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Dental Science

EFFECT OF OIL PULLING ON PLAQUE AND GINGIVITIS: A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Introduction: Microbial colonization and plaque are the accepted etiologic agents for gingival and periodontal diseases. Oil pulling involves the swishing of oil in the mouth for oral and systemic benefits. Virgin coconut and olive oils are the least processed forms and thus contain compounds with anti oxidant effects. Chlorhexidine is the gold standard against which other anti plaque and anti gingivitis agents are measured.

Aim: To assess and compare the effect of coconut oil, olive oil and Chlorhexidine on dental plaque and gingivitis by a single blinded randomized controlled trial.

Settings And Design: A double blinded interventional study was conducted among 45 subjects who gave consent to participate in the study. The subjects comprised of non – teaching staff, aged 20-45 years, working at A. J. Institute of Dental Sciences, Mangalore.

Materials And Method: Randomization was done and subjects were allocated to 1 of the 3 groups, to receive coconut oil, olive oil and Chlorhexidine. All subjects were instructed on the procedure of using the oils as well as the mouthwash. All examinations were carried out at baseline, on day 7 and day 14 using Plaque Index and Gingival Index. The results were subjected to Repeated measures ANOVA.

Results: Statistically significant decrease in the plaque and gingival index scores was noticed after 14 days among the users of Coconut oil as well as Chlorhexidine, but not in the Olive oil group.

Conclusions: Coconut oil can be used as an adjunct in oral hygiene maintenance and is at par with Chlorhexidine.

KEYWORDS : Public Health, Oral Hygiene, Natural Oils, Chlorhexidine.

INTRODUCTION:

Gingivitis and periodontitis are by far the most common forms of human periodontal diseases. Gingivitis develops within 4- 7 days of plaque accumulation. Bacteria are the accepted etiologic agents in its initiation as well as progression.[1]

Essential oils carry some of the most potent antibacterial and anti-fungal properties.[2] Oil pulling therapy or oil swishing is an ancient Ayurvedic remedy procedure which involves the swishing of oil in the mouth for oral and systemic health benefits.[3] It has been in use, since time immemorial, to prevent decay, oral malodor, bleeding gums, dryness of the throat, cracked lips and for strengthening teeth, gums, and the jaw.[4] Oil pulling works by sucking out the toxins from the mouth, thus detoxifying the oral cavity. [2]

Virgin coconut oil extracted using cold compression technique and is known for its fragrance, taste, anti-oxidants, medium chain fatty acids and vitamins. It is therefore known as 'mother of all oils.'[5] Almost 50% of the fat present in coconut oil is lauric acid, a major anti-microbial agent. [6] Since it is not subjected to heat, sunlight and extracted by a different process, virgin coconut oil is certainly richer in benefits than ordinary coconut oil.[5]

Extra virgin and virgin olive oils are the least processed forms and thus contain compounds that provide anti-oxidant effects. The Mediterranean diet features olive oil as its primary source of fat.[7] Olive oil provides mono saturated fats and it also contains oleuropein an anti-bacterial compound.[8] Researches have shown that olive oil is anti-inflammatory due to its major component, oleocanthal. [9]

Chlorhexidine is considered as the gold standard against which other anti-plaque and anti-gingivitis agents are compared due to its ability to adhere to soft and hard tissue and maintain a potent sustained release.[10,11] On oral applications, chlorhexidine binds to the mouth tissue, oral mucosa and teeth. It is then released over time to kill bacteria and fungi. This helps to reduce the bacterial count and prevents dental plaque.[11]

So, this study is undertaken, as there is not enough scientific evidence in medical literature to accept oil pulling therapy with coconut oil and olive oil as a preventive adjunct in plaque control.

SUBJECTS AND METHODS:

A double blinded interventional study with concurrent parallel design was conducted among 45 study subjects who gave consent to participate in the study. The study subjects comprised of non – teaching staff, aged 20-45 years, working at a dental college in Mangalore.

Ethical approval to conduct this study was obtained from the Institutional Ethical Committee at A.J. Institute of Medical Sciences, Mangalore (Ref. No.AJEC/REV/54/2017) and it was registered under Clinical Trail Registry - India with a Ref. No: CTRI/2018/01/011143. A written consent and duly signed patient information sheet were obtained from each participant. 74 non-teaching staff of the institution were screened, out of which 45 were selected for the study, based on the following inclusion and exclusion criteria.

