

## ORIGINAL ARTICLE

# Comparison of the Number of Bacterial Colonies Before and After the Use of Natural Hand Sanitizers Mixed With Betel Leaf Decoction (*Piper betle* L) and Lemongrass (*Cymbopogon nardus* L)

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## ABSTRACT

**Introduction:** Hand Sanitizer is one of the health products that are in demand by the public, mainly for the duration of the contemporary COVID-19 pandemic. There are two kinds of Hand Sanitizers, made by chemicals and made by natural ingredients. There are many plants that contain active substances that can inhibit the growth of bacteria, namely saponins, flavonoids and essential oils and have a distinctive and sharp odor, one of which is the Betel Leaf plant (*Piper betle* L.) and lemongrass (*Cymbopogon nardus* L.). This study shows a comparison of bacterial colony numbers before and after the use of natural-based hand sanitizers a mixture of betel leaf decoction (*Piper betle* L.) and Lemongrass (*Cymbopogon nardus* L.). **Methods:** This study used an experimental- static group comparison design. The sampling technique in this study uses Accidental Sampling. The collected data was analyzed using the SPSS 16.0 application and were analyzed with the Unpaired T test. **Results:** Results were obtained, there has been a distinction withinside the wide variety of bacterial colonies before and after using disinfectant from mixed natural materials. **Conclusion:** It is concluded that there is a significant difference in Number of Bacteria Before and After Using a Hand sanitizer Made from Natural Ingredients A Mixture of Betel Leaf Decoction (*Piper betle* L.) And Lemongrass (*Cymbopogon nardus* L.).

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**Keywords:** Bacterial Colonies; Natural Hand sanitizers; Betel Leaf Decoction (*Piper betle* L.); Lemongrass (*Cymbopogon nardus* L.)

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## INTRODUCTION

Various types of microorganisms, including viruses, bacteria, and fungi, stick to the hands every day through physical contact with the environment, among which can cause/cause various diseases. Recently, the coronavirus known as COVID-19 has become a topic of conversation around the world. This virus became a serious problem and boom, especially after it quickly killed hundreds of Indonesians (1). Indonesia is one in every of the Southeast Asian country to have also impact of the

COVID-19 pandemic. Cases of COVID-19 (New Coronavirus Infectious Disease) have spread to 350 administrative regions and cities in 34 provinces, placing it 19th with a total of 70.736 confirmed cases and 3.417 deaths in December 2020. South Sumatra ranked seventh with 9,919 positive confirmations in December 2020. cases and 541 deaths (2).

The coronavirus a large family of viruses that it illnesses From mild to severe symptoms. At least two types of coronaviruses are known to cause illnesses that can cause severe symptoms, such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) (3). New Coronavirus Infectious Disease belongs to the viruses of the subfamily Orthocoronavirinae of Coronaviridae

and Nidoviridae. It is this group of viruses that causes disease in birds and mammals, including humans. In humans, coronaviruses cause respiratory infections (4).

Coronavirus disease 2019 (Covid-19) is an infectious disease caused by severe acute respiratory illness virus coronavirus 2 (SARS-Cov-2), which was the first identified as corona in Wuhan, China at the end of December 2019. Novel coronavirus that infects humans. Coronaviruses are a own circle of relatives of viruses discovered in people and animals. Some viruses can infect humans and cause various diseases, common diseases such as influenza too deadly illnesses Middle East Respiratory Syndrome (MERS), Severe Acute Respiratory Syndrome (SARS) (5). New Coronavirus Infectious Disease can hit everyone: pregnant women, babies, children, adults, the elderly, and nursing mothers. The time from exposure to the virus to the onset of symptoms is usually about 5 days, but can take anywhere from 2 to 14 days. Common symptoms are fever, cough and malaise. Complications can including pneumonia and acute respiratory distress syndrome (6).

