

## **Irrigation Of Wounds with Red betel 20% And 40% to Bacterial Numbers In Diabetic Foot Infection (DFI) Patients**

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### **ABSTRACT**

**Background:** The most frequent complications of diabetes mellitus are Diabetic Foot Ulcers (DFU), which has a risk of death 2.5 times compared to those without DFU. More than half of them have problems with infection (Diabetic Foot Infections). Research on wound washing to control diabetic wound infections originating from phytopharmaca using tropical natural resources such as red betel has not developed. They are a tropical plant that has many benefits containing flavonoids, tannins, alkaloids, saponins. Washing the wound with irrigation and swab techniques using red betel 20% effectively reduces the total number of bacteria with diabetic ulcer isolates in white mice alloxan-induced. It reduces staphylococcus growth aureus at concentrations of 10%, 20%, 40%, 80%, 100%.

**Purpose:** This study aimed to determine the effectiveness of wound irrigation red betel 20% and 40% of the bacterial rate in DFI patients.

**Methods:** This study used a quasi-experiment with pre-post test control group design two treatment groups where bacterial samples were taken before and after irrigation using 20% and 40% red betel extracts while the control group used 0.9% NaCl. Sampling using consecutive sampling with a large sample of 10 respondents, the total sample swab is 20 samples. The Levine technique swab does perform in the area of the diabetic wound. Wilcoxon test was used as a different test in each group showing a group.

**Results:** The results showed that the Wilcoxon test was used as a different test in each group showing a group. of 20% p-value 0,109, group 40% p-value 0,109 and a dick group p-value 0,180.

**Conclusion:** There was a decrease in the number of bacteria after irrigation betel leaf extract in all groups. The 40% betel extract irrigation group showed an average reduction in bacterial numbers. The DFI wound had an average difference in all groups but was not significant. The suggestion for research follows: Taking more samples, the use of red betel extract as an alternative for infection control in wounds. Further research can be done by isolating the red betel content need for more sampling.

**Keywords:** Wound Washing, Red Betel, Piper Crocatum, DFI, Bacterial Numbers.

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**BACKGROUND**

Complications of diabetes mellitus in the form of Diabetic Foot ulcers 20% have problems expanding infection (DFI), healing old wounds, gangrene, amputation, and death ([Armstrong, Boulton, & Bus, 2017](#)). Open wound infection makes it easy for germs to enter. Infection does characterize by fluid wounds or exudates that are many, smelly. Wound healing is prolonged ([Smith et al., 2016](#)). Bacteria form a layer called biofilms, infection develops, decreases the immune system on the wound surface, and interferes with wound healing ([Smith et al., 2016](#)). The uncontrolled disease continues osteomyelitis, bacteremia, and sepsis. ([I Made Sukma Wijaya, 2018](#)) Infection control does influence by wound washing. This type of washing of electrolyzed strong water acid wounds has a bactericidal effect. It is useful in reducing bacterial colonization ([Pramesti, Andiyanti, & Effendi, 2017b](#)). Superoxidised (oxum), propyl betaine-polihexanide, povidone-iodine, 2% hydrogen peroxide, chlorine dioxide are bactericidal, whereas NaCl 0.9% and TAP water do not have them ([Pramesti, Andiyanti, & Effendi, 2017a](#)). Form of antiseptic soap to control infections, effectively reducing bacterial colonization compared to ordinary soap ([Yusuf & Tahir, 2018](#)).

