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Role of Coconut Oil Pulling On Oral Health - An Overview

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ABSTRACT: Oil pulling (extended mouth swishing) is a long-established ancient herbal practice that includes swishing of oil for a prolonged period in the mouth for maintaining better oral environment and providing systemic healthy effects. There are number of edible oils which are used in this therapy but the scientific evidence is limited. Recent literature shows that coconut is one of the most popular pulling oil amongst all. Coconut oil is effective against many oral and systemic conditions and also in bacterial and fungal infections because of the presence of lauric acid which is a major fatty acid component. This article reviews the literature regarding the mechanism, composition, benefits and scientific clinical studies related to coconut oil pulling therapy on oral health.

KEY WORDS: oil pulling, coconut oil, lauric acid, monolaurin

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INTRODUCTION

Oral health correlates with systemic health and maintaining oral health is very important as oral cavity is considered a reflection of the general well being of human body.¹ Unnecessary use of antibiotics, increasing microbial resistance and toxicity has forced scientists to research on natural herbal products.² Hence, the search for alternative therapies to replace the toxic effects of allopathic medicine has been increased nowadays.³ In these current years Complementary and Alternative Medicine (CAM) has gained recognition over conventional allopathic medicine on the grounds that the practices and products used are natural and safe.⁴ The CAM is highly recommended due to the advantages of being cost effective, safe and giving the freedom of self-treatment without having any harmful effects.⁵ Ayurveda is an ancient and well known modality of CAM which is defined as "The system of traditional medicine native to the Indian subcontinent and is practiced in other parts of the world as a form of alternative medicine".⁶ Ayurveda emphasize mainly on the prevention of different kind of systemic diseases rather than curing the pathological problems or symptoms.⁷

According to World Health Organization around 80% of the population across the globe still depends upon these traditional alternative therapies for their health care.⁸ This system is around 5000-year-old which uses specific herbs and minerals for the treatment of various diseases and the plants and herbs which are used in the Ayurvedic medicine have been proven to be harmless and efficient since the ancient times.⁹

Oil pulling is a well known ancient herbal procedure that includes prolonged swishing of oil in the oral cavity to enhance better oral environment. It is a natural remedy that has been practiced for centuries in sub-continent specially in India as a holistic Ayurvedic technique which is mentioned in the text books written by Charaka and Sushruta.¹⁰ Oil pulling is not a new concept because way back around 3000BC oil pulling has been discussed in Ayurvedic texts with the names of Kavala or Gandusha and it has been beneficial for about 30 different illnesses including diabetes, asthma, headache and migraine.^{9,11} In Russia the idea of oil pulling was renewed by Dr. Karach during the 1990's.⁶ Dr. Med. Karach mentioned about this extraordinary way of treatment in a conference at the Academy of Sciences of UDSSR. He spoke about various different pathologies including cardiovascular diseases, digestive troubles and many hormonal disorders which can be treated by oil pulling.¹²

BENEFITS OF OIL PULLING THERAPY

Oil pulling is currently a well renowned CAM remedy

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for different oral illnesses.¹³ Oil pulling is claimed to reduce the chances of dental caries, bleeding gums, xerostomia, cracked lips and to maintain overall health of the teeth, gums, and jaws.¹⁴ It also helps in removing bad odor from the mouth and stimulates the taste buds. Oil pulling can be an alternative cleaning method in those patients where brushing is difficult as in mouth ulceration, or in those who have a tendency to gag as in asthmatics and severe cough.¹⁵ However, a survey was conducted by an Indian daily newspaper "Andhra Jyoti" in 1996, on the effects of oil pulling on various diseases in which total 1041 readers were included, out of which 89% reported healthy beneficial effects and only 11% did not report any improvement in the signs and symptoms of illnesses.¹⁶ The procedure is useful in number of systemic diseases which have been illustrated in Fig 1.¹⁷