The recommendation in the treatment of the COVID-19 epidemic is to implement basic protection, which consists of everyday hand washing with alcohol or water and soap, keeping a distance from those who suffer symptoms of coughing or sneezing, and training and implementing cough etiquette and a sneeze. treatment if they have related complaints. The recommended distance to be kept is one meter. In addition, the suspect of Covid-19 must keep a distance of at least one meter from other patients, receive surgical masks, cough and sneeze etiquette and be taught to wash hands (7).

Handwashing is one of the hygiene precautions, which involves cleaning your hands and fingers with soap and water. Human hands are often carriers of bacteria and cause the transfer of pathogens from one person or nature to another through direct or indirect contact. In addition to soap, hand sanitizer is another option that has reported a significant increase in usage. Hand sanitizer is a disinfecting hand sanitizer used as an alternative to soap. Some of the advantages of hand sanitizers include simple use, easy to store, and effective in killing microorganisms on hand in a relatively fast time (8).

The increasing public awareness to maintain body hygiene has implications for the high public interest in using hand sanitizers which are considered much more practical than washing hands using water and soap. This triggers a very sharp price increase as well as the difficulty of obtaining in the market. To overcome this, it is necessary to make efforts to

make hand sanitizers independently using natural basic ingredients such as some medicinal plants that are easily obtained in the surrounding environment. Indonesians are considered local wisdom. South Sumatra Province, has long used various parts of plants to prevent microbial infections (9).

Increasing use of hand sanitizers has an impact on the availability and sales price in the market. Where, the availability of hand sanitizers is limited in the market, making the sales price also increase (10). This encourages the public to innovate in providing hand sanitizers, including the manufacture of hand sanitizers made from nature (11). Tanaman which has antiseptic properties that are often used by the people of South Sumatra, namely betel leaves and lemongrass stems. The selection of betel leaves and lemongrass stems is based on several considerations, namely abundant raw materials in the community, low production prices, and the content of bioactive compounds in betel leaves and lemongrass stems are effective in inhibiting growth or killing microorganisms (8).

Betel leaves and lemongrass stems have a distinctive aroma because they contain essential oils, water, proteins, fats, Carbohydrates, calcium, phosphorus, vitamins A, B, C, iodine, sugar, starch. The natural phenol contained in essential oils has 5 times the antiseptic effect of normal phenol (sterilizer / disinfectant) (9). Betel leaves and lemongrass stems contain various chemical compounds, including phenylpropane, essential oil, hydroxycavikol estragol, kavicolkavibetol, allypyrokatekol, caryophyllene, cineole, cadinene, diastase, tannins, and sequeetases (12).

Chemicals contained in betel leaves have the ability to inhibit microbial growth, among others, by preventing the formation of microbial fats, proteins or DNA / RNA as well as oxidizing and dehydrating microbes. Minerals (cofactors) including potassium, calcium, copper, selenium, magnesium, and zinc are present in the citronella stem. Additionally, vitamins (coenzymes) including niacin, riboflavin, thiamin, and pyridoxine are abundant in lemongrass stems. In several chemical processes, both kinds of chemical compounds play a crucial function as catalysts. In addition to being cheap and easy to make, hand sanitizers with the basic ingredients of the two plants have a non-pungent aroma, have no side effects on skin health and provide a warm taste sensation when used (12).

## **MATERIALS AND METHODS**

This study used an experimental-static group comparison design. The study sample is part of the number and characteristics possessed by that population. In this

researcher, the samples that will be taken are the people of Ogan Ilir Regency in Rantau Alai and Lubuk Keliat Districts. The sampling technique in this study uses Accidental Sampling, which is a method of determining samples by taking respondent that actually exists or is available somewhere according to the context that meets the inclusion and exclusion criteria.

This research was conducted at the Microbiology Laboratory of the Muhammadiyah Institute of Health Sciences and Technology Palembang located on Jl. Ahmad yani 13 ulu.

