



## THE EFFECT OF CONSUMING XYLITOL-CONTAINING CHEWING GUM ON PLAQUE INDEX IN FIFTH GRADE CHILDREN SDN 71 MIBO KOTA BANDA ACEH

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### Abstract

Dental plaque is a soft deposit consisting of a collection of various kinds of microorganisms, and is a major cause of caries and periodontal disease. One way to control plaque is by chewing xylitol gum which has been proven to be quite effective in cleaning teeth from plaque, increasing salivary pH, and stimulating saliva production. Xylitol is also able to reduce the synthesis of extracellular polysaccharides that can lead to the attachment of plaque bacteria. The purpose of this study was to determine the effect of consuming chewing gum containing xylitol on the plaque index in class V Sdn 71 Mibo children in Banda Aceh City. This research method is a quasi-experimental (quasi-experimental) method using a one-group pretest-posttest design. The sampling technique is the total population, which is 33 students. This study was conducted on February 15, 2022. The data analysis in this study is quantitative data using a parametric statistical test Paired Sample T-test. The results showed that there was a significant difference between before and after chewing gum containing xylitol on plaque index scores in graders. V SDN 71 Mibo Banda Aceh City  $p=0.001$ . It can be concluded that there is an effect of consuming chewing gum containing xylitol on plaque index in fifth graders at SDN 71 Mibo, Banda Aceh City. It is recommended to all students of SDN 71 Mibo Banda Aceh City to maintain and maintain dental and oral health, namely by brushing teeth 2 times a day, in the morning after breakfast and at night before going to bed.

**Keywords:** Xylitol Chewing Gum, Plaque Index.

### A. Introduction

Most of the causes of tooth decay and oral problems are plaque. This plaque will convert carbohydrates or sugars that come from food into acids that are strong enough to damage teeth. This plaque is the main focus in maintaining dental and oral hygiene and health (Ramadhan, 2010).

Plaque is the main cause of dental disease and gum disease. The plaque layer is mostly made up of germs. Plaque on the teeth can cause cavities or caries, while on the gums the plaque can cause gingivitis or gingivitis (Houwink, 1993).

Efforts to control dental plaque can be reached in two ways, namely mechanically and chemically. The mechanical way is to use a toothbrush and toothpaste. While the chemical method is to use chemicals that are antiplaque. One of the chemicals that have been studied and proven effective in inhibiting plaque formation is xylitol in the form of chewing gum products (Dewi, 2008).

Chewing gum is one of the snacks favored by adults and especially children. The ability of chewing gum in reducing dental plaque comes from the presentation mechanism and non-cariogenic sugar substitutes used as sweeteners. Chewing is an action that aims to break down large food particles and mix the food with the secretions of the salivary glands. Salivary secretion will increase in response to mastication, where secretion will be greater on the chewing side than on the side that is not used for chewing. The action of chewing gum can stimulate the flow of saliva which can clean debris and microorganisms from the oral cavity (Elina et al, 2017).

Plaque control measures that are easy to do are chewing xylitol gum. The benefits of chewing xylitol gum are easier to obtain than having to brush your teeth and use mouthwash that needs to be done in a special place. Xylitol gum can be chewed while playing with friends, and it is easy to get, for example, in supermarkets. In addition, nowadays people like xylitol rubber permeth because it is available in various flavors (Saputera et al, 2019).

## **B. Method**

The type of research used in this study was a quasi-experimental (quasi-experimental) using a one-group pretest-posttest design with all 33 students in the fifth grade of SDN 71 Mibo, Banda Aceh. The sampling technique in this study is the total population. This design does not use a comparison group (control) only uses the first observation (pretest) which

allows researchers to test changes after treatment by comparing the results of observations before (pretest) and after treatment (posttest).

The instruments that will be used are ksp, informed consent, diagnostic tools set and disclosing agent. Analysis of the data in this study is quantitative data using parametric statistical test Paired Sample T-test. Measurement of data started from the pretest to determine the plaque index before chewing xylitol gum. Followed by the intervention (consuming gum containing xylitol) for 2 minutes, after which a post test was performed. Data analysis used Statistics Program for Social Science (SPSS), with hypothesis testing based on the significance level of  $p < 0.05$ .

