

Comparative clinical evaluation of olive oil and coconut oil rinse on plaque levels in gingivitis patients -A Randomized clinical trial

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ABSTRACT

Background: In alternative medicine, oil pulling is a procedure that involves swishing oil in the mouth for oral and systemic health benefits. Oil pulling has been proven effective in preventing decay, oral malodour, bleeding gums, dryness of the throat and cracked lips along with strengthening of gums and the jaw. **Objective:** To compare and evaluate the effects of oil pulling with olive oil and coconut oil on gingivitis and plaque score. **Methods:** A total of 34 selected participants were randomly allocated by lottery method into two groups (Group A- coconut oil; Group B- olive oil) having 17 participants each. After brushing the teeth, participants were asked to rinse with 10 ml of oil till it becomes milky white and then spit out once daily for a period of 30 days. Plaque index (Silness J. and Loe H. 1964) and Gingival index (Loe H. and Silness J. 1963) was recorded at baseline, at 7, 15 and 30 days. **Results:** The mean plaque score of Group-A and Group B at baseline was 1.518 ± 0.1629 and 1.535 ± 0.1656 respectively, which significantly reduced after 30 days (Group A- 0.876 ± 0.1091 ; Group B- 1.171 ± 0.0686 $p < 0.001$). The mean gingival score of Group-A and Group B at baseline was 1.571 ± 0.1649 and 1.618 ± 0.1380 respectively, which significantly reduced after 30 days (Group A- 0.882 ± 0.1286 ; Group B- 1.147 ± 0.0514 $p < 0.001$). **Conclusion:** Although, both coconut oil and olive oil groups showed an effective reduction in values of plaque scores and gingival scores, coconut oil showed significant decrease in plaque and gingival scores in comparison to olive oil in patient with mild to moderates gingivitis.

Key words: Coconut oil, gingivitis, oil pulling olive oil, plaque

The gingiva is a part of the oral mucosa that covers the alveolar processes of the jaws and surrounds the necks of the teeth. Gingivitis is the most common human disease worldwide, is characterized by the presence of clinical signs of inflammation that are confined to the gingiva and associated with teeth showing no attachment loss [1]. Dental plaque is defined as highly specific, variable, structural entity formed by sequential colonization of microorganisms on tooth surface, epithelium and restorations. This constant build-up of plaque act as a irritant to gingiva, thereby leading to deterioration of one's oral health. Oral health can be improved in individuals by an effective plaque control

through mechanical methods of tooth cleaning, adjuvant chemotherapeutic agents [1].

Oil pulling or oil swishing is an ancient method described in Ayurveda, is a procedure that involves swishing oil in the mouth for oral and systemic health benefits. In the Ayurvedic text Charaka Samhita (Sutrasthana 5, 78-80), it is called as Kavala Gandoosha/Kavala Graha and is known to cure about 30 systemic diseases ranging from headache and migraine to diabetes and asthma [2]. In modern era, Dr. F. Karach familiarized the concept of oil pulling in the 1990s in Russia [3]. The most important significance of oil pulling is the cost- effectiveness and easy availability of oil at

one's household. The therapy can be practiced right at home without any expertise or technical considerations with least side effects [4]. The present clinical trial was undertaken with an aim to compare the effects olive oil and coconut oil rinse on gingivitis and plaque score.

MATERIALS AND METHOD

An in vivo randomized clinical trial was conducted in the Department of periodontology, K.M.Shah Dental College and Hospital to study the effects of olive oil and coconut oil rise on gingivitis and plaque score. Subjects visiting the OPD above the age of 18years having plaque induced gingivitis, with a gingival index score of 1.1-2 suggestive of moderate gingivitis were included in the study. Subjects suffering from any systemic disease, pregnant and lactating mothers, subjects using chemotherapeutic mouthwash or on antibiotic therapy, history of smoking, those undergoing orthodontic treatment and non-cooperative subjects were excluded from the study.

