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**DIFFERENCES OF HERBAL AND NON-HERBAL TOOTHPASTE AGAINST  
 DECREASING PLAQUE INDEX OF ADOLESCENT WOMEN**

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**ABSTRACT**

**Background:** Women had better dental and oral health than men because women had better fine motor skills and manual dexterity than men. Dental and oral health problems commonly found in adolescents were caused by plaque. Plaque is a soft layer tightly attached to the tooth's surface. Plaque could be cleaned mechanically and chemically by brushing teeth using toothpaste. Toothpaste was divided into two types, namely herbal and non-herbal toothpaste which had ingredients that were efficacious for dental health. **Purpose:** Analyzing the differences in the effectiveness of herbal and non-herbal toothpaste against decreasing plaque index in adolescent women around 11-19 years at the Aisyiah Hikmah Zam-Zam Orphanage and Harapan Ibu Orphanage, Banjarmasin. **Methods:** This study used the true experimental method with a pre-and post-test control group design, using simple random sampling. **Result:** The Wilcoxon test in the herbal toothpaste group obtained a significant value of 0.001 ( $<0.05$ ) which meant that there was a significant difference between the plaque index before and after using herbal toothpaste, while in the non-herbal toothpaste group a significant value of 0.124 ( $>0.05$ ) which meant that there was no significant difference between the plaque index before and after using non-herbal toothpaste. The significance of the Mann-Whitney test in the herbal and non-herbal toothpaste group was 0.037 ( $<0.05$ ), which meant that there were differences in the effectiveness of herbal and non-herbal toothpaste in adolescent women. **Conclusion:** Toothpaste with herbal content was more effective in lowering plaque index in adolescent women compared to non-herbal toothpaste.

**Keywords:** Adolescent, Herbal Toothpaste, Nonherbal Toothpaste, Plaque Index

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**INTRODUCTION**

Dental and oral health is very important because teeth serves to eat, talk and smile which is also very concerned in everyday life and can affect a person's self-confidence.<sup>1,2</sup> Penelitian by Zetu, et al (2014) stated that women have more anxiety in their self-confidence in their appearance, including in their dental and oral hygiene which makes girls have much better dental and oral health than boys.<sup>3,4</sup>

Problems in dental and oral health in Indonesia according to basic health research data (Riskesdas) in 2018 when viewed based on age, almost 75% of adolescents have a plaque score of 2.0-3.0, which is a bad category on the plaque index.<sup>5</sup> Plaque is a soft layer of a collection of microorganisms that

are tightly attached to the surface of the tooth. Plaque is one of the main causes of dental and oral problems because it can cause caries and periodontal disease. Plaque cannot be removed by rinsing the mouth alone but can be cleaned mechanically and chemically by brushing your teeth using toothpaste.<sup>6</sup>

Toothpaste is an ingredient that can chemically help clean teeth. Toothpaste is divided into two types, namely herbal and non-herbal toothpaste which have ingredients that are efficacious for dental health. There are various kinds of ingredients contained in non-herbal toothpaste, including abrasive ingredients, water, silica, sorbitol, flavorings, cellulose gum, potassium citrate, sodium saccharin, and sodium

monofluorophosphate and fluoride as active ingredients that can prevent demineralization of teeth.<sup>1</sup> Toothpaste with the addition of herbal ingredients has been widely used which is expected to help inhibit microbial growth and plaque formation. One of the herbal ingredients that are the composition in herbal toothpaste is betel leaf extract and siwak as active ingredients that can inhibit the growth of bacteria that cause plaque on the teeth.<sup>1</sup> Betel leaf extract has antiseptic, antioxidant, and antifungal effects.<sup>7</sup> In betel leaf extract, there is also an essential oil content of up to 4.2% which has high bactericides so that it can fight gram-positive and negative bacteria and can also help reduce bad breath, relieve toothache, stop bleeding, clean the tenggorokan, and prevent swelling of the gums.<sup>8,9</sup>

