



The Effect of Dental Paste from Coconut Butter as a Replacement to Toothpaste on Reducing Debris Index and Plaque Index in Class 3 to 5 Students in Elementary School

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Abstract

BACKGROUND: The coconut tree is a multipurpose plant because all parts of it, from the roots to the coconut fruit, can be used for clothing, food and shelter. Coconut fruit contains calories, water, protein, carbohydrates, fat, calcium, iron, Vitamins A, B, and C as well as edible parts. Besides being processed into coconut oil it also contains many benefits for human health, coconut can also be processed into coconut butter which can be made as toothpaste. Many elementary school age children still have dirty teeth in their oral cavity up to 67.3%.

AIM: Therefore, researchers wanted to know the effect of toothpaste from coconut butter as a substitute for toothpaste on the reduction of index debris and plaque index in students in Grades 3 to 5 in elementary schools.

METHODS: This type of research uses Quasi Experiment (Pseudo Experiment). The research design used a pre-test and post-pest approach. Pre-test. The samples in this study were 32 Grade 3 students, 34 grade 4 students and 34 grade 5 students, so the total sample was 100 students. Sampling using purposive sampling technique, and statistical tests using the Wilcoxon test.

RESULTS: The results showed that the debris index before brushing teeth using coconut butter as a substitute for toothpaste obtained an average value of 1.8, while for the debris index after brushing teeth using coconut butter as a substitute for toothpaste, the average value was 0.4. Judging from the value of $p = 0.000$ thus the probability is smaller than 0.05 ($p < 0.05$), so H_0 is rejected and H_1 is accepted, Thus, these results indicate that there is a significant difference between the index debris before brushing your teeth using coconut butter as a substitute for toothpaste and the debris index after brushing your teeth using coconut butter instead of toothpaste. Index plaque before brushing teeth using coconut butter as a substitute for toothpaste obtained an average value of 4.4, while for index plaque after brushing teeth using coconut butter as a substitute for toothpaste, the average value was 2.4. Judging from the value of $p = 0.000$ thus the probability is smaller than 0.05 ($p < 0.05$), so H_0 is rejected and H_1 is accepted, thus these results indicate that there is a significant difference between the index plaque before brushing your teeth using coconut butter as a substitute for toothpaste. And index plaque after brushing teeth using coconut butter as a substitute for toothpaste.

CONCLUSION: It can be concluded that coconut butter toothpaste has an effect on reducing debris and plaque index.

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Introduction

In an effort to maintain and improve public health, it is carried out based on non-discriminatory, participatory and sustainable principles. In the form of an approach with promotive, preventive, curative, rehabilitative and traditional treatment activities in an integrated, comprehensive and sustainable manner, especially in the field of dental and oral health [1].

Dental and oral health is part of overall body health [2]. One of the efforts to improve dental and oral health with the proportion of problems maintaining dental health and carrying out proper dental care from an early age is to have regular dental check-ups with dental health workers, and as a form of responsibility for dental health [3]. Dental and oral health is a healthy state in which hard and soft tissues and related

elements in the oral cavity, which enable a person to eat and talk, interact socially without dysfunction, aesthetic disturbances and discomfort due to disease, loss of teeth and gums. Occlusion deviation, so as to be able to live productively socially and economically [4].

According to the results of the 2018 Basic Health Research on dental and oral health, the proportion of problems that occur in the teeth and mouth is 57.6%, while those who receive services from health workers are 10.2%. In addition, the proportion of people's behavior to brush their teeth correctly is 2.8%. In this case, it can be seen that most of the Indonesian population suffer from dental diseases, namely dental caries and tooth supporting tissues. From the data above, it shows that the rate of increase in children who experience dental and oral health problems based on age characteristics is 5-9 years by 67.3%, aged 10-14 years by 55.6. This shows that the prevalence of

dental and oral health problems has increased over a period of 5 years [5].

