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Review article

Oil pulling for maintaining oral hygiene – A review

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ABSTRACT

Oil pulling is a traditional folk remedy practiced in ancient India. It is believed to cure more than thirty systemic diseases when practiced regularly and as directed. Due to occurrence of side effects to modern medicines and oral hygiene products, people are increasingly attracted towards complementary and traditional practices. Oil pulling in addition to offering several oral health benefits has also beneficial effects on overall health. The present article attempts to review and discuss this ancient practice.

1. Introduction

Mouth is considered as the mirror of the general health of human body. Oral cavity harbors billions of microorganisms, some of these contribute to the development or progression of systemic diseases such as cardiovascular disease, diabetes mellitus, etc.[1] Oral health and general health is interrelated.[2] So it is very important to maintain oral health. Antibiotic resistance, adverse effects and toxicity to modern medicines has prompted scientists to research on natural products. Oil pulling is claimed to improve oral health. It came into lime light and popularity by Dr F Karach.[3,4] The present article reviews the role of oil pulling in maintaining oral hygiene.

Oil pulling is an ancient ayurvedic therapy for maintaining oral hygiene.[5] Oils for oil pulling are easily available in household.[6] Oil pulling is mentioned in the ayurvedic text *Charak Samhita* and *Sushruta Samhita* as 'Kavala Graha' or 'Kavala Gandoosha'.[4,7] In Gandoosha mouth is completely filled with oil such that gargling is impossible whereas in Kavala Graha comfortable lesser quantities of oil is used such that gargling is possible.[6,8]

2. Procedure of oil pulling

In oil pulling, a tablespoon full of oil is swished around the mouth in the early morning before breakfast and in empty stomach for about 20 min. In case of children greater than five years of age, a teaspoon of oil is used. The oil is 'pulled' and forced in between all the teeth by swishing it all around the mouth. At the end of this activity if the procedure is done correctly, the viscous oil will become milky white and thinner. Then it is spit out and mouth is thoroughly washed with clean warm saline water or tap water and teeth are cleaned with fingers or routine tooth brushing is performed.[9] If the jaw aches, then the procedure can be done just for 5–10 min. The oil should not be spit into the sink as the oil can cause clogging of the pipes. Instead, the oil should be spit into a trashcan or on a paper towel.

Oil pulling should be ideally performed daily morning on empty stomach before brushing teeth and care should be taken that oil is not swallowed.[4,10,11] Swallowing of oil during oil pulling should be avoided as the oil contains bacteria and toxins.[12] Oil pulling is best practiced in sitting position with chin up. It can be practiced thrice daily in empty stomach before meals to fasten the healing effects.[13] It is contraindicated for children below 5 years due to risk of aspiration.[14,15] The practitioner should take care not to aspirate the oil while performing rigorous oil pulling. In cases of oral ulcers, fever, vomiting tendency, asthma and in conditions where brushing is difficult and sometimes contraindicated, oil pulling can be advantageously used to maintain oral hygiene.[16]

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3. Mechanism and benefits of oil pulling

Ayurveda hypothesizes that tongue is connected to various organs such as kidneys, heart, lungs, small intestine, spine, etc.[16] Oil pulling is believed to help in the excretion of toxic heavy metals by saliva.[17] Oil pulling activates salivary enzymes which absorb toxins such as chemical toxins, bacterial toxins and environmental toxins from the blood and removed from the body through the tongue.[9,16,18,19] Thus oil pulling detoxifies and purifies the entire human body.[16] However it is argued that since oral mucosa is not a semipermeable membrane, toxins of the body from the blood cannot pass through it.