Another herbal ingredient is siwak which has an anti-plaque-forming effect and affects the pathogenesis of caries by reducing the virulence of periodontopathogenic bacteria.<sup>10</sup> The advantages of siwak in toothpaste can provide grains of siwak powder that are able to reach between the teeth and remove food residues that are still attached to the sidelines of the teeth.<sup>11</sup> Siwak contains chemicals that contain a large amount of chloride, fluorine, trimethylamine, and vitamin C that can help heal and repair tissues in the gums, and various minerals function as tooth cleaners, care for tooth strength, whitening and nourishing teeth, and gums.<sup>11</sup> Siwak has a natural aroma oil that has a fresh taste and smells that make the mouth fragrant and eliminate bad breath.<sup>11</sup>

The results of preliminary studies that have been carried out at the Aisyiah Hikmah Zam-Zam Orphanage and the Harapan Ibu Banjarmasin Orphanage show that there is still a lack of dental and oral health counseling in orphanage children. Based on the above background, researchers are interested in research to find out the difference in the effectiveness of herbal and non-herbal toothpaste against decreasing plaque index in adolescent women. The research with the title above as an implication of the vision and mission of the University and the Faculty of Dentistry, University of Lambung Mangkurat, is to make a dental study program that excels in the implementation of education, research and community service based on dental health problems.

## RESEARCH METHODS

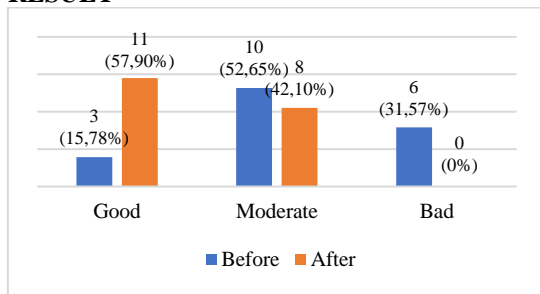
This research is a true experiential study with a pre- and post-test control design group design. This research has received ethical clearance approval from the Research Ethics Commission of the Faculty of Dentistry, Lambung Mangkurat University, Banjarmasin No. 055/KEPKG-

FKGULM/EC/V/2022.

The population in this study were children of Panti Asuhan Aisyiah Hikmah Zam-Zam Banjarmasin and Panti Asuhan Harapan Ibu Banjarmasin. The inclusion criteria in this study were adolescents at the Aisyiah Hikmah Zam-Zam Orphanage and the Harapan Ibu Banjarmasin Orphanage, women, and adolescents aged 11-19 years, and cooperative adolescents. The exclusion criteria in this study were adolescents with orthodontic care and adolescents who were not willing to sign informed consent. The sampling technique in this study used a simple random sampling technique. The sample size was calculated using a categorical calculation formula not paired with two groups and the results were obtained as many as 38 samples, namely 19 samples at the Aisyiah Hikmah Zam-Zam Orphanage and 19 samples at the Harapan Ibu Orphanage.

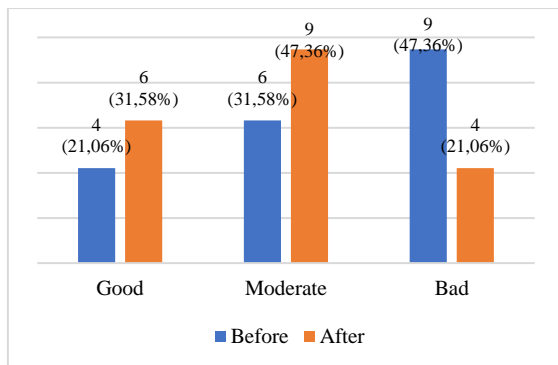
The study was conducted by first dividing the sample into 2 treatment groups containing 19 children in each group. The first group was given toothbrushes and herbal toothpaste, while the second group was given toothbrushes and non-herbal toothpaste. Furthermore, the researchers provided counseling on how to brush your teeth properly and correctly using the bass method of brushing techniques with a brushing duration of 2 minutes. Researchers examined plaques in the oral cavity of respondents using the Turesky-Gilmore-Glickman Modification of The Quigley Hein Plaque Index. In this examination, all respondents' teeth were applied disclosing agents using tweezers and cotton pellets, after which respondents were asked to rinse their mouths with clean water and a plaque examination was carried out by looking and calculating based on the color that arises on the surface of the respondent's teeth, after a plaque examination, all groups were asked to brush their teeth with the Bass method and use the predetermined toothpaste on each group with a duration of brushing teeth for 2 minutes. This treatment is carried out for 14 days, that is, from the 2nd to the 15th day of the study. On day 16 researchers again conducted a final examination of the respondents' oral cavities using the Turesky-Gilmore-Glickman Modification of The Quigley Hein Plaque Index to see the difference in plaque scores before and after treatment.

