

# Effectiveness of Breadfruit Leaf Extract (Artocarpus Altilis) as a Mouthwash to Reduce Saliva Viscosity

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## Effectiveness of Breadfruit Leaf Extract (*Artocarpus Altilis*) as a Mouthwash to Reduce Saliva Viscosity

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### Abstract

Saliva is a complex liquid in the mouth that has an important role as self cleansing. If the viscosity of saliva is getting lower, the possibility of caries will decrease. The use of mouth rinses is one way to maintain oral hygiene. One of the herbs that can be used as medicine is breadfruit leaf (*Artocarpus Altilis*). The objective of this study is to determine the effect of breadfruit leaf extract (*Artocarpus Altilis*) as a mouthwash on saliva viscosity in boarding students of the Dental Nursing Department. This type of research is a pre-experiment with the design of One Group Pretest Posttest which was conducted in October-November 2019. The population of this research study was the boarding students of the Dental Nursing Department of Yogyakarta Health Polytechnic Ministry of Health with a sample size of 40 respondents taken by purposive sampling technique. Data analysis used Paired Sample T-Test and Simple Linear Regression. 62.5% of respondents aged 18 years with female sex were more than men that were 97.5%. The parametric test results using Paired Sample T-Test showed a significant difference with a value of  $p=0.000$ . Simple Linear Regression analysis test results showed that there was a significant influence between the accumulation of salivary viscosity before and after gargling the breadfruit leaf extract (*Artocarpus Altilis*) concentration of 20%, with a decrease in the mean before gargling the breadfruit leaf extract 3.5810 to 2.6025 with a significance value 0.004 ( $P<0.05$ ). The conclusion of this study is that there is an influence of breadfruit leaf extract (*Artocarpus Altilis*) as a mouthwash on saliva viscosity in boarding students of the Dental Nursing Department. It is recommended for further research on the use of breadfruit leaf extract (*Artocarpus Altilis*) as a mouthwash with different concentrations and solvents so as to increase knowledge of the effectiveness of breadfruit leaves as a mouthwash ingredient.

**Keywords:** Saliva Viscosity, Breadfruit Leaves

### 1. INTRODUCTION

The results of the Basic Health Research in 2018 showed that the proportion of dental and oral health problems was 57.6% and those receiving services from dental medical personnel were 10.2%. The proportion of teeth brushing behavior correctly was 2.8%. Seen from the age group, the young age group experienced more dental caries compared to the age  $\geq 45$  years. Age 10-24 years of dental caries is 66.8-69.5%, age  $\geq 45$  years 53.3% and age  $\geq 65$  years by 43.8%. This situation shows that many dental caries occur in the productive age group (Kementerian Kesehatan, R.I., 2018). Dental caries is a multi-factor process that occurs through interactions between teeth and saliva hosts, bacteria in the oral cavity, and easily fermented food. Saliva is a complex fluid found in the oral cavity composed of a mixture of salivary glands (Lima et al, 2010). Saliva is one of the factors having a major influence on the severity of dental caries (Ramadan, 2010).

The environment or saliva has an important role, because saliva functions as self cleansing, maintaining the health of soft and hard tissue that is in the oral cavity, lubrication, antimicrobial and buffer capacity. There are four factors that affect the

quality of this saliva, comprising of the level of acidity (pH), bulk saliva, volume and viscosity (Ristianti et al., 2015). Viscosity is a measure of the viscosity of a liquid. Viscosity is strongly influenced by mucins due to the presence of high molecular glycoproteins in it. At rest, the viscosity of saliva is viscous so that it can flow and last long enough in the oral cavity whereas in the oral cavity function, the viscosity of saliva in a dilute state so as to provide good lubrication in the oral cavity (Rahmawati et al., 2016). If the viscosity of saliva is getting lower, the possibility of caries will decrease, because when viscosity is low, the flow or volume and volume of saliva will increase. Hence, salivary content such as lysozyme which functions as an antibacterial will also increase (KuswardaniE., 2011). If the viscosity increases, the composition of water in the saliva decreases and this will cause the saliva to become thicker (Affianti, 2010).

