

Effect of coconut oil in plaque related gingivitis — A preliminary report

Faizal C. Peedikayil, Prathima Sreenivasan¹, Arun Narayanan²

Departments of Pedodontics and Preventive Dentistry, ¹Oral Medicine and Radiology, ²Periodontics Kannur Dental College, Kannur, Kerala, India

ABSTRACT

Background: Oil pulling or oil swishing therapy is a traditional procedure in which the practitioners rinse or swish oil in their mouth. It is supposed to cure oral and systemic diseases but the evidence is minimal. Oil pulling with sesame oil and sunflower oil was found to reduce plaque related gingivitis. Coconut oil is an easily available edible oil. It is unique because it contains predominantly medium chain fatty acids of which 45-50 percent is lauric acid. Lauric acid has proven anti inflammatory and antimicrobial effects. No studies have been done on the benefits of oil pulling using coconut oil to date. So a pilot study was planned to assess the effect of coconut oil pulling on plaque induced gingivitis. **Materials and Methods:** The aim of the study was to evaluate the effect of coconut oil pulling/oil swishing on plaque formation and plaque induced gingivitis. A prospective interventional study was carried out. 60 age matched adolescent boys and girls in the age-group of 16-18 years with plaque induced gingivitis were included in the study and oil pulling was included in their oral hygiene routine. The study period was 30 days. Plaque and gingival indices of the subjects were assessed at baseline days 1,7,15 and 30. The data was analyzed using paired t test. **Results:** A statistically significant decrease in the plaque and gingival indices was noticed from day 7 and the scores continued to decrease during the period of study. **Conclusion:** Oil pulling using coconut oil could be an effective adjuvant procedure in decreasing plaque formation and plaque induced gingivitis.

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

Address for correspondence:

Dr. Faizal C. Peedikayil,
Department of Pedodontics and
Preventive Dentistry Kannur
Dental College, Kannur - 670 612,
Kerala, India.
E-mail: drfaizalcp@gmail.com

INTRODUCTION

Oral health is of prime importance to all individuals. Oral hygiene habits are instilled in childhood itself irrespective of the nationality or geographic location of an individual. The most reliable and accepted method of oral hygiene maintenance the world over are mechanical methods of tooth cleaning but adjuvants for decreasing plaque formation and maintaining oral hygiene have been sought. Presently chemotherapeutic agents are used as adjuvant agents to reduce plaque formation but they have their own disadvantages.¹

Kavala graha or *Gandoosha*² are procedures recommended for oral hygiene maintenance in ayurveda. They are elaborately mentioned in the texts of *Charaka Samhita*

and *Sushrutha's Samhitha*. It is described as a procedure in which an individual takes a comfortable amount of oil/ medicated oil and holds it or swishes it in the mouth. When the oil turns thin and milky white it is spit out without swallowing.²

Dr. F. Karach popularised this procedure as oil pulling.³ He claimed that oil pulling can cure several illnesses including oral diseases, but his claims were not supported by evidence. Recent studies of oil pulling therapy using sunflower oil⁴ and sesame oil⁵ were found to decrease plaque induced gingivitis. Even though coconut oil is used for gargling among the people in coconut farming communities, no studies have been done on the benefits of oil pulling using coconut oil, to date.

Coconut oil is an edible oil and is consumed as a part of the staple diet in many tropical countries. Coconut oil is a highly desired and easily available oil in India. It is used in cooking and for its cosmetic properties. Coconut oil is different from most other dietary oils because the predominant composition of coconut oil is a medium chain fatty acid, whereas in the majority of other oils the basic building blocks are almost entirely long chain fatty acids. This influences the physical and chemical properties of the oil. Coconut oil contains 92% saturated acids, approximately

Access this article online

Quick Response Code:



Website:

www.nigeriamedj.com

DOI:

10.4103/0300-1652.153406

50% of which is lauric acid. Human breast milk is the only other naturally occurring substance with such a high concentration of lauric acid. Lauric acid has proven anti-inflammatory effects and antimicrobial effects.⁶⁻⁸

Therefore a study was conducted to assess the effect of coconut oil on plaque formation and plaque related gingivitis.

MATERIALS AND METHODS

The aim of the study was to evaluate the effect of coconut oil pulling/oil swishing on plaque formation and to evaluate the effect on plaque induced gingivitis. A prospective interventional study was carried out. A total of 60 age matched subjects in the age-group of 16-18 years with plaque induced gingivitis were included in the study. Informed consent was taken for their inclusion in the study. The use of systemic or topical antibiotics and the history of dental treatment in the past one month were set as exclusion criteria. All the subjects were recruited into a single group. There was no control group in the study. The study was designed to compare the baseline values and the post intervention values in a single group performing coconut oil pulling in addition to their oral hygiene routine.

