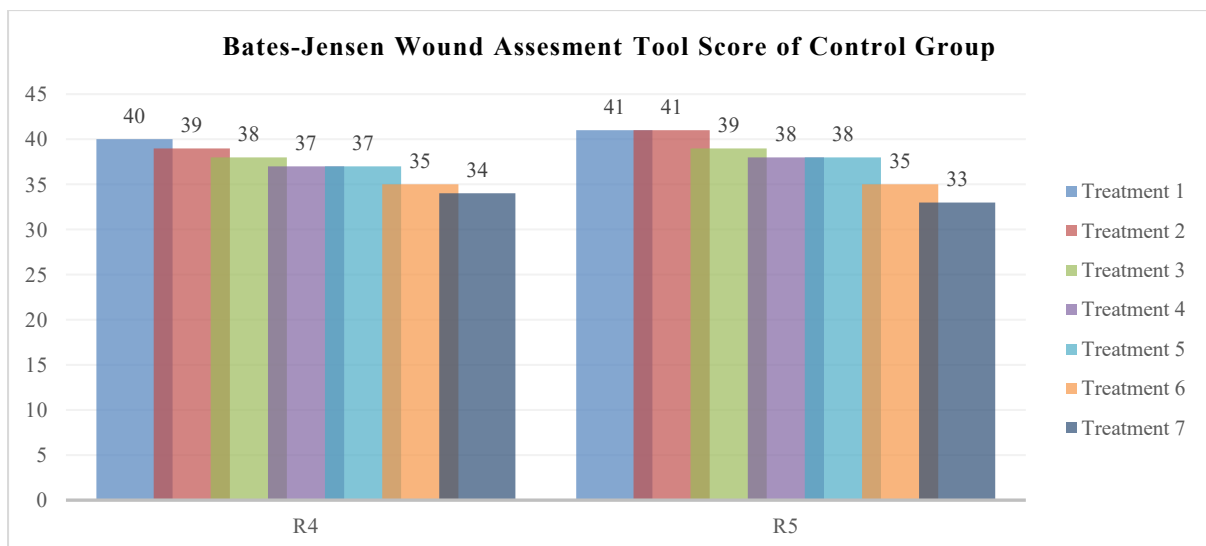


Figure 2. Decrease in Bates-Jensen Wound Assessment Tool scores in the control group, namely R4 and R5, which shows that the intervention given can improve wound conditions.

## DISCUSSION

Diabetes mellitus wound management is carried out through systematic wound care management to create a supportive healing environment, including wound cleansing, wound condition assessment, and appropriate dressing selection (Aminuddin et al., 2020). One approach used is moist wound healing with hydrogel, which functions to maintain wound moisture, support gas exchange, and facilitate autolysis (Nuutila & Eriksson, 2021).

The implementation of moist wound healing treatment using hydrogel from November 18, 2024, to December 19, 2024, showed that the treatment group experienced better clinical improvement than the control group. After seven treatments, the treatment group showed a decrease in BWAT scores accompanied by a reduction in necrotic tissue, slough, and biofilm, a decrease in the amount of exudate, and optimal wound bed repair and granulation tissue formation, while the control group showed slower healing (Armayani et al., 2022).

In the treatment group, R1 showed significant wound improvement with a decrease in BWAT score from 43 to 24, indicating a reduction in necrotic tissue and slough, a decrease in exudate, and improvement in the wound bed and edges despite the initial condition being a complex wound with two interconnected cavities. R2 experienced a decrease in BWAT score from 40 to 20, indicating a good healing process with a reduction in slough and exudate and improvement in the wound bed tissue, although there was damage to two toes. Meanwhile, R3 showed a decrease in BWAT score from 39 to 20, indicating stable wound improvement through a reduction in slough, biofilm, and exudate despite the absence of cavities from the beginning.

In the control group, R4 experienced a decrease in BWAT score from 40 to 34 and R5 from 41 to 33. Although there was improvement, the results showed a slower healing rate, characterized by suboptimal granulation tissue formation and the presence of necrotic tissue and exudate..

Hydrogel is an effective dressing material for promoting wound healing due to its ability to retain moisture, absorb exudate, and reduce pain (Amanda, et al., 2022). The three-dimensional network structure of hydrogels maintains a stable wound environment and supports the local presence of therapeutic agents, thus accelerating the healing process (Hu et al., 2022).

## CONCLUSION

The results showed that moist wound healing treatment using hydrogel provided more significant clinical improvement in the treatment group compared to the control group. After

seven treatments, the treatment group experienced a greater reduction in BWAT scores, accompanied by reduced necrotic tissue, slough, and biofilm, decreased exudate, and improved wound bed and more optimal granulation tissue formation. In contrast, the control group showed a slower healing rate with remaining necrotic tissue and exudate still visible.

These differences in healing responses indicate that hydrogels play a crucial role in creating a conducive wound environment by maintaining wound moisture and facilitating autolysis, thereby accelerating necrotic tissue clearance and supporting granulation tissue formation. Stable moisture also contributes to exudate control and biofilm reduction, a major inhibitor of diabetic wound healing.

In the treatment group, the consistent reduction in BWAT scores across all patients reflects the hydrogel's effectiveness in treating wounds with complex characteristics, including cavities and extensive tissue damage. Meanwhile, the more limited improvement in the control group indicates that without the support of a dressing that maintains optimal moisture, tissue regeneration is slower (Vijaya et al., 2022).

These findings align with research by (Karina et al., 2024) which reported a significant reduction in BWAT scores after the use of hydrogel and antimicrobial dressings in patients with gangrene pedis. These findings also align with a study by Primadani and Nurrahmantika, (2021) which demonstrated that the moist wound healing method can accelerate the healing of diabetic foot wounds by improving BWAT scores. Therefore, this study strengthens the evidence that hydrogel is an effective dressing in the management of diabetic foot wounds, particularly in accelerating the healing process and improving wound tissue quality.

## **LIMITATION**

The study was conducted on a limited number of patients due to time, cost, and the availability of patients who met the inclusion and exclusion criteria. The severity of diabetic wounds varies from patient to patient, resulting in variable results from hydrogel application. Patient compliance with home wound care can also influence healing outcomes, but this cannot be fully controlled by the researchers.

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