The use of mouthwash is one of the methods quite successful in maintaining oral hygiene, the drug that is often used is an antiseptic mouthwash, but the use of antiseptic as a mouthwash can have a carcinogenic effect on its use. The use of traditional medicine has evolved as a safer alternative to chemicals (Ristianti et al., 2015). Herbal mouthwash is safer than chemical mouthwash. Ingredients containing herbal mouthwash are natural and contain no alcohol, artificial preservatives, flavoring agents and colorants (Phatak et al., 2011). Plants that are believed to be used as medicine are breadfruit (*ArtocarpusAltilis*) which is an herbal plant that has many benefits. Breadfruit plants have a variety of benefits, all of these plant parts have been used as traditional medicine, especially the leaves (Ratna, 2018). Breadfruit leaves contain several nutritious substances such as saponins, polyphenols, hydroxyic acid, acetylcolin, tannins, riboflavin and phenol. Flavonoid compounds function as chemicals to overcome disease attacks as antimicrobial or antibacterial (Rasyadi, 2018, Yuliastri, W. O., & Prasetyo, M., 2019).

Previous studies relating to the effectiveness of breadfruit leaf extracts are associated with the growth of Streptococcus mutants bacterial colonies, whereas this study is different from previous studies that are associated with saliva viscosity. The objective of this study is to determine the effect of giving breadfruit leaf extract (*ArtocarpusAltilis*) as a mouthwash on saliva viscosity. Herbal mouthwash has many pharmacological effects as anti-inflammatory, antimicrobial, and anticariogenic. The benefits of this study are as an alternative to the use of safer herbal mouthwash.

## 2. RESEARCH METHOD

This type of research is a Pre-Experiment research with a One Group Pretest Posttest design. The population in this study was students in dormitory 2 Department of Dental Nursing Health Polytechnic Ministry of Health Yogyakarta, with 40 respondents selected by purposive sampling. The inclusion criterion is applied undergraduate student dormitory 2 Department of Dental Nursing Health Polytechnic Ministry of Health Yogyakarta 17-20 years old, do not have systemic diseases such as diabetes, kidney, heart and asthma. Exclusion criteria: using prostheses and orthodontic devices, taking oral drugs and systemic antibiotics, were not present in the study. The time of the study was in October-November 2019.

The type of data used consisted of primary and secondary data. Primary data was data obtained directly by observing and interviewing students at the Dental Nursing Department of Yogyakarta Health Polytechnic Health Ministry. Secondary data is data obtained from the board of directors of the Dental Nursing Department. Data collection techniques were performed using a saliva viscosity inspection sheet. The independent variable is breadfruit leaf extract with 70% ethanol solvent so that it becomes a thick extract. Then, the thick extract was diluted using aquades to 20% breadfruit leaf extract

concentration. The dependent variable is the saliva viscosity, which is the value of saliva viscosity (dyne/cm<sup>3</sup>) measured using the oswald viscometer. Making breadfruit leaf extract (*ArtocarpusAltilis*) is performed by maceration method using 70% ethanol solvent, liquid extract is filtrated 3 times to obtain a thick extract made into a concentration of 20% using aquades. Saliva collection was conducted in the morning 2 times, which was before and after gargling 10 ml of breadfruit leaf extract (*ArtocarpusAltilis*). Measurements were made 2 times, before and after gargling with breadfruit leaf extract (*ArtocarpusAltilis*). The controlled variable was breadfruit leaf extract concentration of 20% by 10 ml, while the uncontrolled variable was dental caries.

Analysis in this study used the Paired Sample T test and Simple Linear Regression test. Paired Sample T-Test is to determine differences in salivary viscosity before and after gargling breadfruit leaf extract (*ArtocarpusAltilis*) and Simple Linear Regression test to determine the effect of breadfruit leaf extract (*ArtocarpusAltilis*) as a mouthwash on saliva viscosity. This research has been declared ethical by the Health Research Ethics Commission (KEPK) of the Health Ministry of Health, Yogyakarta No. e-KEPK/POLKESYO/0324/X/2019.

### 3. RESULTS AND DISCUSSION

**Table 1.** Frequency Distribution of Respondents by Age and Gender.

Respondent Frequency Distribution	Number	Percent (%)
<b>Age (year)</b>		
17	1	2,5
18	25	62,5
19	12	30
20	2	5
<b>Total</b>	<b>40</b>	<b>100</b>
<b>Gender</b>		
Male	1	2,5
Female	39	97,5
<b>Total</b>	<b>40</b>	<b>100</b>

Table 1 shows that the most respondents aged 18 years were 25 people (62.5%), while the respondents who were female were more than men, which were 39 people (97.5%).