### **C. Result and Discussion**

#### **1. Univariate Analysis**

##### **a. General data**

##### **1) Gender of Respondent**

The gender of the respondents can be seen in the following frequency distribution table:

Table 1.1

Frequency Distribution by Gender of Class V Pupils at SDN 71 Mibo Banda Aceh City in 2022

No	Gender	frequency	Percentage (%)
1.	Male	13	39.4
2.	Female	20	60.6
	Total	33	100%

Based on Table 1.1, it is known that the gender of the respondents is mostly in the female sex category, amounting to 20 respondents (60.6%).

## 2) Respondent's Age

The frequency distribution based on the age of the respondents can be seen in the table below:

Table 1.2

Frequency Distribution by Age of Class V Students at SDN 71 Mibo Banda Aceh City in 2022

No	Respondent's Age	frequency	Percentage (%)
1.	10 years	15	45.5
2.	11 years	16	48.5
3.	12 years	2	6.1
Total		33	100%

Based on Table 1.2, it is known that the age of the dominant respondent in the 11 year age category is 16 respondents (48.5%)

## b. Special Data

### 1) Plaque Index (PHP-M) Before Chewing Gum Containing Xylitol

The frequency distribution of respondents based on plaque index (PHP-M) before chewing gum containing xylitol can be seen in table 4.3 below:

Table 4.3

Frequency Distribution of Respondents Based on Plaque Index Before Chewing Chewing Gum Containing Xylitol Against Plaque Index in Class V Children at SDN 71 Mibo Banda Aceh City in 2022

No	Plaque Index Before Chewing Xylitol Gum	N	%
1.	Very good	1	3.0
2.	good	3	9.1
3.	Bad	11	33.3
4.	Very Bad	18	54.5
Total		33	100

Based on table 1.3 above, it can be seen that the students of SDN 71 Mibo Banda Aceh City before chewing gum containing xylitol, the most plaque index (PHP-M) was in the very bad category, namely 18 students.

## 2) Plaque Index (PHP-M) After Chewing Gum Containing Xylitol

The frequency distribution of respondents based on the plaque index after chewing gum containing xylitol can be seen in table 4.4 below:

Table 1.4  
Frequency Distribution of Respondents Based on Plaque Index After Chewing Gum Containing Xylitol Against Plaque Index in Class V Children at SDN 71 Mibo Banda Aceh City in 2022

No	Plaque Index Before Chewing Xylitol Gum	N	%
1.	Very good	6	18.2
2.	good	17	51.5
3.	Bad	10	30.3
4.	Very Bad	0	0

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Total	33	100
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Based on table 1.4 above, it can be seen that the students of SDN 71 Mibo Banda Aceh City after chewing gum containing xylitol, the most plaque index (PHP-M) was in the good category, namely 17 students.

## 2. Bivariate Analysis

### a. Effect of Chewing Gum Containing Xylitol on Plaque Index (PHP-M)

The distribution of respondents based on the effect of chewing gum containing xylitol on the plaque index is shown in table 1.5 below:

Table 1.5  
Distribution of Respondents Based on the Effect of Chewing Gum  
Containing Xylitol on Plaque Index in Class Children  
V SDN 71 Mibo Banda Aceh City

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No	Plaque Index	Mean	N	Standar Deviation	Standar Mean	P Value (sig. 2 Tailed)
1.	Plaque Index Before Intervention	3.39	33	.788	.137	.001
2.	Plaque Index after Intervention	2.12	33	.696	.121	

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Based on table 1.5 above, it can be seen that the plaque index score (PHP-M) before chewing gum containing xylitol with an average of 3.39 has very bad criteria and there is a decrease after chewing gum containing xylitol on average 2.12 has good criteria with a significant value of  $p = 0.001 < 0.05$ , which means  $H_0$  is rejected and  $H_a$  is accepted, so it can be concluded that there is a difference before and after chewing gum containing xylitol on the plaque index score.

