

THE EFFECTIVENESS OF SENDUDUK FRUIT PASTE (MELASTOMA MALABATHRICUM L.) ON THE COLONIZATION OF PLAQUE-FORMING BACTERIA

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ABSTRACT

Background: The cause of dental and oral disease is plaque. Plaque is formed due to bacteria, such as *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Escherichia coli*. Plaque formation can be controlled by mechanical and chemical means. To control the formation of plaque can be done by using natural ingredients that contain antibacterial, one of the plants that contain antibacterial is senduduk fruit (*Melastoma Malabathricum L.*) This plant contains saponins, flavonoids and tannins which are chemical compounds and have potential as antibacterials. Objective: To determine the effectiveness of senduduk fruit paste (*Melastoma Malabathricum L.*) against plaque-forming bacteria colonization. Method: This study uses a true experiment with a pre and post-test control group design, In this study, the number of samples was calculated using the Federer formula and randomly selected. Data analysis using Two Way Anova. Results: Based on the treatment group the value is $0.000 < 0.050$. So it was concluded based on the treatment group had a significant effect on the number of results. Based on the time group value $0.248 > 0.050$. So it was concluded based on the time group did not have a significant effect on the number of results. Based on the treatment group and time (simultaneous/ together) the Sig value is $0.000 < 0.050$. So it can be concluded based on the time treatment group has a significant effect on the total results. Conclusion: senduduk fruit paste (*Melastoma Malabathricum L.*)

INTRODUCTION

Dental and oral health maintenance is an effort to improve health (Saputri, 2017). One of the causes of dental and oral health problems is the behavioral factor or attitude of ignoring dental and oral hygiene (Reca, 2019). Basic Health Research (Riskesmas) in 2018 stated that 57.6% of Indonesian people experienced dental and oral problems (Marlindayanti, 2020). In a study found a relationship between dental disease and the risk of other diseases, the study concluded that someone with inflammation of the tooth supporting tissue (periodontitis) has a risk of suffering from coronary heart disease and also periodontal disease can affect diabetes.

The degree of dental and oral health can be seen from a condition where teeth are declared healthy if they are in the oral cavity in a clean condition, free from plaque and other impurities that are on the surface of the teeth such as debris, tartar, and food scraps and do not smell bad from

inside the mouth Healthy teeth and mouth in other words have good oral hygiene, namely the condition of the teeth and mouth that are free of debris, plaque and calculus. (Munadirah, 2018).

The main cause of dental and oral disease is allegedly plaque. Plaque is a major problem in the oral cavity because it can cause inflammation in soft tissues such as gingivitis and can damage hard tissues such as cavities. The plaque layer is mostly made up of germs. On the teeth, a layer of plaque can cause cavities or caries, while on the gums, a layer of plaque can cause inflammation of the gums or gingivitis (Wiradona, 2018).

Dental plaque is caused by bacteria such as *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Escherichia coli* (Kaligis, 2017). Plaque formation can be controlled by using mouthwash and brushing your teeth, but the use of mouthwash has several drawbacks, including impaired taste every time after gargling. Therefore, antibacterial is one good and easy use

to control dental plaque. This effort can be done in various ways, one of which is using natural ingredients that contain antibacterial properties. One of the plants that contains anti-bacterial which can inhibit the growth of bacteria is senduduk fruit plant (*Melastoma Malabathricum* L.) (Larasati, 2021).

Buahsensit (*MelastomaMalabatricum* L.) has known chemical constituents such as saponins, flavonoids and tannins. Saponins, flavonoids and tannins are chemical compounds which has potential as an antibacterial. According to Arifa & Periadnadi's research (2018) the content of senduduk fruit functions as an antibacterial, including flavonoids. Antibacterials are substances that can interfere growth or kill bacteria by disrupting metabolismharmful microorganisms (Sapitri, 2020).

METHOD

The type of research used in this study was a true experiment with a pre and post test control group design to find out whether senduduk fruit paste (*Melastoma Malabathricum* L.) can be used as an inhibitor for bacterial colonization of plaque.

This research was conducted in March 2022 at the Asy-Syifa Warohmah Lilmukminin Islamic Boarding School (Sematang Borang, Palembang), the Pharmacognosy Laboratory of the Pharmacy Department of the Palembang Health Polytechnic and the Bacteriology Laboratory of the Palembang Polytechnic Medical Laboratory Engineering Department.

Sampling in this study with the Random Sampling technique. With the same dietary criteria. The number of samples was taken using the Federer formula and the number of samples obtained was > 5 and in this study the number of samples was used

5 people in each group and there are 5 groups so that the total sample used in this study was 25 people.

