

THE EFFECTIVENESS OF THE BARK DREDGING OF THE JAVA WOOD TREE (*LANNEA COROMANDELICA*) ON THE DIABETIC ULCER HEALING PROCESS

Dwi Wulandari Ningtias Purnama¹, Wa Ode Rahmadania²

^{1,2}*Universitas Mandala Waluya, in Kendari Southeast Sulawesi Province, Indonesia*

Corresponding Author : Wa Ode Rahmadania
Email : rahmadaniawaode@gmail.com

ABSTRACT

Background: Diabetic ulcer is a micro vascular complication which can be experienced by all Diabetes Mellitus (DM)'s patients. This condition need an appropriate wound care management to prevent infection, reduce necrotic tissue, and enhance the wound healing process. This study aims to determine the effect of using Javanese tree bark scraping on the healing process of diabetic ulcers, namely changes in the size of diabetic ulcers.

Methods: This type of research is a Quasy Experiment with a Pre-test Post-test approach with control group. The populations in this study were all diabetic ulcer patients who came for wound care at Puuwatuhealth care, namely 16 respondents.

Result: The results of statistical tests show that that there is no difference in wound size before and after the intervention in the intervention group and the control group. In the Mann Whitney statistical test found that the p-value in the intervention group was 0.189, which is greater than the value of $\alpha = 0.05$.

Conclusion: The dredging of the bark of the Java tree is not effective against changes in wound size in patients with diabetic ulcers.

Keywords: *Bark, Java tree, Process, Diabetic ulcers, Change.*



INTRODUCTION

Diabetes mellitus (DM) is a metabolic disease with a high incidence in the world, including in Indonesia, with a prevalence of ulcer patients of around 15% with a risk of amputation of 30%, and is the biggest cause of hospitalization, which is 80%. DM has a tendency to experience diabetic ulcers caused by microvascular complications, which is a form of chronic complications of DM1, in the form of open wounds on the skin surface due to blockages in blood vessels in the legs and peripheral neuropathy due to high blood sugar levels so that clients often don't feel a wound that could develop into an infection². Foot ulcers in DM clients that have progressed to putrefaction are more likely to be amputated. (3)

The World Council of Enterostomal Therapy explains that DFU patients need long treatment time and appropriate wound care management to prevent infection, reduce necrotic tissue, and improve the wound healing process⁴. The existence of public awareness of the quality and value of health has led to the re-rolling of a trend known as the back to nature movement. One of the traditional medicinal plant that is still widely used for the treatment of the people of Southeast Sulawesi is Javanese wood (*Lannea coromandelica*) because of its very effective properties in treating wounds.⁽⁵⁾ Previous research has shown that 96% ethanol extract of the bark of Java wood has antibacterial activity against the *Staphylococcus aureus* bacteria that causes skin infections, *Escherichia coli*, *Helicobacter pylori* and *Pseudomonas aeruginosa* which are often found in severe burns, thus inhibiting the wound healing process⁶.

Physiologically, wound healing occurs within one week after the injury, which includes the phases of inflammation, proliferation, and remodeling. However, in ulcer wounds there is a prolonged time in the inflammatory phase which causes the wound to not heal (chronic). (2) By controlling the infection in the ulcer, it will accelerate the

growth of granulation tissue which will later form the extracellular matrix and reduce the size of the wound as a sign of starting the wound healing process.^(1, 3, 4)

DFU patient care, apart from requiring a long treatment time and appropriate wound care management, also needs to pay attention to the amount of costs incurred by the patient and family because it will affect the readiness of the patient in undergoing the treatment process (7). Thus, in an effort to provide more affordable alternative therapies for DFU patients, it is deemed necessary to conduct research on the effectiveness of Javanese tree dredging for the healing process of diabetic ulcers in the Puuwatu Public Health Center which is a quasi experiment research to see the effect of using java tree bark dredging against the healing process of diabetic ulcers, namely changes in the size of the diabetic ulcer wound.