## **Discussion**

Based on the results of research conducted by researchers on 33 students of SDN 71 MiBo Banda Aceh City obtained data from table 4.5 plaque index scores before chewing gum containing xylitol in the very bad category as many as 18 students (54.5%) and there was a decrease and after chewing in the good category 17 students (51.5%) Based on statistical tests on the effect of chewing gum containing xylitol on plaque index in fifth graders at SDN 71 MiBo Banda Aceh City, it can be seen that there is a significant difference between before and after chewing gum rubber containing xylitol.

In this case, it is explained that there is a difference before and after chewing gum containing xylitol on plaque index because chewing gum containing xylitol can increase saliva flow in the oral cavity. Saliva can neutralize the acid produced by plaque bacteria, therefore during chewing gum the degree of acidity will increase. Increased saliva production can reduce the deposition of food debris on the surface of the teeth. The ingredients contained in chewing gum such as enzymes and bicarbonate can trigger tooth enamel remineralization.

Xylitol is a sugar substitute but does not belong to the sugar class. Xylitol is a sugar alcohol that can generally be made by reducing xylose, and its sweetness is almost the same as that of sugar. Most plaque bacteria cannot convert xylitol into acid because of the absence of an essential enzyme (dehydrogenase) so that it cannot be fermented and converted into extracellular polysaccharides.

The mechanism of decreasing the plaque index value in this study was a combination of the benefits of xylitol as a sugar substitute and the benefits of chewing gum. Xylitol can inhibit the growth of plaque bacteria and reduce plaque adhesion on the tooth surface, while the benefits of chewing gum itself can trigger saliva in cleaning plaque deposits on the tooth surface (Indah et al, 2018).

Chewing gum containing xylitol can be used to clean teeth and gums. High carbohydrate consumption in children causes bacteria to multiply more quickly in the mouth. Bacteria cause an acidic atmosphere in the mouth and facilitate the occurrence of caries. Chewing gum

containing xylitol will reduce the occurrence of demineralization due to carbohydrates (Susanto, 2011).

The results of this study are similar to those conducted by Sulistiadi in Jakarta from December 2005 to January 2006. He found that there was a significant relationship between chewing gum containing xylitol and changes in plaque index values. Clinical trials conducted by Tellefsen et al in Sweden by consuming 4 grams of xylitol gum a day for 6 days can be proven that xylitol-containing gum can reduce plaque formation.

The results of this study are in line with the results of research conducted by (Putti et al, 2008), with the title the effect of consumption of chewing gum containing xylitol on the formation of dental plaque. The results of data analysis using the unpaired paired t-test, the difference in plaque index between before and after treatment in the two groups showed a significant difference with p value = 0.000 ( $p < 0.05$ ).

Furthermore, research conducted by Rahmawati (2011) found a decrease in the plaque index score for those who chewed xylitol gum, while those who did not chew xylitol gum experienced an increase in the plaque index score. The p-value in the first-stage experimental group was 0.001 and the second-stage experimental group was 0.000, which means that there is a difference between the plaque index scores between before and after chewing gum containing xylitol. This is also in line with research conducted by Hasibuan et al in 2018. In his research, it was found that the average plaque index before chewing xylitol gum was 1.4 with moderate criteria, and the plaque index score after chewing xylitol gum was 0.4 with good criteria. So there is a decrease in plaque index of 1 with good criteria

## **E. Conclusion**

Based on the results of research and discussions that have been carried out on fifth grade students at SDN 71 Mibo, Banda Aceh City in 2022, the following conclusions can be drawn:

1. The plaque index score before chewing gum containing xylitol was in the very poor category, as many as 18 students (54.5%).
2. The plaque index score after chewing gum containing xylitol was in good category, as many as 17 students (51.5%).



3. There was a significant difference between before and after chewing gum containing xylitol on the plaque index score in fifth graders at SDN 71 Mibo, Banda Aceh City in 2022 ( $p=0.001<0.05$ ).

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