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Comparison of The Effectiveness of Gel and Spray Hand Sanitizers Against Reducing The Number of Germs on The Palms

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ABSTRACT

Maintaining hand hygiene is one of the measures recommended by the Centers for Disease Control and Prevention (CDC) to help prevent infection during the COVID-19 pandemic. Maintaining hand hygiene can use soap and water or other alternatives such as hand sanitizer with an alcohol content of at least 60%. Hand sanitizer is a hand sanitizer that contains alcohol functions to kill microorganisms in the hands quickly and without rinsing. Hand sanitizers generally consist of two types, namely gels and sprays, both of which have their own advantages and disadvantages. This study aimed to determine the decrease in the number of germs on the palms after using gel and spray hand sanitizers, as well as a comparison of the effectiveness of gel and spray hand sanitizers. The research method used is pre-experimental with the research design "One Group Pretest Posttest design" and the examination method uses Total Plate Count (TPC). The study was conducted at the AAK An Nasher microbiology laboratory from June to August 2021. The results of the study obtained that gel and spray hand sanitizers are effective in reducing the number of germs on the palms, but there is no difference in effectiveness in reducing the number of germs on the palms between the use of gel and spray hand sanitizers. Data analysis using paired sample t-test obtained sig value. (0.000<0.050) for the two types of hand sanitizers, it is concluded that both are significantly able to reduce the number of germs on the palms. The results of the independent samples t-test obtained sig values. (0.449>0.050) There needs to be an effective comparison between gel and spray hand sanitizers. Hand sanitizer gel and spray are effective in reducing the number of germs on the palm, but there is no difference in effectiveness in reducing the number of germs on the palm between the use of gel and spray hand sanitizer.

Keywords: hand sanitizer, gel, spray, germ number.

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INTRODUCTION

Health is the most important aspect of every human activity because it can improve the quality of life (Susanti & Kholisoh, 2018). For this reason, efforts are needed to maintain and care for the body to improve the quality of life. What we can do to support the effort One of them is to maintain hand hygiene.

The hands are one of the limbs often involved in daily activities. It is very easy for microorganisms such as bacteria, viruses and fungi, which cause disease to spread to other body organs (Amaliyah, 2017). There are two types of normal flora on human skin: Transient and resident flora (Riskawati 2016). Transient flora is microorganisms on the skin that stay temporarily and are non-pathogenic or potentially pathogenic as are commonly found, namely *Escherichia coli, Salmonella sp, Shigella sp. and Clostridium perfingens*. Whereas Synder (Harlim, 2017). Make me fat that flora resident is a microorganism nonpathogen, except for *Staphylococcus aureus,* which resides in most healthy people's skin layers and skin crevices (Nash, Dalziel, and Fitzgerald 2015).

Maintaining hand hygiene is one of the steps recommended by the Centers for Disease Control and Prevention (CDC) to help prevent infection during the COVID-19 pandemic (Coronavirus disease 2019) (Ayenew et al. 2021). Infections can be prevented by maintaining hand hygiene, namely respiratory infections, diarrhea, pneumonia, infection worm, eye infections, and skin diseases.

Maintaining hand hygiene has effectively prevented the spread of microorganisms and infection for more than 150 years (Rahman, 2020). This data is reinforced by the WHO study (2007) results, which showed that maintaining hand hygiene could reduce up to 94% of the incidence of diarrhea. Keeping your hands clean can use soap and water. However, if water is unavailable, you can use other alternatives, such as antiseptics or hand sanitizers with an alcohol content of at least 60%.

Hand sanitizers as hand sanitizers contain various ingredients which generally contain alcohol as the main ingredient which functions to inhibit and kill bacteria, hydrogen peroxide functions to deactivate bacterial spores, and glycerol as a humectant (Herdt et al. 2021). Hand sanitizer can remove dust and dirt and reduce temporary and permanent flora (Hasty 2021). In the modern era, along with increasing community activity and during the COVID-19 pandemic, various efforts to prevent viruses and bacteria have had an impact on all aspects of infection prevention, especially hand hygiene, which has made this hand sanitizer products very popular with the public as a substitute for hand sanitizer. conventional because it is practical and efficient. Currently, hand sanitizers are increasingly easy to find in various places with various brands, types, compositions, and carrier substances. Based on the type hand sanitizers are divided into two types, namely gel and spray (Wang et al. 2022). Both have their advantages and disadvantages, so there may be differences in their ability to kill microorganisms. Hand sanitizer gel gives a cold sensation on the skin but does not dry easily. Meanwhile, hand sanitizer spray dries faster and does not feel sticky. Therefore it must be used quickly after spraying (Yolandari et al. nd).