Nadie in Warni (2017) in his research stated that dental disease that often occurs in school-age children is dental caries. Dental caries is one of the dental health problems with the highest percentage, one of the contributing factors is dental and oral hygiene that is not maintained because school-age children still have bad personal habits so that there are still a lot of food residue that sticks to the tooth surface which is harmful to the teeth sweet like sugar [6]. Meanwhile, according to Mitchell, 2015 that acid is produced as a by-product of carbohydrate metabolism of food by plaque bacteria and the time that causes cavities, the government's efforts to improve dental and oral health rates in school children are through UKGS activities (School Dental Health Business) which is supported by promotive efforts, preventive, and curative. What school children can do is maintain dental hygiene by brushing their teeth at least 2 times a day, after eating and before going to bed at night using toothpaste [7].

The coconut tree is a multipurpose plant because all parts of it from the roots to the coconut fruit can be used for food, clothing and shelter needs [8]. Coconut that has been processed into coconut oil (coconut oil) which can be used as a medicine has good properties with potential as anti-viral, anti-bacterial, anti-protozoal [9]. Coconut oil can also be used as a mouthwash to reduce the number of bacteria in the mouth [10]. According to Lingga, 2012 in his research, stated that the coconut plant is an original Indonesian medicine, namely coconut root as one of the simplicia that can treat pain tooth. And coconut fiber can also be used as a substitute for a toothbrush which can reduce plaque on teeth [11]. In a study conducted by the Ministry of Health of the Republic of Indonesia DKBM (2000) stated that coconut fruit consists of coir, fruit water shell and fruit flesh. The content of each coconut flesh has a different percentage maturity. Coconut fruit contains calories, water, protein, carbohydrates, fat, calcium, iron, Vitamins A, B, and C as well as edible parts. Besides being processed into coconut oil (coconut oil) it also contains many benefits for human health, coconut can also be processed into coconut butter, which is the method of making it almost the same as making coconut oil but not separated from the meat [12]. Coconut butter has benefits that can be used as a skin moisturizer, lip balm or lip balm, body or foot scrub, heart healthy, vegan, solid food, and hypoallergenic (does not cause allergies), and can be made into toothpaste as an ingredient for brushing teeth [13].

Brushing teeth should be done in the right way and on time, using toothpaste as an adjuvant to clean teeth mechanically [14], [15]. The type of toothpaste used is one of the factors that play a role in it, because toothpaste can reduce the formation of debris and plaque, strengthen teeth, polishing the tooth surface, eliminating bad breath, and maintaining gingival

health [16], [17]. Various kinds of non-herbal toothpastes include abrasives, water, therapeutic ingredients, and many more. These ingredients become a composition for the means to help maintain oral hygiene [18]. Herbal toothpastes are superior to non-herbal toothpastes because the addition of these herbs is able to inhibit microbial growth [19]. The presence of anti-bacterial contained in coconut butter is able to kill bacteria that cause plaque to form [20]. The continuous use of non-herbal toothpaste can cause side effects, for example, it is abrasive because of the detergent content in non-herbal toothpaste which can erode tooth enamel and also contains fluoride which can interfere with health if the material is used too much [21]. Therefore, the need for new innovations as an alternative to toothpaste. The aim of this herbal toothpaste is to increase public interest in using natural ingredients [22].

Based on a preliminary study that was carried out on May 16 at SD Alaswangi 1 Pandeglang Banten for Grades 3 to 5 as many as 120 students, it was found that the debris index in the good category was 20%, the debris index was in the medium category, and the debris index was in the bad category at 40% and the index plaque obtained in the good category of 15%, the index plaque in the moderate category at 35%, and the index plaque in the bad category by 50%. One of the efforts to reduce index debris and index plaque is to brush teeth using toothpaste properly and correctly. Toothpaste plays a role in cleaning food debris, preventing caries, and eliminating bad breath and being able to improve dental and oral hygiene [23]. Coconut butter as an alternative to toothpaste which is suitable for use for children because it is safe if swallowed and does not cause side effects because it is made from natural ingredients, namely coconut flesh which contains calcium, anti-bacterial, flavoring, and moisturizing ingredients that can improve oral hygiene [24].

