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Analysis of Wound Treatment in Patients with Diabetic Foot Ulcer (DFU) Using Honey and Aloe Vera Extracts

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ABSTRACT

Diabetic Foot Ulcer (DFU) is a complication of Diabetes Mellitus which occurs due to high blood sugar levels. Treatment for DFU can involve treating pressure sores and mobility exercises and using herbal dressings such as honey and aloe vera extracts. This study aims to analyze the effect of wound care using honey and aloe vera extract on DFU wounds. This research design uses pre-experimental. Data collection used the Bates-Jensen Wound Assessment Tool (BWAT) questionnaire. Analysis used Paired Test. The population used patients with Diabetic Foot Ulcer (DFU) and a sample of 17 respondents was obtained. The results of the study showed that before the wound was treated, the condition of the wound was in the non-regenerating category. After the wound was treated and evaluated, the mean value decreased from previously 25.24 to 16.76. The Paired Test results obtained a Sig value (2-tailed)=0.000 which means it is smaller than α 0.05, thus H1 is accepted. The percentage of influence on wound development was 82.4% indicating that there was regeneration in the wound and 17.6% did not regenerate.

Keywords: Diabetic Foot Ulcer (DFU), honey and aloe vera extract

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INTRODUCTION

Diabetes mellitus is a chronic disease that occurs when the pancreas cannot produce enough insulin or when the body cannot effectively use the insulin produced (Hestiana, 2017). Diabetes mellitus is a metabolic disease that occurs with typical symptoms, namely tingling, dry skin, discomfort in the feet and feet that are easily infected. Microvascular complications that damage the eyes (retinopathy) which results in blindness, damage to the kidneys (nephropathy), nerve damage (neuropathy) which causes impotence and diabetic foot disorders which result in infection (Saputri, 2020). Research conducted by Fatimah (2017) proves that the high incidence of DM causes an increase in complications such as diabetic retinopathy, diabetic nephropathy, stroke, coronary artery disease, Diabetic Foot Ulcer (DFU) and other diseases. A complication that often occurs in DM sufferers is Diabetic Foot Ulcer (DFU). Research shows that as many as 15-25% of DM patients suffer from DFU

during their lives and 59% of patients with DFU have to be amputated due to infections that occur due to the wound.

International Diabetes Federation (IDF) in 2019, a total of 463 million people were estimated to be living with diabetes, representing 9.3% of the global adult population (20-79 years). This number will increase to 578 million (10.2%) in 2030 and 700 million (10.9%) in 2045 (IDF, 2021). The prevalence of diabetes mellitus in Indonesia in 2013 experienced an increase in cases until 2018 (Indonesian Ministry of Health, 2018). Riskesdas reported that diabetes mellitus sufferers in East Java in 2013 were 6.9% and in 2018 were 8.5%. There has been an increase in diabetes mellitus sufferers from the total population with a prevalence increase of 1.6% (Basic Health Research, 2018).

Diabetes mellitus is a complex chronic disease involving metabolic abnormalities and the development of macro vascular, micro vascular and neurological complications as a result of prolonged microangiopathy caused by hyperglycemia. Physiological changes induced by "tissue hyperglycemia" cause nerve damage in the autonomic system that results in shunting of oxygen-rich blood away from the surface of the skin. Nerves are damaged by hyperglycemia in various ways, making it easier for injuries to occur in the nerves. Decreased tissue oxygen levels associated with impaired sensory and motor nerve function can cause Diabetic Foot Ulcer (DFU). Nerve damage in diabetes mellitus involves motor, sensory and autonomic neuropathy. Motor neuropathy causes muscle weakness, atrophy and paresis. Sensory neuropathy causes loss of protective pain sensations of pressure and heat. Autonomic neuropathy that causes vasodilation and reduced sweating can also cause loss of skin integrity, which forms an ideal location for microbial invasion (Wijaya, et al, 2019).

Management of skin integrity disorders from a nursing approach is in accordance with the Indonesian Nursing Intervention Standards (SIKI), namely treating pressure sores and prone movement exercises such as foot exercises for diabetes mellitus patients (PPNI, 2018). In accordance with evidence-based practice from the results of various studies, it was found that for healing diabetes mellitus wounds (DFU), wound care with modern dressings was applied to speed up the healing process of diabetes mellitus wounds (Subandi, 2020). By carrying out diabetes wound care, especially choosing the right dressing method and compliance in carrying out wound care (Nur Azizah, 2019).

Dressing management in healing DFU can be done using herbal remedies such as honey and aloe vera extracts. In general, honey contains glucose, fructose, sucrose, water and several amino acid compounds, vitamins and minerals which play a role in the wound healing process, such as anti-inflammatory, anti-bacterial and anti-oxidant. Apart from that, honey also has a broad spectrum bactericidal effect, accelerating the proliferation of the epithelium and absorbing edema around the ulcer (Lestari, et al, 2019).

Aloe Vera is a plant that can be used as a natural medicine. The nutrients contained in aloe vera are in the form of organic and inorganic materials, including vitamins, minerals, several amino acids, and enzymes that the body needs. It was found to contain active substances that function to improve the wound healing process, including saponins, tannins, flavonoids and mannose. The use of aloe vera functions as anti-inflammatory,

antifungal, antibacterial and cell regeneration. Aloe vera stimulates epidermal growth factor, increases fibroblasts and the formation of new blood vessels so that it can improve wound healing. Patients with Diabetic Foot Ulcer (DFU) who had wounds treated using honey extract combined with aloe vera said that the wound healing process was relatively fast. The method of treating wounds using honey and covering it with sterile gauze makes the wound dry more quickly and reduces the smell of the wound. Wound care is usually done every day.

