

Original Research Article

The Effectiveness of Using Total Paste with Sodium Lauryl Content in Removing Dental Plaque in Tanjung Lhoknga Elementary School Students, Aceh Besar Regency

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Abstract: Background: Dental caries is a disease caused by one of the bacteria *Streptococcus mutans*. Prevention of caries and dental plaque can also be done by brushing the teeth regularly using toothpaste. Mechanical or chemical methods can remove plaque. Caries prevention can be done by brushing the teeth using toothpaste. **Aim:** To determine the effectiveness of brushing teeth with sodium lauryl sulfate toothpaste and toothpaste without sodium lauryl sulfate on reducing dental plaque index in elementary school students in Aceh Besar district. **Methods:** This study used a quasi-experimental method with a post-test-only group design. This research was conducted on students of elementary school students Tanjung Lhoknga, Aceh Besar district, with 120 people. Data analysis using statistical test used is Chi-Square test at 95% confidence level ($= 0.05$). **Results:** There is a difference between toothpaste with sodium laurel sulfate and toothpaste without sodium laurel sulfate (p -value < 0.05). Brushing teeth with toothpaste without sodium laurel sulfate had a better effect on reducing plaque index (p -value < 0.05). Brushing teeth with sodium lauryl sulfate toothpaste before the intervention, the plaque index was 1.731, and after the intervention, the plaque index was 1.562, there was a decrease in plaque by 0.169. while brushing teeth without sodium laurel and sulfate plaque index before intervention was 1,845, and plaque index after the intervention was 1,230. There was a decrease in plaque by 0.615. Toothpaste without sodium laurel sulfate lowers plaque index more than toothpaste with sodium laurel sulphate. **Conclusion:** Brushing teeth with toothpaste without sodium laurel sulfate is more effective in reducing plaque index.

Keywords: Sodium lauryl sulphate, toothpaste, plaque index.

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INTRODUCTION

Dental caries is a global disease problem [1, 2]. The 2015 Global Burden of Disease study found that permanent dental caries have affected 2.3 billion people and 560 million children [3]. A higher caries burden occurs in economically disadvantaged communities [4, 5]. The World Health Organization reports that 60 to 90% of school children and nearly 100% of adults worldwide suffer from cavities [6]. Dental caries is a disease caused by one of the bacteria *Streptococcus mutans* [7]. Efforts to prevent dental caries include balancing the level of oral bacteria, controlling the consumption of sugary and starchy foods, strengthening demineralized enamel through fluoridated products [8]. Prevention of caries and dental plaque can also be done

by brushing the teeth regularly using toothpaste. Plaque can be removed by mechanical or chemical methods [9].

The mechanical plaque removal method is effective in controlling plaque. One of these methods is brushing the teeth. Brushing the teeth using toothpaste in the right way can prevent plaque from forming and inhibit the growth of microorganisms that can interfere with dental and oral health. Toothpaste containing fluoride can repair and maintain tooth structure because it is resistant to decay and stimulates remineralization [10]. However, the toothpaste available in the market today are detergent and non-detergent toothpaste. Non-detergent toothpaste has the principle of restoring the natural function of the

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peroxidase system contained in saliva to inhibit the growth of bacteria. Toothpaste containing detergents has a foaming effect, is abrasive, and causes dryness in the oral cavity [11].

Surfactants (or detergents) are substances added to toothpaste to provide a cleaning and antibacterial effect through surface action, depending on their hydrophilic and hydrophobic properties [12]. The most widely used surfactant in toothpaste is sodium lauryl sulfate (SLS) (C 12 H 25 NaO 4 S) which has been used for more than 50 years [13]. Surfactants also aid in the intra-oral dispersion of kinds of toothpaste and the micellization of hydrophobic materials, such as flavor compounds and active antiplaque/antigingivitis [14]. Elementary school children are a group that is vulnerable to dental and oral diseases, such as cavities, bad breath problems, and dietary problems that can affect oral and dental health [15]. Most of these children do not know the importance of maintaining dental and oral health. Therefore, elementary school children need special attention to get a dental and oral health degree. Factors that influence this are students' lack of knowledge about dental and oral hygiene. Determine the effectiveness of brushing teeth with sodium lauryl sulfate toothpaste and toothpaste without sodium lauryl sulfate on reducing dental plaque index in elementary school students in Aceh Besar district.

MATERIAL AND METHODS

This research is a quasi-experiment with a post-test-only group design. The post-test-only group

design was chosen to determine the effect of brushing teeth with toothpaste containing sodium lauryl sulfate and toothpaste without sodium lauryl sulfate. The research was carried out from August-October 2021. The population in the study was all students from class I to class V at basic school Tanjung Lhoknga Aceh Besar. The population in this study amounted to 120 students.

The number of samples used is the total population of 120 students. Then they were divided into 2 groups. Group, I consisted of 60 students using toothpaste containing sodium lauryl sulfate, and group 2 consisted of 60 students using non-sodium Lauryl Sulphate toothpaste. Researchers measured the initial plaque index before using sodium laurel sulfate toothpaste and non-sodium laurel sulfate toothpaste. Each tooth is examined on four surfaces, namely the mesial, distal, lingual, and palatal surfaces, and then the score is calculated. Plaque Index Score is: If the score ranges from 0-1, it is categorized as good. 3 is categorized as bad. The data collected is then compared before and after the use of toothpaste containing sodium laurel sulfate. The examination results are presented in tabular form so that the difference between the use of toothpaste with sodium laurel sulfate and without sodium laurel sulfate can be seen. Data analysis using statistical test used is Chi-Square test at 95% confidence level (= 0.05).

