

The Effectiveness of Hand Rub Against *Staphylococcus aureus* Bacteria in the Internal Illness Original in Dr. M Djamil Padang

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ABSTRACT

Hospital. DR. M. Djamil Padang using a hand rub containing 45% ethanol and 18% 1-propanol (containing total alcohol 63%). Based on 2019 data, there was an increase in the use of alcohol hand rub as an antiseptic by 90% between 2012 and 2019. The use of hand rub in the field contains different compositions of compounds. The active compounds that are widely used in hand rubs are ethanol, isopropyl alcohol, n-propanol, and the combination of ethanol-chlorhexidine gluconate. To determine the choice of hand rub products, usually health workers only choose based on the antibacterial effect listed on the hand rub product. This study aimed to see the effectiveness inhibition hand rub against staphylococcus aureus bacteria. This type of research is a quasi-experimental research. The design of this study was laboratory experimental with posttest only control group design using *Spread Plate method* on Mueller Hinton Agar (MHA). The bacteria of this study were *Staphylococcus aureus*. The sample in this study amounted to 30 people in the treatment and control group. The data were processed using the SPSS program and tested for normality with the Saphiro-Wilk test and independent comparative hypothesis testing t Tes. Based on research, hand rub has effectiveness in inhibiting the growth of *Staphylococcus aureus* with p value = 0,000. That the provision of hand rub is statistically quite effective. However, descriptively, hand rub was more effective because the mean number of germs was much lower than the number of germs after NaCl was given. This study only compar the effectiveness of hand rub and NaCl against *Staphylococcus aureus*. Therefore, further research is needed to see effectiveness type hand rub against other germs that cause nosocomial infections.

Keywords: "Hand Rub, *Staphylococcus aureus*, antibacterial effect".

1. INTRODUCTION

Staphylococcus aureus is one of the gram-positive bacteria that produces -lactam enzymes and can eliminate antibacterial activity, especially the penicillins such as methicillin, oxacillin, penicillin G, and ampicillin. This enzyme will damage the -lactam ring so that antibiotics which are -lactam derivatives become inactive. *Staphylococcus aureus* that has been resistant to methicillin antibiotics including -lactam derivatives [1]. The latest data in 2019 see that *Staphylococcus aureus* was the first cause of nosocomial infections with a prevalence of around 88% [2]. hospital. DR. M. Djamil Padang using a hand rub containing 45% ethanol and 18% 1-propanol (containing total alcohol 63%). This alcohol is effective against viruses, fungicides, and bactericides, especially MRSA. According to EN (Europe National) 1500 for hygienic hand disinfectant, this hand rub can reduce germs on the

skin by 3 ml in 15 seconds. In addition, this product also meets the requirements of EN 12791 for surgical hand disinfection that by using 2-3 ml after 90 seconds there is a reduction of germs on the skin [3].

Based on 2019 data, there was an increase in the use of alcohol hand rub as an antiseptic by 90% between 2012 and 2019. This shows that almost all health workers use hand rub as a preventive measure against infection, especially nosocomial infections caused by MRSA. In addition, currently hand rub has become component in the prevention of nosocomial infections because it is practical, and is less irritating than ordinary soap [4]. Meanwhile, microorganisms continue to develop resistance properties with different mechanisms so that the antibacterial effect on hand rubs that are widely used today needs to be reviewed [5].

Another study on the antibacterial effect of alcohol-based hand rub against nosocomial

pathogenic bacteria showed that alcohol-based hand rub containing chlorhexidine gluconate had the strongest antibacterial effect compared to other types of hand rub [6]. Based on secondary information obtained from the PPIRS committee, 2019 data, it can be concluded that nosocomial infections increased by 90% from the previous year, which was considered a threat or a problem that was often found in hospitals, because it was considered the influence of the contaminated surrounding environment due to the behavior of visitors and families. patients who have direct contact and ignore hand hygiene which is one of the chains of infection spread in hospitals, then the hand rub used does not use one trademark, automatically the antiseptic composition contained will also differ between one trademark and another [7]. Therefore, a study was conducted the

effectiveness of hand-ups against staphylococcus aureus bacteria in order to stop spread of infectious bacteriology.

