

**THE EFFECT OF GARGLING COCONUT ESSENTIAL OIL (*COCOS NUCIFERA* L)
WITH *OIL PULLING* METHOD AGAINST TOOTH CALCULUS INDEX AND
PAPILA BLEEDING INDEX IN WOMAN WITH GINGIVITIS DISEASE**

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ABSTRACT

Coconut oil is a pure coconut oil that can only be made with fresh non-copra coconut ingredients. This type of research is *research experiment* with *pre and post test randomized control trial* design by intervention of gargling coconut essential oil (*Cocos nucifera* L) with *oil pulling* method to the women with gingivitis disease. The control group is gargling using mouthwash betadine gargle. Data analysis using *Wilcoxon test*, and *kruskal wallis* test and to compare the final result of day 0, day 7, and day 14. The results showed that the index calculus value for group I given VCO 0.89 ± 0.35 which means light calculus, while group II of 1.42 ± 0.40 which means medium calculus. The papilla bleeding index of group I is 1.20 ± 0.29 or mild criteria, while group II is 1.91 ± 0.36 or moderate criteria. The conclusion of this study that the administration of VCO gargling therapy showed a more meaningful anti-inflammatory and antibacterial effect on the decrease in gingival bleeding index and plaque index in gingivitis patients which was characterized by a higher decrease in papilla gingiva (PBI) and plaque index (CI) bleeding index compared to the control group.

Keywords: Gingivitis, coconut oil, papilla bleeding index, calculus index.

INTRODUCTION

In the mouth there are many flora of our mouth consisting of a variety of organisms, including bacteria, fungi, mycoplasma, protozoa and viruses that can survive over time. These organisms usually live in harmony in a variety of habitats including teeth, gingival sulcus, tongue, cheeks, hard and soft palate and tonsils. However, many of these bacteria also harm teeth so that it can cause gingival irritation, bad breath, inflammation and bleeding of the gums. Mouthwash is one of the ingredients used to help fight bad breath, improve oral health, strengthen teeth and gums, prevent plaque buildup, treat mouth sores, and refresh breath. Gargling is an attempt to release the remains of food that sticks in between the teeth. Gargling after eating is highly recommended but should not always be with mouthwash (Ramadan, 2014).

Oil pulling method is an additional oral hygiene procedure performed by gargling using vegetable oil. Oil pulling is derived from traditional Indian medicine which lately is also considered to have benefits for systemic health and oral cavity. One of its benefits in the field of oral cavity health is to prevent the occurrence of gingival bleeding.

Cocos nucifera or coconut is one of the multipurpose plants that are widely marketed in Indonesia, including the world because it has a high economic value (Sutarmi, 2005). Coconut products are widely used in non-food industries, among others, coconut fiber industry, activated charcoal, oleochemicals and even handicrafts. Bioactive ingredients contained in coconut oil are caprylic acid, caprate, and lauric that act as antibacterial *ingredients*, *tocopherols* that act as antioxidants as well as *tocotrienols* and *flavonoids*. Oleic acid and linoleic acid are also present in coconut oil. These unsaturated fatty acids act as anti-inflammatories and can reduce fat peroxidation so that inflammatory tissues will be reduced.

Plaque control can be done mechanically by brushing your teeth. However, brushing your teeth alone is considered insufficient in maintaining the cleanliness of the oral cavity. Gingivitis treatment can be done by scalling, root planning and polishing. However, it will be difficult to clean all plaques and calculus perfectly in the pocket periodontal so additional procedures are needed in the form of antimicrobial therapy as an additional oral hygiene procedure to maintain the health of the oral cavity.

Recently, many studies have started to raise the topic of *oil pulling* in the field of dental health. Previous studies linking the role of *oil pulling* therapy in maintaining oral cavity health have been conducted. Bellinda et al (2008) in a 5-day study to find out the effectiveness of coconut oil against the growth of alpha streptococcus colonies in dental plaques of gingivitis sufferers showed that between 60% and 80% concentrations can inhibit the growth of colonies of *alpha streptococcus* bacteria and have the same effect as Hexetidine 0.1%.