Based on the description above, the researcher intends to examine "The Effect of Coconut Butter Toothpaste as a Substitute for Toothpaste on Decreasing Debris Index and Plaque Index in Class 3-5 Students of Elementary School Alaswangi 1 Pandeglang Banten."

Method

This research is a Quasi Experiment with a pre-test and post-pest approach. The research was carried out in August 2021 and has obtained a statement of ethical feasibility from the Poltekkes Kemenkes Semarang No. 510/EA/KEPK/2021. The research subjects used were grade 3 to 5 elementary school students with 100 students with purposive sampling technique. 50 for the index debris sample and 50 for the index plaque sample. The inclusion criteria used were willingness to be used as research samples

and complete index teeth. The exclusion criteria used were children who did not attend school when taking research data and children who were sick.

The independent variable in this study was coconut butter as a substitute for toothpaste. The dependent variables of this study were index debris and plaque index. Data were collected by observation with a checklist instrument and examination of index debris and index plaques. Data analysis was carried out using univariate analysis (frequency distribution) to explain the characteristics and results of each variable and bivariate analysis using the Wilcoxon test to see the effect.

Results

Table 1 presents the characteristics of research respondents consisting of gender and age as follows:

Table 1: Characteristics of research subjects

Characteristics of respondents	Amount
Gender	
Man	40 (40.0)
Woman	60 (60.0)
Total	100 (100)
Age (years)	
8	4 (4.0)
9	28 (28.0)
10	26 (26.0)
11	32 (32.0)
12	10 (10.0)
Total	100 (100)

Table 1 shows that in this study consisted of 60 (60.0%) respondents with female gender and 40 (40.0%) respondents with male sex. Respondents are dominated by female gender. Judging from the age characteristics, most of the respondents were 11 years old, namely, 32 (32.0%) respondents. 28 (28.0%) with the age of 9 years, 26 (26.0%) with the age of 10 years, 10 (10.0%) with the age of 12 years, and 4 (4.0%) with the age of 8 years. All respondents belong to Grades 3, 4, and 5 elementary school students.

In Table 2, the results of the analysis between the debris index before brushing their teeth using coconut butter as a substitute for toothpaste and after brushing their teeth using coconut butter as a substitute for toothpaste showed that before brushing their teeth using coconut butter, only 1 (2.0) students had a debris index in a good category. (%) of students, after brushing their teeth using coconut butter as a substitute for toothpaste, most of the students were 45 (90.0%) with a good category debris index. There were 27 (54.0%) students with debris index in the medium category

Table 2: Results index debris check before and after brushing teeth using coconut butter instead of toothpaste

Category	Before, F (%)	After, F (%)
Good	1 (2.0)	45 (90.0)
Currently	27 (54.0)	5 (10.0)
Bad	22 (44.0)	0
Total	50 (100)	50 (100)

before brushing their teeth using coconut butter instead of toothpaste and after brushing their teeth using coconut butter it decreased to 5 (10.0%) students.

In Table 3, the results of the analysis between index plaque before brushing their teeth using coconut butter as a substitute for toothpaste and after brushing their teeth using coconut butter as a substitute for toothpaste showed that before brushing their teeth using coconut butter there were no students with either very good index plaque category or good category, after brushing teeth using coconut batter there were 9 (18.0%) students with plaque index in the good category. There were 4 (8.0%) students with moderate index plaque before brushing their teeth using coconut butter as a substitute for toothpaste and after brushing their teeth using coconut butter it increased to 40 (80.0%) students. Students with bad category plaque index before brushing their teeth using coconut butter as a substitute for toothpaste there are 46 (92.0%) students.

