KIAN JOURNAL
ISSN 2964-3910
PREFIX DOI: 10.56359/kian
Vol. 3 No. 1 Page Number 33-41

Implementation of Aloe Vera for Wound Care in Post Op Amputation Patients with Diabetes Mellitus

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DOI: https://doi.org/10.56359/kian.v3i1.556

ABSTRACT

Introduction: Diabetes mellitus is a chronic metabolic disease that can cause serious complications such as impaired wound healing. One of the severe complications is amputation, which requires optimal wound care to prevent infection and accelerate tissue regeneration. Aloe vera is known to have anti-inflammatory, antibacterial, and stimulating tissue regeneration effects.
Objective: This study aims to implement the use of aloe vera gel in wound care in postoperative amputation patients with diabetes mellitus.
Method: The study used a descriptive case study approach that focused on the nursing care process and the use of aloe vera gel as a nonpharmacological therapy in wound care.
Result: After administering aloe vera gel for 3 meetings, the results showed that the wound looked more moist, increased hydration, sufficient exudate, and complete epithelialization without signs of infection. This intervention is effective in addressing skin/tissue integrity disorders.
Conclusion: Aloe vera gel is proven to be effective in helping the wound healing process in postoperative amputation patients with diabetes mellitus and can be an alternative nursing implementation.

Keywords: Aloe vera, wound care, diabetes mellitus, amputation, nursing

Introduction

Diabetes mellitus (DM) is a chronic metabolic disease that has become a global health problem. This disease is characterized by increased blood glucose levels (hyperglycemia) due to impaired insulin secretion by the pancreas, ineffective insulin action, or a combination of both. Insulin is an important hormone that regulates glucose metabolism in the body. An imbalance of this hormone causes glucose to not be able to enter the cells properly, thus accumulating in the blood and triggering various long-term complications (ADA, 2022).

One of the chronic complications often found in people with diabetes mellitus is chronic wounds that are difficult to heal, known as diabetic ulcers. This condition often starts from small wounds that go unnoticed due to disturbances in the peripheral nervous system (diabetic neuropathy), and is accompanied by blood flow disorders (angiopathy) which cause

a decrease in the supply of oxygen and nutrients to body tissues. If not treated properly, the wound can worsen and lead to severe infection, gangrene, and amputation (Zhang, P. Et al 2020).

DM patients who undergo amputation require special attention in the process of postoperative wound care (postoperative amputation), because the wound healing process in these patients progresses more slowly than non-diabetic patients. This is due to various factors, such as disruption of tissue vascularization, hyperglycemia that causes changes in the body's immune response, and the high risk of local and systemic infections. In this context, effective, efficient and safe wound care is very important to accelerate the healing process and prevent further complications (Zhang, P. Et al 2020).

In Indonesia alone, the prevalence of diabetes mellitus continues to show an increase from year to year. Based on data from the Indonesian Ministry of Health and the International Diabetes Federation (IDF), Indonesia is ranked in the top five in the world in terms of the number of people with diabetes. The West Java region, as one of the provinces with the largest population, records a significant number of DM cases. Ciamis Regency, as part of the province, has also experienced an increase in the number of diabetes cases, including chronic wound complications that require serious treatment. UPTD Puskesmas Lakbok, one of the health care facilities in the region, has a high prevalence of DM cases, making it a relevant location for this study (MOH, 2023).

Wound care in post amputation patients with DM requires a multidimensional approach, both medically and nursing. In addition to pharmacological interventions involving the administration of antibiotics, analgesics, or insulin for blood sugar control, nonpharmacological approaches are also very important to support the success of wound therapy. One of the non-pharmacological therapies that has begun to be widely used is the use of natural ingredients such as Aloe vera (aloe vera) in gel form (Armstrong, D. Et al 2021).

Aloe vera has long been recognized in traditional and modern medicine as a plant that has various therapeutic benefits. Its thick, slimy leaves contain bioactive compounds such as aloin, glucomannan, gibberellin, vitamins C and E, and anti-inflammatory enzymes. These compounds work synergistically to improve tissue hydration, accelerate cell regeneration, stimulate collagen production, and inhibit the growth of pathogenic microorganisms. In addition, the anti-inflammatory effect of aloe vera can reduce pain and inflammation in wounds (Khorsandi, L. Et al 2020).