Ethical clearance was obtained from the institutional ethical committee and the details of the study were explained to the subjects, however they were blinded about the aim and objectives of investigation and an informed consent was obtained. A total of 34 participants with mild to moderate gingivitis were included in the study who were then randomly allocated by lottery method into two groups (Group A- coconut oil; Group B- olive oil) with 17 participants each. A thorough history regarding the medical condition and the medication taken in the past 6 months was obtained from the subjects. The oral hygiene habits of all the subjects were recorded in detail. Plaque index (Silness J. and Loe H. 1964) and Gingival index (Loe H. and Silness J. 1963) [5] of participants were recorded at baseline.

Oil for rinsing was given to patient in a 250ml clear plastic bottle by primary investigator. Participants were asked to rinse after brushing, with about 10 ml of oil using a tea spoon till the mouth is half filled. They were instructed to start swishing left and right, front to back. Swish approximately 10 minutes and then spit as soon as it becomes milky white and thin. They were asked to do this procedure in morning with empty stomach. Participants were asked to continue this procedure for 30 days. Plaque index and gingival index [5] were recorded at 7, 15 and 30days. Recording of the data was done by well-trained recorder and to avoid bias the recorder and evaluator both were blinded to the study's aim. Oral prophylaxis was carried out for the participants at the end of the study.

The Statistical software IBM SPSS statistics 20.0 (IBM Corporation, Armonk, NY, USA) was used data analysis. Descriptive and inferential statistical analyses were carried out; continuous measurements were presented as Mean±SD and categorical measurement were presented in number (%). Level of significance was fixed at p=0.05 and any value less than or equal to 0.05 was considered to be statistically significant. Chi square analysis was used to find the significance of study parameters on categorical scale. Repeated measures Analysis of variance (RM-ANOVA) was used to find the significance of study parameters within the group at different time intervals. Further, Bonferroni's post hoc analysis was carried out if the values of RM-ANOVA test were significant. Student t tests (two tailed, unpaired) was used to find the significance of study parameters on continuous scale between two groups.

RESULTS

A total of 34 participants were include in the study who were then divided into two groups with 17 participants each. Mean age of participants in group A and group B was 25.12±3.839 and 23.41±2.093 years respectively. Our study comprised of 47.1% males and 52.9% females in Group-A and 35.3% males and 64.7% females in Group-B (Table 1). All the participants followed horizontal brushing technique once a day with toothbrush and toothpaste. Additionally tongue cleaner was used by all participants for tongue cleaning. Neither floss nor mouthwashes were part of their daily routine. Patients' responses after use of oils were quite satisfactory in context to oiliness. According to many, they found oils much oily as soon as they started rinsing, but after spitting the oiliness was readily reduced. Taste of oils was not a major issue for the participants.

Table 1: Mean age and sex distribution in study groups

Parameter	Group A (n=17)	Group B (n=17)	Test	P value
Age	25.12±3.84	23.41±2.09	t-value	0.118
Sex	Male	8 (47.1%)	Chi square	0.486
	female	9 (52.9%)		
		11 (64.7%)		

Mean vale of plaque index at baseline in both groups were similar (group A-1.518±0.1629 vs group B- 1.535±0.1656

p= 0.756). Although no changes were observed in the scores after 7days, slight reduction of mean ± SD in both groups after 15 days and 30 days of rinse. Mean difference of the plaque index score between baseline and after 30 days was statistically significant (group A:0.6412±0.15835vs group B- 0.36470.15387p= <0.001) (Table 2).