Based on the results of observations or surveys in the village aras kabu District Beringin Deli serdang district reported that many people who come to the dental poly puskesmas aras kabu complain of gingivitis or gingivitis. Based on the analysis of the situation it is known that dental poly in puskesmas Aras Kabu Deli serdang does not have adequate facilities for scalling actions both manual and electric. Public dental health business activities are rarely carried out so that the follow-up of gingiva bleeding cases with scalling or root planning actions. On the basis of these considerations researchers feel interested to examine whether through gargling coconut essential oil (*Cocos Nucifera L*) with the

method of Oil Pulling effect from the dental plaque index and bleeding gingiva in women with complaints of gingivitis who visited Puskesmas Araskabu Beringin District Lubuk Pakam. The aim of this study was to find out the effect of gargling coconut essential oil (*Cocos nucifera* L) with *oil pulling* method against to the calculus index and papilla bleeding indeks in womens with gingivitis complaints who visited the Araskabu Health Center Beringin District Lubuk Pakam.

METHOD

1. Study Design

The type of research was *experimental research* with *pre and post test randomized control trial design* (Arikuntoro 2006). In this study intervention was gargling coconut essential oil (*Cocos nucifera* L) with *oil pulling* method to the women with gingivitis, while the control is gargling using betadine gargle containing povidon iodine 2%. The respondent were women with gingivitis whom come to the public health centre of Aras Kabu, Deliserdang for treatment.

The sample was randomly selected and divided into 2 groups. A total of 30 samples each per group with group I was the pure coconut oil intervention group whereas group II was the control.

2. Inclusion and exclusion criteria

The inclusion criteria consist of not in sick condition, cooperative, have not systemic diseases and has moderate-severe dental plaque indeks. the exclusion criteria were have not Diabetes mellitus, blood disorders or mallowmenstruation, never duet o the treatment of periodontal, still in Taking drugs (anticoagulants and *calcium channel blockers*).

3. Clinical and laboratory measurements (Silaban, R, Hutopea , 2011)

Preparation stage :

- Preparing examination and measurement dental plaque indeks and gingival bleeding index by 2 examiners to obtain preliminary data (*baseline*).
- Explaining the implementation of the study to respondents and the respondents signing the *informed consent* sheet
 1. All respondents was given toothbrushes, toothpaste, intervention materials (coconut oil for group I and betadine gargle for group II), and mouthwash glasses.
 2. Demonstrating to the subject about gargling with *the Oil Pulling Method*
 - Group I: gargle using coconut oil with *oil pulling* method, then followed by brushing teeth with *roll* method. They gargling in the morning after breakfast and at night before going to bed. Gargling method as much as 1 tablespoon of coconut oil is accumulated in the oral cavity for 2 minutes characterized by oil becoming liquid and whitening like milk and then discarded from the mouth.
 - Group II: gargle as usual using betadin gargle then followed by brushing teeth using *roll method*. Gargle in the morning after breakfast and at night before going to bed. Gargling method is as much as 5 ml of betadine gargle is scattered in the oral cavity for 2 minutes and then removed from the mouth. This intervention lasts gradually for 7 and 14 days .

- Research Stage

Periodontal measurement by using *papilla bleeding index* that is probing around sulcus gingiva using *probes of the University of North Carolina (UNC) #15*.

Clinical measurements were recorded in 6 sextans at the location of the dana tau index teeth in gingiva which had inflammation/redness. Sextan 1 is from molar teeth 3 upper right to Premolar teeth 1 upper right. Sextan 2 from upper right C tooth to upper left C. Sextan 3 from Premolar 1 top left to Molar 3 top left. Sextan 4 is from molar teeth 3 lower left to Premolar teeth 1 bottom left. Sextan 5 from lower left C tooth to bottom right C. Sextan 6 from Premolar 1 bottom right to Molar 3 bottom right. The test result is the base line or pre-intervention data, day 7, and the 14 recorded on the examination sheet.

DATA ANALYSIS

The data analysis was processing using statistical *package for social science* (SPSS) program. The results of the study were displayed in a frequency distribution table. Statistical analysis used *saphiro wilk* test to find out normal distributed data marked value $p > 0.05$. To compare Papila Bleeding Index data and Calculus Indeks data before and after intervention in each group I and II using *t*- test dependent if data distributed normally, or non-parametric test with *Wilcoxon* test if the data is not distributed normally. To see the difference in final data (H-14) between groups I and II after intervention using *the t test independent* or *Man whitney* test if the data is not distributed normally. To compare initial or pre intervention data, at the 7th day and 14th day in each group using *Anova's one way* test or the *Kruskal wallis* test if the data is not distributed normally. Significance is characterized by a *value of p* < 0.05 with a confidence level of 95%.

