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EFFECTIVENESS OF GARGLING BOILED WATER FROM GUAVA LEAVES AGAINST PLAQUE INDEX

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ABSTRACT

Dental plaque is a collection of microorganisms on the surface of the teeth in the form of a biofilm which can affect the oral cavity system. One way to control plaque is by gargling. Guava leaves have two important components, namely guaijaverin as an antibacterial and has high potential in the defense process to inhibit plaque growth by reducing hydrophobicity which is the main factor for bacteria to stick to the tooth surface, and the flavonoid quercetin which functions as anti-inflammatory, spasmolytic activity. antioxidant, and antimicrobial. The aim of this research was to determine the effectiveness of gargling with boiled water from guava leaves on the plaque index in class IV students at SD Negeri Lamsayuen Aceh Besar. The type of research used was a quasi experiment with a pretest-posttest design with control group. Carried out at Lamsayuen Aceh Besar State Elementary School, data collection was carried out by examining the plaque index. The population taken in this study was all 40 class IV students. The sample taken in this study used a saturated sampling method, namely the sample used was 40 people, 20 people in the group gargling boiled water with guava leaves and 20 people in the group gargling water. mineral. The results of the study showed that the p value (probability value) using a statistical test, Paired Sample T-Test p = 0.000 was smaller than 0.05 or (p=0.000<0.05), so there was a difference in plaque index in the group gargling with boiled leaf water. guava and mineral water group. Conclusion, that gargling boiled water from guava leaves is effective in reducing the plaque index in class IV students at SD Negeri Lamsayuen Aceh Besar. The research results can be used to provide information to others that boiled water from guava leaves can reduce the plaque index.

Key words : dental plaque, plaque index, guava leaves, mineral water

INTRODUCTION

Dental and oral health is an important aspect of public health and one of the aspects of life, so it must be paid attention to by everyone in society. By receiving the necessary dental care, this state can be achieved. Conditions associated with poor oral hygiene, such as toothlessness, excessive tooth decay, plaque, calculus, and stains, can make life difficult [1] . In both

developed and developing countries, periodontal disease is a common condition affecting approximately 20-50% of the global population. According to a National Institute of Dental Research (NIDR) survey conducted in Indonesia, periodontal disease ranks second as a serious social problem. With a population of 70%, periodontal disease is the most common dental and oral disease in Indonesia. According to Loe et al., dental plaque is a significant etiological factor for periodontal disease [1].

Dental plaque is a thin layer consisting of bacteria that grow in a matrix and form a collection. Dental plaque sticks firmly to gums, teeth and other hard oral surfaces that have not been cleaned. The most common bacteria found early in the formation of dental plaque are gram-positive cocci, including Streptococcus mutans, Streptococcus sanguis, and Streptococcus salivarius. The glucosyltransferase enzyme these microorganisms possess allows them to convert carbohydrates into acids, which is how the bacteria in dental plaque cause periodontal diseases such as gingivitis and periodontitis in addition to causing caries [2].

Controlling plaque that sticks to the gums or tooth surface and cleaning dental plaque regularly are two ways to maintain oral and dental hygiene. Inhibiting plaque formation also directly inhibits calculus formation, thereby improving periodontal tissue health. The main method for controlling plaque is regular teeth cleaning, which can be accompanied by mouthwash. Gargling can be an alternative to brushing teeth in terms of preventing and suppressing the formation of dental plaque, while brushing teeth remains the most effective method [1].

Mouthwash is a liquid or solution used to help clean the mouth of bacteria that cause oral disease and help freshen the mouth [3]. Mouthwashes are divided into two categories based on their ingredients: chemical mouthwashes and herbal mouthwashes. Among the many benefits of mouthwash is its ability to freshen breath and mouth, eliminate bad breath, and prevent and reduce the growth of dental plaque germs [4].

Controlling plaque with mouthwash can use ingredients such as Chlorhexidine and can also use natural ingredients. However, chlorhexidine shows adverse effects, namely discoloration of the teeth, restorative materials, and the dorsal tongue. Chlorhexidine also alters taste sensation and can cause erosion of the oral mucosa [5]. As a result, there has been a significant increase in interest in using natural ingredients rather than chemicals, and many people are turning to natural therapies for health care because they are more efficient, safe, affordable, and usually have fewer side effects [1].