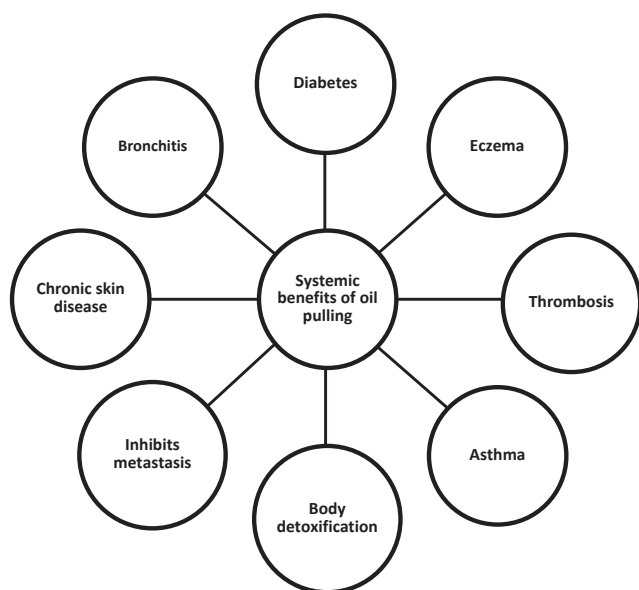


Figure 1
Systemic effects of oil pulling

OIL PULLING THERAPY PROCEDURE

In oil pulling, a teaspoonful of any kind of oil is swished around the mouth early in the morning preferably before having breakfast, for about 15-20 minutes. The oil is 'pulled' and forced around the oral cavity. If done correctly, oil will become viscous, milky white and thinner. It is then expectorated, the mouth is thoroughly washed with warm saline or normal tap water followed by routine tooth brushing.² If the duration is less than 10 minutes it is not sufficient and if it exceeds more than 20 minutes there are chances of reabsorption of toxins. It can be performed by anyone above 5 years of age, also during pregnancy and

menstruation.¹⁸

COMMONLY USED OILS

Commonly used oils for oil pulling include:¹⁴

- Coconut oil
- Sunflower oil
- Sesame oil
- Corn oil
- Palm oil
- Soya bean oil
- Rice bran oil.

IMPORTANCE OF COCONUT OIL

Coconut oil is derived from the dried kernel of fully ripe coconuts. Grown in tropical regions, it has been among the primary sources of dietary fat for decades.¹⁹ Coconut oil is commonly and culturally used throughout the sub continent especially in India and Pakistan.²⁰ Coconut oil has many healthy effects on hair, skin, cholesterol levels and weight loss. It boosts the immune system and has been used in stress relief.²¹ With added health and nutritional benefits it acts as an anti-inflammatory, immune modulator²², moisturizer and wound healer. It shows a potent antimicrobial and anti-fungal activity also.^{23,24}

COMPOSITION OF COCONUT OIL

Coconut oil is made up of medium chain fatty acids whereas other edible oils have long chain fatty acid structure.^{20,25} There are 92% saturated fatty acids, 6% monounsaturated fatty acids and 2% polyunsaturated fatty acids in the composition. The distribution of its total fatty acid content is shown in table 1. Lauric acid, myristic acid

Fatty acids	%age
Lauric	44-52
Myristic	13-19
Palmitic	8-11
Capric	6-10
Caprylic	5-9
Oleic	5-8
Stearic	1-3
Linoleic	<3
Caproic	<1

Table 1
Fatty acid composition of coconut oil

and palmitic acid are its saturated fatty acids components where as oleic acid and linoleic acid are its only

monounsaturated and polyunsaturated fatty acids respectively whereas, α -tocopherol, β -tocopherol with α -, β and γ -tocotrienol are the anti-oxidants present in the coconut oil.²³ The lauric and capric acids hydrolyzes to become monoglycerides named as monolaurin and monocaprin, which are approved by the US Food and Drug Administration (FDA) as non-toxic compounds and used as generally recognized as safe (GRAS) food additive.¹⁹

MECHANISM OF ACTION

The actual mechanisms behind oil-pulling therapy are not identified yet. It has been assumed that the plaque aggregation and bacterial adhesion on the tooth surface can be inhibited by the high viscosity of coconut oil.²⁶ Moreover, the monolauric and monocapric acids present in the oil has the tendency to penetrate cell membranes and eventually kills the harmful pathogens by inhibiting the enzymes utilized in energy production and nutrient transfer.²⁵ Another probable mechanism might be due to the alkali hydrolysis of oil by the presence of bicarbonates in saliva known as the saponification process. These soaps might be efficient in removing microbes or plaque materials.^{25,27} Coconut oil has a high saponification index (254.82 mg KOH/100 g oil) when compared with other edible oils like soybean and sunflower oil.²⁸ It forms a soap like substance called sodium laurate, when lauric acid of the oil gives a chemical reaction with sodium hydroxide and bicarbonates present in saliva, resulting in decreased plaque adhesion and accumulation which enhances cleansing action.^{27,29} Furthermore, the third theory hypothesizes that the antioxidants present in the oil cause detoxification by preventing lipid peroxidation, resulting in an antibiotic-like effect thus helping in the destruction of microorganisms.³⁰