RESULT

The average of PBI and CI measurements along with the results of *saphiro –Wilk* data normality test are described as presented in the following table.

Table 1.

Baseline table of each group before intervention

Variable	Group I	<i>p value</i>	Group II	<i>p value</i>
	<i>Mean ± SD</i>		<i>Mean ± SD</i>	
Initial PBI	2.32 ± 0.34	0.004	2.23 ± 0.32	0.002
PBI day 7	1.76 ± 0.29	0.007	2.09 ± 0.30	0.000
Final PBI (H-14)	1.20 ± 0.29	0.000	1.91 ± 0.36	0.128*
Initial CI	1.66 ± 0.41	0.000	1.82 ± 0.35	0.030
CI day 7	1.28 ± 0.40	0.0788*	1.74 ± 0.44	0.002
Final CI (H-14)	0.89 ± 0.35	0.001	1.42 ± 0.40	0.200 *

*=*Data homogeneity value* : $p > 0.05$

The table above shows that the results of the *Saphiro wilk* test which shows that almost all of the data is not distributed normally ($p < 0.05$).

Table 2.

Average of Papila Bleeding Indeks/PBI values for each group (based on *Wilcoxon test*)

Group	n	PBI	(mean difference)	<i>p-value</i>
		<i>Mean ± SD</i>		

I (coconut Oil)				
Before	30	2.32 ± 0.34	1.12 ± 0.48	0.000*
After	30	1.20 ± 0.29		
II (betadine gargle)				
Before	30	2.23 ± 0.32	0.32 ± 0.19	0.000*
After	30	1.91 ± 0.36		

*=Significance value : $p < 0.05$

In the table above show that there was a very significant difference between PBI before and after the intervention ($p < 0.05$) in both groups I and II. However, based on the average difference before and after the intervention in the two groups, it is known that the difference changes of the decrease in gingival bleeding occurs most in group I, namely 1.12 ± 0.48 or the comparison of the difference in changes is 1:3.5 between groups I and II. .

Table 3
The Average of Calculus Index

Group	n	CI (Mean ± SD)	Δ	p-value
I (Oil)				
Before	30	1.66 + 0.41		*
After	30	0.89 + 0.35		
II (betadin gargle)				
Before	30	1.82 ± 0.35	0.40 ± 0.23	0.000*
After	30	1.42 ± 0.40		

*= Significance value : $p < 0.05$

On the table 3 show that there was a very significant difference between CI before and after the intervention ($p < 0, 05$) both in groups I and II. However, based on the average difference before and after the intervention in the two groups, it is known that the most significant difference in changes occurred in group I (0.76 ± 0.26) while in group II it was 0.40 ± 0.23 . Comparison of changes in the average difference before and after the intervention in group I and group II was 1:1.9.

Table 4

The average comparison of CI from baseline, day 7 and day 14 between groups (*Kruskal Wallis test*)

Variable	Pre Mean ± SD	Day 7 Mean ± SD	post Mean ± SD	p-value
Ex. I (gargle coconut oil	1.66 ± 0.41	1.28 ± 0.40	0.89 ± 0.35	0.000*
Kel.II (gargle with gargle)	1.82 ± 0.35	1.74 ± 0.44	1.42 ± 0.40	0.001*
<i>p value</i>	0.000	0.000*	0.000*	

*= Significance value: $p < 0.05$

Table 5

The average comparison of PBI from baseline, day 7 and day 14 between groups (*Kruskal Wallis test*)

Variable	Pre intervention Mean ± SD	Day 7 Mean ± SD	Post intervention Mean ± SD	p-value
Ex. I (gargle coconut oil	2.32 ± 0.34	1.76 ± 0.29	1.20 ± 0.29	0.000*
Kel.II (gargle with gargle)	2.23 ± 0.32	2.09 ± 0.30	1.91 ± 0.36	0.001*
<i>p value</i>	0.000	0.000*	0.000*	

Based on the table above, it is known that after giving coconut oil (VCO) in group I and gargling with betadine gargle in group II both had a decrease in gingival papilla bleeding on day 14 from the value of papilla bleeding index in group I being $1,2 \pm 0.29$ (mild criteria) while in the second group to 1.91 ± 0.36 . Based on measurements of PBI and CI between groups H-0, H-7 and H-14 through the Kruskal Wallis it was known to have very significant changes. To compare the results of the final measurement of PBI and CI from groups 1 and 2, the data were tested using the test analysis *Man Whitney*. The results of statistical analysis *Man Whitney's* showed that there was a very significant difference between the two groups. The post hoc results also show that there is a very significant difference between Ho, H7 and H14. However, the average difference between coconut oil was higher than the control.