Herbal mouthwash is a safe and effective substitute for conventional medicine which is currently being developed. Herbal mouthwashes have been shown to have a number of side effects associated with conventional treatments [4]. Guava (Psidium guajava Linn) is one of the plants that can be used as an ingredient in herbal mouthwash [6].

The benefits of guava (Psidium guajava) have long been known, especially its leaves. Guava leaves are one of the ingredients in traditional medicine, which are used as mouthwash, toothache medicine, stomach ulcer medicine, diabetes mellitus treatment, prevention and healing of canker sores, cancer prevention, lowering high blood pressure, prevention of dengue fever, prevention of coughs and flu, stroke prevention, and treatment of bone prolapse [7].

According to Oktiarna, Manaf, and Suripno citing Soedibyo, guava leaves contain hemostatic, astringent and anti-inflammatory substances. Some of the active ingredients in guava leaves (Psidium guajava Linn) include tannins which can precipitate bacterial proteins, quercetin, polyphenols, quinones, saponins, alkaloids and flavonoids which can inhibit bacterial growth, as well as guayaverine, leukocyanidin, essential oils, malic acid, resin, and oxalic acid [8].

Guava leaves have two important components, namely guaijaverin as an antibacterial and has high potential in the defense process to inhibit plaque growth by reducing hydrophobicity which is the main factor for bacteria to stick to the tooth surface [9], and the flavonoid quercetin which functions as an anti-inflammatory activity. spasmolytic, antioxidant, and antimicrobial [9].

In the 2018 Basic Health Research statistics (RISKESDAS), dental and oral health problems were reported by 55.6% of teenagers (aged 10-14) and 67.3% of young children (aged 5-9 years). As many as 55.3% of respondents to the 2018 Aceh Basic Health Research Survey (RISKESDAS) reported having problems with their teeth and oral health (Riskesdas, 2018). The 2018 Aceh Besar Basic Health Research (RISKESDAS) findings showed that 43.36% of participants had dental and oral health problems, with the highest percentage occurring in the 5-9 year old age group, 60.2%, and 10-12 year olds, 52.9 % [10].

From the results of the initial survey conducted on 10 class IV students at Lamsayuen Elementary School, Aceh Besar, it was found that 6 students were in the bad plaque index category, 3 students were in the good plaque index category and 1 student was in the very good plaque index category. Based on these things, the researchers were interested in finding out the effectiveness of gargling with boiled water from guava leaves on the plaque

index in class IV students at Lamsayuen State Elementary School, Aceh Besar district.

The aim of this study was to determine the plaque index in fourth grade students at SD Negeri Lamsayuen Aceh Besar before and after gargling with boiled water from guava leaves and to determine the plaque index in grade IV students at SD Negeri Lamsayuen Aceh Besar before and after gargling with mineral water.

METHODS

This type of research is a quasi experiment or experiment which aims to determine a symptom or influence that arises as a result of certain treatments [11] . The research design used was pretest-posttest with control group, where this research aimed to determine the plaque index before being given treatment and after being given treatment by gargling with boiled guava leaf water in class IV students. The population in this study was all fourth grade students at Lamsayuen State Elementary School, Aceh Besar, totaling 40 people. The sampling technique chosen was a sampling technique, namely the entire total population. Univariate data analysis describes each variable and respondent characteristics. The independent variable is gargling with boiled guava leaves. The dependent variable is a decrease in plaque index. Bivariate analysis to test the relationship between the independent variable and the dependent variable using the paired sample T-test.

