

Decreased Plaque Score Due to Gargling with Guava Leaf Decoction Among Adolescents at the “Sejati Muhammadiyah Rappang” Social Welfare Institution Sidenreng Rappang Regency

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ABSTRACT

Plaque plays an important role in the occurrence of dental and oral diseases such as dental caries and periodontal disease. Plaque control needs to be done to reduce the buildup of plaque on the surface of the teeth. Gargling with boiled water from guava leaves is one effort that is believed to be able to reduce dental plaque scores because it has antiseptic, antibacterial and antimicrobial activity. The aim of this study was to determine the effect of gargling boiled water with guava leaves on reducing plaque scores in adolescents at the Sejati Muhammadiyah Rappang Child Welfare Institution. The type of research used is experimental research using a *One group pre-test post-test* research design. The sample in the study was 30 people taken using *purposive sampling* technique. Before gargling boiled guava leaf water, the participants' average plaque score was 2.193 with moderate criteria, there was a decrease of 0.536 to 1.656 with good criteria. The data was analyzed using the *Paired T-Test* and obtained a result of 0.001 or $p < 0.05$ so that the null hypothesis was rejected and the alternative hypothesis was accepted. Based on the research results, it can be concluded that there is an effect of gargling boiled guava leaf water on reducing plaque scores in adolescents at the Sejati Muhammadiyah Rappang Child Welfare Institution.

Keywords: Dental plaque, guava leaf boiled water, teenagers

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INTRODUCTION

Dental and oral health is an indicator of overall health, well-being and quality of life (Amelinda, et al., 2022). However, dental and oral health problems are still experienced by many countries, both developed and developing countries, which still receive little attention and even tend to be ignored. Many people in Indonesia still suffer from dental and oral diseases, especially dental caries and other periodontal diseases, both children and adults (Putri, M.H. et al., 2018). According to the *World Health Organization* (WHO) in 2012, it was stated that throughout the world 60-90% of school children and even almost 100% of teenagers and adults have dental caries which often causes pain and can affect the quality of life.

Dental caries is the most common dental and oral health problem suffered by people in Indonesia with a percentage of 45.3%. Specifically, the province of South Sulawesi is in 4th place with a percentage of 55.5% of people suffering from damaged/caved teeth (RISKESDAS, 2019). In the oral cavity there are more than 700 species of bacteria that colonize each other in biofilms and then form plaque and is described as one of the most complex microbial ecosystems (Kasuma, 2016). Plaque plays an important role in the occurrence of dental and oral diseases such as dental caries and periodontal disease. Plaque is formed due to food residue left behind and not cleaned for a long time (Putri, M.H. et al., 2018). Dental plaque is a biofilm or mass of bacteria that grows on surfaces in the mouth (Arya, 2021). One effort to reduce plaque scores can be done through plaque control.

Plaque control is an effort to remove and prevent the buildup of plaque on the surface of the teeth, this effort can be done mechanically or chemically. Mechanical plaque control can be done by brushing teeth or using dental floss, then chemical plaque control can be done using mouthwash which is antiseptic and antibacterial. Chemical plaque control is carried out using mouthwash which aims to clean areas that cannot be reached by a toothbrush (Penda, et al., 2015). Since ancient times, people have used medicines derived from natural ingredients to treat various diseases. The use of natural ingredients used as medicine rarely causes adverse side effects compared to drugs made from synthetic ingredients (Eriyati, 2019).

The use of chemicals to reduce plaque on teeth is indeed more effective, but there are side effects. In research conducted by (Aini, N. et al., 2022) during the research, the group who gargled using chemical mouthwash admitted that they felt uncomfortable. Some of them complained of a bitter and hot sensation a few moments after using it. This is in line with previous research conducted by (Yetty, 2015) which stated that long-term use of chemicals (chlorhexidine) can cause side effects. This material is less preferred because it tastes bitter and causes changes in taste perception, apart from causing staining on the surface of the teeth and also triggering the emergence of supragingival calculus.