Colonization of plaque-forming bacteria was carried out by smearing senduduk fruit paste and then taking the first specimen at 0 hours, after that waiting for 4 hours, then taking the second specimen using a cotton swab and placing it in a test tube. Then after 8 hours, the third specimen was taken using a cotton swab and placed in a test tube. Then, the test tube containing the plaque and senduduk fruit paste was diluted using as much NaCl liquid

9 ml in each tube, totaling 3 tubes, namely 10-1 10-2 and 10-3, after that it was transferred

to a petri dish and given PCA material, waited until the material hardened, then incubated in an incubator at 37°C for 1 x 12- 18 hours. After incubation for 1 x 12-18 hours then counting the number of bacteria was done outside the incubator.

RESULTS

Senduduk fruit paste, control (-) and control (+) can inhibit plaque-forming bacterial colonization (amount of bacteria). In the control group (-) it can be seen that the number of bacteria every hour is always increasing. Meanwhile, the group with the paste treatment and control (+) always decreased every hour. The greater the concentration of the paste, the more effective it is at inhibiting the colonization of plaque-forming bacteria.

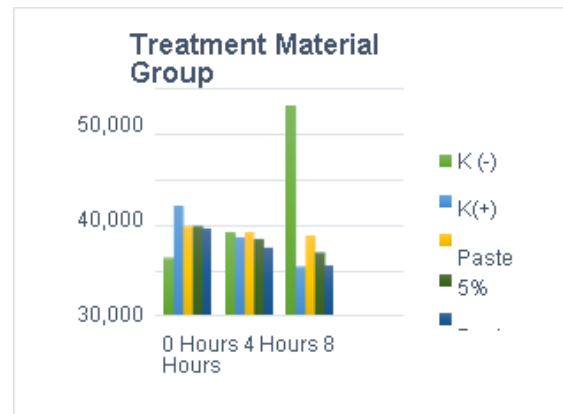


Diagram 1. The average number of bacterial colonization of each treatment.

By analyzing the two way ANOVA test for the treatment group and time, based on the treatment group the Sig value is 0.000 < 0.050. So based on the treatment group has a significant effect on the number of results. Based on the time group, the Sig value is 0.248 > 0.050. So based on the time group has no significant effect on the number of results. Based on the treatment group and time (simultaneous / together) the value of Sig is

0.0 < 0.050. So based on the treatment group *time has a significant effect on the total results.

Table 1. Differences in bacterial colonization in the treatment group with respect to time and concentration.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
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Source	Type III Sum of Squares	df	Mean Square	F	Sig.
group.	10318748	4	2579687	8046	.000
treatment	8,933		22,233		
time	91586882	2	4579344	1,428	.248
	427		1,213		
group.	38457845	4	4807230	14.99	
treatment	6.107	8	68,263	4	.000
* time					

With the analysis of the two way ANOVA test for each treatment group, based on *mean, control (+) and paste 5%, 10%, 15% have the same inhibition of bacterial colonization. While the Control (-) has a different inhibition of bacteria. Based on the Control (-) to Control (+) group, 10% paste and 15% paste Sig value 0.000 < 0.050. And the Control group (-) for 5% pasta, the value of Sig 0.001 < 0.050. It can be concluded that based on the Control group (-) it has a significant effect on the number of results.

Table 2. Test the effectiveness of the treatment group with 3 concentrations, positive control and positive control.

(i) group. treatment	(j) group. treatment	Mean Difference (IJ)	Sig.
Control (-)	Control (+)	8355.67*	.000
	paste 5%	7242.93*	.001
	paste 10%	8961.53*	.000
	paste 15%	10750.53*	.000
Control (+)	Control (-)	-8355.67*	.000
	paste 5%	-1112.73	.592
	paste 10%	605.87	.771
	paste 15%	2394.87	.251
paste 5%	Control (-)	-7242.93*	.001
	Control (+)	1112.73	.592
	paste 10%	1718.60	.409
	paste 15%	3507.60	.095
paste 10%	Control (-)	-8961.53*	.000
	Control (+)	-605.87	.771
	paste 5%	-1718.60	.409
	paste 15%	1789.00	.390
paste 15%	Control (-)	-10750.53*	.000

(i) group. treatment	(j) group. treatment	Mean Difference (IJ)	Sig.
	Control (+)	-2394.87	.251
	paste 5%	-3507.60	.095
	paste 10%	-1789.00	.390

