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"Comparing the Effectiveness of Oil Pulling using Sesame Oil Verses Coconut Oil on Plaque – Induced Gingivitis - An Interventional Study"

Dr.Shamila Shetty[1]
Reader, A J Dental College Mangalore,India

Dr. Misha Rose Mathew[2,] Dr. Nishith R K[3], Dr. Disha Rai[4], Dr. Abhijith Shetty[5]
Post graduate, A J Dental College Mangalore, India

Dr. Shrinidhi Ballal A B[6]

Abstract:
Context: Oil pulling or swishing, the ancient practice of healing developed originally in ayurvedic medicine. Coconut and sesame oil being common ingredients used in Indian foods are easy to access. Besides having numerous health benefits, these are also cheaper in comparison with avocado, black cumin seed, canola, cedar nut, and olive oil.

Aim: The study herewith strives for a comparison on the effects of oil pulling with coconut and sesame oil for people with plaque-induced gingivitis.

Materials & Modes: Participants were divided into 3, namely, Group A – 26 people with plaque-induced mild-to-moderate gingivitis using sesame oil for oil pulling, Group B – 26 those with plaque-induced mild-to-moderate gingivitis using coconut oil for oil pulling, and Group C – 26 those with plaque-induced gingivitis, following routine brushingalone. Plaque Index and gingival index (GI) scores for the groups were assessed at pre-intervention and post-intervention stage son 7th and 14th day.

Results: Severity of gingivitis had remarkably decreased in Groups A &B on 7thand 14th day. The decrease was greater in these two groups when compared to Group C which depicted only mild reduction in mean GI and PI scores.
Conclusion: Oil pulling can be effective for oral hygiene together with routine practices. Coconut and Sesame oils are helpful to reduce the acuteness of gingivitis.

Keywords:- *Coconut oil, gingivitis, oil pulling, sesame oil*

I. INTRODUCTION

The human mouth is believed to be the mirror of one's general health. Oral cavity harbors over a billion microorganisms, of which some couldcause development or progression of systemic diseases like cardiovascular disease, diabetes mellitus, etc. Both oral and general health areconnected.[1]Hence it is vital that oral health is maintained at all times. The resistance to antibiotics and its adverse side effects coupled with toxicity to modern medicines therefore stimulated scientists, the world over to research on natural products. Thus Oil pulling, which supposedly improves oral health, came into limelight through Dr. F Karach .[2,3]

Oil pulling or swishing, a traditional, natural healing practice that originated in India, is termed as Kavalagraha or Gandhoosha in Charaka Samhita and Sushruta Samhita ayurvedic texts.[4]It refers to the act of holding or swishing a comfortable quantity of oil insideone's mouth for 10 to 20 minutes and then spitting it out. This act of swishing oil, it is believed will draw out microbes from different areas of the mouth and aid detoxification.[5,6]

Oil pulling therapy can be carried out with edible oils like sunflower, coconut or sesame oil. The sesame plant (Sesamumindicum) of Pedaliaceae family is regarded as Nature's gift to the human race for its health and nutritional qualities[5]. The sesame oil is considered the queen of oil seed crops simply by virtue of its myriad benefits.[6]

Coconut oil with its unique composition predominately consists of medium-chain fatty acids unlike the long-chain fatty acids in other edible oils. This influences its physical properties and renders this as a better oil for mouth swishing. Moreover, lauric acid, a saturated fatty acid, with its proven anti-inflammatory and anti-microbial effects, has a high content of coconut oil.The human milk is the only other natural substance with this high a concentration. In spite of this, detailed studies on oil pulling are still very limited.

The aim of this study is for an in-depth comparison and evaluation of the effects of oil pulling using two edible oils on plaque-induced gingivitis.

II. MATERIALS AND MODES

This prospective interventional comparative study comprising 78 participants was conducted after gaining approval from the Institutional Ethical Committee.

The inclusion criterion was individuals having plaque-induced gingivitis plaque index and gingival index score more than 2,in the age group of 18 to 35 years having at least 20 permanent natural teeth including all index teeth(16,12,24,46,32,34) (1) Individuals with systemic disease, (2) those with smoking and other tobacco-related habits, (3) those using antibiotic or steroid medications in the last 6 months, (4) those with dental treatments over the last 6 months, (5) pregnant and lactating mothers, and (6) unwilling participants were excluded from this study.

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From among the selected participants, informed written consent was obtained before proceeding and they were divided into three groups:

Group A: 26 participants who were diagnosed with plaque-induced gingivitis and advised to use sesame oil pulling along with regular brushing of teeth.

Group B:26 participants who were diagnosed with plaque-induced gingivitis and advised to use coconut oil along with regular brushing of teeth.

Group C:26 participants who were diagnosed with plaque-induced gingivitis who were advised to continue regular brushing alone.

Gingival and plaque status at the pre-intervention stages were evaluated using gingival index (GI) and plaque index (PI) for all the participants. Standard brushing techniques will be taught using dental models and professional cleaning will be performed for those with calculus deposits on their teeth. This was to ensure standard oral hygiene practice, so as to eliminate any impact of local factors such as calculus on gingivitis.