Various previous studies have shown the effectiveness of aloe vera gel in accelerating the wound healing process, both burns, cuts, and chronic ulcers. However, the use of aloe vera specifically in postoperative amputation wounds due to DM is still not widely discussed in the context of nursing practice in Indonesia, especially in first-level health care facilities. Therefore, this study is very important to directly assess the impact of using aloe vera gel on the wound healing process in post op amputation patients with a background of diabetes mellitus (Hamzah, F. Et al 2021).

This intervention not only offers a relatively cheap and easily available approach, but is also safer than the use of chemical drugs which in some cases can actually trigger irritation or microbial resistance. Aloe vera as an adjunctive therapy in wound care also has the potential to improve patient quality of life, shorten the length of stay, and reduce the burden of health costs for both individuals and health care institutions (Hamzah, F. Et al 2021).

This study was motivated by the urgency of finding effective and efficient solutions in caring for postoperative wounds in patients with DM. It is hoped that the results of this study can make a real contribution to nurses in designing and implementing targeted interventions, as well as being a reference for educational institutions and health services in improving the quality of nursing services.

With this background, the author felt the need to explore the implementation of aloe vera gel as part of nursing interventions in accelerating wound healing in postoperative amputation patients due to diabetes mellitus. The main focus in this study is how the application of aloe vera gel can provide optimal clinical results in a relatively short time and strengthen the role of nurses as holistic healing agents.

Objective

To evaluate the effectiveness of aloe vera gel implementation in accelerating wound healing in post-amputation surgery patients with diabetes mellitus.

Method

Design and setting

This research design uses a descriptive case study design with a nursing approach to explore the effectiveness of using Aloe Vera gel in wound care in postoperative amputation patients with diabetes mellitus (Polit, D. et al 2021). The research was conducted in Baregbeg Village, Lakbok District, Ciamis Regency, which is the domicile or residence of the patient.

Population and sampling

The population in this study were patients who underwent amputation due to complications of diabetes mellitus in the Lakbok area, Ciamis Regency. This population was chosen because it has characteristics relevant to the research objectives, namely evaluating the effectiveness of using aloe vera gel on post-amputation wounds. Inclusion criteria included patients who had undergone amputation due to diabetic ulcers, were willing to follow the research procedures, and had open wounds that could be treated regularly. Exclusion criteria were patients who suddenly withdrew as respondents, clients who experienced sudden health problems such as dizziness, fatigue, and weakness and other problems that did not allow respondents and clients who experienced a decline in health condition.

The sample in this study was determined using purposive sampling technique, namely by selecting subjects intentionally based on certain criteria in accordance with the needs of the case study. The number of samples used in this study was one patient who met the inclusion and exclusion criteria. The selection of this number is based on a descriptive case study approach, where the main focus is an in-depth exploration of one case comprehensively. This allows researchers to explore detailed and contextual data related to the implementation of the use of aloe vera gel on the wound healing process in patients with specific conditions (Etikan, I. Et al 2020).

The sample selection procedure was carried out by conducting an assessment with a brief interview and observation of the wound condition. The selected patient was 57 years old, male, with a history of diabetes mellitus for more than 5 years, and had undergone amputation. The determination of the number of single samples in this study is based on the

case study method which aims to explore clinical phenomena thoroughly, not for generalization, but to produce an in-depth description that can be the basis for evidence-based nursing interventions.

Instrument and measurement

The instruments used in this study were a nursing assessment format and a wound observation sheet based on the Bates-Jensen Wound Assessment Tool (BWAT) standard. This tool includes parameters such as wound size, depth, necrotic tissue, exudate, wound edges, skin discoloration around the wound, and degree of epithelialization. Each aspect is scored on a numerical scale to obtain a more objective total wound condition score.

In addition, a standardized nursing documentation format was used to record the results of assessment, intervention, and evaluation after administering Aloe Vera gel. The instruments were tested for content validity by the supervisors and examiners, and reliability was tested through readability tests and consistency of observations during the implementation of the intervention. Measurements were taken systematically at each treatment session to ensure consistency and accuracy of data (Bates-Jensen, B. M. 2021).