Table 2: Comparison of plaque index and gingival index values at different time intervals

Parameter		Group A (n=17)	Group B (n=17)	T test	P value
Plaque index	Baseline	1.52±0.16	1.53±0.16	0.31	0.756
	7 days	1.52±0.16	1.53±0.16	0.31	0.756
	15 days	1.15±0.05	1.4±0.11	8.64	<0.001
	30 days	0.87±0.10	1.17±0.06	9.40	<0.001
Gingival index	Baseline	1.51±0.16	1.61±0.13	0.90	0.374
	7 days	1.57±0.16	1.62±0.13	1.03	0.306
	15 days	1.15±0.05	1.42±0.06	13.27	<0.001
	30 days	0.88±0.12	1.14±0.05	7.87	<0.001

Similarly, Mean score of gingival index at baseline and at day 7 was 1.571±0.1649 in group A and 1.618±0.1380 in group B, the difference was not significant (p=0.374). After 15 days of rinse, there was a reduction in scores. Mean ± SD dropped to 1.153±0.0514 in Group-A and 1.424±0.0664 in Group-B (p<0.001). After 30 days of continuous rinse, mean ± SD reduced to 0.882±0.1286 in Group-A and 1.147±0.0514 in Group-B (p<0.001). There was a significant drop down in mean ± SD of plaque and gingival index of Group A in comparison to Group B. Mean difference of the gingival score between the baseline and after 30 days was statistically significant (p<0.001) (Table 2, Figure 1).

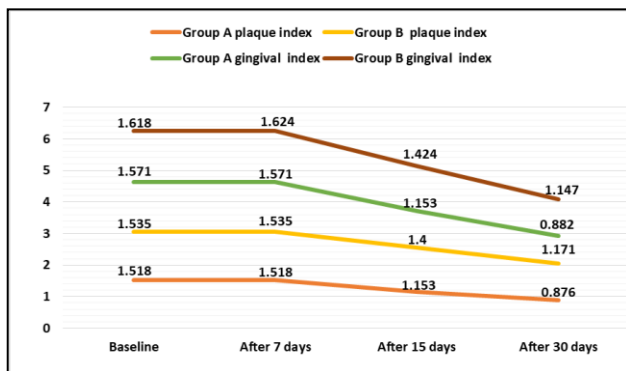


Figure 1: Comparison of mean plaque index and gingival index values at different time intervals using repeated measures ANOVA test

In comparison to baseline values, the mean ± SD of plaque index and gingival index were substantially reduced during period of assessment. Intragroup comparisons using ANOVA test showed a significant improvement in gingival index and plaque index scores in each group (Table 3).

Table 3: Comparison of intragroup plaque index and gingival index using repeated measures ANOVA test

Parameter		Mean± SD	Wilk's Lambda value	P value
Group A plaque index	Baseline	1.51±0.16	131.949	<0.001
	7 days	1.51±0.16		
	15 days	1.15±0.05		
	30 days	0.87±0.10		
Group A gingival index	Baseline	1.57±0.16	152.695	<0.001
	7 days	1.57±0.16		
	15 days	1.15±0.05		
	30 days	0.88±0.13		
Group B plaque index	Baseline	1.53±0.16	62.068	<0.001
	7 days	1.53±0.16		
	15 days	1.40±0.11		
	30 days	1.17±0.07		
Group B gingival index	Baseline	1.61±0.14	333.035	<0.001
	7 days	1.62±0.13		
	15 days	1.42±0.06		
	30 days	1.14±0.05		

Bonferroni's post hoc analysis for plaque and gingival index performed showed a statistically significant improvement (Table 4).

Table 4: Bonferroni's post hoc analysis for plaque and gingival index

Group		Baseline	7 days	15 days	30 days
	Group A	Baseline	-	-	<0.001
7 days		-	-	<0.001	<0.001
15 days		<0.001	<0.001	-	<0.001
30 days		<0.001	<0.001	<0.001	-
Group B	Baseline	-	-	<0.014	<0.001
	7 days	-	-	<0.014	<0.001
	15 days	<0.014	<0.014	-	<0.001
	30 days	<0.001	<0.001	<0.001	-

DISCUSSION

Gingivitis or inflammation of gingiva is the most common form of gingival disease. This usually occurs due to interaction of gingival epithelium and plaque present on tooth surface. Good plaque control facilitates the return to health for patients with gingival diseases. Various mechanical and chemical plaque control methods are used to restrict the formation of plaque [1]. Oil pulling is another ancient method which is effective as plaque control and against gingivitis. Various oils like sesame seed oil, coconut oil, sunflower oil, olive oil are considered to be used. It involves swishing oil around in mouth similar to mouthwashes. It has been used for many years as Indian folk remedy against gingivitis. In developing countries and rural communities, access to oral care is minimal, and the use of toothbrushes, toothpaste and mouthwashes are still not easily accessible; therefore oil pulling can be an affordable option and improve oral health [4].