Research on wound washing to control diabetic wound infections originating from tropical nature such as betel has not developed. Betel has many benefits, easily cultivated in a tropical climate. The content in the form of flavonoids destroys bacterial extracellular integrity. Tannins destroy bacterial cell membranes. Alkaloids can inhibit glycan peptides so that bacterial cells do not develop fully ([Mustofa, 2017](#)). Betel reduces odor in diabetic wounds ([Sutrisno & Hidayat, 2018](#)). Irrigation and swab wound washing using 20% betel effectively reduces the total number of diabetic ulcer isolate bacteria in alloxan-induced white rats ([Purwaningsih, 2016](#)). The combination of 0.9% NaCl irrigation and 40% red betel infusion in diabetic ulcers proved to be more effective in the process of healing diabetic wounds ([Pashar, 2018](#)). Ethanol red betel extract has an inhibitory effect on the growth of staphylococcus aureus at concentrations of 10%, 20%, 40%, 80%, 100% ([Candrasari, Romas, & Astuti, 2011](#)). Bacteria in the second most DFI Staphylococcus aureus 30%. ([Gaol, Erly, & Elmatris Sy, 2017](#)). Research problem formulation: How is the effectiveness of wound irrigation using 20% and 40% red betel (red betel) against the bacterial reduction in DFI patients?.

**OBJECTIVE**

This study aimed to determine the effectiveness of wound irrigation red betel 20% and 40% of the bacterial rate in DFI patients.

**METHODS**

The research design was a quasi-experiment using pre-post group control: Group I treated with wound irrigation using 20% leaf extract. Group II treated with a wound. Irrigation using 40% betel leaf extract. Group III treated with wound irrigation using 0.9% NaCl. Wound swab collection was carried out before wound irrigation and after wound irrigation using betel leaf extract in all three groups.

Several stages have carried out as follows: making ethanol extract 20% and 40% betel leaf is done by maceration. Fresh betel leaves are washed clean and finely sliced, then dried in the shade, continued drying in the drying cabinet for three days. Material that has been dried, blended with a blender to form a powder.

1. Finely ground powder with blender is weighed, mixed with 96% ethanol, and filtered. The next step is evaporation using a rotary vacuum evaporator with a temperature of 50 ° C.
2. The making 20% extract liquid, the extract is taken as much as 20 mg and diluted with 100 ml NaCl and 25 mg DMSO. The extract does obtain a concentration of 20%. The 40% extract was weighed as much as 40 mg and diluted with 100 ml NaCl and 25 mg DMSO. The extract does obtain a concentration of 40%. ([Sutopo, Bestari, & Sintowati, 2017](#)) ([Eka Wisnu Kusuma, 2019](#)) ([Badan POM RI, 2010](#)).



Figure 4. 1 washing, then dried, sliced, blanded



Figure 4. 2 weighing, giving ethanol dan rotary evaporator

3. The extract with a concentration of 20% was put into the syringe as much as 20 ml. The needles obtained containing the extract concentration of 20% do use for the treatment group of 20% extract irrigation of 5 respondents.
4. The extract with a concentration of 40% was put into the syringe as much as 20 ml. It was used for the treatment group to extract 40% irrigation as many as five respondents. All extracts that have incorporated into syringes do sterilize with a combination of heat and ultraviolet sterilizers. The temperature used is 120 ° C for 30 minutes and together with ultraviolet exposure for 30 minutes.



Figure 4.3 Delusion extract process

5. The wound was irrigated with the diluted extract at a 20 ml dose using a 20 ml syringe the size of an 18 gauge needle (attached to the sampling SOP). The frequency of wound irrigation treatment for respondents does only once.

The swab is taking specimens in the area to be examined. Several types of swabs, such as simple techniques, z-stroke techniques, and Levine swab techniques, were often used because they have a high sensitivity reaching 52.9% ([Beta Subakti Nata'atmadja, 2013](#)). Levine's technique is more reflective than others. The method carried out using a swab rotation with a slight pressure on the wound area of 1 cm<sup>2</sup> of granulation tissue to remove the exudate for 5 seconds. ([Baranoski & Ayello, 2015](#))



Figure 4. 4 Swab of wound



Figure 4.5 Plate count bacterial

The measurement of bacterial was used by the Total Plate Numbers (Eka Wisnu Kusuma, 2019). The examination of bacterial numbers by the total plate count method (Plate Count Total / PCT) carried at the UPTD health laboratory in East Kalimantan Province. The calculation of bacterial cells in the cup used in units of CFU / ml. CFU stands for Colony Forming Unit, which means colony forming units or units.