RESULTS

Table-1: plaque index data by group intervention

Intervention using toothpaste	Average ± SD	Difference Average ± SD	CI: 95%	p-value
Sodium lauryl sulfate				
Plaque index before	1.73±1.141	0.17±0.493	0.042 to 0.297	0.010
Plaque index after	1.56±0.889			
No Sodium Lauryl Sulfat				
Plaque index before	1.86±0.693	0.62±0.455	0.497 to 0.732	0.000
Plaque index after	1.23±0.089			

Lhoknga State Elementary School 1 using sodium lauryl sulfate was previously 1.73 after the intervention to 1.56. Plaque index without sodium lauryl sulfate before the intervention was 1.86, and after using toothpaste that did not contain sodium lauryl sulfate, the plaque index decreased to 1.23. using a toothpaste containing sodium lauryl sulfate had a significant effect on reducing dental plaque index in

students at Tanjung Lhoknga Elementary School Students District, Aceh Besar. These results are evidenced by the results of statistical tests, which show that there are There is a significant difference in the dental plaque index in Tanjung Lhoknga Elementary School Students between before and after the index using toothpaste with Sodium Lauryl content p = 0.010.

Table-2: The effect of using pastes containing sodium and without sodium on changes in dental plaque index

Plaque Index	N	Min	mak	Average	Std. Deviation
Using sodium					
Before	60	0.3	4.0	1,731	1.1406
After	60	0.2	3.5	1,562	0.8895
Without using sodium					
Before	60	0.3	4.0	1,845	0.6930
After	60	0.0	2.8	1,230	0.6942

Plaque index in Tanjung Lhoknga Elementary School Students before having an average value of 1.73 and after using toothpaste containing Sodium Lauryl Sulfate plaque index decreased to 1,562. However, at Tanjung Lhoknga State Elementary School 1, students

without using sodium it was known that before the intervention had an average score of 1.845, and after the intervention without using sodium, it became 1.230. This means that there is a decrease.

Table-3: The effectiveness after the use of toothpaste between Sodium Lauryl Sulpat and without Sodium Lauryl Sulpat on changes in the dental plaque index of elementary school students

Intervention group	Dental Plaque Index				p-value
	n	Average ± SD	Difference Mean ± SD	CI: 95%	
Sodium Lauryl Sulfate toothpaste	60	1.57±0.889	0.33±0.146	0.43 to 0.62	0.025
Toothpaste without Sodium Lauryl Sulfate	60	1.23±0.694			

The content of sodium laurel sulfate and toothpaste without sodium laurel sulfate can reduce dental plaque index. Using toothpaste without sodium laurel sulfate had a better effectiveness value (p-value < 0.05) than using toothpaste containing sodium lauryl sulfate on changes in dental plaque index in Tanjung Lhoknga Elementary School Students Aceh Besar District (p=0.025).

DISCUSSION

Toothpaste without sodium laurel sulfate was more effective in reducing dental plaque index than toothpaste containing sodium laurel with a p-value = 0.025. Using toothpaste containing sodium laurel sulfate and toothpaste without sodium laurel sulfate can reduce dental plaque index. Using toothpaste without sodium laurel sulfate had a better effectiveness value (p-value < 0.05) than using toothpaste containing sodium lauryl sulfate on changes in dental plaque index. However, in general, toothpaste with sodium laurel sulfate and toothpaste without sodium laurel sulfate can reduce dental plaque index. This is also consistent with the previous study, which stated that no significant differences were observed concerning the effects of plaque and gingivitis between SLS-containing and SLS-free tubes of toothpaste containing enzymes, colostrum, and low concentrations of zinc [16].

Test toothpaste without SLS was as effective as regular SLS toothpaste on gingival bleeding and plaque scores [17]. The content of sodium laurel sulfate and toothpaste without sodium laurel sulfate can reduce dental plaque index. Toothpaste functions as an abrasive that helps remove dental plaque food residue adhering to the teeth suppresses halitosis, and provide active ingredients such as fluoride or xylitol to help prevent tooth and gum disease (gingivitis). Important materials include abrasives, scouring agents, humectants, fluoride, teeth whiteners, water, flavoring agents, sweeteners, binders, and foaming agents [18]. SLS used exceeding the recommended limit can irritate the epidermis and denaturation of the polypeptide chain of a protein molecule, thereby changing the protein structure when SLS is used in the oral cavity, the salivary protein chain structure changes to reduce the salivary solubility [19]. The side effect of excessive use

of SLS is a decrease in taste sensitivity. The decrease in sweet taste sensitivity due to SLS use is included in the temporary taste disturbances that can occur every day after brushing teeth. This temporary disturbance is due to protein denaturation by eliminating the cause of the denaturation [20]. The use of SLS in the long term will cause permanent taste disturbances and cause harmful side effects such as irritating the epidermis in the oral cavity, irritation of the eyes, dryness, and peeling of the skin, severe ulceration is also harmful to other organs such as the liver and kidneys, Heart [21].

CONCLUSIONS

Within the limitations of the current *in vitro* investigation, it can be concluded that all tested irrigants significantly lowered the microhardness of root dentin and increased its roughness. The root dentin surface significantly roughenes in case of ultrasonic activation of the disinfection solutions.

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