Table 3: Results index plaque check before and after brushing teeth using coconut butter instead of toothpaste

Category	Before, F (%)	After, F (%)
Very good	0	0
Good	0	9 (18.0)
Currently	4 (8.0)	40 (80.0)
Bad	46 (92.0)	1 (2.0)
Total	50 (100)	50 (100)

Table 4 shows the debris index before brushing teeth using coconut butter as a substitute for toothpaste, the average value is 1.8, while for the debris index after brushing teeth using coconut butter as a substitute for toothpaste, the average value is 0.4. Judging from the p value = 0.000, the probability is smaller than 0.05 ($p < 0.05$), so H_0 is rejected and H_1 is accepted, thus these results indicate that there is a significant difference between the debris index before brushing your teeth using coconut butter as a substitute for toothpaste. And index debris after brushing teeth using coconut butter as a substitute for toothpaste.

Table 4: Comparison of average debris index before and after brushing your teeth using coconut butter instead of toothpaste

Comparison of debris index	n	Average + SD	p value
Debris index before brushing teeth using coconut butter instead of toothpaste	50	1.8+0.42	0.000
Index debris after brushing teeth using coconut butter instead of toothpaste	50	0.4+0.42	

SD: Standard deviation.

In Table, the average value for index plaque before brushing teeth using coconut butter as a substitute for toothpaste is 4.4, while for index plaque after brushing teeth using coconut butter as a substitute for toothpaste, the average value is 2.4. Judging from the $p = 0.000$, the probability is smaller than 0.05 ($p < 0.05$), so H_0 is rejected and H_1 is accepted, thus these results indicate that there is a significant difference between the index plaque before brushing your teeth using coconut butter as a substitute for toothpaste. And index plaque after brushing teeth using coconut butter as a substitute for toothpaste.

Table 5: Comparison of average plaque index before and after brushing your teeth using coconut butter instead of toothpaste

Comparison of debris index	n	Average + SD	pvalue
Index plaque before brushing your teeth using coconut butter instead of toothpaste	47	4.4 + 0.64	0.000
Index plaque after brushing your teeth using coconut butter instead of toothpaste	47	2.4 + 0.60	

SD: Standard deviation.

Discussion

Based on the results of the study, the average value of the debris index before brushing teeth using coconut butter as a substitute for toothpaste was 1.8 in the medium category and after brushing teeth using coconut butter as a substitute for toothpaste, the average value was 0.4 in the good category. From the statistical test results, the Wilcoxon signed-rank test stated that there was a significant difference between the value of the initial debris index and the value of the final debris index. After brushing their teeth using coconut butter as a substitute for toothpaste, 45 (90.0%) students had a good category debris index, so that the $p = 0.000$ with a probability less than 0.05 ($p < 0.05$). Based on these results, H_0 is rejected and H_1 is accepted because there is a significant difference between the index debris before brushing your teeth using coconut butter as a substitute for toothpaste and the debris index after brushing your teeth using coconut butter as a substitute for toothpaste. In the opinion of Saputra *et al.* explained that toothpaste uses coconut butter which has a very soft texture of coconut pulp so it is very effective and able to remove debris from the surface of the teeth, especially when applied to elementary school children, it is very good, considering the ingredients of toothpaste from coconut butter are herbal ingredients, contains calories and calcium which is still very much needed for children during their teething period, and without preservatives.

The average value of index plaque before brushing teeth using coconut butter as a substitute for toothpaste obtained an average value of 4.4 in the poor category and after brushing teeth using coconut butter as a substitute for toothpaste, the average value was 2.4 in the medium category. From the results of the Wilcoxon signed-rank test statistic, it was stated that there was a significant difference between the initial index plaque value and the final index plaque value. After brushing their teeth using coconut butter as a substitute for toothpaste, there were only 1 (2.0%) students with bad category plaque index, so that the $p = 0.000$ with a probability smaller than 0.05 ($p < 0.05$). Based on these results, H_0 was rejected and H_1 was accepted because there was a significant difference between the index plaque before brushing your teeth using coconut butter as a substitute for toothpaste and index plaque after brushing your teeth using coconut butter as a substitute for toothpaste. This is also because, before the children brushed their teeth, the researcher gave directions to

them about the correct brushing technique using the 3T technique, namely diligent, thorough and regular.