Guava leaves are a traditional medicine that is believed to have active compounds that are able to treat various diseases suffered by people. The leaves of guava (*Psidium guajava* L.) are empirically used by the community to treat diarrhea which contain antibacterial substances, namely tannins, flavonoids, attrition oil and alkaloids (Fратиwi, 2015). It is believed that boiled water from guava leaves can reduce the dental plaque index score, so it is hoped that it can prevent the formation of caries on teeth. Gargling with boiled water from guava leaves can be used as an effort to prevent dental and oral health problems, such as reducing the plaque index score on teeth (Tambunan & Misnaniarti, 2021).

Guava leaves (*Psidium guajava* L.) contain quite a lot of phenolic compounds including tannins and flavonoids, so guava leaves are antimicrobial. Guava leaves contain secondary metabolites, namely tannins, polyphenols, flavonoids, monoterpenoids, sisculterpenes, alkaloids, quinones and saponoids, vitamin B1, B2, B3, B6, and vitamin C (Agustina, 2018). Not only the leaves, all parts of the guava tree have been used to treat various diseases. Examples are to treat scurvy in Asia and Africa, lung dysfunction and coughs in Bolivia and Egypt, etc. (Syafitri, 2020).

The aim of this study was to determine the effect of gargling boiled water with guava leaves (*Psidium guajava* L.) on reducing plaque scores in adolescents at the Real Muhammadiyah Rappang Child Welfare Institution, Sidenreng Rappang Regency.

METHOD

This research is quantitative research using a type of experimental research, namely research carried out to determine the consequences of the treatment given to the thing being researched (Sugiyono, 2018). The research design used was *One group pre-test post-test*, so

that the plaque score was checked before being given the treatment (*Pre-Test*), after that the participants were given treatment, namely gargling with boiled water from guava leaves and then the plaque score was checked after being given the treatment (*Post-test*). This research was aimed at determining the effect of gargling with boiled water from guava leaves (*Psidium guajava L.*) on reducing plaque scores in adolescents.

The research was conducted from May to June 2023 at the Real Muhammadiyah Rappang Child Welfare Institution, Sidenreng Rappang Regency. The number of samples in this study was 30 people taken using a *purposive sampling* technique, namely sampling carried out by selecting samples that were deemed to support the research and meet the predetermined inclusion criteria. The research instruments used are; Tools such as basic instruments, PPE (masks and handscond), nier bekken, measuring cups, mouthwash cups, drink bottles, stopwatches, scales and filters. The materials used include 20 ml of boiled water from seed crested leaves for use with each sample, 4 biscuits for each sample, disclosing solution, cotton, betadine, tissue, cotton pallet, 70% alcohol and water.

To measure participants' plaque scores, PHP (*Personal Hygiene Performance*) was carried out by Podshaley and Haley (1968) in (Putri, M.H. et al., 2018), namely the examination was carried out on the facial or lingual crown of the tooth by dividing each surface of the tooth crown into five parts. , namely D (distal), G (middle third of gingiva), M (mesial), C (middle third), I/O (middle third of incisal or occlusal). If there is plaque, it is given a value of 1 and if there is no plaque it is given a value of 0. The PHP score is obtained by adding up all the plaque scores on the teeth that have been examined and then dividing by the number of teeth examined. So a score is obtained with the criteria: Very good = 0, Good = 0.1-1.7, Medium = 1.8-3.4, Poor = 3.5-5.0.

Figure 1. Dental Plaque Score Examination Before and After Gargle with boiled water from guava leaves



Plaque score checks are carried out by smearing disclosing solution on the surface of the tooth to be examined, then a *pre-test* is carried out. After that, the treatment was given, namely the participants gargled with boiled water from guava leaves for 30 seconds. Then 5 minutes later a *post-test* was carried out.