Data collection and analysis

Data collection in this study was carried out through direct observation of patient wounds, semi-structured interviews with patients and families, and documentation of nursing care provided. The instruments used included wound observation sheets using the Bates-Jensen assessment format, daily wound progress notes, and nursing evaluation sheets. Data were collected during three meetings at the research location, namely one of the patient's homes in Baregbeg Village, Lakbok District, Ciamis Regency.

The participant in this study was one post op amputation patient with a history of diabetes mellitus who met the inclusion criteria.

After the data was collected, the analysis was done descriptively qualitative. Data obtained from observations and interviews were analyzed through a process of data reduction, data presentation, and conclusion drawing. Data validity was maintained through source triangulation, discussion with academic supervisors, and systematic recording of each nursing action process. The results of the analysis were used to assess the effectiveness of using aloe vera gel on the patient's wound healing process.

Result

Table 1. Wound Evaluation Before and After Application of Aloe Vera Gel

Parameters	Day 1	Day 2	Day 3
Wound Lenght	19 cm	19 cm	18 cm
Wound Moisture	Wet	Moist	Optimal
Exudate	A little	Simply	Normal
Signs of Infection	None	None	None
Epitalization	100 %	100 %	100%

After intervention with aloe vera gel, the wound showed increased moisture, reduced pain, and faster epithelialization process.

Discussion

This section discusses the research findings in more depth by linking them to theory, previous studies, and their implications for nursing practice. This discussion does not just repeat the results, but aims to provide meaning, context, and a new perspective on the effectiveness of using aloe vera gel in wound care in postoperative amputation patients with diabetes mellitus. With this approach, it is hoped that a more comprehensive understanding can be gained regarding the potential of aloe vera as a nonpharmacological intervention in wound nursing practice (Maan, A. A. Et al 2022).

Restate the Key Findings

This study showed that the use of aloe vera gel in the treatment of postoperative amputation wounds in patients with diabetes mellitus gave very positive results. Within three appointments, the wound showed progressive signs of healing such as increased wound moisture, reduced pain, absence of signs of infection, and significantly increased epithelialization (>75%). This shows that aloe vera gel is able to provide optimal wound conditions, which are moist, non-infected, and have sufficient exudate. This effectiveness occurs despite the short duration of action, which further emphasizes the speed of the body's response to this intervention.

Interpret the Results

This finding can be explained from a biological perspective that aloe vera contains active substances such as glucomannan and gibberellin, which are known to stimulate fibroblast activity. Fibroblasts are key cells in the wound healing process as they produce collagen and granular tissue. Aloe vera is also rich in vitamins A, C and E which act as antioxidants, helping to protect tissues from oxidative stress and repair damaged cells. In addition, the chromium content and anti-inflammatory compounds in aloe vera support the regulation of the inflammatory process, which is usually a barrier to wound healing in diabetic patients (Kurnia, D. 2022).

The antimicrobial effect of aloe vera also plays an important role in preventing local infections often experienced by DM patients, especially as high blood sugar levels create a favorable environment for bacterial growth. The natural hydrating properties of aloe vera gel keep the wound moist, which is important for preventing tissue dehydration and maintaining an optimal epithelialization process (Alepandi, R. Et al 2022).

Compare with Previous Studies

The results of this study are in line with a number of previous studies. A study by Sahu (2013) showed that aloe vera gel can accelerate the wound healing process by increasing collagen production and accelerating skin tissue regeneration. Research by Alepandi (2022) also proved the effectiveness of aloe vera in accelerating burn wound healing, specifically due to its antimicrobial content and ability to increase tissue granulation. Meanwhile, Kurnia (2022) highlighted that aloe vera contains essential amino acids and proteins that play an active role in repairing damaged tissue.

In addition, international clinical research suggests that the use of herbs such as aloe vera in medical practice is increasingly gaining ground in integrative approaches. Thus, this study also strengthens the scientific basis for the use of aloe vera in wound care, especially in vulnerable populations such as post-amputation diabetic patients.