METHOD

This study is a Quase experimental study to see the effectiveness of using the bark of Java wood against the healing process of diabetic ulcers, namely changes in the size of diabetic ulcer wounds using a pre-test post-test approach with a control group. This research was conducted from 31 July to 31 September 2020 in the working area of Puuwatu Public Health Center, Southeast Sulawesi. The research was designed with the initial stages, the stages of treating ulcer wounds, and the final stages. The initial stage of the study carried out screening of DM patients with ulcers who went to the Puuwatu Community Health Center using the Bates-Jensen Wound Assessment Tool (BJWAT). Patients with a BJWAT score > 13 were used as the study population, then by random sampling, 16 patients who met the inclusion criteria were selected as the study sample which were divided into two groups, namely 8 people as the intervention group and 8 people as the control group. Furthermore, the stages of ulcer wound care are carried out, and the final stage is carried out.

RESULT

Table 1. Frequency Distribution and Percentage Characteristics of Respondents with Diabetic Ulcers who perform wound care at Puskesmas Puuwatu

Variable	Category	f	%
Gender	Male	5	31,2
	Female	11	68,8
Age	47 - 51	3	18,8
	52 - 56	7	43,8
	57 - 61	2	12,5
	62 - 66	1	6,2
	67 - 71	1	6,2
	72 - 76	2	12,5
Education Level	Primary school	0	0
	Junior high school	2	12,5
	Senior high school	8	50
	Diploma	0	0
	Bachelor	6	37,5
Work	Housewife	6	37,5
	Entrepreneur	6	37,5
	Swasta	2	12,5
	Government employees	2	12,5
Current Blood Sugar Levels	Normal	6	37,5
	Abnormal	10	62,5

Based on the table above, it can be seen that the characteristics of respondents based on gender are mostly women, namely 11 respondents (31.2%). The most respondents aged 52 - 56 years amounted to 7 respondents (43.8%), while those at least 62 years old and 67 years old respectively amounted to 1 respondent.

Of the total number of respondents, there were many respondents whose GDS levels were not normal, namely 10 respondents (62.5%). According to Perkeni (2015) the results of examining blood sugar levels are said to be normal if the current blood sugar (GDS) is <140 mg / dL.

Table 2. Differences in pre-test and post-test wound sizes in diabetic ulcer patients

Wound	n	Intervention	Control
-------	---	--------------	---------

Size		Group		Group	
		Z	p-value*	Z	p-value*
Pre-Test	16			0.000	
Post-Test	16	-1,000	0,317		1,000

* Wilcoxon Signed Rank Test

In the table above, it can be seen that from the test results obtained the p-value for the intervention group is 0.317 and the p-value for the control group is 1,000, where this value is smaller than the alpha (α) 0.05 so it means that statistically there is no significant difference in wound size in the two groups.

Table 3. Analysis of the Effectiveness of the Bark Dredging of the Java Wood Tree on the Size of Wounds between the Intervention and Control Groups

Wound Size	n	Mean Rank	Z	p-value*
Intervention Group	8	6,94	-1,314	0,189
Control Group	8	10,06		
Total	16			

* Uji Mann Whitney U Test

Based on the table above, it is known that the p-value = 0.189 is greater than the value of $\alpha = 0.05$, which means that the dredging of the bark of the Java tree (*Lannea Coromandelica*) is not effective against changes in wound size in patients with diabetic ulcers.

DISCUSSION

The results showed that the most respondents who suffered from diabetic ulcers based on gender were women as many as 11 people (68.8%) with the most vulnerable ages being in the 52-56 years age group as many as 6 people (37.5%). The body physiologically decreases due to the aging process; there is a decrease in insulin secretion or resistance so that the body's ability to function to control high blood glucose is not optimal. The aging process causes a decrease in insulin secretion or

resistance resulting in macroangiopathy, which will affect the decrease in blood circulation, one of which is large or medium blood vessels in the legs where diabetic foot ulcers are more prone to occur.(2).