**RESULTS**

Characteristics of respondents can be seen in the table below as follows:

Table 5. 1 Characteristic of respondents based on age, sex, length of wound care, grade PEDIS

Characteristics	Amount	f (%)
Age		
a. 20-30	1	10
b. 31-40	1	10
c. 41-50	1	10
d. 51-60	2	20
e. 61-70	5	50
Total	10	100
Sex		
a. Laki-laki	1	10
b. Perempuan	9	90
Total	10	100
Duration of wound care		
a. 2 month	6	60
b. 3 month	3	30
c. 4 month	1	10

Total	10	100
Grade PEDIS		
a. Grade 2	7	70
b. Grade 3	3	30
Total	10	100

Table 5.1 shows the most dominant age characteristic is 61-70 years, with many 5 respondents (50%). Female sex numbered 9 respondents (90%). The longest wound treatment was 2 months, with 6 respondents (60%) and PEDIS 2 grade of 7 respondents (70%).

Tabel 5.2 Calculate bacterial numbers before irrigation, after irrigation and decrease rates in all groups

Respondents	Group	The bacterial count of before irrigate (CFU)	Bacterial count after an irrigation (CFU)	difference (CFU)
A1	20%	372	60	312
A2	20%	1	1	0
A3	20%	45266	41533	3733
A4	20%	147000	11125	135875
A5	20%	1	1	0
B1	40%	62500	57300	5200
B2	40%	19133	11	19122
B3	40%	68	1	67
C1	NaCl 0,9%	6300	2300	4000
C2	NaCl 0,9%	79622	10000	69622

Source: Primary Data on 2019 (UPTD East Kalimantan Provincial Health Laboratory)

All respondents count the number of bacteria has decreased from before irrigated and after irrigated. The decrease in the number of bacteria is in line with previous studies where irrigation can reduce the number of bacteria in diabetic wounds ([Yusuf & Tahir, 2018](#)). Irrigation using betel leaf extract is one method to reduce the number of bacteria ([Saputri, 2014](#)). Wound washing is essential in reducing bacterial numbers ([Pramesti et al., 2017b](#))

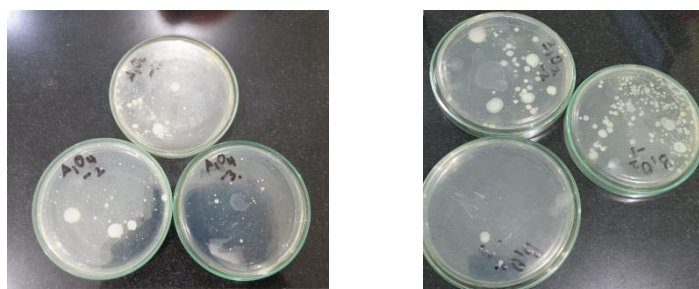


Figure 5.1 bacterial number samples

**DISCUSSION**

From the table above shows the most significant decrease in bacterial numbers is in A4 respondents from 147000 CFU to 11125 CFU with the difference in the reduction of 135875 CFU. The study is in line with previous studies where wound washing by wound irrigation using betel extract, 20% can reduce the total bacterial number of diabetic ulcer isolates in white mice alloxan-induced ([Purwaningsih, 2016](#)). Red betel extract contains flavanoid, polyphenolate and tannin compounds that function antibacterial ([Eka Wisnu Kusuma, 2019](#))

From the five respondents, Wilcoxon statistical tests carried out, the data in the table below obtained as follows:

The group giving 20% red betel extract in diabetic foot infection wounds showed no significant difference in the count of bacteria before and after giving 20% betel extract with a significant value of 0.109. Small differences in clinical results can be statistically significant if the number of subjects is huge. Conversely, very striking clinical differences can be statistically meaningful if the subjects are too few, this phenomenon formulated. Too many subjects prove everything; too few subjects prove nothing. ([Sastroasmoro, 2014](#)) Limited research time resulted in insufficient sample size