The collected data was analyzed using the SPSS 16.0 application. to determine and view normal data can be done using a normality test with a Shapiro wilk test with a probability value of  $\geq 0.005$  normal distributed data if  $< 0.005$  normally distributed data. If the distributed data is normal, the statistical test is to use the Unpaired t test, if the data are not normally distributed, the alternative test used is the Mann-Whitney test. Criterion is if the probability value  $> 0.005$  means that there is no difference and if the probability value is  $< 0.005$  it means that there is a difference.

**Ethical Approval**

This research received ethical approval from Health Research Ethics Committee of Health Polytechnic of Ministry of Health of Palembang with No: 784/KEPK/Adm2/XII/2022 dated on 12th December 2022.

**RESULTS**

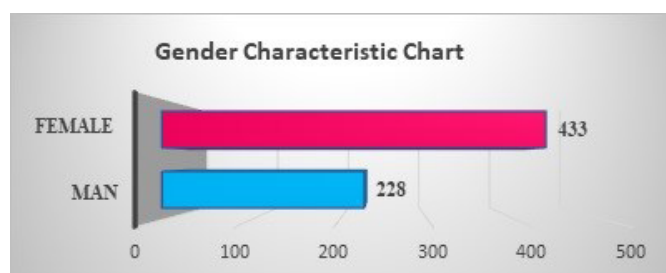
Results of the examination of calculation of the number of colonies before and after using a hand sanitizer from natural ingredients a mixture of Betle Leaf Decoction (Piper betle L.) and lemongrass (Cymbopogon nardus L.). In this study can be seen in the table below:

- 1) Characteristics of Respondents
  - a) Age of Respondents

The age characteristics of the respondents can be seen in table I, which are as follows:

**Table I : The age characteristics of the respondents**

Age	Frequency
11-20	123
21-30	121
31-40	150
41-50	191
51-60	42
61-70	26
71-80	8
Total	661



**Figure 1 : Gender of Respondents.**

This can be seen for the 661 respondents from Table I above, aged 41-50 years, namely 191 respondents  
 b) Gender of Respondents

The gender characteristics of the respondents can be seen in the chart below, which is as follows:

Based on figure 1, the gender obtained by respondents in taking hand swabs in Ogan Ilir districts of Rantau Alai and Lubuk Keliat districts, the most female respondents in this study were 433 respondents.

**A. Data Analysis**

In determining the hypothesis, an unpaired t test is used in Table II.

**Table II : In determining the hypothesis, an unpaired T test is used**

		Unpaired T Test							
		95% Confidence Interval of The Difference					T	Df	Sig (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper				
Unpaired T Test	Before-After	44.0393	30.04696	1.16869	-24.47526	-17.09811	-11.055	1320	0.000

## DISCUSSION

The study used a sample of 1,322 samples. The sample consisted of two groups, namely before and after using a hand sanitizer from mixed natural materials which will be carried out a comparison of the calculation of the number of bacterial colonies. respondents aged 31-40 as many as 150 respondents, aged 41-50 years, namely as many as 191 respondents, aged 51-60 years, namely as many as 42 respondents, aged 61-70 years, namely as many as 26 respondents, and age 71-80 years, namely 8 respondents. Meanwhile, the gender obtained by respondents in taking hand swabs in Ogan Ilir districts, Rantau Alai and Lubuk Keliat Districts, was found by men to have 228 respondents and women in this study 433 respondents.

Results of surveys conducted before using the hand sanitizer obtained a number of colonies of 42,850 colonies spread across 661 media with an average of 62 colonies, while after using a hand sanitizer made from nature a mixture of betel leaf decoction (*Piper betle* L.) and lemongrass (*Cymbopogon nardus* L.) got the number of colonies is 29,110 colonies spread over 661 media with an average of 42 colonies. So that a hand sanitizer made from nature a mixture of betel leaf decoction (*Piper betle* L.) and lemongrass (*Cymbopogon nardus* L.) can be used as a hand sanitizer from natural substances with an effectiveness of only 31.92%.