Inclusion Criteria:

1. Subjects who give consent to participate in the study.
2. Subjects with plaque and gingival score ≥ 1.

Exclusion Criteria:

1. Subjects on medication for any systemic conditions.
2. Subjects undergoing Orthodontic treatment or using intra oral artificial prosthesis.
3. Subjects using any other mouthwashes, or other oral hygiene aids.
4. Subjects with known allergy to certain foods.

The study subjects were then randomly allocated into 3 groups, using a computer generated random allocation sequence: Group A- Coconut oil group, Group B- Olive oil group and Group C: Chlorhexidine group, with 15 members in each group. (Figure 1)

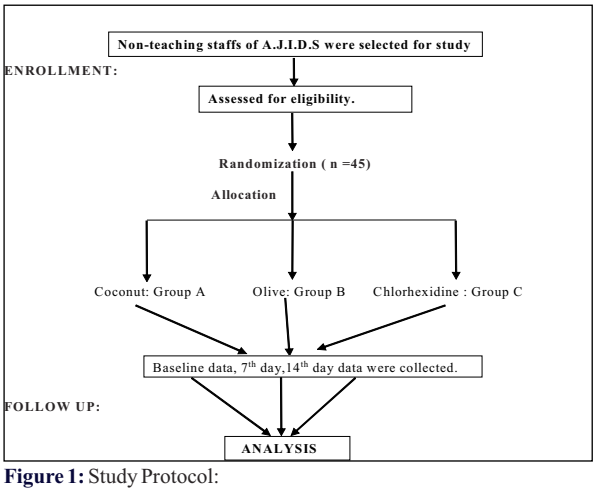

Figure 1: Study Protocol:

Pre-study Procedure:
The various products used were extra virgin olive oil, virgin coconut oil and Chlorhexidine mouth washes which were procured from the supermarket and pharmacy respectively. (Figure 2a, 2b and 2c)

a-Coconut oil **b- Olive oil** **c-Chlorhexidine**

Figure 2: The Products Used For The Study

Peppermint oil is an inert ingredient of Chlorhexidine mouthwash preparations. So few drops of peppermint extract were added to each oil sample to enhance the flavor as well as to mask the taste. The oil samples as well as the mouthwash was packed without labels, in 300 ml white plastic bottles (Figure 3) and later masked (Figure 4a,4b and 4c) at Srinivas College of Pharmacy, Valachil, Mangalore.

Figure 3: The Final Products:

Group A **Group B** **Group C**

Figure 4: Products After Masking

A study proforma was prepared which included demographic characteristics: name, age, sex, oral hygiene practices performed and the oral hygiene aids used. This was recorded prior to the examinations.

Examination Procedure:
Informed consent from the subjects was obtained prior to the study. Intra examiner calibration was done before the start of the study. All subjects were instructed to continue their routine home oral hygiene procedures and to continue brushing twice daily during the study period.

All examinations were carried out at baseline, on day 7 and day 14.

The baseline data on the plaque and gingival score of the patient was assessed using Plaque Index and Gingival Index [15]. Thereafter oral prophylaxis was carried out for all the subjects. They were then provided with a bottle of the prepared sample by an assistant who was not part of the study and were advised on the technique to be followed.

Reassessment of Plaque and Gingival Index for each patient was carried out, recorded and the values were compared, after 7 days and 14 days.

The oil pulling procedure[12,16]:
The subjects were instructed about the procedure as per the following steps.

Oil pulling should be done in the morning, on an empty stomach before eating or drinking anything. About 10 ml of the sample should be taken in the mouth, sipped, sucked and pulled between the teeth for 10-15 minutes. Subjects are instructed to lift the chin a bit, close the eyes and swish the liquid, from left to right, front to back and vice versa until the viscous oil turn thin and milky white in consistency. Precaution should be taken to not to swallow the oil. Oil should then be spat out and mouth should be rinsed with warm water. They are asked to repeat the procedure at night.

Mouthwash rinsing procedure: [17]
10 ml of undiluted solution is to be taken in the mouth and rinsed for 30 seconds before or after brushing. Swish the solution around in the mouth and spit it. Do not swallow the rinse. Wait at least 30 minutes before brushing the teeth, eating, drinking, or rinsing the mouth with water.