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. All the chosen subjects had a habit of brushing once or twice a day with toothbrush and paste. Six subjects had the habit of flossing once in the night along with brushing twice a day. The subjects were advised to routinely perform oil pulling with coconut oil every day in the morning in addition to their oral hygiene routine. Five subjects discontinued from the study as they could not tolerate the taste of the oil and three subjects discontinued from the study because of antibiotic usage during the period.

Modified Gingival Index⁹ and Plaque Index¹⁰ were used as the clinical measures to assess gingival inflammation and plaque formation respectively. The clinical examination was performed by two independent observers. All subjects were assessed around 4 hrs after performing oil pulling. Plaque and gingival indices were measured at baseline that is, and on days 1, 7, 15, 30 after the oil pulling routine was started. The final scores were statistically analyzed using the students paired t test. Interobserver agreement was measured using the kappa coefficient.

RESULTS

Reliability of clinical examination was tested for all the days of assessment and the interexaminer reliability was found to be substantial to good. The Kappa coefficient scores were in the range of 65-92 [Table 1a and b]. The

mean gingival index was 0.91 and the plaque index was 1.19 at baseline. In comparison to the baseline values both the gingival and the plaque indices substantially reduced during the period of assessment. There was a steady decline in both the plaque index and the gingival index values from day 7. The average gingival index score on day 30 was down to 0.401 and the plaque index score was 0.385 [Figures 1 and 2]. Statistical analysis using the paired t test showed that the decrease was statistically significant [Tables 2 and 3].

DISCUSSION

The primary cause of gingival inflammation is plaque. Dental plaque is defined clinically as a structured, resilient substance that adheres to intraoral hard surfaces and is composed of bacteria in a matrix of salivary glycoprotein and extracellular polysaccharides. Plaque induced gingivitis is the result of an interaction between plaque and the tissues and the inflammatory response of the host. It is associated with the subtle microbial alterations as the plaque matures.^{11,12}

Table 1a: Kappa scores for modified gingival index

Day	Kappa score	P value
Day 0	0.857	0.000
Day 1	0.950	0.000
Day 7	0.847	0.000
Day 15	0.658	0.000
Day 30	0.920	0.000

Table 1b: Kappa scores for plaque index

Day	Kappa score	P value
Day 0	0.676	0.000
Day 1	0.693	0.000
Day 7	0.844	0.000
Day 15	0.857	0.000
Day 30	0.943	0.000

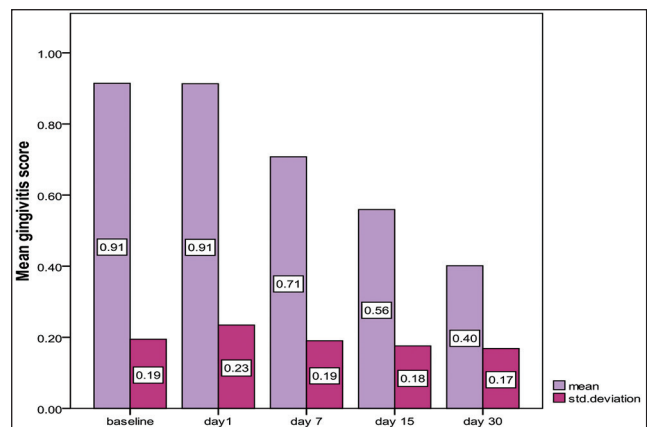


Figure 1: Shows the mean and standard deviation of plaque index scores

Oral hygiene measures using chemo mechanical procedures reduce the incidence of plaque related diseases by decreasing the plaque accumulation. Our study aimed at checking the effectiveness of oil pulling with coconut oil as an adjuvant to brushing, in decreasing the plaque accumulation and plaque induced gingivitis. Plaque Index by Sillness and Loe¹⁰ and Modified Gingival Index⁹ were used for clinical assessment in the study as they are the most widely used indices in trials for therapeutic agents.¹³ Oil pulling with sunflower oil was found to significantly reduce plaque index and gingival index after 45 days.⁴ Asokan *et al.*, found oil pulling therapy with sesame oil was equally effective as chlorhexidine in decreasing plaque induced gingivitis.⁵ 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.⁵

It was also proposed that the alkalis in the saliva can react with the oil leading to saponification and formation of a soap like substance [Figure 3] which can reduce the adhesion of plaque.^{5,14} Coconut oil has a high saponification value and is one of the most commonly used oil in making soaps. The soaps produced with coconut oil can lather well and have an increased cleansing action.¹⁵ The lauric acid in the coconut oil can easily react with sodium hydroxide in saliva during oil pulling to form sodium laureate, the main constituent of soap¹⁶ which might be responsible for the cleansing action and decreased plaque accumulation.