2. MATH AND EQUATIONS

The design of this study was laboratory experimental using *Spread Plate method* on Mueller Hinton Agar (MHA). The bacteria of this study were *Staphylococcus aureus*. The sample in this study amounted to 30 people in the treatment and control group. The data were processed using the SPSS program and tested for normality with the Saphiro-Wilk test and independent comparative hypothesis testing t Test.

3. RESULTS

3.1 Average Growth of Staphylococcus aureus Bacteria on the Use of Hand Rub

Table 1. Average growth of *Staphylococcus aureus* bacteria Before and After Using Hand Rub

Variable	Minimum	Maximum	Standard deviation	Mean
<i>Staphylococcus aureus</i> Bacteria (Pretest)	0	566	124,075	57,80
<i>Staphylococcus aureus</i> Bacteria (Postest)	0	551	116,844	44,57

Bacterial growth before the use of the hand rub was 57.80 CFU's/ml and after use of the hand rub was 44.57 CFU's/ml.

3.2 Average Growth of Staphylococcus aureus Bacteria on the Use of NaCl

Table 2. Average growth of *Staphylococcus aureus* bacteria Before and After Using NaCl

Variable	Minimum	Maximum	Standard deviation	Mean
<i>Staphylococcus aureus</i> Bacteria (Pretest)	2	5	0,860	3,53
<i>Staphylococcus aureus</i> Bacteria (Postest)	3,00	3,00	0,000	3,00

Bacterial growth before the use of NaCl was 3.53 CFU's/ml and after use of NaCl was 3.00 CFU's/ml.

3.3 The Effectiveness of Hand Rup Against Staphylococcus aureus Bacteria

Table 3. The Effectiveness of Hand Rup Against *Staphylococcus aureus* Bacteria

	Treatment	N	Mean	Standard deviation	P value
Pretest	Hand Rup	30	57,80	124,075	0,057
	NaCl	30	3,53	0,860	
Postest	Hand Rup	30	44,57	116,844	0,000
	NaCl	30	3,00	0,000	

Statistical analysis using SPSS through independent t-test with p value: 0.000 or p <0.05, which means

that an average differen of *Staphylococcus aureus* with hand rub than NaCl. So it can be concluded that

the use of hand-up is effective against *Staphylococcus aureus* bacteria in the Internal Inpatient Room of dr. M. Djamil Padang.

4. DISCUSSION

Staphylococcus aureus is a gram-positive bacterium that can produce the enzyme coagulase, thus distinguishing it from other species. *S. aureus* is a normal flora on the skin, but if the amount exceeds 10⁶ per gram, it can cause toxins that can cause skin infections. If *S. aureus* is widespread and bacteremia develops, endocarditis, acute hematogenous osteomyelitis, meningitis or pulmonary infection may occur [8].

The chloride content in NaCl has the ability to be bacteriostatic, which is to inhibit the growth of bacteria. Chlorine compounds work to affect the function of cell membranes, especially the transport of extracellular nutrients and carbohydrates and amino acids. The mechanism of action that occurs is to inhibit the oxidation of glucose in microorganism cells by inhibiting enzymes involved in carbohydrate metabolism [9].

The effectiveness influenced by the type, volume, and concentration of alcohol used. The type of alcohol most often used is ethanol, isopropyl alcohol/ isopropanol/ n-propanol or a combination of both. The volume of 0.2-0.5 ml of alcohol-based hand rub used is no more effective than washing hands with soap and water. In the study, Larson and Colleagues stated that 3 ml alcohol-based hand rub was significantly more effective than 1 ml [10]

Alcohol can also change the permeability of bacterial cell membranes, causing leakage of essential cell constituents and causing bacteria to die¹¹. This indicates that the administration of hand rub is statistically quite effective than NaCl which has no inhibitory power. This proves that in Handrub there is an alcoholic content of 65%, which can denature microorganisms to the core, while NaCl does not contain alcoholic or other similar substances that can damage the bacterial core.

5. CONCLUSION

Research concluded that average bacterial growth before the use of the hand rub was 57.80 CFU's/ml and after the use of the hand rub was 44.57 CFU's/ml, the average bacterial growth before the use of NaCl was 3.53 CFU's/ml and after the use of NaCl is 3.00 CFU's/ml and the use of hand dressing effective against *Staphylococcus aureus* bacteria with p value = 0.000.

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