



The Effect of Cucumber Fruit (*Cucumis sativus* L) on pH Saliva at the Rapha-EL Orphanage Foundation

Molek^{1*}, Sinta Marito¹, Mangatas Halomoan Parluhutan Hutagalung¹

¹ Dentistry Education Faculty of Dentistry, Universitas Prima Indonesia, Medan, Indonesia

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*Corresponding author:

Molek

E-mail address:

drg.molek@yahoo.com

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ABSTRACT

Increasing the pH of saliva will affect oral health. One way to increase the pH of saliva is to chew fruit that is fibrous, crunchy, and contains lots of water. The research objective was to determine the effect of cucumber on salivary pH at the Bina Mandiri Social Orphanage. This type of research is a one-group pretest and posttest group design. The study population was the children at the Rapha-El Orphanage Foundation. The sample size is determined based on the Roscoe formula of 20 people. Methods of data collection by measuring the pH of saliva before and after chewing cucumbers using a digital pH meter. The data that has been collected, is then analyzed by paired t-test. The results showed that there was a difference in the average pH of saliva before and after chewing cucumber ($p = 0.001$). The conclusion is that there is an effect of chewing cucumber on increasing the pH of saliva in children at the Rapha- El Orphanage Foundation.

1. Introduction

Oral health is a condition that shows that in the mouth such as debris, tartar, and plaque. If oral hygiene is neglected, plaque will form on the teeth and will spread to the entire surface of the teeth.¹

Maintenance efforts can be made to maintain healthy teeth and mouth by means of mechanics, chemistry, and modification of mechanical and chemical methods. Currently, clean teeth and mouth using a mechanical method, namely by brushing the teeth. In addition, other additional maintenance efforts that support natural teeth cleaning can be done by eating fruits.²

Saliva is a thick fluid that is produced by the salivary glands, parotid glands, sublingual glands, and

submandibular glands located under the tongue, near the cheek muscles, and near the palate (palate) in the mouth. 99.5% of the saliva content is water, while other substances consist of calcium, phosphorus, sodium, and magnesium.³

The main function of the salivary glands is to secrete saliva into the oral cavity to help protect the mouth, maintain the condition of the mouth, digest food, and kill bacteria in the mouth. If there is no saliva or the amount of saliva drops drastically and stops protecting the teeth, the bad thing that will happen is reduced cleaning activity from bacteria and food traces from the mouth, reduced buffer due to changes in acid in the mouth, so that oral activity becomes more acidic. One way to measure the degree

of acid or base is the Potential of Hydrogen (pH) Afrina et al (2018). The average normal pH in the saliva is 6.7.

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Several factors can cause changes in saliva, such as microorganisms present in the oral cavity, average salivary flow rate, and salivary buffer capacity.⁵ To control the pH, volume, and thickness of saliva to remain normal, adequate nutrition is needed and the food in the oral cavity contains vitamin C so that the viscosity of saliva is lower, besides that chewing food that contains lots of water, can control the pH that exists. in the mouth which also affects the pH of saliva.³

Fruits that are watery and fibrous and contain vitamin C when eaten and chewed can help clean teeth and mouth because they stimulate the secretion of Khasanah's saliva.⁶ According to McDonald and Avery, fruits that are watery and fibrous can result in self-cleansing of the teeth (self-cleaning effect) because when chewing the fibers shift so that the fibers release food debris that sticks to the surface of the teeth with this chewing. stimulates salivary secretion. Fruits that contain water, contain vitamin C and have high fiber, one of which is cucumber (*Cucumis sativus* L) so by consuming cucumbers, the pH of saliva can be affected.³

Cucumber (*Cucumis sativus* L) comes from the northern part of India and then entered the Mediterranean region, namely China in 1882 Decondolle put this plant into the list of native plants of India and in China cucumber was only known for 2 century AD. This type of cucumber is a type of wild cucumber known as the scientific name *Cucumis Hardwichi* Royle. Although cucumber is not a native plant in Indonesia, cucumber fruit is very well known in Indonesia and can be found easily in all corners of Indonesia.⁷ The content contained in cucumber is protein, fat, calcium, phosphorus, iron, carbohydrates, vitamin A, vitamin C, vitamin B1, vitamin B2, vitamin B6, potassium, sodium, and water.⁸

Based on the description above, the researchers were interested in conducting research on the effect of

cucumber fruit (*Cucumis sativus* L) on increasing salivary pH at the Rapha-El Orphanage Foundation.

2. Methods

This research is a pre-experimental study with one group interpretation and posttest group design. This research was conducted at the Rapha-El Orphanage Foundation. This research has received approval from the Ethics Commission with Letter Number: 021 / KEPK / UNPRI / IV / 2021

The population of this study was children at the Rapha-El Orphanage Foundation. The reason for choosing the research population of children at the Rapha-El Orphanage Foundation was for the homogeneity of the research because the Rapha-El Orphanage Foundation had the same life pattern.

The sample size is determined based on the Roscoe formula that for simple experimental research, the number of sample members is between 10-20 and in this study, the sample size was 20 people.

In this study, the tools and materials used were: a digital pH meter, plastic container, plastic mouthwash, measuring cup, mask, gloves, and tissue. The research procedures were as follows: Distributing informed consent and research explanation to respondents, the sample was instructed to rinse with mineral water for 30 seconds, measure the initial saliva pH score before chewing cucumber fruit treatment, give cucumber 25 grams to chew for 1 minute then swallowed, the pH measurement of saliva after chewing cucumber, before and after chewing was collected using the spitting method for 5 minutes. Saliva is collected in a plastic container, and the saliva flow rate is obtained by measuring the volume of saliva in ml/minute, and recording the saliva pH results using a digital pH meter.