DISCUSSION

Gingivitis is an inflammation of the soft tissue around the teeth, namely the gingiva. This inflammation does not extend to the underlying alveolar bone, nor to the periodontal ligament or cementum. Gingival bleeding is one of the clinical signs of gingivitis and is the most common condition. Gingival bleeding on examination appears earlier than discoloration or other visual signs. The main cause of gingivitis is the microbiological build up found in plaque or calculus. Predisposing factors that can cause gingivitis include caries, iatrogenic factors, malpositioned teeth, mouth breathing and partial dentures, *overhangs*, and orthodontic use. Based on the results of this study, it is known that the calculus index value for group I was given VCO of 0.89 ± 0.35 which means mild calculus, while group II is 1.42 ± 0.40 which means moderate calculus. The value of papilla bleeding index in group I was 1.20 ± 0.29 . It means the bleeding index was mild, while in group II was 1.91 ± 0.36 , which meant the bleeding index was moderate. This

shows that in group II the inflammatory process is still ongoing even though its severity has decreased, while in group I, the infection and inflammation have been recovering/healing.

Coconut oil is pure coconut oil that can only be made with non-copra fresh coconut, and its processing does not use chemicals and does not use high heat and no further purification is carried out, because virgin coconut oil is very natural and very stable when used. in the next few years (Vala, & Kapadiya, 2014). The ability of virgin coconut oil to kill bacteria and viruses is based on the content of lauric acid and capric acid (6-7%). *Medium chain triglycerides (MCT)*, including monoglycerides of lauric acid, caprylic acid, capric acid, and myristic acid, which have antimicrobial effects. Antibacterial, antifungal (effects *fungal*), antifungal (*yeast*) and antiviral are mainly shown by monoglyceride derivatives. The content of oleic acid and linoleic acid and flavonoids also functions as an anti-inflammatory. The mechanism of unsaturated fatty acids or *Polyunsaturated Fatty Acid (PUFA)* in reducing inflammation is to reduce the production of eicosanoids, cytokines, and Reactive Oxygen Species (ROS). While the mechanism of flavonoids in reducing inflammation is that flavonoids are able to inhibit eicosanoids from producing enzymes including phospholipase A2, cyclooxygenase and lipoxygenase, thereby reducing the concentration of prostanooids and leukotrienes. Other mechanisms include inhibition of histamine release, phosphodiesterase, protein kinase and transcriptase activation (Rathee, *et al.* 2009 Ribeiro, 2015, & Calder. 2006). The uniqueness of therapy with lauric acid is that it is almost impossible to develop resistance to

The processes lauric acid into monolaurin which is responsible for destroying viruses, and bacteria, such as bacteria *Streptococcus*, *Staphylococcus aureus* which is very dangerous and causes gingivitis, including the fungus *Candida Albicans* which is very common in causing infections in humans, especially in the oral cavity (Robert, 2014). According to research by Sumiasih *et al* (2016) coconut oil can be used as medicine to help accelerate the healing of perineal wounds, dermatitis, and other infectious diseases. In the study of Tirta *et al* (2015) it was reported that coconut oil can treat disease *methicillin resistant staphylococcus sureus* (MRSA) because of its high antibacterial power. The incidence of infection in gingivitis is recorded at 5-10%. If the gingivitis is exposed to more than 105 microorganisms, it is very likely that infection will occur in the wound. Approximately 75% of the incidence of wound infection is a superficial infection.

In the analysis results, it can be seen that in the administration of gargling topical VCO therapy was higher decrease than the bethadine gargle as control. Based on these results, it appears that both VCO and bethadine gargle have anti-inflammatory and antiseptic properties for gingivitis, but VCO has higher anti-inflammatory and antiseptic and antibacterial properties than bethadine gargle.

CONCLUSION

Based on the results of the study, it can be concluded that the gingival papillary bleeding index in the group that gargled with coconut oil showed a better effect than betadine gargle. With coconut oil showed a better change in plaque accumulation than betadine gargle. The administration of coconut oil/VCO gargling therapy showed more anti-inflammatory and antibacterial effects and significant reduction in the gingival bleeding index and plaque index in gingivitis patients.

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