RESULTS AND DISCUSSION

This research was conducted from 21 May to 28 May 2024 on grade IV children at SD Negeri Lamsayuen Aceh Besar. The sample in this study was all grade IV children totaling 40 students. The results of data collection were obtained by examining the dental plaque index. Based on the results of data processing obtained, presented in the form of tables and narratives, the following results were obtained:

Table 1
Univariate Analysis Of Respondent Frequencies Based On Age For Fourth Grade Students At Lamsayuen State Elementary School

No	Age	The number of students	Percentage (%)
1	9 years	9	22.5%
2	10 years	26	65%
3	11 years old	4	10%

4	12 years old	1	2.5%
	Amount	40	100%

From table 1 it can be seen that the highest number of respondents based on age in class IV students at SD Negeri Lamsayuen Aceh Besar were in the 10 year age category, namely 26 students (65%)

Table 2
Univariate Analysis Frequency Distribution Of Respondents Based On Gender Among Class IV Students At Lamsayuen State Elementary School

No	Gender	The Number Of Students	Percentage (%)
1	Man	23	57.5%
2	Woman	17	42.5%
	Amount	40	100%

From table 4.2 it can be seen that the largest number of respondents based on age in Class IV students at SD Negeri Lamsayuen Aceh Besar were in the male category, namely 23 students (57.5%).

Table 3
Univariate Analysis Of The Frequency Distribution Of Plaque Checks On Students Before Being Given Boiled Water From Guava Leaves To Class IV Students At SD Negeri Lamsayuen

No	Plaque Examination	Before	%	After	%
1	Very good	0	0%	2	10%
2	Good	4	20%	11	55%
3	Bad	14	70%	7	35%
4	Very bad	2	10%	0	0%
	Amount	20	100%	20	100%

From table 3 it can be seen that plaque examination of students before being given boiled water from guava leaves with the highest criteria being bad was 14 people (70%). From the table above it can also be seen that by examining plaque on students after gargling boiled water with guava leaves, 11 people (55%) obtained the highest plaque index score in the good criteria.

Table 4
Univariate Analysis Of The Frequency Distribution Of Plaque Checks On Students Before Being Given Mineral Water To Class IV students at SD Negeri Lamsayuen

No	Plaque Examination	Before	%	After	%
1	Very good	0	0%	0	0%
2	Good	2	10%	2	10%
3	Bad	16	80%	16	80%
4	Very bad	2	10%	2	10%
	Amount	20	100%	20	100%

From table 4 it can be seen that 16 students (80%) checked plaque on students before being given mineral water. From the table above it can also be seen that examination of students after gargling with mineral water showed that the highest plaque index score was in the bad criteria, as many as 16 people (80%).

Table 5
Univariate Analysis Of The Frequency Distribution Of Mean Values Before And After Being Given Guava Water And Mineral Water To Class IV students at SD Negeri Lamsayuen

Variable	Mean	elementary school
Mark *Pretest* Gargle with boiled water from guava leaves	37.20	6,955
Mark *Post t test* gargle with boiled water from guava leaves	25.80	8,439
Mark *Pretest* mineral water	39.15	6,046
Mark *Post t test* mineral water	38.95	6,143

From table 5 above, it shows that there was an increase in the mean plaque index value after gargling boiled water with guava leaves by 11.4 from the pretest of 37.20 to 25.80 at the posttest. And it also showed a slight increase in the mean plaque index value after gargling mineral water by 0.2 from the pretest 39.15 to 38.95 at the posttest.

Table 6
Bivariate Analysis Of Normality Test Using Shapiro-Wilk, Pretest And Posttest Plaque Index Examination Value Data

Variable	Test Normality (*Shapiro - Wilk*)	Information
Mark *Pretest* Gargle Guava Leaves	0.687	Normal
Mark *Posttest* Gargle Guava Leaves	0.092	Normal
Mark *Pretest* gargle Mineral water	0.439	Normal
Mark *Posttest* Gargle with mineral water	0.348	Normal

Normality testing uses computer software (SPSS) and the results of normality testing (Table 6) can briefly be stated that all the data in this study, both student pretest and posttest scores, are normally distributed (sig. >0.05) with a significance level of 95%.

Table 7
Bivariate Analysis Of Test Results Regarding The Effectiveness Of Gargling With Boiled Water From Guava Leaves On Plaque Index In Class IV Children

Variable	Mean	P Value
Mark plaque index before and after gargling with boiled water from guava leaves	11,400	0,000
Mark index plaque before And after gargle with mineral water	0.200	0.042

Table 7 shows that the plaque index before and after gargling with boiled water from guava leaves has a significant value of $p = 0.000$ ($p < 0.05$), this shows that there is an effect of gargling with boiled water from guava leaves on reducing the plaque index in class students. IV Lamsayuen State Elementary School, Aceh Besar. Based on table 4.9, it also shows that the plaque index before and after gargling with mineral water has a value of $p=0.042$ ($p<0.05$), this shows that there is an effect of gargling with mineral water on reducing the plaque index even though there is no significant difference.

