Biomedical Journal of Indonesia
Journal Homepage: https://bji-fk.ejournal.unsri.ac.id

The Effect of Gargling Young Coconut Water (*Cocos Nucifera L.*) On Changes In Salivary pH In Children At SMP Negeri 1 Muara Pinang, Empat Lawang

Shafira Ari Yuni[1], Abu Hamid[2*]

[1,2]Poltekkes Kementrian Kesehatan, Palembang, Indonesia

ARTICLE INFO

Keywords:
Young coconut water
Saliva pH

Corresponding author:
Abu Hamid
E-mail address:
abu@poltekkespalembang.ac.id

All authors have reviewed and approved the final version of the manuscript.

https://doi.org/10.32539/BJI.v10i2.197

ABSTRACT

Introduction. Dental caries is one of the various dental health cases that has a high prevalence in Indonesia. One of the variables that influences the development of dental caries is saliva. The way to control the acidity (pH) of saliva is to gargle with antibacterial fluid. Young coconut water (*Cocos Nucifera L.*) contains tannins or antidote (anti-toxic). The aim is to determine the effect of gargling young coconut water (*Cocos Nucifera L.*) on changes in the pH of saliva. **Methods.** This research uses a quasi-experimental research type with a pre-test post-test design and a control group (comparison group) using a purposive sampling technique. **Results.** Proves that there is a significant impact on the pH of saliva before and after gargling with young coconut water, namely before gargling the pH is 7.645 and after gargling the pH is 7.325 or it can be concluded that there is an effect of consuming coconut water on changes in saliva pH. **Conclusion.** There is a significant effect of gargling young coconut water (*Cocos Nucifera L.*) on saliva pH.

1. Introduction

One factor of overall health that is often overlooked is oral health. Neglecting oral health can result in disease or infection of other vital organs in the body. According to the Ministry of Health of the Republic of Indonesia (2013)2, in Indonesia, 25.9% of the population has some type of dental health problem. The DMF-T index for Indonesia is 4.6, which means 460 out of every 100 Indonesians experience tooth decay, with 31.1% receiving treatment and care from dental health workers. These data show that dental caries remains a major threat to people's oral health.[1,2]

Saliva is one of several variables that cause caries to develop. Saliva determines the condition in the mouth because saliva continuously hits the teeth. When the pH is 7, saliva is neither acidic nor alkaline and is considered neutral. When the pH is in the range of 6.5-7.5, bacteria can form in the mouth and when the pH of saliva is in the range of 4.5-5.5 (low), it can cause Streptococcus mutants and Lactobacillus bacteria to multiply in the mouth. The higher the pH value of saliva can cause remineralization, conversely the lower the pH value of saliva can cause demineralization.[3] An important function of saliva is to maintain the pH of the mouth in the proper range for protect teeth from acidity in food which can trigger the formation of caries. Saliva acidity level decreases when we consume foods rich in its carbohydrates. This condition tends to increase dental plaque formation, hence buffering capacity saliva returns the pH of the mouth to its normal level. Is it is very challenging to prevent dental caries, such as the prevalence is generally very high population and it happens economically abandoned people who cannot afford it commercial to have oral hygiene products.[4]

Proper oral hygiene is the basis of keeping the oral cavity healthy. Brushing, flossing, a suitable diet and proper hydration, are all necessary. Nevertheless, there are additional, adjuvant oral hygiene products to potentiate the effectiveness of oral hygiene, such as irrigators, tongue scrapers and mouthwashes. Mouthwash is a very popular and numerous additional element of oral hygiene individual products. There are two main types of mouthwash use: preventive and therapeutic. A single product may have a dual function: an antiplaque agent preventing and supporting the treatment of periodontal disease, among other things. Not that it is closely related to the concentration of active substances seen in the mouthwash, but with the duration of use and of

course with the current health status. In prevention, long term use is necessary, whereas in therapy, short-term use is usually sufficient. Other functions are to provide assistance in several conditions, in preoperative or post-operative management as well as in aesthetic dentistry (anti-staining and whitening effect).[5]

An antibacterial solution is a mouthwash to control the acidity (pH) of saliva because it can kill bacteria on the teeth. Young coconut water (*Cocos Nucifera L.*) (has more tannin or antidote (anti-toxic) content than old coconut water. Tannin has antibacterial properties which suppress the growth of bacteria. Because sodium can be used as a plaque controller, the tannin content in coconuts can increasing its role in cleaning the oral cavity, namely by limiting the formation of plaque. Calcium and phosphate are also found in young coconut water. Various contents of coconut water can help the role of saliva in the mouth.[6] This research was conducted to show the effect of gargling young coconut water on changes in saliva pH of children at SMP Negeri 1 Muara Pinang, Empat Lawang.

2. Methods

This study used a quasi-experiment with a pretest-posttest design with control group (comparison group) to determine the average pH of saliva before and after gargling young coconut water (*Cocos Nucifera L.*). The subjects of this research were 40 male students of SMP N 1 Muara Pinang. The research sample was taken using a purposive sampling method.