Organic oils such as sunflower oil, sesame oil, and coconut oil are of benefit especially if it is cold pressed, though refined oil also works in "pulling" the bacteria, viruses and protozoa from the oral cavity. Since trans fats are absent in cold pressed oils when compared to commercial oils which are extracted from strong petroleum based solvents; oil pulling is ideally performed with cold pressed oils.[3] Traditionally sesame oil is documented to be preferred oil for practicing oil pulling.[7] Oil pulling using olive oil, milk, extracts of gooseberry and mangoes is also documented.[20] Sesame oil and sunflower oil has been found to reduce plaque induced gingivitis.[4] Root of Sesame (*Sesamum indicum*) contains chlorosesamone which has antifungal activity.[10] Also polyunsaturated fatty acids present in sesame oil reduces free radical injury occurring in oral cavity.[3]

Oil pulling generates antioxidants which damage the cell wall of microorganisms and kill them.[21] These oils will attract the lipid layer of bacterial cell membranes, and cause it to stick or get attracted, and pulled to the oil. During oil pulling, the oil gets emulsified and surface area of the oil gets increased.[4] The process of emulsification of oil begins upon 5 min of oil pulling.[22] This oil will coat the teeth and gingiva and inhibits bacterial co-aggregation and plaque formation.[4] Thus plaque building bacteria responsible for dental caries, gingivitis, periodontitis and bad breath are removed from the oral cavity. Gums become pink, healthier and problem of bleeding gums is solved. Oil pulling is also of help to resolve symptoms of dry mouth/throat and chapped lips.[7] Also teeth become whiter; breath becomes fresher; oral cavity muscles and jaws become stronger with excellent achievement of oral hygiene.[9,23] Oil pulling prevents dental caries, gingivitis, oral candidiasis and periodontitis from occurring, helps to reduce tooth pain, fixes mobile teeth and achieves vigorous oral hygiene.[5,9,13,24] Oil pulling when practiced regularly is believed to freshen and stimulate the mind and strengthen the senses. It is also beneficial in sore throat, dry face, impaired vision, taste loss and anorexia.[16]

Coconut oil has high saponification index. It contains lauric acid which can react with alkalis present in saliva such as sodium hydroxide and bicarbonates to form sodium laureate-soap like substance, which reduces plaque adhesion and accumulation, and possesses cleansing action.[3,4,12] Lauric acid has antimicrobial, anti-inflammatory properties, prevents dental caries and is beneficial to oral health. In addition to this it also has a pleasant taste.[4,25] Coconut oil has antimicrobial activity and is effective against *Streptococcus mutans* and *Candida albicans* in an *in vitro* biofilm model.[4] Coconut oil also has anti-septic properties and can be safely used as emollient and moisturizer. Coconut oil does not have adverse effects produced by chlorhexidine such as brown staining and altered taste sensation.[4]

Olive oil contains 70% monounsaturated fatty acids with oleic acid as predominant constituent. It also contains plant phenolic compounds, squalen, phytosterols; vitamin A, E and K. These constituents have antimicrobial, immunomodulatory and antioxidative effect. Oil pulling with olive oil is presumed to prevent oral malodor.[17] Almond oil containing mouth rinse is suggested to result in low gingival scores whereas olive oil based mouth rinses is believed to inhibit plaque formation and inhibition.[22] Sesame oil contains sesamin, sesamolin and sesaminol and has detoxification, antioxidant, and antibiotic actions. It also prevents lipid peroxidation.[25] Also cost of sesame oil is 5–6 times cheaper than chlorhexidine.[12]

Chronic use of mouthwashes containing phenols and stannous fluoride produces staining.[4] Also stannous and zinc salts have organoleptic problem.[20] Monolaurin in coconut oil is effective against microorganisms such as *Staphylococcus aureus, Candida* spp., *Helicobacter pylori, Escherichia vulneris* and *Enterobacter* spp. It is hypothesized that monolaurin causes bacterial death by altering bacterial cell wall, penetrating and disrupting cell membranes and inhibiting enzymes related to energy production and nutrient transfer. Monolaurin also has virucidal activity by dissolving lipids and phospholipids in the viral envelope; leading to disintegration of virus.[11] Lauric acid in coconut is effective against mouth sores. Sucrose monolaurate of coconut has anti-caries properties due to reduction in glycolysis and sucrose oxidation by *S. mutans* and thus prevents the formation of dental plaque.[26] However it should be kept in mind that oil pulling does not reverse the existing dental caries and hence regular visits to dentists are still required.[4]

In addition to maintaining oral hygiene it has been claimed to have systemic health benefits and cure systemic diseases.[23] Oil pulling is also supposed to increase the metabolism of the body, heal the cells, tissues and organs of the body and improve longevity in human beings.[9] An improvement in oral hygiene is noticed within two weeks of practicing correct method of oil pulling. Sunflower oil is observed to decrease both plaque and gingival indices after using it for oil pulling for period of forty five days.[4]