DISCUSSION

The main advantage of oil pulling therapy is its simplicity and a method which is economical for the fact it uses only oil for the swishing for the improvement and maintenance of good oral health with no strict precautions required to follow the regimen. Compared to other detoxification methods, it is effortless and simple.¹⁷ However researches has been done on the side effects produced by the oil pulling Kuroyama et al reported two cases of exogenous lipid pneumonia in patients who routinely performed oil pulling with sesame oil. The manifestations of exogenous lipid pneumonia are fever, weight reduction, cough, dyspnea, chest discomfort, and hemoptysis. Oil might be accidentally suctioned amid oil pulling and it was assumed that if the suctioned oil is microorganism rich, at that point it might

bring about appearance of lipoid pneumonia.³¹ Upset stomach has additionally been encountered whereas more scientific data is required to give proof of conceivable side effects.³²

STUDIES RELATED TO THE EFFECTS OF COCONUT OIL ON SYSTEMIC HEALTH

Literature suggests the use of coconut oil because of its high saponification value.²⁸ In 2017, Mythri assumed the formation of sodium laurate (the main component of soap) which is formed by the interaction of lauric acid found in coconut oil and sodium hydroxide from the saliva during oil pulling causes the cleansing effect and decreased plaque formation in oral cavity.¹⁰ Furthermore the presence of lauric acid in coconut oil can inhibit the growth of *Staphylococcus aureus*, *Bacillus cereus*, *Salmonella typhimurium* and *Escherichia coli* at a concentration of 5% when compared with Ciprofloxacin.³³ In 2006, Ósk Thorgeirsdóttir et al. investigated the effects of monocaprin acid as a denture disinfecting agent and he reported an increased antimicrobial activity against *Candida* when it is topically applied.³⁴ Likewise, a study done in Nigeria, evaluated 100% concentration of coconut oil which showed an inhibitory effect on some species of *Candida* when compared to fluconazole.³⁵ Besides this, Verallo-Rowell et al. in 2008 conducted a clinical trial on the antibacterial effects of virgin coconut oil (VCO) against *Staphylococcus aureus* collected from human atopic dermatitis skins and reported a highly significant decrease in the bacterial count.³⁶

According to an animal study done by S. Intahphuak et al. VCO was useful in the reduction of ear and paw edema. The results showed significant anti-inflammatory effects when VCO was given in high doses.³⁷ Furthermore, in a study by Swee Keong Yeap et al in 2015, mice which were treated with VCO showed increased levels of brain antioxidants and reduction of 5-hydroxy tryptamine with the lowered levels of serum cholesterol, triglyceride, glucose and corticosterone. He proposed that VCO can be used as an anti-stress functional oil.³⁸ Horas et al in 2017 conducted a study to evaluate the beneficial effect of VCO on palatoplasty, palatal surgical wound healing. The topical application of virgin coconut oil accelerated wound healing showing an increased number of fibroblast cells appearing in the wound, as well as with fewer pain complaints.³⁹

STUDIES RELATED TO EFFECTS OF COCONUT OIL PULLING ON ORAL HEALTH

Online literature searches in PubMed and Google scholar provided eight scientific articles on oil pulling therapy related to coconut oil which are discussed below:

Chalke et al in 2017 conducted a trial with 75 subjects having plaque-induced gingivitis on the effects of coconut oil pulling. The clinical parameters such as plaque and gingival index scores were assessed at day 0, 15 and 30. Results showed a significant decrease in pre- and post-treatment scores of plaque and gingival index and they concluded that coconut oil pulling can be used as an adjunctive oral hygiene aid in reducing the plaque formation and subsequent plaque-induced gingivitis.⁴⁰