The significant reduction in gingivitis can be attributed to decreased plaque accumulation and the anti-inflammatory, emollient effect of coconut oil. In animal studies coconut oil was found to be an effective burn wound healing agent and this was attributed to its anti-inflammatory and

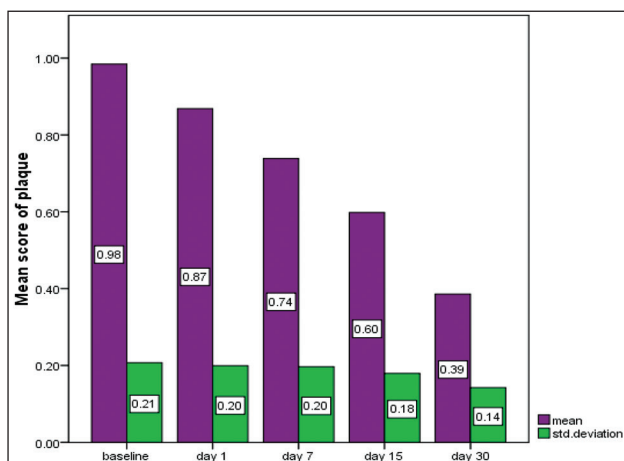


Figure 2: Shows the mean and standard deviation of gingival index scores

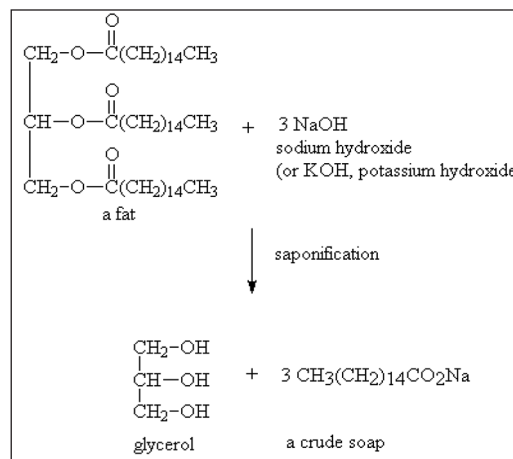


Figure 3: Saponification reaction

Table 2: Comparison of plaque index scores between baseline, 7, 15, and 30 days

Period	Mean	Std. dev	Mean diff.	Std. dev diff.	95% CI		Paired t value	P value	significance		
					Lower	Upper					
Base line day 1	0.9845	0.8685	0.2072	0.1994	0.11596	0.12321	0.08166	0.15026	6.787	0.000	S
Baseline day 7	0.9845	0.7387	0.2072	0.1968	0.24573	0.17797	0.19618	0.29528	9.957	0.000	S
Baseline day 15	0.9845	0.5982	0.2072	0.1795	0.38633	0.19631	0.33167	0.44098	14.191	0.000	S
Baseline day 30	0.9845	0.3859	0.2072	0.1425	0.59862	0.17870	0.54887	0.64836	24.156	0.000	S

Table 3: Comparison of gingival index scores between baseline, 15, 30 and 45 days

Period	Mean	Std. dev	Mean diff.	Std. dev diff.	95% CI		Paired t value	P value	significance		
					Lower	Upper					
Base line day 1	0.9145	0.9132	0.1946	0.2345	0.00133	0.21743	-0.05921	0.06186	0.44	0.965	NS
Baseline day 7	0.9145	0.7075	0.1946	0.1902	0.20700	0.17608	0.15798	0.25602	8.477	0.000	S
Baseline day 15	0.9145	0.5592	0.1946	0.1785	0.35529	0.18703	0.30322	0.40736	13.698	0.000	S
Baseline day 30	0.9145	0.4014	0.1946	0.1684	0.51306	0.20496	0.45600	0.57012	18.051	0.000	S

antiseptic properties.¹⁷ Coconut oil showed moderate anti-inflammatory effects on ethyl phenylpropiolate induced ear edema in rats, and carrageenin and arachidonic acid-induced paw edema.¹⁸ It was found to be effective and safe when used as an emollient and moisturiser.¹⁹

There are many commercially available mouthwashes. Chlorhexidine containing mouthwashes have been found to be the most effective among them. Listerine (phenol compound) and Meridol (an amine/stannous fluoride mouthwash) were found to be less efficacious than Chlorhexidine in controlling plaque induced gingivitis. (Listerine) and (Meridol). After 3 weeks of rinsing, plaque indices remained the lowest in the chlorhexidine group, while subjects using Listerine or Meridol the score were similar but significantly lower than that of individuals rinsing with the placebo solution. The antimicrobial potential of chlorhexidine was found to be the highest followed by Meridol.²⁰ In our study there was a 50% decrease in the plaque and gingival index scores in 4 weeks which is comparable to the decrease produced by chlorhexidine.

