



## THE DECREASE OF STAPHYLOCOCCUS AUREUS COLONY BY NaCl 0,9% ON DIABETIC ULCER

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### ABSTRACK

Diabetes mellitus (DM) ulcer is one of the DM complications. It increases every years. DM ulcers is classified as chronic ulcer. It needs intensive wound care. Staphylococcus bacteria is one of bacteria in the DM ulcer. Woundcare always use NaCl 0,9% for eliminating the bacteria. NaCl 0.9% is a physiological liquid. It si not antiseptic or anti-inflammatory. The aims of research was study the effect of wound care with 0.9% NaCl on the staphylococcus aureus colony. This research is a quantitative research with quasy experiment design. The sample is DM ulcer patients in Dr. Rasidin Hospital. This research was March 2020. They are 16 respondents. The treatment is given once a day for 4 days. Data on the number of colony staphylococcus were taken before and after treatment. Data were tested using the t test dependent. The result obtained p value = 0.001. It means that there is an effect of wound care using NaCl 0.9% on the amount of colony staphylococcus in DM ulcers

**Keywords:** *Wound Care, NaCl 0.9%, Staphylococcus, DM Ulcers*

### INTRODUCTION

Diabetes mellitus (DM) is a chronic disease. The prevelance increase every year<sup>[1]</sup>. One of DM complication is diabetes ulcers. Diabetic ulcers are a problem in DM patients because it impact to amputations<sup>[2]</sup>. Diabetic ulcers are superficial infections on the surface of the skin of DM patients. The risk of ulcers in DM patients is 29 times greater than in patients without diabetes. The risk of death will increase 2.5 times in DM patients with ulcers, compared with DM patients without ulcers.

The entry of bacteria is the beginning of ulcers. the high sugar levels becomes a strategic place for bacterial development. The bacteria found in diabetic ulcers are enterobacter sp (10.71%), stapylococcus aureus (17.85%), salmonella sp (82.15%), and pseudomonas sp (17.86%)<sup>[3]</sup>. The entry of bacteria is the beginning of ulcers. The high sugar levels become a strategic

place for bacterial development. The bacteria found in diabetic ulcers are enterobacter sp (10.71%), stapylococcus aureus (17.85%), salmonella sp (82.15%), and pseudomonas sp (17.86%).

One of the bacteria is stapylococcus aureus. These bacteria form a biofilm on the wound bed. It makes delay of wound healing process. The bacteria can to live longer<sup>[3]</sup>.

Wound healing consists of several phases, including the inflammation, proliferation and remodeling phases. Normal wounds will heal in 7- 10 days. The length of the wound healing phase is influenced by many factors, one of which is hyperglycemia. In DM patients wound healing lasts longer.

Wound care is one of the nursing actions that aims to provide a conducive environment so that the wound can be handled properly. Modern wound care has found that moist wound care is much



more effective for wound healing. In addition to stimulating wound granulation, wound care with a moist method also prevents infection<sup>[4]</sup>. NaCl 0,9% is a physiological solution. It does not cause irritation and supports granulation growth. However, NaCl is not an antiseptic so it can't kill any bacteria that might be present in the wound. So it is usually in clean wounds<sup>[5]</sup>. NaCl 0,9% are less effective at preventing the emergence of necrotic tissue. the presence of necrotic tissue in the ulcer becomes a hiding place for bacterial colonies. It also inhibits the tissue granulation process<sup>[6]</sup>. The use of NaCl 0,9% in the DM ulcer treatment room has become a permanent procedure. The purpose of this study was to study the effect of NaCl administration on the colonization of *Staphylococcus aureus* bacteria in DM ulcers in DM patients in Padang City, Indonesia.

## MATERIAL AND METHDOS

This research is a quasi-experimental study, pre and post test control group design. The population in this study was DM ulcer patients in the city of Padang. The sample consisted of 16 people. Inclusion criteria: patients with DM ulcers who did not use herbs during wound care. The exclusion criterion was severe illness during the study. The study was conducted at internal room RSUD.Rasidin. Wound care is done once a day for 4 days. The length of time needed for 1x treatment is 30-40 minutes. Data taken by swab on wound fluid. Pre test data were taken on the first day before the wound was cleaned. Post test data were taken on the last day after the wound was cleaned. Data were collected using a colony counter and then processed by SPSS using the dependent t test. Sterile wound care set consisting of: anatomical tweezers,

surugis, sterile com, sterile gauze, and NaCl 0,9%, colony counter and observation sheet. Material for taking wound swabs: sterile cotton swabs, physiological NaCl, sterile gauze, sterile test tubes, labels and markers.