METHOD

The research method used in this study was the pre-experimental method with the research design "One Group Pretest Posttest design. The sample in this study was the palms of the Pesalakan village community consisting of 17 people using hand sanitizer gel and 17 people using hand sanitizer spray. Technique-taking samples were carried out by purposive sampling, and data collection techniques were carried out by interviews (Nurdiani, 2014). The research location is the Microbiology Laboratory of the An Nasher Academy of Health Analysts, Cirebon. The research was conducted from June to August 2022.

This study's independent (free) variables were hand sanitizer gel and spray. The dependent variable in this study is the number of germs on the palms (Cordita, Soleha, and Mayasari 2019). Data analysis was used, namely univariate analysis (descriptive) and bivariate analysis. The bivariate analysis that will be carried out in this study is to use statistical calculations that are Paired Samples T - Test and Independent Samples T - Test with a degree of significance $\alpha = 0.05$.

RESULTS AND DISCUSSION

The number of germ numbers is obtained from the number of germ colonies calculated on the petri dish (CFU) divided by 221 cm; namely, the surface area of the palm is 180 cm, and the surface area between the fingers is 41 cm2. The results of the calculation of the number of germ numbers before and after treatment in respondents can be seen in table 1 below:

Table 1. Number of Germ Numbers Before and After Treatment

Treatment Group	Number of Numbers Germs (CFU/cm2)	
	Before	After
	n=17	n=17
Hand Sanitizer Gel	6	2
Hand Sanitizer Spray	6	1

The decrease in the number of germs is the result of reducing the number of germs before treatment is reduced by the number of germs after treatment. The results of reducing the number of germs using gel and spray hand sanitizers can be seen in table 1 above.

Bivariate analysis was carried out on variables suspected to be related or correlated because the data were normally distributed; the Paired Samples T-Test test was carried out to compare the number of germ numbers before and after using hand sanitizer gel with spray (Cynthia, 2019). An independent samples T-Test to see the comparison of the decrease in germ numbers on the palms using hand sanitizer gel with hand sanitizer spray can be seen in the following table:

Based on univariate analysis, in table 1, the number of germs before using hand sanitizer is more than after using hand sanitizer. In table 2, the decrease in the number of germs after using gel hand sanitizer in 17 samples was 4 CFU / cm2 with a percentage of 74%. Meanwhile, the decrease in germ numbers after using hand sanitizer spray in 17 samples was 5 CFU / cm2, with a percentage of 77%.

Hand sanitizer is a hand sanitizer that can be used instead of soap. Hand sanitizers contain various substances, such as alcohol, hydrogen peroxide, glycerol, aqua dest, trichloramine and carbopol 940. However, the main component that is commonly used in hand sanitizer dressings is alcohol. The alcohol content in the hand sanitizer functions as an active substance, which breaks down proteins and coagulates protein metabolism in germ cells to reduce the number of germs in the palm (Merta Ayu, 2021).

In this study, the samples used by both hand sanitizer gel and hand sanitizer spray both had the same alcohol concentration of 70%, where the concentration was effective in killing germs on the hands. Based on the bivariate analysis results, normality results were obtained > 0.050, meaning that the data are normally distributed. The bivariate analysis results used the paired-samples t-test to determine the difference.

The number of germs before and after using the gel hand sanitizer shows a significant value. 0.000< 0.050 and th = 6.1540 > tt = 2.1191 with df = 16, and hand sanitizer spray shows sig values. 0.000 < 0.050 and the = 5.643 > tt = 2.1191 with df = 16, which means that there is a meaningful difference. Based on the independent samples t-test, which aims to determine the difference in the effectiveness of gel and spray hand sanitizers, it shows a significant value. 0.449 > 0.050 and th = -0.766 < tt = 2.03693 with df = 32, which means H0 is accepted or H1 is rejected (there is no meaningful difference). This can be because the active ingredients contained in these two types of hand sanitizers have the same alcohol content, so the mechanism of action is almost similar, which in the end can cause germ cell lysis (Wahyuni, 2017), where the gelling agent in the gel-type hand sanitizer does not affect the working mechanism of the active material. In addition, the research subjects in this study were limited according to the inclusion criteria. The factors affecting the effectiveness of antiseptic use have been equalized to allow the results of the effectiveness of the two to show no meaningful differences. The effectiveness of hand sanitizers in reducing the number of germs in different alcohol concentrations and the public is expected to be able to get used to washing hands with hand sanitizers five times a crisis (Berardi et al. 2020). It is necessary to consider the selection of hand sanitizer composition so that in its use, it can effectively reduce the number of germs.

CONCLUSION

Hand sanitizer gel and spray are effective in reducing the number of germs on the palm. However, there is no difference in effectiveness in reducing the number of germs on the palm between using hand sanitizer gel and spray. For the Next Researcher, it is expected to use a larger scope, such as samples with different brands and concentrations of alcohol, and for the public is expected to be able to get used to washing hands with hand sanitizer at five times of crisis and needs to be considered in the selection of the composition of the hand sanitizer so that in its use it can effectively reduce the number of germs.

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