4. Studies done on effect of oil pulling on oral hygiene

Anand et al in their study observed 20% reduction in bacterial count upon 40 days of oil pulling using sesame oil. Also they observed reductions in the severity of dental caries. Sesame oil was observed to possess moderate antimicrobial activity against *S. mutans* and *L. acidophilus*. They mentioned that toxins and bacteria from the body may be removed through the tongue and get trapped in oil and thrown out from the body.[10]

Four researchers in their study involving 60 adolescents of age 16–18 years with plaque induced gingivitis, observed statistically significant reduction of plaque and gingival indices upon oil pulling using coconut oil. Subjects performed oil pulling in early morning at empty stomach in addition to their routine oral hygiene measures such as brushing and flossing. They were assessed after 4 h after performing oil pulling. Modified Gingival Index and plaque index by Sillness and Loe were measured at baseline and on days 1, 7, 15 and 30. Steady decline in indices was found from day seven. Plaque and gingival indices significantly decreased after 30 days of oil pulling. The study observed 50% decreases in gingival and plaque indices after four weeks which is comparatively similar to results produced by chlorhexidine. They concluded that oil pulling with coconut oil is helpful in decreasing plaque formation and plaque induced gingivitis.[4]

In a study conducted by Jauhari D et al on children aged 6–12 years, the authors observed no significant reduction in *S. mutans* count using oratest and dentocult SM strip mutans kit after two weeks of oil pulling twice daily using sesame oil. However the result may probably be due to the fact that oil pulling may take atleast four weeks to show its effect.[25] Sesame oil is more palatable when compared to other refined edible oils.[21]

In an *in vitro* study on oral biofilm model, sesame oil was observed to possess antibacterial activity against *S. mutans*; sunflower oil had antibacterial activity against *C. albicans*; and coconut oil was active against both *S. mutans* and *C. albicans*.[11]

A group of researchers compared oil pulling method using sesame oil with chlorhexidine mouthwash for two weeks on twenty adolescent subjects. There was statistically significant reduction in the *S. mutans* count in the plaque samples of oil pulling group after one and two weeks. Also there was reduction in the mean scores of salivary *S. mutans* count after two weeks. However the study noted that the reduction in *S. mutans* count is more in chlorhexidine group than oil pulling group.[12]

Three authors assessed the effect of oil pulling on plaque, gingivitis and also its safety on oral hard and soft tissue. Refined sunflower oil was used for 45 days by ten subjects. Reduction in plaque and gingival scores were observed to be statistically significant. They concluded that oil pulling is useful as a supplemental oral hygiene aid.[20]

Asokan et al in their *in vitro* study observed that benefits of sesame oil on oral health are due to saponification, emulsification and mechanical cleansing action.[27]

Singla et al observed significant reduction in the mean *S. mutans* and *Lactobacillus* count in saliva, and also in the plaque scores and gingival scores in 32 subjects upon gum massage using sesame oil, olive oil and coconut oil. The subjects massaged their gums around all the teeth with the 2 ml oil for 10 min every day after tooth brushing using index finger in circular motion for a period of three weeks. No adverse effects was reported by the subjects.[28]

Dani N et al assessed the antiplaque effect of oil pulling using sesame oil in a randomized controlled trial. Also the effect of sesame oil pulling on plaque induced gingivitis was studied. Forty subjects with plaque induced gingivitis were treated by scaling and root planing. Thereafter randomly 20 subjects were instructed to perform oil pulling for 14 days; remaining 20 subjects were given chlorhexidine mouth wash for 14 days. Plaque index scores, gingival index scores and total colony counts of aerobic bacteria were reduced in oil pulling group after 14 days. Sesame oil was found to be as effective as chlorhexidine against plaque induced gingivitis.[29]