Work procedure: Clean the wound with sterile gauze and NaCl 0,9% carefully, Wipe the sterile cotton swab to the DM ulcer without touching the wound edge, Put the cotton swab into the test tube, close the bottle, label it and take it to the laboratory. Wound care is done once a day for 4 days, with 40-60 minutes long wound care. Each of the test bacteria was inoculated on Muller-Hinton Agar (MHA) by zigzagging together from bottom to top using ose and sprider needles and incubated in an incubator for 24 hours at 37°C. Bacteria that have been incubated and grown on MHA agar with a round loop needle and bacterial staining are done using gram staining to ensure *staphylococcus* bacteria. The following day, the test bacterial suspension was diluted using a manual dilution formula (equivalent to 0.5 McFarland), (0.1 µL of the ulcer sample + 100 µL (Nacl). After the absorbance was produced in that range, the bacterial suspension was diluted again to obtain the final number of bacteria. It contained in each one well plate is equivalent to approximately 1 / dilution factor (1 / 10-8) CFU / mL Calculation of the number of colonies using the cup calculation method. The principle of the cup calculation method is if the living microbial cells are grown on a medium so , the microbial cells will multiply and form colonies that can be seen directly with the eye without using a microscope. The pour plate method is a microbial calculation method that is diluted and the medium is provided first. If dilution is piped as much as 1 ml or 0.1 ml. This plate sample first pipette into the petri dish and then put the agar medium.



The data obtained were tested for normality with Shapiro Wilk, p values = 0.636 were obtained. Furthermore, the dependent t test was carried out, the value of p = 0.000 was obtained.

**RESULTS**

**Table 1 . The average number of staphylococcus colonies after wound care by giving NaCl 0,9%**

| Variable  | Mean  | N  |
|---|-------|----|
| The average number of staphylococcus colony before NaCl 0,9% administration | 72,88 | 16 |
| The average number of staphylococcus colony after NaCl 0,9% administration  | 56,68 | 16 |

Based on table 1, the average number of staphylococcal colony in the intervention group before being given wound care with 0.9% NaCl was 72.88, while the number of staphylococcus colony after being given wound care with 0.9% NaCl was 56.68.

**Table 2. The average number of staphylococcus colonies after wound care with 0.9% NaCl administration in diabetic ulcers**

| Variabel   | Mean  | SD    | P-Value | N  |
|--|-------|-------|---------|----|
| Effect of wound care with NaCl administration on colonization of Staphylococcus aureus bacteria in diabetic ulcers | 56.68 | 5.020 | 0.001   | 16 |

Based on table 3, p value = 0.01 (p ≤ 0.05) means there is a significant difference between the number of staphylococcal colony after wound care using 0.9% NaCl

**DISCUSSION**

The most influential thing in chronic wound healing such as DM ulcers is the amount of colony staphylococcus present in the wound. The biofilm layer produced by staphylococcus is a mechanical barrier to wound healing. Biofilm coating occurs 60% in chronic wounds and 6% in acute wounds. The biofilm layer prevents contact between the antibacterial and the wound surface. The biofilm layer which is in the wound is

resistant to irrigation performed with 0.9% NaCl. Based on the results of the study, the number of staphylococcal colony carried out wound care using 0.9% NaCl was an average of 56.68 using a 10-8 dilution. This colony count was lower than the number of staphylococcal colony before wound treatment, which was 72.88 with the same dilution.

NaCl 0.9% is a bactericidal liquid, works by diluting and destroying the outer membrane of bacteria, and after the membrane is destroyed, electrolysis of NaCl produces free chlorine, such as HClO, Cl<sub>2</sub> and Cl<sup>-</sup>. This chlorine will interact with bacterial enzymes and destroy the periplasma and inner membrane so that the cytoplasm can get



out of bacterial cells resulting in bacterial cell death.

NaCl 0.9% also provides a moist environment for the wound. A moist environment can help break down the necrotic tissue in the wound. Performing wound care with NaCl can reduce the number of staphylococcus bacteria and clean the wound from necrotic tissue. Conventionally, if the biofilm layer is too thick then debridement of the wound is carried out to remove the biofilm layer on the wound. regular debridement can accelerate wound healing<sup>[7] [8]</sup>. After the wound treatment was carried out using 0.9% NaCl for 4 days, the wound was red, slightly exudate, smelled slightly, did not harden, did not have a bluish color, the wound edges were smooth, thin, clean and soft. From the results of the author's analysis, it can be seen that for 4 days treatment with 0.9% NaCl the wound phase is still in the inflammatory phase. Compared to before cleaning, the appearance of the amount of pus has decreased considerably. DM ulcers are classified as chronic wounds that heal for a long time, so they need intensive wound care at every phase of wound care<sup>[9]</sup>

## CONCLUSION

NaCl can reduce the number of staphylococcal colony in DM ulcers so that it is still effective in treating wounds.

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