From table 5.2 above shows, the most significant decrease in bacterial numbers was in B2 respondents from 19133 CFU to 11 CFU with a difference in the reduction of 19122 CFU. Wound irrigation using 40% red betel infusion can accelerate wound healing, wound healing that is quickly influenced by the decrease in the number of bacteria in the wound where the number of bacteria is an inhibiting factor in wound healing ([Pashar, 2018](#)). Contamination of bacterial colonies on wounds increases the burden of bacteria on wounds prolonging healing and growing cases of chronic wounds ([Atiyeh et al., 2009](#))

The group giving 40% red betel extract in diabetic foot infection wounds showed no significant difference. Small differences in clinical results can be statistically significant if the number of subjects is huge. Conversely, very striking clinical differences can be statistically meaningful if the subjects are too few; this phenomenon can be formulated. Too many subjects prove everything; too few subjects prove nothing. ([Sastroasmoro, 2014](#)) the number of bacteria before and after giving betel extract 40% with a significant value of 0.109.

From table 5.2 shows the most significant decrease in bacterial numbers was on C2 respondents from 79622 CFU to 1000 CFU with a difference of 69622 CFU reduction. Washing wounds using NaCl can reduce bacterial numbers ([Pramesti et al., 2017b](#)) ([Pramesti et al., 2017a](#)). Wound washing is an essential step in a series of wound care that can control infection and accelerate wound healing. Controlling bacterial colony contamination is an excellent wound care measure ([Atiyeh et al., 2009](#)). The control group with 0.9% NaCl irrigation in diabetic foot infections wounds showed no significant difference in the number of bacteria before and after NaCl irrigation 0.9% with a significant value of 0.180. From the table above, the average value of the 20% group has decreased in bacterial count 10544 CFU. The average amount of the 40% group has reduced in bacterial count 19104 CFU, and the average value of the control group has decreased 6150 CFU. The most significant decrease in bacterial count in the three groups was in the group giving 40% red betel extract irrigation, which was 19104 CFU. The 25% red betel extract can maintain inhibitory levels and minimal kill rate against streptococcus aureus bacteria ([Juliantina, M, & Nirwani, 2009](#)). In conditions of levels of more than 10%, 20%, 40%, 80%, and 100% can inhibit staphylococcus aureus, the higher the concentration, the more inhibitory inhibition against bacteria ([Candrasari et al., 2011](#)). One of the most bacteria in diabetic foot infections is a staphylococcus aureus ([Jneid et al., 2017](#))

Table 5.6 Frequency distribution calculate the bacterial numbers in all three groups

	Pre20 (n=5)	post20 (n=5)	pre40 (n=3)	post40 (n=3)	Precontrol (n=2)	Postcontrol (n=2)
Mean	38528	10544	27233	19104	42961	6150
Median	372	60	19133	11	42961	6150
Range	146999	41532	62432	57299	73322	7700
Minimum	1	1	68	1	6300	2300
Maximum	147000	41533	62500	57300	79622	10000

Calculate the number of bacteria before and after administration of 20% red betel irrigation on DFI wounds, which has an average difference of 10544 CFU. Calculate the number of bacteria before and after the administration of 40% red betel irrigation in DFI sores with an average difference of 19104 CFU. Calculate bacterial numbers before and after administration of 0.9% NaCl irrigation in DFI sores, with an average difference of 6150 CFU. Calculate the number of bacteria in giving red betel irrigation 20%, 40%, and NaCl 0.9%.

### STUDY LIMITATIONS

This study has several limitations, as follows:

1. The inspection of samples cannot be done at any time because samples can be received during working hours from 8:00 to 11:00 so that the swab wound sampling can only be done in the morning.
2. The number of samples is limited so that it affects the results of statistical tests
3. The results of irrigation using red betel extract reduce the number of bacteria in the wound. But they have not been able to identify which betel content has the most role in reducing the number of these bacteria, so that isolation or separation of red betel content needed in observing research respondents in full daily cannot yet be carried out.

### CONCLUSIONS

There was a decrease in the number of bacteria after irrigation betel leaf extract in all groups. The DFI wound had an average difference in all groups but was not significant. The suggestion for research follows: Taking more samples use of red betel extract as an alternative for infection control in wounds. Further research can be done by isolating the red betel content.

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