Along with regular oral hygiene practices, each participant of Group A was given sesame oil and advised to take 10 **ml** into the mouth and swish it around the gums, teeth, and tongue. This was to be done before brushing or consuming any fluids in the morning. Swish for about 5 to 10 minutes and when oil becomes viscous and milky, it should be spit out, following which the mouth must be rinsed with warm water.

Group B was given coconut oil and advised to practice the same method.

Group C was advised to continue only the regular oral hygiene practice.

Weekly follow-up was done for motivating participants into continuing the practice and to clinically examine the oral cavity.

Post-intervention gingival and plaque status for participants of all 3 groups were assessed using Gingival and plaque index on the 7^{th} and 14^{th} days.

Mean Gingival and plaque index scores were calculated for the whole group at the pre-intervention and other stages of post-intervention i.e., 7^{th} and 14^{th}days.

III. STATISTICAL ANALYSIS

Analysis was done through descriptive statistics. Paired and unpaired test revealed the statistical significance. Analysis was done using package SPSS version 23.0 and P value of <0.05 was taken as statistically significant.

IV. RESULTS

This current study is undertaken for comparing effects of oil pulling practices utilizing coconut oil with sesame oil to reduce acuteness of plaque-induced gingivitis.

Comparison of Mean gingival Index among varied groups at varying time intervals was found by applying ANOVA. At base line there was no difference in the mean Gingival Index and the difference was not significant (p=0.103). On the 7^{th} day while comparing mean Gingival index among three groups, there was a statistically significant.(p<0.001) change. The mean score is minimum in Coconut oil and then in Sesame oil. Similarly on the 14^{th} day, the mean gingival index was found to be significant among these three groups (p<0.001). Here too, the minimum score was found in coconut oil and the maximum score was under control.

While Comparing the Mean Plaque Index among the different groups at different time intervals by applying ANOVA we found significant difference among the groups at all the time interval. At base line, there was a difference in mean Plaque Index which was found to be significant (p=0.006). On the 7^{th} day, while comparing mean Plaque index among three groups it was found that there was a statistically significant.(p<0.001) change. The mean score is minimum in Sesame oil and then in Coconut oil. Similarly at 14^{th} day the mean Plaque index was found to be significant among these three groups (p<0.001). Here also, the minimum score was found in Sesame oil and the maximum score was in control.

Inter comparison was done to see when the decrease is more and significant. As we see in Sesame oil the decrease of Plaque index was more from baseline to 14^{th} day wh9ile comparing between baseline and 7^{th} day. The difference was significant. But the decrease from 7^{th} day to 14^{th} day is minimum (0.339). Similarly in coconut oil also the difference was seen maximum from base line to 14^{th} day and minimum in 7^{th} day to 14^{th}day. But the difference was found to be significant. But in control there was no significant difference from $7^{th}$to 14^{th}day (p=0.446)

O	Baseline		7^{th} day		14^{th} day		F
9	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	
Sesame oil	2.635	0.252	1.113	0.352	0.722	0.383	211.318***
Coconut oil	2.6	0.254	0.922	0.333	0.583	0.304	300.63 ***
Control	2.478	0.265	1.447	0.442	1.365	0.486	52.934 ***

Table no 1: Comparison of Mean Gingival Index at different time intervals in all the three groups

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	Baseline		7th day		14th day		F
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	
Sesame oil	2.665	0.217	0.922	0.333	0.583	0.304	344.359***
Coconut oil	2.709	0.221	1.113	0.352	0.722	0.383	239.446 ***
Control	2.482	0.289	1.409	0.375	1.261	0.356	84.300 ***

Table no 2: Comparison of Mean Plaque Index at different time intervals in all the three groups

	Baseline		7th day		14th day	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Sesame oil	2.635	0.252	1.113	0.352	0.722	0.383
Coconut oil	2.600	0.254	0.922	0.333	0.583	0.304
Control	2.478	0.265	1.447	0.442	1.365	0.486
F	2.358		11.375		25.335	
P	0.103		<0.001 ***		<0.001 ***	

Table no. 3: Comparison of Mean Gingival Index among three groups at different time intervals

Group	Period (i)	Period (j)	Mean difference	P
Sesame oil	Baseline	7th day	1.743	<0.001 ***
		14th day	2.083	<0.001 ***
	7th day	14th day	0.339	<0.001 ***
Coconut oil	Baseline	7th day	1.596	<0.001 ***
		14th day	1.987	<0.001 ***
	7th day	14th day	0.391	<0.001 ***
Control	Baseline	7th day	1.073	<0.001 ***
		14th day	1.221	<0.001 ***
	7th day	14th day	0.148	0.446 ns

Table no. 4: Inter comparison – Plaque Index

V. DISCUSSION

Chronic inflammation of gingival tissue is a very common oral disease occurring mostly due to improper oral hygiene procedures. Systemic diseases like diabetes mellitus, common among elders is related to the aggravation of gingival and periodontal diseases.[13]

Adjuvant oral hygiene measures like usage of chemical mouthwash, can improve oral health of those with gingivitis.[14]

But using chemical mouthwash causes allergic reactions to some while extended usage can take away taste sensation and cause teeth staining.[15]

This traditional practice of Oil pulling is chronicled in Ayurvedic literature as a step to improve and maintain good oral hygiene. Avocado, black cumin, canola, cedar nut, and olive oils have been used for oil pulling practices.[14]

Coconut and sesame oil are common ingredients in Indian cuisine and are easy to access. They are cheaper and have several health advantages.