This research uses univariate and bivariate analysis which is carried out on two variables that are thought to have an influence or regression using pre-test and post-test (Notoatmodjo, 2018). The data that has been collected will be analyzed using the Paired T-Test or T-Difference Test which is used to determine the comparison of two variables. The aim of using this test is to see whether there is an average difference between two paired or related data. Guidelines for drawing conclusions on the T difference test results based on the significance value (Sig.) of the SPSS output results, namely if the Sig. (2-tailed) < 0.05 then H₀ is rejected and H_a is accepted. Conversely, if the Sig. (2-tailed) value is > 0.05 then H₀ is accepted and H_a is rejected (Santoso, 2014).

RESULT

Based on research conducted on 30 teenagers at the Real Muhammadiyah Rappang Child Welfare Institution which was carried out from May to June 2023 with the aim of determining the reduction in plaque scores due to gargling boiled guava leaf water, the following results were obtained:

1. Participant Characteristics

The characteristics of participants at the Real Muhammadiyah Rappang Child Welfare Institution who took part in the research directly are presented in table 1.

Table 1. Characteristics of Participants at the Real Muhammadiyah Rappang Child Welfare Institution

Variable	N	%
Gender		
Male	7	23
Famale	23	77
Total	30	100
Age		
13 years	10	33
14 years	3	10
15 years	4	13
16 years	6	20
17 years	5	17
18 years	2	7
Total	30	100
Education		
Junior High School	15	50
Senior High School / Vocational High School	15	50
Total	30	100

Source: Primary Data, 2023

In table 1 you can see the characteristics of participants at the Muhammadiyah Rappang Real Children's Social Welfare Institute from the total sample of 30 people. Based on gender, the number of female participants was greater than male, namely 23 people (77%). Based on age, the most people who participated in this research were 13 year olds, namely 10 people (33%). Meanwhile, based on education, the number of participants was balanced, with 15 people taking junior high school education (50%) and 15 people taking high school or vocational school education (50%).

2. Average Value of Participants' Plaque Index

The following is the average distribution of plaque index before and after gargling boiled water with guava leaves among participants at the Sejati Muhammadiyah Rappang Child Welfare Institution, presented in table 2.

Table 2. Average distribution of plaque index before and after gargling water boiled with guava leaves in adolescents at the Sejati Muhammadiyah Rappang Child Welfare Institution

	N	Plaque Index	Average Plaque Index	Criteria
Before gargling with boiled water from guava leaves	30	65,8	2,193	Medium
After gargling with boiled water from guava leaves	30	49,7	1,656	Good

Source: Primary Data, 2023

From the table above it can be seen that there is a difference in the average plaque index of the 30 participants, where before gargling water boiled with guava leaves the average plaque index of participants was 2.193 with medium criteria, and after gargling water boiled guava leaves There was a decrease in the average plaque index of participants to 1.656 with good criteria.

3. Paired T-Test Test Results

The following are the results of the Paired T-Test on participants before and after gargling boiled guava leaf water, presented in table 3.

Table 3. Paired T-Test Results for Plaque Scores on Participants Before and After Gargling Guava Leaf Boiled Water

	N	Average Plaque Index		Decline Rate	Sig-2 (p-value)
		Pre-test	Post-test		
Gargle with boiled water from guava leaves	30	2,193	1,656	0,536	0,001

Source: Paired T-Test, 2023

From table 3 above, it can be seen that the average reduction in plaque index scores before and after gargling with boiled guava leaf water for 30 participants was 0.536. And based on the results of the *Paired T-Test*, the significance value of the average plaque score before and after gargling boiled guava leaf water was $p = 0.001$ ($p < 0.05$). So the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. From these results it is known that there is an effect of gargling with boiled water from guava leaves on reducing plaque index scores in participants.

DISCUSSION

From the research results, in table 2 it can be seen that there was a decrease in plaque scores in participants, where before gargling boiled water with guava leaves the average plaque

score was 2.193 with medium criteria. Meanwhile, after gargling boiled water with guava leaves, the average plaque score decreased to 1.656 with good criteria. So the average level of plaque score reduction is 0.536.