DISCUSSION

Buahsensit (Melastoma Malabatricum L.) has a chemical content senduduk was able to inhibit the growth of Streptococcus mutans at a concentration of 20% with a diameter of 10.26 mm. Seeing the potential of senduduk plant as a traditional medicine, it is necessary to carry out simplicia characterization and phytochemical screening of senduduk fruit extract (Melastoma malabathricum L.) so as to determine the quality and safety of the extract raw materials used in supporting known as saponins, flavonoids and tannins. Saponins, flavonoids and tannins are chemical compounds that have potential as antibacterials (Marlindayanti, 2020). According to Arifa & Periadnadi's research (2018) the content of senduduk leaves functions as an antibacterial, including flavonoids. Antibacterials are substances that can interfere with the growth or kill bacteria by interfering with the metabolism of harmful microorganisms (Sapitri, 2020).

Senduduk fruit contains well-known chemical compounds such as saponins, flavonoids and tannins. Saponins, flavonoids and tannins are chemical compounds that have potential as antibacterial agents. (Sari et al, 2016). According to Arifa & Periadnadi's research (2018) the content of senduduk fruit functions as an antibacterial, including flavonoids. Antibacterials are substances that can interfere with the growth or kill bacteria by interfering with the metabolism of harmful microorganisms.

Based on research by Marsepriani (2017) it shows that fruit extract Health (Rahmawati & Sari, 2018). Not much has been done on the potential of senduduk fruit against other test bacteria, so based on this background it is necessary to test the antibacterial activity of the ethanol extract of senduduk leaves (Melastoma malabathricum L.) against Escherichia coli and Staphylococcus aureus bacteria.

Simplisia and ethanol extract of senduduk fruit (Melastoma malabathricum L.) showed the presence of flavonoids, saponins, tannins and steroid/triterpenoid compounds. The ethanol extract of senduduk fruit (Melastoma malabathricum L.) The results of the activity test

of senduduk fruit have antibacterial activity against *Escherichia coli* and *Staphylococcus aureus*, the smallest concentration is 20% with an inhibition zone of 12.6 mm which is included in the strong inhibition response and for the largest concentration is 80 % with an inhibition zone of 21.3 mm including a very strong inhibition response so it can be concluded that the level of inhibition of the growth of *Staphylococcus aureus* by senduduk fruit extract has increased from a concentration of 20% to 80% (Safitri, Alfi. 2020)

One of the flavonoid components from plants that can function as antioxidants is a natural dye called anthocyanin, which is an antioxidant substance that can prevent various types of damage caused by oxidative stress.. Flavonoid compounds are thought to be very useful in food because these compounds are strong antioxidants. Flavonoids have the ability to remove damaging oxidizing species. Another benefit of flavonoids is protecting cell structures, preventing bone loss, and increasing the effectiveness of vitamin C, as an antibiotic and anti-inflammatory (Yuslianti, 2018).

From the results of the above study, it can be concluded that senduduk fruit paste can inhibit bacterial colonization of plaque. Senduduk fruit paste with a concentration of 15% is more effective than pasta with a concentration of 5% and 10%. As for the senduduk fruit extract itself, it can drastically reduce the number of bacterial colonization of plaque which can result in the death of bacteria in the mouth. Meanwhile, with the loss of bacteria in the mouth, the flora in the mouth becomes unbalanced. Bad bacteria will more easily appear and stick to the teeth, because good bacteria are not controlled. Therefore, to prevent the increase in the number of bacteria in the plaque senduduk fruit paste is used with a concentration of 15% because more effectively prevent bacterial colonization.

CONCLUSION

Based on the results of a study on senduduk fruit paste (*Melastoma Malabathricum* L.) can inhibit plaque-forming bacterial colonization (number of bacteria) by applying it all over the tooth surface at 0 hours, 4 hours and 8 hours treatment, it can be concluded:

1. Senduduk fruit paste (*Melastoma Malabathricum* L.) with concentrations of 5%, 10% and 15% can inhibit plaque-forming bacterial colonization (number of bacteria).
2. Senduduk fruit extract (*Melastoma*

Malabathricum L.) can inhibit plaque-forming bacterial colonization (bacteria count).

3. There was a difference in the number of bacteria in the disclosing treatment and senduduk fruit paste (*Melastoma Malabathricum* L.)
4. Both pastes and extracts can reduce the amount of bacterial colonisation in plaque.

SUGGESTION

With the conclusion above, the authors try to provide suggestions for improving dental and oral health, namely the need for further research on senduduk fruit (*Melastoma Malabathricum* L.) as an inhibitor of bacterial colonisation of plaque.

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