Chlorhexidine on long term use alters taste sensation and produces brown staining on the teeth which is very difficult to remove. The mucous membranes and the tongue can also be affected and may be related to the precipitation of chromogenic dietary factors on to the teeth and mucous membranes.²¹ Staining is also associated with the long term use of Phenol compound and stannous fluoride containing mouth washes.²² In the present study there were no reported alterations in the taste or noticeable staining from coconut oil at the end of 4 weeks.

As an antimicrobial agent, chlorhexidine is effective against both gram positive and gram negative bacteria. Its antibacterial action is due to an increase in cellular membrane permeability followed by coagulation of the cytoplasmic macromolecules.²³⁻²⁵ It has also been shown that chlorhexidine can reduce the adherence of *Porphyromonas gingivalis* to epithelial cells.²⁶ Pure-culture studies of 10 oral bacteria (eight genera) showed that *Actinomyces naeslundii*, *Veillonella dispar*, *Prevotella nigrescens*, and the streptococci were highly susceptible to CHX, while *Lactobacillus rhamnosus*, *Fusobacterium nucleatum*, were less susceptible.²⁷

Studies show that coconut oil also has substantial antimicrobial activity. This is attributed to the presence of monolaurin in coconut oil. It is shown to have significant antimicrobial activity against *Escherichia vulneris*, *Enterobacter spp.*, *Helicobacter pylori*, *Staphylococcus aureus*, *Candida spp.*, including *C. albicans*, *C. glabrata*, *C. tropicalis*, *C. parapsilosis*, *C. stellatoidea* and *C. krusei*.^{7,28} Studies also show that coconut oil is effective against *S. mutans* and *C. albicans* in an *in vitro* oral biofilm model.²⁹ The antimicrobial potency of coconut oil was not tested

in our study. Further studies with a have been planned to check the antimicrobial potential of coconut oil. The fact that a control group with a proven chemotherapeutic agent was not used is the major the limitation of our study.

CONCLUSION

Oil pulling has been proven to be an effective method in reducing plaque formation and plaque induced gingivitis. This preliminary study shows that coconut oil is an easily usable, safe and cost effective agent with minimal side effects which can be used as an adjuvant in oral hygiene maintenance. More studies on the antimicrobial potency of coconut oil on microorganisms causing oral diseases is required to authenticate the use of coconut oil as an effective oral antimicrobial agent. Further studies on coconut oil with a large number of subjects and comparative studies using various chemotherapeutic agents can improve the quality of evidence.

REFERENCES

1. Mandel ID. Chemotherapeutic agents for controlling plaque and gingivitis. *J Clin Periodontol* 1998;15:488-98.
2. Sooryavanshi S, Mardikar BR. Prevention and treatment of diseases of mouth by gandoosha and kavala. *Anc Sci Life* 1994;13:266-70.
3. Bruce Fife MD. The healing miracle of coconut oil. Piccadilly Books Ltd. 1st edition. Health Colorado Springs: Wise publications Co; 2000. p. 1-46.
4. Amith HV, Ankola AV, Nagesh L. Effect of oil pulling on plaque and gingivitis. *J Oral Health Community Dent* 2007;1:12-8.
5. Asokan S, Emmadi P, Chamundeswari R. Effect of oil pulling on plaque induced gingivitis: A randomized, controlled, triple-blind study. *Indian J Dent Res* 2009;20:47-51.
6. DebMandal M, Mandal S. Coconut (*Cocos nucifera* L: Arecaceae): In health promotion and disease prevention *Asian Pac J Trop Med* 2011;4:241-7.
7. Ogbolu DO, Oni AA, Daini OA, Oloko AP. *In vitro* antimicrobial properties of coconut oil on *Candida* species in Ibadan, Nigeria. *J Med Food* 2007;10:384-7.
8. Pehowick DJ, Gomes AV, Barnes JA. Fatty acid composition and possible health effects of coconut constituents. *West Indian Med J* 2000;49:128-33.
9. Lobene RR, Weatherford T, Ross NM, Lamm RA, Menaker L. A modified gingival index for use in clinical trials. *Clin Prev Dent* 1986;8:3-6.
10. Loe H. The Gingival Index, the Plaque Index and the Retention Index Systems. *J Periodontol* 1967;38:610-6.
11. Newman MG, Takei HH, Klokervold PR. Carranza's Clinical Periodontology. 10th edition. Elsevier; 2006. p. 241.
12. Marsh PD. Dental plaque: Biological significance of a biofilm and community life-style. *J Clin Periodontol* 2005;32:7-15.
13. Ciancio SG. Current status of indices of gingivitis. *J Clin Periodontol* 1986;13:375-8.
14. Ambika S. Fundamentals of biochemistry for medical students. 7th edition. Kartik Offsets Printers; 2001. p. 50-4. 2001
15. Alsberg CL, Taylor AE. The Fats and Oils — A General Overview (Fats and Oils Studies No. 1). Stanford University Press; 1928. p. 86.
16. Pavia DL, Lampman GM, Kriz GS, Engel RG. Introduction to Organic Laboratory Techniques: A Small Scale Approach. Brooks/Cole Laboratory series for organic chemistry. 2nd edition; 2004. p. 252-65.