The subjects were asked not to eat and drink 3 hour before taking saliva. The saliva was collected by asking the subject to spit into the cup. The first saliva collection was used to measure initial pH. The 40 students were given an explanation of the research objectives, then the 40 students were divided into 2 groups. The first group gargled with coconut water, while the second group gargled with 20 ml of mineral water for 20 seconds each. After that, the researchers observed the pH of saliva before and after gargling with young coconut water and mineral water.

This research data analysis is univariate and bivariate data analysis. This research uses statistical testing, namely the Independent T-Test.

3. Results

The results of the research in February 2023 showed that the average pH of saliva before gargling young coconut water was 7.645 and the average after gargling was 7.325. In the control group, gargling with mineral water before was 7.710, and after gargling was 7.645. Based on table 2 of the independent T test, the statistical test results are P value = 0.001, because P < 0.05. This means that there is a significant effect between before and after gargling young coconut water solution on saliva pH compared to mineral water.

4. Discussion

The results of the research prove that the pH is in the acidic direction. Several variables that influence changes in pH are carbohydrate intake, buffer capacity, saliva flow and secretion stimulation.[7] Saliva pH can be influenced by the food and drink ingested. Gargling with young coconut solution water causes the pH of saliva to decrease because young coconut solution water contains acid ions such as lactic acid, vitamin C and reducing sugars such as glucose, fructose and amino acids.[8] Coconut water has a pH of 5.5. In this study the value the pH does not fall below the threshold value, namely 5.5. The respondent's saliva was measured immediately after gargling with young coconut water with the aim that the buffer capacity was not affected.

The food and drinks consumed can causes saliva to become acidic or acidic base. You can consume young coconut water lowers saliva pH. A decrease in pH occurs after consuming coconut water because of the water young coconuts have a low pH, namely 5.5, and the ion content in it is acidic such as vitamin C, total solids or lactic acid, as well as reducing sugars consisting of fructose, glucose, and amino acids. Organic acids found in water this coconut can affect pH changes saliva. More sources of acids organic matter that can be metabolized, the pH of saliva decreases. Ionization of lactic acid will produce H+ ions thus causing an acidic atmosphere saliva. Lactic acid forms extra acidity thus lowering the pH then causes the release of calcium and phosphate ions from tooth enamel, then you can causes cavity formation in the enamel.[9]

Table 1. Average distribution of saliva pH before and after gargling in each treatment group

Group treatment	N	Average saliva pH		Difference in average saliva pH before and after treatment
		Before	After	
Coconut water	20	7,645	7,325	-0.32
Mineral water	20	7,710	7,645	-0.035

Table 2. Independent T-Test effect of gargling young coconut water and mineral water on saliva pH

Group	Before	After	Sig.
Coconut water	7,645	7,325	<0.001
Mineral water	7,710	7,645	

The high sodium content in young coconut water can help the role of saliva as a plaque control agent to clean the oral cavity.[10] Natural anti-inflammatory substances such as magnesium and calcium and vitamin C can relieve pain. This is supported by previous research by Lestari (2015), regarding young coconut solution water can relieve pain.[3]. From the Paired T test on saliva pH before and after gargling young coconut water in Table 5.2, the p value obtained is 0.001 (<0.05). These results prove that there is a significant difference in the pH of saliva before and after gargling with young coconut water. Consuming coconut water after eating alkaline foods can reduce the pH value to normal. On the other hand, consuming young coconut water after eating acidic foods will make the pH of saliva even more acidic. The results of this research are supported by research which shows that there is a significant difference in the pH of saliva before and after gargling with a solution of young coconut water.[11] The water content is quite high coconut fruit can help the function of internal saliva cleaning the oral cavity, so you can inhibits plaque growth, due to sodium can be used as plaque control. Calcium and magnesium which can reduce muscle tension and vitamin C is a natural anti-inflammatory substance which can help relieve pain due to pain.[9]

This research shows that the decrease in saliva pH after consuming young coconut water does not reach the critical pH (under 5.5). Salivary pH measurement in research is measured immediately after the respondent has finished consuming young coconut water or directly after being stimulated with intention not to provide a time span for the process buffer capacity for work. It happened decrease in saliva pH for 1-3 minutes by acid will make the enzyme bicarbonate anhydrase catalyzes the reaction of free H+ ions bicarbonate and that reaction will produce distilled water and carbon dioxide that will be released into the oral cavity, so that the pH of saliva varies will slowly rise in the next 15 minutes and will return to normal pH in 30-60 minutes[11].

Based on the research results and discussion of gargling young coconut (*Cocos Nucifera L.*) solution on saliva pH, it was found that there was a significant effect of gargling young coconut (*Cocos Nucifera L.*) water gargling on saliva pH.

5. Conclusion

Consuming coconut water (*Cocos Nucifera L.*) can decrease the pH level of saliva. It is recommended not to consume coconut water excessively and to drink mineral water after consuming coconut water. Research needs to be developed Next, by increasing the number of samples it is more representative of the population.

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