METHOD

This research design is pre-experimental using a one group pre-test and post-test design approach. The population of this study was patients with Diabetic Foot Ulcer (DFU) with a sample of 17 patients. The intervention in this study was providing wound care with honey extract combined with aloe vera. The dependent variable of this research is wound development. Wound assessment using BWAT (Bates-jensen wound assessment tool) with the criteria of Healed if the score is 0-10, Wound regeneration if the score is 11-20, and Wound degeneration if the score is 21-30.

FINDING AND DISCUSSION

Table 1: Results of Observational Assessment of Diabetic Foot Ulcer Wounds

No	Inisial	Pre test	Post test
1	Tn. B	23	13
2	Ny. E	25	13
3	Tn. E	29	21
4	Tn. J	23	15
5	Ny. K	25	17
6	Ny. M	23	15
7	Tn, N	27	21
8	Tn. S	23	16
9	Ny. S R	23	14
10	Ny. S	29	22
11	Ny. Sy	27	15
12	Tn. T	26	19
13	Ny, T	26	19
14	Ny. S	24	16
15	Tn. S	28	20
16	Ny. B	24	14
17	Ny. W	24	15

Source: Primary Data Observation Results of Diabetic Foot Ulcer Wound Measurements

Based on descriptive analysis, the average wound condition was obtained based on the BWAT (Bates-Jensen Wound Assessment Tool) score, namely the pretest score was

25.24 and posttest 16.76 and the paired test results obtained Sig. (2-tailed)=0.000 which means it is smaller than α 0.05, thus H1 is accepted.

Diabetic Foot Ulcer (DFU) is a complication of DM which can develop into gangrene which can cause infection and can lead to amputation. Diabetic Foot Ulcer (DFU) dressings can use herbal treatments such as honey extract and aloe vera. Honey plays a role in the wound healing process such as anti-inflammatory, anti-bacterial and anti-oxidant, broad spectrum bactericidal, accelerating epithelial proliferation and absorbing edema around the ulcer. Aloe vera or Aloe Vera can be used as a natural medicine which functions as anti-inflammatory, antifungal, antibacterial and cell regeneration. Aloe vera stimulates epidermal growth factor, increases fibroblasts and the formation of new blood vessels so that it can improve wound healing. Patients who have treated wounds using honey extract combined with aloe vera say that the wound healing process is relatively fast. The method of treating wounds using honey and covering it with sterile gauze makes the wound dry more quickly and reduces the smell of the wound.

This analysis showed that there was a decrease in the BWAT (Bates-Jensen Wound Assessment Tool) value on the 3rd day when evaluating the condition of the wound after wound treatment using honey extract combined with aloe vera. Based on the conclusions of the BWAT (Bates-Jensen Wound Assessment Too) score category from 17 respondents, it was found that changes in wounds in the non-regenerating category were 3 respondents (17.6%) and wounds were regenerating in 14 respondents (82.4%). It can be concluded that the effect of treating Diabetic Foot Ulcer (DFU) wounds using honey extract combined with aloe vera has a good impact on wound regeneration. This is in accordance with research by Lestari and Kusumaningrum (2021), showing that nutrition, both in the form of macronutrients (for example omega 3) and micronutrients (zinc, magnesium, vitamin D, vitamin E, and probiotics), plays an important role in the DFU wound healing process. These macro and micronutrients play a role starting from the process of modulating cell proliferation, collagen metabolism, as well as as biomarkers of inflammation and oxidation phases. Proper nutritional intake will control and suppress DFU complications so that wound healing occurs optimally. Omega-3, zinc, magnesium, vitamin D, vitamin E, and probiotics play a major role in increasing collagen production, protein synthesis, and eliminating bacteria and necrotic cells.

Similar results were also shown by researchers Prabowo and Risdiyanto (2023) who stated that wound treatment using honey showed an increase in skin/tissue integrity after treatment with an intensity of 3 times a week within a 1 month treatment period using honey. Increased skin/tissue integrity is indicated by the color of the necrotic or sloughed base of the wound disappearing and turning red which is the granulation process and pink wound edges which indicate an epithelialization process. Honey therapy is very helpful in the healing process of diabetic foot ulcers because honey is able to stimulate or encourage the growth of new tissue in diabetic foot ulcers.

CONCLUSION

After the wound was treated using honey extract combined with aloe vera and evaluated, there was a decrease in the BWAT (Bates-Jensen wound assessment tool) value. Wound care given to 17 samples showed changes in wounds in the non-regenerating category for 3 respondents (17.6%) and wounds undergoing regeneration for 14 respondents (82.4%). Analysis of the pre test mean of 25.24 and post test of 16.76 shows that there was a decrease in the BWAT value and the t test results obtained a Sig value. (2-tailed) =0.000. It can be concluded that the effect of honey extract combined with aloe vera has a good impact on the regeneration of Diabetic Foot Ulcer (DFU) wounds.

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