This is in line with the results of research conducted by Fitria which states that diabetic ulcers are mostly suffered by women (63.5%) with a dominant age of 56-65 years followed by 46-55 years. Age is a risk factor for DM that cannot be modified and the age of women in the menopausal age range (40-45 years) will accelerate the decrease in estrogen production and insulin resistance. The earlier the menopausal woman is the more risk for type 2 diabetes mellitus. In postmenopausal women, metabolic disorders, obesity and steroid hormone disorders increase the incidence of metabolic syndrome, type 2 diabetes mellitus, cardiovascular disease, and malignancy. (3).

The cause of the large number of wound incidence begins with the incidence of diabetes in women because of the decrease in the hormone estrogen due to menopause. The hormones estrogen and progesterone can affect cells to respond to insulin because after menopause changes in hormone levels will trigger blood sugar levels to rise and fall. The increase in glucose levels is caused by the accumulation of glucose which results in obstruction of the flow of nutrients to the surface of cells in blood vessels, this result in the absence of other nutrients that supply cells other than glucose. (4).

In this study, the current blood sugar level (GDS) was said to be normal if the amount was <140 mg / dL, so that the blood sugar level when it was grouped into normal and abnormal groups. From the results of the study, it can be seen from 16 respondents before the intervention (pre-test) there were 10 people (62.5%) of respondents whose blood sugar levels were in the abnormal group or it could be interpreted that there were 10 respondents who had blood sugar levels above 140 mg./ dL at the time of the

examination and there were 6 people (37.5%) of respondents whose blood sugar levels were in the normal group at the time or the blood sugar levels were below 140 mg / dL at the time of the examination, while the blood sugar levels after the intervention There were 7 people (43.8%) of respondents whose GDS was in normal susceptibility and 9 people (56.2%) whose GDS was not normal.

Checking blood sugar levels when carried out regularly every time the respondent performs wound care and the results of the GDS measurement for all respondents are fluctuating in table 9 above, the data presented in the post-test is the result of the examination on the last day of the study (day 14). All respondents in this study took drugs to lower blood sugar levels, some were given therapy in the form of Metformin and Glibenclamide and some were given Novorapid injection therapy.

The results showed that in the control group before the intervention, the respondent's wound size was in the range of 36.1 - 80 cm or at a score of 4 a total of 8 people (100%) were assessed using the observation sheet Bates Jansen Wound Assessment Tools (BJWAT) and after Interventions were carried out in the form of wound care using NaCl solution every time they carried out wound care without the use of other drugs for 14 days there was no change in the wound size score for all respondents in the control group but from direct observation it appears that there was a change in wound size in some respondents but changes in size The wound was not significant with an average change in wound size of 0.21 cm so that it could not get out of the score range for the BJWAT wound size assessment and after the Wilcoxon signed rank test was carried out the p-value was greater than the α value of 0.05, namely 1,000. meaning that there was no change in the size of the pre and set cuts Intervention using NaCl solution has been carried out in control group respondents.

Whereas in the intervention group before the intervention, the most respondents' wound size was in the range of scores of 4 with a wound size of 36.1 - 80 cm for 5 people (62.5%) and a score of 3 with a wound size of 16.1 - 36 cm for 3 people (37.5%) and after the intervention there was a change in wound size in 1 respondent from a range of 36.1 - 80 cm to 16.1 - 36 cm or in other words from a score of 4 to a score of 3. In the Wilcoxon sign rank test on the intervention group obtained a p-value of 0.317 with alpha (α) 0.05, which means that the p-value is greater than the α value so that it is statistically concluded that there is no significant change in wound size prior to the intervention in the form of granting Java tree bark scrapings (*Lannea Coromandelica*) and after intervention for 14 days.

Based on the description above, it can be concluded that based on the results of the Wilcoxon sign rank test, the p-value is greater than the value of $\alpha = 0.05$, which statistically means that the first hypothesis is rejected or it is described that there is no difference in wound size before and after intervention in the control group and the intervention group. The results of the Mann Whitney test for wound size showed a p-value of 0.189 which is greater than $\alpha 0.05$, which means that the hypothesis is rejected or it is described that the dredging of the bark of the Java tree (*lannea coromandelica*) is not effective against the size of the wound in patients with diabetic ulcers.