The decrease in index debris and index plaque occurred because coconut butter made from coconut fruit can be used as an anti-viral, anti-bacterial, and anti-protozoal drug [25]. Coconut oil can also be used as a mouthwash to reduce the number of bacteria in the mouth [26]. According to Lingga (2012) in his research stated that the coconut plant is an original Indonesian medicine, namely coconut root as one of the simplicia that is able to treat toothache. Research from the Ministry of Health of the Republic of Indonesia DKBM (2000) stated that coconut fruit consists of coir, fruit water shell and fruit flesh. Coconuts contain calories, water, protein, carbohydrates, fat, calcium, iron, Vitamins A, B, and C as well as edible parts [27].

Coconut butter as a substitute for toothpaste can help reduce the formation of debris and plaque, strengthen teeth, polish tooth surfaces, eliminate bad breath and maintain gingival health [28], [29]. Various kinds of non-herbal toothpastes include abrasives, water, therapeutic ingredients, and many more. These ingredients become a composition for a means to help maintain oral hygiene [18], [30]. Research by Zhafirah *et al.* (2020) stated that coconut water can cause changes in salivary pH, Shabrina *et al.*, (2017) stated that there were significant changes based on the O'leary plaque index. in the Baduy community between before and after brushing their teeth using coconut fiber which was included in the bad category, but there was no significant change based on the BMPS plaque index which was included in the good category. F, Peedikayil dkk, also think that coconut butter is suitable as a substitute for toothpaste and it is proven in the results of this study, that it has an effect on reducing index debris and index plaque [30], [31].

The study limitations, the Principal of SDN Alaswangi 1 Menes only permits the research time during the first and second school breaks, to not interfere with the effective study hours of the students, so that researchers had some difficulties with a very short time, but this difficulty could be overcome with the help of their respective homeroom teachers, they were willing to assist researchers in carrying out research, by regulating and directing students to be obedient.

Conclusion

The debris index before brushing teeth using coconut butter as a substitute for toothpaste obtained an average value of 1.8, while for the debris index after brushing teeth using coconut butter as a substitute for toothpaste, the average value was 0.4. Judging from $p = 0.000$, the probability is smaller than 0.05 ($p < 0.05$), so H_0 is rejected and H_1 is accepted, thus these results

indicate that there is a significant difference between the debris index before brushing your teeth using coconut butter as a substitute for toothpaste. And index debris after brushing teeth using coconut butter as a substitute for toothpaste.

Index plaque before brushing teeth using coconut butter as a substitute for toothpaste obtained an average value of 4.4, while for index plaque after brushing teeth using coconut butter as a substitute for toothpaste, the average value was 2.4. Judging from the $p = 0.000$, the probability is smaller than 0.05 ($p < 0.05$), so H_0 is rejected and H_1 is accepted, thus these results indicate that there is a significant difference between the index plaque before brushing your teeth using coconut butter as a substitute for toothpaste and index plaque after brushing your teeth using coconut butter instead of toothpaste.