The study subjects were recalled for follow up after 7 days, and after 14 days respectively.

On Day 7 and 14: Reassessment of the Plaque and Gingival Index for each patient were carried out and recorded and the values were compared.

RESULTS:
Table 1 shows the comparison of mean plaque and gingival index scores of the subjects at baseline, day 7 and day 14. At baseline, Plaque Index (PI) and Gingival Index (GI) scores were similar with no significant differences.

Table 1 - Mean Values Of Plaque And Gingival Index Scores:

Days	Indices	Coconut Oil	Olive Oil	Chlorhexidine	p values
Day 1	PI_1	2.09 ± 0.36	1.87 ± 0.22	2.07 ± 0.47	0.58
	GI_1	2.14 ± 0.39	2.44 ± 0.30	2.50 ± 0.32	0.63
Day 7	PI_7	1.71 ± 0.22	1.82 ± 0.12	1.94 ± 0.60	0.53
	GI_7	1.54 ± 0.36	2.31 ± 0.16	2.17 ± 0.36	0.01
Day 14	PI_{14}	1.18 ± 0.30	1.88 ± 0.12	1.42 ± 0.41	0.04
	GI_{14}	1.25 ± 0.35	2.17 ± 0.28	1.80 ± 0.34	0.01

The plaque index scores at the end of 7 days in all the 3 groups showed no significant difference. A statistically significant decrease in the gingival scores was noted from day 7 among the users of coconut oil ($p < 0.05$), as well as Chlorhexidine, while there was no significant decrease in the gingival index scores in the olive oil group.

The mean plaque and gingival index scores at the end of 2 weeks was found to be lowest in the coconut oil group.

Statistical analysis using RANOVA showed that there was a significant difference between the plaque and gingival scores from day 7 and 14. Post hoc tests showed that coconut oil was better than Chlorhexidine in reducing gingival index scores. (Table 2)

Table 2: Post Hoc Values

Groups	p values		
	PI-14th day	GI- 7th day	GI- 14th day
Coconut oil- Olive oil	0.04	0.01	0.01
Coconut oil – Chlorhexidine	0.40	0.04	0.01
Olive oil – Chlorhexidine	0.06	0.66	0.71

PI –Plaque index, GI- Gingival index

DISCUSSION:
Oil pulling has a powerful detoxifying effect both in the oral cavity as well as for the body [18]. The exact mechanism of oil pulling is not known but it was claimed that swishing oil in the mouth activates enzymes and draws toxins out of the blood [16].

Studies on the mechanism of action of oil pulling therapy by Ashokan et al[4] found that emulsification process of oil started 5 minutes after oil

pulling. The emulsification occurs due to agitation of oil in the mouth and leads to the formation of a soapy layer which can alter the adhesion of the bacteria on the tooth surface, remove superficial worn out squamous cells and improve oral hygiene. Thus it prevents bacterial adhesion as well as plaque co-aggregation.

This clinical trial was conducted on subjects who had low education and were housekeepers by their profession. The potential barriers to maintenance of good oral hygiene are the high dental costs, multiple appointments, time off work, child care, transportation costs, etc. As the oils used in this trial are fairly inexpensive, easily accessible, and available in most of the houses, they can be used to prevent dental diseases and are suitable for this population.

A study conducted by Peedikayil FC et al in 2015[14], which aimed to evaluate the effect of oil pulling with coconut oil, on plaque formation and plaque induced gingivitis, showed a statistically significant decrease in the plaque and gingival indices from day 7 and the scores continued to decrease during the period of their study. This is in accordance with the present study.

Another study conducted by Singla et al[13] observed that when coconut oil as well as olive oil was used for gingival massage there was a steady decline in Plaque and Gingival Index scores.

CONCLUSIONS:

Based on the results of the study it can be Coconut oil was found to be better than Chlorhexidine in inhibiting plaque and gingivitis, with increasing effect when used for 14 days. Olive oil was found to be not effective in reducing plaque and gingivitis.

Clinical Significance:

- Chlorhexidine, which is considered as a gold standard in plaque control is not easily accessible and affordable to low income groups. It also has side-effects such as unpleasant taste and staining of teeth.
- In a predominantly rural population, coconut oil is an easily available and affordable commodity. It's use can be considered as an appropriate primary oral health care approach to vulnerable and low income communities.

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