In 2017 a randomized controlled triple blinded clinical trial was conducted by Varsha et al. to evaluate the effect of oil pulling therapy with pure coconut oil on Streptococcus mutans count. Total thirty patients were included between the ages of 20-23 years and randomly divided into coconut oil, sesame oil and saline groups. The collection of unstimulated saliva before and after oil pulling therapy was done and analyzed for the colony forming units (CFU) per ml saliva for *S. mutans*. There was a statistically significant decrease in the CFU of *S. mutans* after oil pulling with pure coconut oil showing P value = 0.001 and also against saline with P value = 0.039. The results showed that the oil pulling with pure coconut oil can be effective for maintaining the oral hygiene as it reduces the *S. mutans* count in saliva.⁴¹ Another trial was carried out in 2017 by Jithender Nagilla et al., among 40 dental students. The students were randomly assigned to a study group having coconut oil and the control group having a placebo. Plaque levels were assessed on baseline, day 3 and day 7. The results showed significant decrease in the mean plaque scores and they concluded that oil pulling is effective in controlling plaque levels.⁴²

Earlier in 2016, Peedikayil conducted a study on a total of fifty female children aged between 8-12 years for the evaluation of the antibacterial efficacy of coconut oil in comparison with chlorhexidine mouthwash. The treatment regimen (swishing) continued for 30 days with coconut oil or with chlorhexidine. Using the Dentocult SM StripMutans test, the microbial count for *S. mutans* were recorded on day 1, 15, and 30. There was a significant decrease in the *S. mutans* count in the coconut oil as well as in chlorhexidine group. He concluded that the coconut oil has same antimicrobial effects when compared with chlorhexidine mouthwash for the reduction of *S. mutans* count.⁴³

Another randomized controlled study was done by Kaushik et al in 2016 with a sample size of 60. The subjects were divided into three groups, Group A: Oil pulling, Group B: Chlorhexidine, and Group C: Distilled water. Saliva samples were collected and cultured on 1st day and after 2 weeks from all subjects. Colonies were counted to compare the efficacy of coconut oil and Chlorhexidine with distilled water and statistically significant reduction in *S. mutans* count was seen in both the coconut oil pulling and

Chlorhexidine group.⁴⁴

Moreover, an in-vitro study was conducted by Shino et al with the isolation of *Candida* species in children with Early Childhood Caries. The antifungal activity of coconut oil, 0.2% chlorhexidine and probiotics on *Candida albicans* using Disc Diffusion method, when compared with routinely prescribed ketoconazole. Results showed that coconut oil was more effective than probiotics having the mean zone of inhibition = 16.8 mm. The study reported that Chlorhexidine and coconut oil have comparable antifungal effects with ketoconazole.⁴⁵

Another study by Peedikayil was done in 2015 to assess the effect of coconut oil pulling on plaque formation and plaque induced gingivitis. The trial included sixty age matched adolescent teenagers comprising of the age-group between 16-18 years with plaque induced gingivitis who were advised oil pulling for 30 days. Patients were evaluated at baseline, days 1,7,15 and 30 for periodontal scores. Results showed statistically significant reduction in the plaque and gingival indexes from the 7th day. Peedikayil concluded that coconut oil pulling could be used as an efficient supportive therapy in plaque induced gingivitis.²⁹

An in-vitro study in 2011 was done by Thaweboon S. on oil-pulling using coconut oil, corn oil, sesame oil, sunflower oil, palm oil, soya bean oil and rice bran oil. The biofilm models of *Streptococcus mutans*, *Lactobacillus casei* and *Candida albicans* were evaluated on salivary-coated microtiter plates in comparison with the negative and positive controls i.e. 0.2% chlorhexidine gluconate solution and saline respectively. The author concluded that the coconut oil has a significant antimicrobial activity against *S. mutans* and *C. albicans* only.²⁵

To date, there are insufficient numbers of scientific studies done on coconut oil pulling itself which can provide the necessary clinical evidence to demonstrate that it reduces the incidence of tooth decay, shows effective teeth whitening or improves overall oral health and well-being.¹⁷ However, literature suggests that the use of coconut oil in oil pulling therapy may decrease the chances of oral and systemic harmful effects.

CONCLUSION

In reviewing the literature we feel that adequate research has not been done to assess the benefits of specifically coconut oil pulling in oral cavity, even though there are many studies showing the beneficial effects of coconut oil on general health and oral environment. Available data have shown that coconut oil pulling can significantly reduce plaque and gingivitis and can be used as an effective antibacterial and antifungal agent. Whereas, there is a dire

need of additional clinical trials which can investigate the effects of monolaurin on oral microorganisms present in dental plaque.

CONFLICT OF INTEREST

None declared.

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