Based on table 3 regarding the T-test (*Paired sample T-Test*), it shows that there is a difference between the results before and after gargling boiled guava leaf water. This can be seen from the Sig value. (2 tailed) or $p\text{-value} = 0.001 < 0.05$. So H_0 is rejected and H_a is accepted, so the hypothesis states that there is an effect of gargling boiled water with guava leaves on reducing plaque scores in adolescents at the Real Muhammadiyah Rappang Child Welfare Institution. Based on the data analysis, it can be said that there is a significant difference in the plaque scores of teenagers before and after gargling with boiled water from guava leaves.

This is also in line with previous research conducted by (Tambunan & Misnaniarti, 2021) with the title "The effect of gargling with boiled water from guava leaves on the plaque index and saliva pH." The results showed that there was a significant reduction in plaque scores seen before gargling (1.34) until after gargling boiled water with guava leaves, namely (1.09). Gargling with boiled water from guava leaves can reduce the plaque index and increase the pH of saliva, which is expected to help prevent the formation of dental caries.

In research conducted by (Eriyati, 2019) which was carried out on two groups, it was found that after gargling the guava leaf decoction, the average plaque index was 0.38, while those who did not gargle the guava leaf decoction had an average plaque index of 0.41. It was seen that there was an effect of boiled guava leaves on plaque formation. And based on research by (Oktariani, 2021) which compared the effects of gargling water boiled with betel leaves and water boiled guava leaves, it was found that the average plaque index score before gargling water boiled guava leaves was 2.160 (medium criteria) down to 1.687 (good criteria). In this study, boiled water from guava leaves was used to avoid side effects so that it did not become an obstacle to its use to optimally inhibit dental plaque. The reduction in plaque index by boiled guava leaf water is due to the content of flavonoids, essential oils and tannins which are reported to have antimicrobial, antibacterial and antiseptic effects.

From the research that has been carried out and looking at previous research, a common thread can be drawn that guava leaves can reduce problems in a person's oral cavity, one of which is reducing plaque levels on teeth. The flavonoids contained in guava leaves also have an antibacterial effect, because they can inhibit the growth process of bacterial colonies by damaging the cytoplasmic membrane which disrupts the process of transferring nutrients through the membrane (Ikhsan, T. et al. 2017). Guava leaves are rich in active substances that are antibacterial and antioxidant, namely tannins, flavonoids, saponins, malic acid, felric acid and vitamin C (Wang F. et al., 2014). Guava leaves contain 0.4% essential oils (such as avicularin and guajaverin) and tannins. The essential oils and tannins found in guava leaves are antiseptic which can prevent and kill the growth of *Streptococcus mutans* and have the ability to inhibit bacterial adhesion so that they can reduce the accumulation of plaque on the surface of the teeth (Limawan, 2018).

Mouthwash has been widely used to control the growth of dental plaque. The ability of mouthwash to influence plaque formation and reduce the occurrence of dental and oral health problems. Currently, there are many innovations in mouthwash using medicinal plant ingredients which are believed to have antibacterial properties (Tambunan & Misnaniarti, 2021). One of the herbal plants that is believed to have the ability to maintain healthy teeth and mouth is guava leaves (*Psidium guajava L.*).

CONCLUSION

The average plaque index score for 30 teenagers at the Real Muhammadiyah Rappang Child Welfare Institution before gargling water boiled with guava leaves was 2.193 with moderate criteria, and after gargling it was 1.656 with good criteria. Based on statistical tests, gargling boiled water from guava leaves can reduce the plaque index score with a reduction rate of 0.536 and the value obtained is 0.001 or $p < 0.05$, which means that there is an effect of gargling boiled water from guava leaves on reducing plaque scores in 30 teenagers at the Institute. Muhammadiyah Rappang True Children's Social Welfare. It is hoped that the public will carry out health promotions regarding plaque control. In fact, plaque control can not only be done mechanically by brushing your teeth but can also be balanced by gargling with boiled water from guava leaves because it has been proven to be effective in reducing the plaque score on teeth.

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