Kuroyama et al reported two cases of exogenous lipoid pneumonia in patients who habitually practiced oil pulling with sesame oil. The symptoms of exogenous lipoid pneumonia are fever, weight loss, cough, dyspnea, chest pain, and hemoptysis. 40% of patients have mild or no symptoms. Severe pneumonia with acute symptoms can be fatal to the patient.[30] Oil may be unintentionally aspirated during oil pulling. If the aspirated oil is microorganism rich, then it may result in manifestation of lipoid pneumonia.[31]

The term halitosis is unpleasant breath odor and is not same as oral malodor. Oral malodor arises only from the oral cavity. Oral malodor is due to the proteolytic activity of three bacterial species *Porphyromonas gingivalis*, *Tannerella forsythia* and/or *Treponema denticola*. 85% of halitosis arises due to gingivitis, periodontitis and tongue coating.[32] Volatile sulfur compounds like hydrogen sulphide, methyl mercaptan and dimethyl sulphide are responsible for oral malodor. Sood et al in their three week randomized controlled trial involving sixty subjects observed that oil pulling with sesame oil was equally efficient when compared with chlorhexidine mouthwash in reducing oral malodor and the causative microorganisms. Reduction in mean gingival index scores and mean plaque index scores were observed. The researchers noted that sesame oil reduces volatile sulfur compounds and mean anaerobic bacterial count in the oral cavity and hence resulting in reduced mean objective and subjective organoleptic scores. One hindrance for oil pulling noted was the long duration of time required to perform the procedure.[21]

Five researchers in a randomized controlled pilot trial involving 20 adolescent subjects concluded that oil pulling with sesame oil is as effective as chlorhexidine to reduce halitosis and microorganisms associated with it. The subjects performed oil pulling once daily for 10–15 min before tooth brushing for 14 days. Modified gingival index score, plaque index score, organoleptic breath assessment score, self assessment of breath score and BANA test scores from tongue coating samples reduced in both chlorhexidine and oil pulling groups.[32]

In a randomized controlled triple blind study involving 20 age matched adolescents, the effect of sesame oil pulling on plaque induced gingivitis and its efficiency when compared to 0.12% chlorhexidine mouth wash was evaluated for a period of ten days. Oil pulling was performed everyday for 1 min in the morning after tooth brushing. Plaque index scores and modified gingival index scores were recorded at the baseline and after ten days. Plaque samples were collected to evaluate the microorganisms present and to calculate the total colony count of aerobic microorganisms after ten days. The study found statistically significant reduction in the pre- and post-values of the plaque and modified gingival index scores in both groups. Reductions in the total count of aerobic microorganisms were detected in both groups.[33]

Three authors carried out a microbiological study on the effect of sesame oil pulling on plaque, gingivitis and colony forming bacteria. Twenty subjects of the study performed oil pulling for 15–20 min daily for a period of forty five days. The study observed that oil pulling resulted in statistically significant decrease in plaque, gingival scores and bacterial counts. Plaque scores, gingival scores and number of bacterial colonies increased after forty five days in the twenty subjects of the control group who practiced routine oral hygiene practices. The authors concluded that oil pulling with sesame oil is an effective preventive oral hygiene method when practiced daily.[34]

People allergic to specific oil should use other types of oil compatible with them. Sesame oil does not have side effects like staining, lingering aftertaste, and allergy.[3] Oil pulling has also been claimed to cure several diseases such as arthritis, allergies, asthma, migraine headaches, nerve paralysis, kidney and heart disorders etc, though it is not scientifically proven.[9,24] However it certainly has positive benefits on oral health.[5] Care should be taken that oil is not swallowed as it is heavily loaded with toxic microorganisms. However if accidently small amounts of oil is swallowed, there is nothing to worry as the same is removed from the body through feces.[24]

5. Conclusion

Oil pulling is observed to bring improvement in oral hygiene when practiced correctly and regularly. Limited available research on effect of oil pulling on oral hygiene shows promising benefits of oil pulling procedure on oral cavity. However oil pulling does not replace dental therapy and is currently not recommended by American dental association.[35] Extensive research on the role of this traditional, cheap and valuable remedy should be encouraged without bias. Based on currently available research it can be concluded that oil pulling when performed as recommended, can be safely used as an adjunct to maintain good oral hygiene and health along with the routine tooth brushing and flossing with promising positive results.

Conflict of interest

There is no conflict of interest.

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