**Table 2.** Paired Sample T test results difference in average viscosity of saliva before and after gargling breadfruit leaf extract (*ArtocarpusAltilis*).

Saliva viscosity	Mean	SD	t	df	p
Before gargling breadfruit leaf extract	3,581	0,37	16,318	39	0,000
After gargling the breadfruit leaf extract	2,602	0,13			

Table 2 shows the results of the Paired Sample T-test indicating that there was a significant difference in the average viscosity of saliva before and after gargling the breadfruit leaf extract (*ArtocarpusAltilis*) with a p value = 0.000.

**Table 3.** Results of analysis of the Simple Linear Regression test before and after gargling of breadfruit leaf extract (*ArtocarpusAltilis*).

Variable	Coefficients	t	Sig.
After gargling the breadfruit leaf extract	-3,62	3,079	0,004

Table 3 results of simple linear regression analysis results show that the magnitude of the effect of mouth rinse extract of breadfruit leaves on the viscosity of saliva obtained regression coefficient number -3.62 shows that there is a negative effect after rinse of breadfruit leaf extract on saliva viscosity, namely a decrease in saliva viscosity by 3.62 with value of  $p = 0.004$ .

Lower salivary viscosity will increase the rate of salivary flow so that a good self cleansing effect is obtained to reduce the risk of dental caries (Sulendra et al., 2013). High viscosity of saliva (thick) causes the saliva flow rate will be lower and there is a buildup of leftovers that cause caries, so prevention is needed by using mouthwash. The results of this study are supported by Sa'diah&Hayati (2018) who stated that the role of saliva as a lubricant is very important for oral health, which helps the movement of the tongue and lips during the process of chewing and swallowing and to clarify speech.

In this study, breadfruit leaf extract was used with a concentration of 20%. It is in line with research Ratna, (2018) that the physical properties of mouthwash concentrations of 10%, 15% and 20% provide good results and met the requirements of mouthwash preparations. Breadfruit leaves have inhibitory effects on the growth of Streptococcus mutants. The antibacterial and antimicrobial content of breadfruit leaves (*Artocarpus Altilis*) can inhibit the growth of Streptococcus mutants' bacteria that cause dental caries (Bempa, 2016).

Breadfruit leaf extract has antibacterial properties by inhibiting some extract concentrations. The stronger the inhibitory power, the higher the concentration of the extract sensitivity to microbial growth, and the greater the diameter of the inhibition against the *Staphylococcus aureus* bacteria (Sucy, 2014, Suryanto, E., & Wehantouw, F., 2019). The higher the number of dental caries, the thicker the viscosity of saliva because the content of lysozyme in saliva which functions as an antibacterial decreases, so prevention is needed by using mouthwash in order to increase saliva production and viscosity (Sariyem et al., 2015). The difficulty in this study is that the *viscometer ostwald* is not clearly visible so it can affect the recording of salivary flow times.

The use of 70% ethanol as a solvent in this study to improve the effectiveness of breadfruit leaf extraction (Verdiana et al., 2018) that a compound will be dissolved in a solvent with the same properties. Breadfruit leaves contain various antibacterial compounds such as flavonoids, phenols, alkaloids and tannins (Rosmawaty & Tehubijuluw, 2013). Flavonoids include natural phenolic compounds that have potential as antioxidants and have bioactivity as a drug (Una, 2010). Breadfruit leaf flavonoids compound is also as anti-inflammatory, anti-oxidant, anti-platelet, anti-cancer, anti-diabetes and anti-atherosclerosis (Rizema, 2013). The flavonoid compounds contained in the breadfruit leaf extract are polar so that we need a polar solvent that is also ethanol. The results of this study indicate that breadfruit leaf extract can be used as an alternative mouthwash ingredient from herbal ingredients because it has antibacterial and antimicrobial properties that can inhibit the growth of bacteria that cause dental caries.

#### 4. CONCLUSION

There is an influence of the use of breadfruit leaf extract (*Artocarpus Altilis*) as a mouthwash on saliva viscosity. Breadfruit leaf extract (*Artocarpus Altilis*) can reduce the viscosity of saliva. Suggestions for further research is the use of breadfruit leaf extract (*Artocarpus Altilis*) as a mouthwash with different concentrations and solvents so as to increase knowledge of the effectiveness of breadfruit leaves as a mouthwash ingredient.

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