**RESULT**



**Figure 1.** Differences in Plaque Index Before and After Herbal Toothpaste Use in Adolescent Women

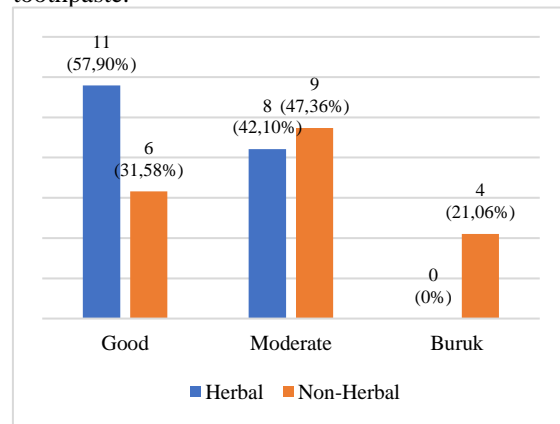
Figure 1 shows the plaque index category with the number of respondents 19 people in the herbal toothpaste group before being given treatment in the form of brushing their teeth using herbal toothpaste obtained data, namely the highest value was found in the medium category, which was 52.65%. After being given treatment in the form of brushing your teeth using herbal toothpaste, data was obtained, namely the highest value was found in the good category, which was 57.90%.



**Figure 2.** Differences in Plaque Index Before and After Use of Non-Herbal Toothpaste in Adolescent Women

After the data analysis test using the Wilcoxon test was obtained a significant value of 0.124 (> 0.05), then H0 was accepted, which mean after the data analysis test using the Wilcoxon test was obtained a significant value of 0.124 after the data analysis test using the Wilcoxon test was obtained a significant value of 0.124 (> 0.05), then H0 was accepted, which means that there was no significant difference between the plaque index before and after using non-herbal toothpaste. 0.05), then H0 was accepted, which means that there was no significant difference between the plaque index before and after using non-herbal toothpaste. That there was no significant difference between the plaque index before and after using non-herbal

toothpaste.



**Figure 3.** Effectiveness of Herbal and Non-Herbal Toothpaste against Decreasing Adolescent Women Plaque Index

Figure 3 shows the plaque index posttest score category in the group of herbal toothpaste and non-herbal toothpaste. The results of the good category were more found in the herbal toothpaste group, namely 12 people (63.16%), the results of the moderate category were more found in the non-herbal toothpaste group, namely 9 people (47.36%), and the results of the bad category were more found in the non-herbal toothpaste group, namely 4 people (21.06%).

**Table 3.** Mann Whitney Analysis Test Results of Herbal and Non-Herbal Toothpaste Groups

	Toothpaste	N	Mean Rank	p-value
Plaque Index	Herbal Toothpaste	19	16,16	0,041
	Non-Herbal Toothpaste	19	22,84	

Tabel showed that after a data analysis test using the Mann-Whitney test, a significant value of 0.037 (<0.05) was rejected, then H0 was rejected, which means that there was a difference in the effectiveness of herbal and non-herbal toothpaste on the plaque index of adolescent women.

**DISCUSSION**

**Plaque Index Before and After Use of Herbal Toothpaste in Adolescent Women**

The results of the plaque index study on the use of herbal toothpaste in adolescent women at the Harapan Ibu Banjarmasin Orphanage showed an increase before and after the use of herbal toothpaste. Before the intervention, it was known that the plaque index had a bad score of 31.57%, while after the intervention, there were no more adolescent women who had a bad score on their

plaque index or there was a 100% decrease in the plaque index in the bad category. This is in line with Susanto's research (2020) which states a significant decrease in plaque index before and after the use of herbal toothpaste.<sup>12</sup>

A decrease in plaque index can occur due to the provision of interventions in the form of counseling on how to brush your teeth properly and correctly using herbal toothpaste. According to Liana (2019) brushing your teeth regularly can help in cleaning your teeth. The use of herbal toothpaste when brushing your teeth is also very influential in plaque reduction. This is because the herbal toothpaste used contains betel leaf extract and siwak which can reduce plaque formation on the teeth. After all, in betel leaf extract there is an essential oil of 4.2% which is antiseptic and antibacterial, while herbal toothpaste with siwak content has an antibacterial effect on causing plaque and periodontal pathogen bacteria so that it can prevent plaque accumulation because siwak contains more than 20 substances that improve dental and oral hygiene, among which is salvadorine which has antiseptic properties and tannin acid which is astringent.<sup>13,14</sup>