References

- Law on Health of Indonesia (Law No. 36/2009).
- Sabbah W, Folyan MO, El Tantawi M. The link between oral and general health. *Int J Dent*. 2019;2019:7862923. <https://doi.org/10.1155/2019/7862923>
PMid:31275387
- Al-Qahtani SM, Razak PA, Khan SD. Knowledge and practice of preventive measures for oral health care among male intermediate schoolchildren in Abha, Saudi Arabia. *Int J Environ Res Public Health*. 2020;17(3):703. <https://doi.org/10.3390/ijerph17030703>
PMid:31973187
- Achmad H, Armedina RN, Timokhina T, Goncharov VV, Sitanaya R, Riyanti E. Literature review: Problems of dental and oral health primary school children. *Indian J Forensic Med Toxicol*. 2021;15(2):4146-62. <https://doi.org/10.37506/ijfnt.v15i2.15019>
- Ministry of health Republic of Indonesia. Basic health research 2018. Jakarta: Badan Litbangkes, Kemenkes RI; 2019.
- Andayani LH, Souliassa AG, Lestari S. Dental and oral health status of elementary school children in central lampung. *J Indones Dent Assoc*. 2021;4(1):7-13. <https://doi.org/10.32793/jda.v4i1.669>
- Lestari DR. No Titl Evaluasi penerapan manajemen UKGS dalam perilaku perawatan gigi dan mulut siswa sekolah dasar. *J Health Educ*. 2016;1(2):1416. <https://doi.org/10.47718/jgm.v2i2.1416>
- Nurhasanah N, Wulansari A, Rasulu H, Tjokro diningrat S, Fahri J, Suwito S, *et al*. The depiction of coconut products (Food and Non-Food) In Tidore Islands, North Maluku. *Int J Food Agric Nat Resour*. 2021;2(3):1-4. <https://doi.org/10.46676/ij-fanres.v2i3.53>
- Lima EB, Sousa CN, Meneses LN, Ximenes NC, Santos MA Jr., Vasconcelos GS, *et al*. *Cocos nucifera* (L.) (Arecaceae): A phytochemical and pharmacological review. *Braz J Med Biol Res*. 2015;48(11):953-64. <https://doi.org/10.1590/1414-431x20154773>
PMid:26292222
- Benny KH. Effect of pure coconut oil mouthwash 12, 5% on the number of porphyromonas gingivalis bacterial colonies and treponema denticola at the margin of the crown full metal porcelain. Thesis. 2017;1:10-15
- Lingga L. Coconut Therapy for Health and Beauty. Jakarta: PT Elex Media Komputindo Gramedia Group; 2012.
- Ng YJ, Tham PE, Khoo KS, Cheng CK, Chew KW, Show PL. A comprehensive review on the techniques for coconut oil extraction and its application. *Bioprocess Biosyst Eng*. 2021;44(9):1807-18. <https://doi.org/10.1007/s00449-021-02577-9>
PMid:34009462
- Leny L, Ginting I, Sitohang TN, Hanum SF, Hafiz I, Iskandar B. Formulasi dan Uji Efektivitas Sediaan Body scrub Labu Kuning (*Cucurbita moschata*). *Maj Farmasetika*. 2021;6(4):375. <https://doi.org/10.24198/mfarmasetika.v6i4.35776>
- Listriana L. The relationship between brushing teeth and toothpaste contains herbs to reduce debris score in an-nisa dental clinic patient in Palembang. *J Keperawatan Gigi Poltekkes Kemenkes Palembang*. 2017;12:83-94. <https://doi.org/10.35790/eg.3.2.2015.10488>
- Slot DE, Valkenburg C, Van der Weijden GA. Mechanical plaque removal of periodontal maintenance patients: A systematic review and network meta-analysis. *J Clin Periodontol*. 2020;47(S22):107-24. <https://doi.org/10.1111/jcpe.13275>
PMid:32716118
- Morawiec T, Dziedzic A, Niedzielska I, Mertas A, Tarasiewicz M, Skaba D, *et al*. The biological activity of propolis-containing toothpaste on oral health environment in patients who underwent implant-supported prosthodontic rehabilitation. *Evid Based Complement Alternat Med*. 2013;2013:704947. <https://doi.org/10.1155/2013/704947>
PMid:23762153
- Oroh ES, Posangi J, Wowor VN. Effectiveness comparison herbal toothpaste and non-herbal toothpaste against decrease in dental plaque index. *e-GIGI*. 2015;3(2):10020. <https://doi.org/10.35790/eg.3.2.2015.10020>
- Janakiram C, Venkitachalam R, Fontelo P, Iafolla TJ, Dye BA. Effectiveness of herbal oral care products in reducing dental plaque and gingivitis. *BMC Complement Med Ther*. 2020;20(1):43. <https://doi.org/10.1186/s12906-020-2812-1>
PMid:32046707
- Puspitasari A, Balbeid MA, Adirhesa A. The difference between toothpaste herbal and non-herbal to decrease plaque index score in children. *E-Prodenta J Dent*. 2018;2(1):116-1. <https://doi.org/10.21776/ub.eprodenta.2018.002.01.3>
- Peedikayil F, Sreenivasan P, Narayanan A. Effect of coconut oil in plaque related gingivitis-a preliminary report. *Niger Med J*. 2015;56(2):143-7. <https://doi.org/10.4103/0300-1652.153406>
PMid:25838632
- Tatikonda A, Debnath S, Chauhan V, Chaurasia V, Taranath M, Sharma A. Effects of herbal and non-herbal toothpastes on plaque and gingivitis: A clinical comparative study. *J Int Soc Prev Community Dent*. 2014;4(Suppl 2):S126-9. <https://doi.org/10.4103/2231-0762.146220>
PMid:25558453
- Aylıkci B, Çolak H. Halitosis: From diagnosis to management. *J Nat Sci Biol Med*. 2013;4(1):14-23. <https://doi.org/10.4103/0976-9668.107255>
PMid:23633830
- Saputra L, Gita F, Dewi RS. Effect of 12.5% virgin coconut oil (*Cocos nucifera*) mouthwash on plaque index of fixed prosthetic denture users. *Int J Appl Pharm*. 2017;9(Special Issue 2):41-4. <https://doi.org/10.22159/ijap.2017.v9s2.11>
- Widyaningrum DC, Noviandi CT, Salasia SI. Antibacterial and immunomodulatory activities of virgin coconut oil (VCO) against *Staphylococcus aureus*. *Heliyon*. 2019;5(10):02612. <https://doi.org/10.1016/j.heliyon.2019.e02612>
PMid:31673647
- Woolley J, Gibbons T, Patel K, Sacco R. The effect of oil pulling with coconut oil to improve dental hygiene and oral health: A systematic review. *Heliyon*. 2020;6(8):04789. <https://doi.org/10.1016/j.heliyon.2020.04789>