DISCUSSION

Based on the results of research on fourth grade students at SD Negeri Lamsayuen Aceh Besar, it can be seen in table 3 that the plaque index of students before gargling water boiled with guava leaves was 0% in the very good category, 20% in the good category, 70% in the bad category and 10% in the very bad category. Table 3 can also be seen where the student's plaque index after gargling with boiled water from guava leaves for one week is 10% in the very good category, 55% in the good category, 35% in the bad category and 0% in the very bad category.

Gargling with boiled water from guava leaves is effective in reducing the plaque index. This is because the content in guava leaves, namely quercetin, has a high level of antibacterial activity so that it is able to fight pathogens that cause periodontal disease, namely Aggregatibacter actinomycetemcomits, Porphyromonas gingivalis, Prevotella intermedia, and is able to inhibit the growth of the bacteria Streptococcus mutans, Streptococcus sanguinis, and Actinomyces species [12] .

Based on table 4, it can be seen that the students' plaque index before and after gargling with mineral water is the same, where 0% is in the very good category, 10% is in the good category, 80% is in the bad category and 10% is in the very bad category. These results can be interpreted as no significant difference because mineral water does not contain antibacterial content.

Based on table 5 above, it shows that there was an increase in the mean plaque index value after gargling boiled water with guava leaves by 11.4 from the pretest of 37.20 to 25.80 at the time of the posttest. And it also showed a slight increase in the mean plaque index value after gargling mineral water by 0.2 from the pretest 39.15 to 38.95 at the posttest. During the pretest and posttest, there was a significant difference, based on the results of the paired t-test, p=0.000 (p=<0.05) at a confidence level of 95%, so it can be concluded that there is an effect of gargling guava leaf decoction on reducing the plaque index. in class IV children at SD Negeri Lamsayuen Aceh Besar.

Based on table 6, you can see the results of the normality test on existing data using Shapiro-Wilk, namely the normality test for small samples (less than 50). The pretest value of gargling water boiled with guava leaves was 0.687 and the posttest value of gargling water boiled guava leaves was 0.092. And also the pretest value for gargling with mineral water is 0.439 and the posttest value for gargling with mineral water is 0.348, indicating that the four values are normally distributed (sig. >0.05) with a significance level of

95%, which aims to check whether the research data obtained comes from a population with a normal distribution.

Table 7 shows that the p value = 0.000 (p <0.05), this shows that there is an effect of gargling with boiled guava leaf water on reducing the plaque index. This is similar to research by Claudine Radot Pamela Boru Tambunan (2021) The Effect of Gargling Guava Leaf Boiled Water on Plaque Index. Based on the results of the Wilcoxon test, a value was obtained (p<0.05), which means that gargling boiled water with guava leaves can reduce the plaque index. Based on table 4.9, it also shows that the p value = 0.042 (p < 0.05), this shows that there is an effect of gargling with mineral water on reducing the plaque index even though there is no significant difference. This is similar to research by Feryra Putri Ayu Suma (2016) The Effect of Gargling Mineral Water on the Plaque Index. Based on the test analysis, a value was obtained (p = 0.000 < 0.05), which means that gargling with mineral water can reduce the plaque indexOne aspect of overall health is dental and oral health, which plays an important role in children's optimal development. Plaque prevention, plaque removal, and control of plaque-related diseases are the first steps in the most important preventive measures against dental and oral diseases: maintaining healthy teeth and mouth every day [13] .

CONCLUSION

Based on the results of the research and discussion, it can be concluded that gargling with boiled water from guava leaves is effective in reducing the plaque index in class IV students at Lamsayuen Elementary School, Aceh Besar (P=0.000<0.05). There was an increase in the mean score after gargling boiled guava leaf water by 11.4 from the pretest 37.20 to 25.80 at the posttest

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