And as for the data analysis carried out in this study is the Univariate Analysis and Bivariate Analysis. This univariate analysis was conducted to describe the research variables by creating a frequency distribution table and data distribution. And the bivariate analysis was carried out on two variables to determine the existence of a relationship or correlation

and difference.

3. Results and Discussion

The results of the study on age characteristics showed that the majority of respondents were 14-16 years old, as many as 11 people (55%), while only 9 respondents were aged 11-13 years (45%). In terms of gender, the results showed that the majority of the sample were women, namely 12 people (60%), while the sample was male-only 8 people (40%).

The results of the research on the average pH of saliva before and after chewing cucumbers in children at the Rapha-El Orphanage Foundation showed that the average pH of saliva before chewing cucumbers was 6.94 ± 0.53 and after 7.44 ± 0.42 . From these results, it can be stated that there is an increase in the pH of saliva after chewing cucumbers in children at the Rapha-El Orphanage Foundation.

The results showed that the average pH of saliva before chewing cucumber was 6.94 ± 0.53 and after 7.44 ± 0.42 with an average difference of 0.50 ± 0.11 . obtained p-value = 0.001 which means that there is a significant difference in the average pH of saliva before and after chewing cucumber. From these results, it can be stated that there is an effect of chewing cucumber on increasing the pH of saliva in children at the Rapha- El Orphanage Foundation.

This study was conducted to determine the effect of cucumber (*Cucumis sativus* L) on the pH of saliva in children at the Rapha-El Orphanage Foundation. Before chewing a cucumber, first, measure the pH of the saliva. The results of salivary pH measurements before chewing cucumber were 6.94 ± 0.53 and 7.44 ± 0.42 .

Cucumber is a crunchy fruit that works like a natural toothbrush and teeth whitener. The liquid released by the cucumber contains a sufficiently acidic solution⁹. Based on the results of the study, there was an increase in the saliva pH of the respondents after chewing cucumbers. The results of this study are in line with research conducted by ³ which stated that before chewing cucumbers, the average pH of the respondents' saliva was 6.7, and afterward, it was 6.8.

The results of the study from ¹⁰ are also in accordance with this study which reported that chewing cucumber showed an increase in salivary flow rate and pH.

Saliva is a complex oral fluid. A combination of various fluids and components is excreted into the mouth.¹¹ The normal pH value for saliva is 6.7 to 7.4. The pH value of saliva will change after consuming food.¹² The increase in the pH of saliva after chewing cucumbers in this study may be caused by the high water content of cucumbers, namely 96.2%.³ Fruits that contain water when eaten and chewed can help clean teeth and mouth which is known as a self-cleansing effect because it can stimulate salivary secretion which affects the pH of saliva.⁶

The above statement is supported by the results of the statistical analysis of the paired t-test which shows that there is an effect of cucumber on the increase in salivary pH in children at the Rapha-El Orphanage Foundation. From the results of this study, it can be seen that there is an increase in salivary pH after consuming cucumber with an average increase of 0.5 ± 0.11 . An increase in salivary pH after consuming cucumber fruit was also obtained from the results of research which stated that there was an effect of chewing cucumber on salivary pH.

Fruits that contain fiber, water and vitamin C such as cucumbers can affect the pH of saliva, help clean teeth and mouth because they stimulate salivary secretion, and have a taste that can stimulate saliva to secrete more saliva and make saliva viscosity lower³. In addition, foods that require high chewing power or foods that taste quite striking can increase saliva flow by stimulating saliva to excrete more saliva than in unstimulated conditions so that the pH of saliva in the mouth can change and also change its composition.^{6,4} This is in line with the statement of Mori et al. (2012) that chewing activity is regulated by the parasympathetic nervous system, which is activated by the plastic organ, which can trigger the production of large volumes of saliva.¹¹

Saliva contains substances including antibacterial substances, glycoprotein compounds, calcium, and fluoride.¹³ The acidic condition of the oral cavity can

facilitate the growth of Streptococcus mutants and Lactobacillus bacteria which will lead to demineralization of the tooth surface so that caries formation can occur.¹¹ Saliva has the ability to regulate the balance of the salivary buffer, so as to minimize acid-base and clean acids produced by microorganisms so as to prevent demineralization of tooth enamel.¹⁰

Another study reported that cucumber has a strong antacid effect against acids. In addition, cucumber fruit also contains phytochemicals such as alkaloids,

flavonoids, tannins, saponins, and vitamins A, B3, B5, B6, B7, D, and K.¹¹ These contents are proven to have hypoglycemic effects, pH-neutralizing effects, and antibacterial effects against cariogenic bacteria such as S. mutans.¹² From the results of this study, it was found that the pH of saliva before chewing cucumber was acidic, and after the pH was alkaline. Thus, from the results of this study, it was shown that chewing cucumbers can prevent dental caries.

Table 1. Sample characteristics based on age and gender

Characteristics of Respondents	n	%
Age (years old)		
11-13	9	45.0
14-16	11	60.0
Gender		
Male	8	40.0
Female	12	60.0
Total	20	100

Table 2. The difference in average pH of saliva before and after chewing cucumber fruit in children at the Rapha-EL orphanage foundation.

pH of saliva	XXX±SD	Mean diff	P-value
Before	6.94 ± 0.53	-0.50 ± 0.11	0.001
After	7.44 ± 0.42		

4. Conclusion

The conclusion of this study is that there are differences in the average pH before and after chewing cucumbers and there is an effect of chewing cucumbers on increasing the pH of saliva in children at the Rapha-El Social Orphanage Foundation.

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