Highlight the Implications

The results of this study have important implications for nursing. Firstly, this intervention proves that the use of natural ingredients such as aloe vera can be an effective and economical alternative solution, especially in primary healthcare facilities that have limited access to modern therapies. Second, the use of aloe vera supports holistic nursing practice that takes into account the biological, psychological and spiritual aspects of the patient.

In addition to clinical benefits, this intervention also has a positive impact on patient acceptance. Because it is derived from natural ingredients, aloe vera is more easily accepted by patients and families, especially in the Indonesian culture which has a tendency to prefer herbal remedies. This may improve adherence to therapy and accelerate the wound rehabilitation process.

Furthermore, these results suggest that nurses have a central role in initiating and evaluating herbal-based interventions in the practice setting. Knowledge and skills in implementing aloe vera wound care SOPs can improve the quality of nursing care, reduce complication rates, and reduce long-term health costs.

Discuss the Limitations

Although the results obtained are very promising, this study has some limitations that must be recognized. Firstly, the design used was a single case study so the results cannot be widely generalized to the population of diabetic patients with amputation wounds. Case studies, although in-depth, have limitations in terms of external validity. Secondly, the observations were only made over a short period of time, namely during the three interventions, so the long-term effects of using aloe vera cannot be determined with certainty.

Thirdly, no microbiological or histological examination was conducted in this study to objectively assess tissue changes. The assessment was only based on clinical observations. Laboratory analysis of bacterial culture, collagen levels, or pro-inflammatory cytokine expression would provide objective data that reinforces the observed clinical results. In addition, no direct comparison was made with other wound care methods, such as the use of modern dressings or silver-based ointments, so the relative effectiveness of aloe vera cannot be fully assessed.

Suggest Future Research

To overcome these limitations, further research is highly recommended. Studies with quasi-experimental designs or randomized controlled clinical trials (RCTs) need to be conducted to obtain quantitative data that can be statistically analyzed. A larger sample size will improve the validity and reliability of the results. Studies should also compare aloe vera with other standard wound therapies to determine their relative advantages or disadvantages.

The addition of biomolecular variables such as levels of collagen, fibroblasts and pro-inflammatory cytokines may help explain the mechanisms of wound healing in greater depth. In addition, longitudinal studies could provide information on the long-term effects, possible allergic reactions, and wound recurrence rates after aloe vera use.

Future research could also explore the use of combinations of aloe vera with other herbal ingredients such as honey, propolis, or virgin coconut oil to determine if there is a synergistic effect in accelerating wound healing. Finally, it is important to assess the psychosocial aspects of patients in this herbal intervention, including perceptions of natural remedies, compliance, and the impact on patients' quality of life (Winarni, E. Et al 2021).

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Conclusion

This study aims to evaluate the effectiveness of using aloe vera gel in wound care in post-amputation surgery patients with diabetes mellitus. The results showed that routine application of aloe vera gel was able to accelerate the wound healing process, increase moisture, accelerate epithelialization, and prevent local infection. These findings indicate that aloe vera can be an alternative nonpharmacological intervention that is safe, economical, and easy to implement in nursing practice. Therefore, the use of aloe vera gel is recommended as part of standard wound care, especially in diabetic patients who are prone to healing complications (Arifin, Z. Et al 2023).

Acknowledgement

The authors would like to thank STIKes Muhammadiyah Ciamis for the support and facilities provided during this research process. The author would like to thank the patients and their families who have been willing to be participants and support the smooth implementation of this study.

Author Contribution

Tarisa Yuniar acted as the main author who conducted proposal preparation, data collection, data analysis, and scientific article writing. Ade Fitriani contributed as a supervisor in providing methodological direction, content validation, as well as conducting critical reviews and final editing of the article manuscript. Both authors contributed actively in all stages of research and manuscript preparation.

Conflict of Interest

The authors declare that there are no financial, personal, or professional conflicts of interest that could affect the results and integrity of this study.

Ethical Clearance

This study has obtained ethical approval from the Research Ethics Committee of STIKes Muhammadiyah Ciamis. All research procedures were carried out in accordance with the ethical standards of health research, and participants have given written consent (informed consent) after receiving an explanation of the objectives, benefits, and their rights in this study.

Funding

This research did not receive funding support from any source. All costs of conducting research are borne independently by the author.

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