Our study aimed at comparative evaluation of effects of olive oil and coconut oil as an adjuvant to brushing, in decreasing the plaque accumulation and plaque induced gingivitis. This clinical trial was conducted on participants who mostly had low education, low income, and were housekeepers. These participants were unable to access the dental care. The olive oil and coconut oil used in this trial were inexpensive, easily accessible, and easily available in most of the houses; they could be used to prevent dental diseases and were suitable for this population. Previous studies emphasize of the substantial antimicrobial activity of coconut oil. This is primarily due to presence of monolaurin in coconut oil. It is believed to have its antimicrobial property against various microorganisms such as *Escherichia vulneris*, *Enterobacter* species, *Staphylococcus aureus* and *Candida* species [6,7]. Studies also show that coconut oil is effective against *S.mutans* and *C.albicans* in an in vitro oral biofilm model [8]. Olive oil belongs to *Olea europaea* L., a Mediterranean species, also plays an important role as it has inhibitory effect against bacteria and fungi. A report shows that olive oil has anti-inflammatory effects due to oleocanthal, a phenolic compound of virgin olive oil which has similar effects to ibuprofen. [9, 10].

Plaque Index and Gingival Index were used for clinical assessment in the study as they are the most widely used indices in trials for therapeutic agents. In our study also there was a significant decrease in the plaque and the gingival index at the end of 30 days. There are various

hypotheses on the mechanisms by which oil pulling may act in decreasing the plaque and gingival index. In oil pulling, as the oil is swished in the mouth the mechanical shear forces exerted on the oil leads to its emulsification and the surface area of the oil is greatly increased. The oil film thus formed on the surface of the teeth and the gingiva can reduce plaque adhesion and bacterial co aggregation. It was also proposed that the alkalis in the saliva can react with the oil leading to saponification and formation of soap like substance which can reduce the adhesion of plaque [11].

Peedikayil et al [11] showed that by using coconut oil rinsing, there was a significant improvement in the mean \pm SD gingival index and plaque index from baseline and After 30 days. Bansal et al [12] in their study with olive oil, also noticed an improvement in gingival index values. The mean \pm SD of gingival index at baseline was 1.46 ± 0.21 which after 21 days reduced to 0.58 ± 0.12 . Similarly, our study showed that in case of coconut oil the mean \pm SD of plaque and gingival index at baseline was 1.518 ± 0.1629 and 1.571 ± 0.1649 respectively. After 30 days, it dropped to 0.876 ± 0.1091 for plaque index and 0.882 ± 0.1286 for gingival index. In case of olive oil the mean \pm SD of plaque and gingival index at baseline was 1.535 ± 0.1656 and 1.618 ± 0.1380 respectively which after 30 days dropped to 1.171 ± 0.0686 for plaque index and 1.147 ± 0.0514 for gingival index. We did not carry out any reliable microbiological study to show the decrease in amount of plaque and reduction of gingivitis; is a major limitation of our study.

CONCLUSION

Oil pulling has been proven to be an effective method in reducing plaque formation and plaque induced gingivitis. In this study, although, oil pulling with both olive oil and coconut oil showed a significant reduction in values of plaque scores and gingival scores in patients with mild to moderate gingivitis, however results with coconut oil were more significant as compared to olive oil. Therefore, coconut oil and olive oil can be included as a preventive and therapeutic agents in gingivitis.

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