17. Srivastava P, Durgaprasad S. Burn wound healing property of *Cocos nucifera*: An appraisal. *Indian J Pharmacol* 2008;40:144-6.
18. Intahphuak S, Khonsung P, Panthong A. Anti-inflammatory, analgesic, and antipyretic activities of virgin coconut oil. *Pharm Biol* 2010;48:151-7.
19. Agero AL, Verallo-Rowell VM. A randomized double-blind controlled trial comparing extra virgin coconut oil with mineral oil as a moisturizer for mild to moderate xerosis. *Dermatitis* 2004;15:109-16.
20. Brecx M, Brownsfone E, MacDonald L, Gelskey S, Cheang M. Efficacy of Listerine®, Meridol® and chlorhexidine mouthrinses as supplements to regular tooth-cleaning measures. *J Clin Periodontol* 1992;19:202-7.
21. Leard A, Addy M. The propensity of different brands of tea and coffee to cause staining associated with chlorhexidine. *J Clin Periodontol* 1997;24:115-8.
22. Brecx M, Macdonald LL, Legary K, Cheang M, Forgay MG. Long-term Effects of Meridol® and chlorhexidine mouthrinses on plaque, gingivitis, staining, and bacterial vitality. *J Dent Res* 1993;72:1194-7.
23. Hennessy T. Some antibacterial properties of chlorhexidine. *J Periodont Res* 1973;8:61-7.
24. Emisilon CG. Susceptibility of various microorganisms to chlorhexidine. *Scand J Dent Res* 1977;85:255-65.
25. Budtz-Jorgensen E, Løe H. Chlorhexidine as a denture disinfectant in the treatment of denture stomatitis. *Scand J Dent Res* 1972;80:457-64.
26. Grenier D. Effect of chlorhexidine on the adherence properties of *Porphyromonas gingivalis*. *J Clin Periodontol* 1996;23:140-2.
27. McBain AJ, Bartolo RG, Catrenich CE, Charbonneau D, Ledder RG, Gilbert P. Effects of a chlorhexidine gluconate-containing mouthwash on the vitality and antimicrobial susceptibility of *in vitro* oral bacterial ecosystems. *Appl Environ Microbiol* 2003;69:4770-6.
28. Verallo-Rowell VM, Dillague KM, Syah-Tjundawan BS. Novel antibacterial and emollient effects of coconut and virgin olive oils in adult atopic dermatitis. *Dermatitis* 2008;19:308-15.
29. Thaweboon S, Nakaparksin J, Thaweboon B. Effect of oil-pulling on oral microorganisms in biofilm models. *Asia J Public Health* 2011;2:62-6.

How to cite this article: Peedikayil FC, Sreenivasan P, Narayanan A. Effect of coconut oil in plaque related gingivitis - A preliminary report. *Niger Med J* 2015;56:143-7.

Source of Support: Nil, **Conflict of Interest:** None declared.

Staying in touch with the journal

1) Table of Contents (TOC) email alert

Receive an email alert containing the TOC when a new complete issue of the journal is made available online. To register for TOC alerts go to www.nigeriamedj.com/signup.asp.

2) RSS feeds

Really Simple Syndication (RSS) helps you to get alerts on new publication right on your desktop without going to the journal's website. You need a software (e.g. RSSReader, Feed Demon, FeedReader, My Yahoo!, NewsGator and NewzCrawler) to get advantage of this tool. RSS feeds can also be read through FireFox or Microsoft Outlook 2007. Once any of these small (and mostly free) software is installed, add www.nigeriamedj.com/rssfeed.asp as one of the feeds.