-
- org/10.1016/j.heliyon.2020.e04789
PMid:32923724
26. Dewi TS, Daulay SB, Rohanah A. Effect of frying temperature of sweet potato chips on vacuum frying type vacuum pump. *Int J Eng Appl Technol*. 2019;2(2):71-85.
27. Octaviani NR, Prasetyowati S, Marjianto A. The effectiveness of using pasta herbal and non-herbal teeth in reducing plaque index Miftahul Ulum Middle School Students in Surabaya in 2020. *J Ilmu Keperawatan Gigi*. 2020;1(2):62-9. <https://doi.org/10.37160/jikg.v1i2.531>
28. Aung EE, Ueno M, Zaitso T, Furukawa S, Kawaguchi Y. Effectiveness of three oral hygiene regimens on oral malodor reduction: A randomized clinical trial. *Trials*. 2015;16(1):31. <https://doi.org/10.1186/s13063-015-0549-9>
- PMid:25622725
29. Korsuwannawong S, Vajrabhaya LO, Teinchai C, Salee W. Comparison of enamel surface roughness after brushing with herbal and non-herbal toothpastes. *World J Dent*. 2020;11(3):215-20. <https://doi.org/10.5005/jp-journals-10015-1732>
30. Zhafirah RG, Budirahardjo R, Nugroho R. Efek air kelapa hijau (*Cocos nucifera* Linn Var. *viridis*) sebagai obat kumur terhadap perubahan pH saliva anak usia 12 tahun. *Pustaka Kesehatan*. 2019;7(3):147. <https://doi.org/10.19184/pk.v7i3.10714>
31. Shabrina G, Wardani R, Setiawan AS. Indeks plak masyarakat suku baduy sebelum dan sesudah menyikat gigi menggunakan sabut kelapa. Plaque index of the baduy tribe community before and after toothbrushing with coconut fibre. *J Kedokteran Gigi Univ Padjadjaran*. 2017;29(2):83-90. <https://doi.org/10.24198/jkg.v29i2.18568>