Based on the data from the results of the research carried out, it can be seen that in the unpaired T test, significant results were obtained  $p < \alpha$  ( $\alpha = 0.005$ ) In that case, we can conclude that the hypothesis was accepted. Statistically, There is a difference in the number of bacterial colonies before the use of natural-based hand sanitizers a mixture of betel leaf decoction (*Piper betle* L.) and lemongrass (*Cymbopogon nardus* L.). To see the difference in growth between before and after the use of natural-based hand sanitizers, a mixture of betel leaf decoction (*Piper betle* L.) and lemongrass (*Cymbopogon nardus* L.) obtained a value of 0.000. From the data above, before and after using a hand sanitizer from mixed natural ingredients, there are differences. This difference occurs due to the content in the hand sanitizer of natural ingredients a mixture of betel leaf decoction (*Piper betle* L.) and lemongrass (*Cymbopogon nardus* L.).

These betel leaves (*Piper betle* L.) and Lemongrass contain flavonoid compounds, polyphenols, tannins and essential oils. The plant is often used in traditional medicine. This is because betel leaves contain essential oils with bactericidal properties, which are important ingredients for suppressing the growth of pathogenic bacteria. Betel leaves also have

antiseptic, antioxidant and antiseptic properties. The essential oil content of betel leaf extract is 4.2% and the antibacterial effect of betel leaf is high. Meanwhile, if you use a hand sanitizer from chemicals so that it can have a bad impact on health and the environment (11). Differences in content before and after using natural ingredient hand sanitizers can lead to an increase in bacterial colonies when natural hand sanitizers mixed with betel leaves (*Piper betle* L.) and lemon grass (*Cymbopogon nardus* L.) are used more than before with natural ingredients betel leaves. (*Piper betle* L.) and lemon grass (*Cymbopogon nardus* L.) mixture.

This study is consistent with previous studies conducted by (13) said that there were differences in bacterial counts before and after hand washing with hand sanitizers made from *Acacia nilotica* leaf extract. The most bacterial colonies were found at 30% concentration, 64.84 % in men and 89.61% in women. This proves that the lively elements withinside the extract can inhibit or kill those bacteria. The results of this study are known that the hand sanitizer from natural ingredients a mixture of betel leaves (*Piper betle* L.) and lemongrass (*Cymbopogon nardus* L.) has a high content of natural substances so that it can be used as a hand sanitizer made from nature to reduce bacterial growth on the palm hand. But This study, new effectiveness level of 31.92% was due to differences in the technique of making natural hand sanitizers which only require a decoction technique without extraction.

## CONCLUSION

From the research that has been carried out on "Examination of the Number of Bacteria Before and after using a Hand Sanitizer Made from Nature Mixed Decoction of Betel Leaves (*Piper betle* L) And Lemongrass (*Cymbopogon nardus* L.)." It can be concluded that based on research on the number of colony growth before using the hand sanitizer, namely 29110 colonies spread across 661 media. The growth of the colony was completed using a hand sanitizer, namely 42850 colonies spread across 661 media. Based on research there is a significant difference  $p = 0.000$  Number of Bacteria Before and after Using a Hand sanitizer Made from Natural Ingredients A Mixture of Betel Leaf Decoction (*Piper betle* L.) And Lemongrass (*Cymbopogon nardus* L.).

The research advice that has been carried out on "Examination of the Number of Bacteria Before and After Using a Hand Sanitizer Made from Natural Ingredients Mixed with Betel Leaf Decoction (*Piper betle* L.) And Lemongrass (*Cymbopogon nardus* L.)." is the differences in the number of colonies bacteria before and after use mixed natural hand sanitizers different concentrations. As well as testing to find

out different mixed natural ingredients that can be reused as materials for making hand sanitizers.

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