The significant differences produced in the plaque index before and after using herbal toothpaste are in line with the research of Oroh, et al (2015) which states that the results of the decrease in the plaque index are influenced by the action of brushing teeth and are influenced by excess antibacterial power in essential oils in betel leaf extract and siwak. The antibacterial power of essential oils is caused by the presence of phenol compounds and their derivatives that denature the proteins of bacterial cells and can inhibit the growth and development of oral cavity bacteria.<sup>15</sup>

#### **Plaque Index Before and After Use of Non-Herbal Toothpaste in Adolescent Women**

The results of the plaque index study on the use of non-herbal toothpaste in adolescent women at the Aisyiah Hikmah Zam-Zam Banjarmasin Orphanage showed an increase before and after the use of non-herbal toothpaste. Before the intervention, it was known that the plaque index had a bad score of 47.35%, while after the intervention there was a decrease of 50%. This is in line with Oroh's research (2015) which states that there is a decrease in plaque index after the use of non-herbal toothpaste.<sup>15</sup> This is due to the provision of interventions in the form of counseling on how to brush your teeth properly and correctly using non-herbal toothpaste. In non-herbal toothpaste, various ingredients can help in cleaning and reducing dental plaque. The ingredients contained in non-herbal toothpaste include fluorine, sodium fluoride as an anti-

inflammatory and anti-inflammatory agent, sodium lauryl sulfate as a detergent that can lower the tension on the tooth surface and loosen the bonds of debris and plaque that stick to the tooth surface, trioxane which works by interfering with bacterial growth and affecting bacterial metabolism, baking soda as an abrasive material, and chemically active ingredients such as flavor as a flavoring, cellulose gum as a viscosity regulator in pastes, potassium citrate which can prevent tooth loss, sodium silicate as a buffer, sodium chloride, calcium carbonate, potassium citrate and Cocamidopropyl betaine which can desensitize and clean debris that sticks.<sup>16</sup>

Based on a descriptive analysis, there was a 50% decrease in the use of non-herbal toothpaste, but the results of a statistical analysis with the Wilcoxon test showed that there was no significant relationship between plaque index before and after using non-herbal toothpaste. This result is in line with Susanto's research (2022) which states that there is a less significant decrease due to the lack of antibacterial active ingredients in non-herbal toothpastes. Another content in non-herbal toothpaste is the presence of abrasive ingredients that can help increase the elimination power of plaque so that plaque attached to the surface of the teeth can be eliminated it can be proven that brushing teeth using non-herbal toothpaste can reduce the plaque index even though the results obtained are less significant.<sup>12</sup>

#### **Effectiveness of Herbal and Non-Herbal Toothpaste against Decreasing Plaque Index of Adolescent Women**

In this study, there were differences in plaque index scores in the posttest results for the use of herbal and non-herbal toothpaste. It can be seen in Figure 3, the results obtained on the post-test value of the herbal toothpaste group on the bad category plaque index of 0% and in the non-herbal toothpaste group on the bad category plaque index of 21.06%. This is in line with the research of Puspita, et al (2018) which states that herbal toothpaste is more effective in lowering plaque index than non-herbal toothpaste because herbal toothpaste containing betel leaf extract and siwak contains essential oils which are powerful antiseptics and can inhibit the growth of microbes that cause plaque accumulation better than non-herbal toothpaste.<sup>13</sup>

The posttest results in the herbal toothpaste and non-herbal toothpaste groups showed that the non-herbal toothpaste group was less effective than herbal toothpastes in lowering the plaque index. This was discussed in the research of Nadar et al (2020) which stated that fluorine found in non-herbal toothpastes is an antibacterial agent that is

able to prevent plaque accumulation on the surface of the teeth, but its effectiveness is still less than that of herbal toothpaste in lowering the plaque index.<sup>17</sup>

Based on the research conducted, it can be concluded that dental pasta with herbal content is more effective in lowering plaque index in adolescent women compared to non-herbal toothpaste.

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