The observations made and the measurement of the wound size before and after the intervention in the study carried out there was a change in the size of the wound in the intervention group but which was significant and able to get out of the wound size range, resulting in a change in the score on the BJWAT observation sheet in only 1 patient with a large wound size (length x width) before the intervention was 48.75 cm (BJWAT score = 4) and after the intervention was carried out on the 14th day the size of the wound was 24 cm (BJWAT

score = 3), in other respondents there was also an average reduction in wound size. - The average change in wound size was 5.41 cm but it was not significant so that it could not get out of the range of wound sizes on the BJWAT observation sheet which resulted in the statistical test results showing a p-value greater than α value 0.05, which means that H_0 is accepted and H_a is rejected.

According to Pradika(6), the reduction in wound size is caused by the epithelialization process that occurs after the granulation process, while the granulation process can take place on the 2nd to the 24th day. Epithelialization occurs after granulation tissue grows and starts from the wound edge, the cells experience contraction (shift), the wound edges fuse together until the wound size decreases until it enters the remodeling phase that occurs on day 21 to one or two years. From this, it can be seen that to see a more significant change in wound size it takes a longer time, while the time of this study is only 14 days so that no significant change can be seen.

Based on the description above, it explains that changes in wound size can occur quickly if the formation of granulation tissue occurs well and quickly and the perfect epithelialization process that occurs after the granulation tissue formation process reaches the remodeling stage that occurs on day 21 to one or two years, so to see changes in wound size it takes a longer study time.

CONCLUSION

The dredging of the bark of the Java tree is not effective against the healing process of diabetic ulcers, namely changes in the size of the diabetic ulcer wound.

REFERENCES

1. American Diabetes Association. Standards of medical care in diabetes. Diabetes Care (2018) Vol. 41 (1)

2. Devi, Anakardian. 2017. Anatomy of Nursing Physiology and Biochemistry, Yogyakarta: New Library Press. [nt%20Tool.pdf](#).
3. Fitria, Eka, et al. 2017. Characteristics of Diabetic Ulcers in Diabetes Mellitus Patients at dr. Zainal Abidin and Meuraxa Hospital Banda Aceh. Health Research Bulletin, Vol. 45, No. 3, September 2017: 153 - 160.
4. Yunus, Bahri. 2014. Factors Affecting the Length of Wound Healing in Diabetic Ulcer Patients at the Makassar ETN Center Nursing Home. <http://repositori.uin-alauddin.ac.id/1333/1/Bahri%20Yunus.pdf>
5. Kshanti, Ida Ayu Made., et al. 2019. Guidelines for Independent Blood Glucose Monitoring. PB Permit. [https://pbperkeni.or.id/wp-content/uploads/2019/12/Pedoman-Peng-
Manajemen-Glucose-Darah-Mandiri-2019.pdf](https://pbperkeni.or.id/wp-content/uploads/2019/12/Pedoman-Peng-Manajemen-Glucose-Darah-Mandiri-2019.pdf)
6. Pradika, Jaka. 2015. The Effectiveness of Wound Cleansing Using Guava Leaves 20% with 15 Psi Pressure Showering Technique on the Healing of Diabetic Foot Ulcers at Kitamura Clinic, Pontianak. [http://repository.umy.ac.id/bitstream/handle/123456789/8979/12.%20NASKAH%20\].pdf?sequence=12&isAllowed=y](http://repository.umy.ac.id/bitstream/handle/123456789/8979/12.%20NASKAH%20].pdf?sequence=12&isAllowed=y)
7. Kristiyaningrum, et al. The effectiveness of using NaCl solution was compared with D40% on the healing process of DM ulcers. <https://ejr.stikesmuhkudus.ac.id/index.php/jikk/article/viewFile/208/139>. Retrieved August 13, 2019.
8. Prawirohardjo, Erwin. Anti-Oxidant Activity Test and Toxicity Test of 70% Ethanol Extract and Water Extract of Java Wood Bark (*LanneaCoromandelica*).
9. *Bates Jensen Assesment Tools*. <http://fikes.ummgl.ac.id/downlot.php?file=BatesJensen%20Wound%20Assesme>