Oil pulling creates antioxidants that can damage cell walls of microorganisms and destroy them. These oils attract the lipid layer of bacterial cell membranes, by causing it to get pulled to the oil. When oil is swished around in the mouth, the sheer mechanical force exerted on the oil leads to its emulsification, thus increasing the surface area of the oil. This emulsification of oil begins within 5 min and coats the teeth and gingiva to inhibit bacterial co-aggregation and plaque formation. In this way, plaque building bacteria responsible for dental caries, gingivitis, periodontitis and bad breath are effaced from the mouth.[9]

Sesame oil with its three lignans - sesamin, sesamolin, and seminal - own antioxidant properties and potentiate Vitamin E action. Sesame oil has increased polyunsaturated fatty acids and itsdecreased lipid peroxidation reduces free radical injury to any tissue. The process by which oil pulling therapy causes plaque inhibition is stillunknown. It is probably the oil viscosity that inhibits bacterial adhesion and plaque co-aggregation. Other probable explanationscould be the saponification or the 'soap-making' process that happensdue to the alkali hydrolysis of fat. [9]

Coconut oil with its abundant lauric acid seems to possess anti-inflammatory and antimicrobial properties. Alkalis in the saliva react with oil,causingthe saponification and formation of a soap-like substance which canreduceplaque adhesion. Hence, lauric acid present in coconut oil may react with salivary sodium hydroxide to form sodium laureate. This is the vital ingredient of soap which mayactually cause the cleansing action and decreased plaque accumulation. [3,4]

Peedikayil et al, in their initial study found that this coconut oil pulling practice can reduce plaque formation and plaque-induced gingivitis. A statistically significant decrease in plaque and gingival indices was observed from day 7 onwards wherein the scores depicted continued

decrease during the study period. Further studies were recommended for comparingits effects with different chemotherapeutic agents and oil pulling.[3]

Asokan et al. compared oil pulling therapy with sesame oil and chlorhexidine mouth rinse. They found that it was as effective as chlorhexidine in decreasing plaque-induced gingivitis. In their study, a statistically significant reduction of Streptococcus mutans count in the plaque was observed after the first and second week. [7]

Saravanan et al. studied oil pulling effects with sesame oil on plaque-induced gingivitis. They found a statistically significant decrease in plaque scores and gingival indices and reduction inbacteria within the mouth. The study compared the effectiveness of coconut and sesame oil in oil pulling practicesformitigating plaque-induced gingivitis.[12]

Our results depicted reduced mean GI and PI scores for coconut oil, sesame oil, and control group in comparison with pre-interventionstage.

The coconut oil group depicted a greater reduction of GI on the 14th day than the sesame oil group which showed more reduction in PI score than the coconut oil group.However, this difference wasnot statistically significant.

Sesame oil, a vegetable fat, when acted upon by salivary alkali, like the bicarbonates, initiates the soap making process. Soaps are good cleansers owing to their emulsifying action. Emulsification is a process wherein insoluble fats like sesame oil can be broken down into small drops and dispersed in water. Emulsification enhances the oil's surface area greatly, thereby increasing the cleansing action. Sesame oil unlike other fats (sesamin or sesamolin) is relatively high in unsaponifiable substances and prevents mouth infection and inflammation by its antioxidant property. These may explain thereduction of the plaque scores .[9]

The comparisons between coconut oil and sesame oil groups revealed that GI scores reduced more significantlyin the coconut oil group. These results suggestthat oil pulling utilizing coconut oil is far superior and this is further validated by the evidence of the substantial anti-microbial activity of coconut oil.

Peedikayil et al. compared the anti-bacterial efficacy of coconut oil and chlorhexidine on S.mutans and found a significant count decreasefor both.Hence the conclusion was that coconut oil is as effective as chlorhexidine in its anti-bacterial efficacy against S.mutans.[10]

Thaweboon et al studied oil pulling effect using several oils against S.mutans and Candida albicans. Coconut oil had anti-microbial activity against both, whereas sesame oil showed activity only against S. mutans.[11]

The current study findings were in accordance with previous studies i.e., both coconut oil and sesame oil were effective in reducing gingivitis.

VI. CONCLUSION

Oil pulling utilizing both coconut oil and sesame oil is observed to transform oral hygiene if practiced correctly and regularly. Elaborate research regarding this ancient, economic and valuable remedy must be promoted without bias. Based on current research, it can be concluded that oil pulling if carried out as suggested, can safely work as an adjunct in maintaining good oral hygiene. Together with regular brushing and flossing of teeth, this can deliver promising positive results and in turn enhance overall body health.

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