

Coconut Oil and Virgin Coconut Oil: An Insight into its Oral and Overall Health Benefits

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ABSTRACT

Oral health is of prime importance to all individuals. The traditional use of oil in India for maintenance of good oral hygiene has been mentioned in the Vedic literature since ancient times. Oil pulling therapy also known as 'Kavala Gandoosha' is a traditional procedure involving rinsing or swishing of the oil in the mouth, which is said to have anti-inflammatory and antimicrobial effect thus reducing plaque formation in the oral cavity. Coconut oil is an edible oil that is highly desired and easily available in India and has antimicrobial effect against a wide range of microorganisms found within the body. The growing popularity of Virgin Coconut Oil (VCO) has opened up new research in its clinical application apart from its role as functional food oil. The present review aims to highlight the general benefits of coconut oil usage and the traditional concept of oil pulling with coconut oil as a supplemental oral hygiene aid and acknowledge the use of traditional medicine as part of primary healthcare.

Keywords: Antimicrobial, Oil pulling therapy, Oral cavity

INTRODUCTION

Coconut (*Cocos nucifera*) with its multiple benefits has been known for its nutritional and medicinal values and hence rightly termed in Sanskrit as 'Kalpavriksha'. Coconut oil is an important product that is obtained from the fruit and has various oral and overall health benefits. VCO obtained from the coconut kernel by wet processing, is a recently emerging potent microbicidal, which is being used for oral and other purposes [1]. Oral health being of paramount importance, various adjuvants for oral hygiene maintenance, in addition to mechanical methods has always been sought. Ayurveda, which involves the use and practice of traditional medicine to cure and maintain health, is well known. It has shown evidence for the usage of various edible oils as a curative for several illnesses including oral diseases. Hence, the concept of oil pulling/gargling using these edible oils was popularised by Dr. F Karach in 1990s, which was known to prevent decay, oral malodour, bleeding gums and dryness of throat and cracked lips. Coconut oil being easily available, is highly consumed by the Indian population, and there are limited studies supporting its benefits as a curative and preventive agent [2,3].

Coconut Oil

Properties and effects on general health: Coconut oil is an edible oil that is easily available and predominantly composed of Medium Chained Fatty Acids (MCFAs) with 92% of saturated fats. Various components of coconut oil include Lauric Acid (LA) 50%, followed by other acids like myristic acid, caprylic acid, palmitic acid, capric acid, oleic acid, stearic acid and linoleic acid. The MCFAs are directly transported from intestine to liver where they are rapidly metabolised and hence do not participate in the biosynthesis and transport of cholesterol [1]. Hence, the fact that coconut oil contributes to the bad cholesterol in the system is possibly a myth. Various benefits of coconut oil include antiviral, antibacterial, antifungal, antiparasitic, anti-thrombotic, cardioprotective, hepatoprotective, antidote, antidermatophytic, antidiabetic, insect repellent, hypolipidemic,

anticholecystitic, antioxidant, anticancer, anticaries and disinfectant activities [1]. It is also effective in fighting intestinal infections, bronchitis, asthma and headaches [4]. Fresh juice and kernel extracts of *C. nucifera* have also been known to have an antipyretic, anti-inflammatory and wound healing properties. Internationally, it has been used in the traditional Malay medicine to treat ailments such as fever, headaches, stomach upset and diarrhea. Recently, the focus of research is being shifted towards VCO due to its benefits in the pharmaceutical, cosmetic and health fields [5]. VCO based diet lowers the tissue Plasminogen (t-PA) in the body, favourably affecting the fibrinolytic system and lipoprotein (a) concentration and thus, seems to exhibit antithrombotic effect [1]. Monoctanoic, derived from caprylic acid has been used for the dissolution of retained cholesterol gallstones following cholecystectomy. Similarly, VCO and monolaurin have a broad spectrum activity against *S. aureus* and thus used in the treatment of atopic dermatitis colonisation. In the oral cavity, sucrose monolaurate which is a glycolipid compound present in coconut has anticaries effect due to sucrose oxidation caused by *S. mutans* and thus prevents in vitro dental plaque formation [1].

VCO

Coconut oil can be extracted either through dry or wet processing. Dry processing is used to extract oil from dry steamed copra that is wedge pressed and then subjected to Refining, Bleaching and Deodorisation (RBD) following which it is distributed widely. Wet processing involves extraction of cream from coconut milk, which undergoes emulsification to produce VCO [6]. Philippine National Standard for VCO, along with Bureau of Agriculture and Fisheries Product Standards (BAFPS, 2004) [7] has defined VCO as "the oil obtained from fresh, mature kernel of the coconuts by mechanical or natural means, without the use of heat, chemical refining, bleaching and odourising which does not lead to the alteration of the natural content of the oil". VCO has preserved oil composition as it is not subjected to drastic processing by RBD. It has a high

saturation degree and oxidative stability, which has put it in high demand in recent times [8]. The use of controlled temperature in the preparation of VCO has more beneficial effects compared to copra oil as there is greater retention of its active components like squalene, tocopherols and sterols [8]. VCO has also been reported to have a reduced total cholesterol, triacylglycerols, phospholipids, Low Density Lipoprotein (LDL) and Very Low Density Lipoprotein (VLDL) cholesterol and increased high density lipoprotein levels in serum and tissues compared to copra oil, which makes it more advantageous. Moreover, VCO has also reported to have more antioxidant and antithrombotic activity as compared to copra oil [8]. In vitro and animal studies assessing the pharmacological properties of VCO have demonstrated that it has moderate anti-inflammatory and analgesic effects along with certain antipyretic properties [9].

Effects on Oral Health and Future Implications

Oral cavity is a natural habitat for various plaque related and tooth related microorganisms causing periodontal diseases and dental caries. Almost 85% of cases of halitosis or bad breath originate from the oral cavity attributing to the above factors and tongue coating. Use of chemical methods for plaque control has its own disadvantages. The traditional vedic remedy of using edible oils to reduce microbial counts and halitosis has been demonstrated through various in vivo and in vitro studies [10,11]. Coconut oil being readily available has been commonly used in oil pulling therapy.

Oil Pulling and its Mechanism in the Oral Cavity

Oil pulling is a procedure that involves swishing/gargling oil in the mouth for oral and systemic health benefits. Oil pulling therapy can be done using various edible oils like coconut oil, rice bran oil, palm oil, sunflower oil, sesame oil, olive oil, corn oil, soya bean oil etc. A tablespoon of oil is sipped, sucked, and pulled between the teeth for 10 to 15 minutes. The viscous oil turns thin and milky white after which it is expelled out, followed by normal brushing. The enzymatic activation that is caused due to the swishing action also possibly removes toxins from blood [12,13]. Advantages of oil pulling include its cost, ease to perform, involving less effort, harmless as it is a natural product, does not cause tooth staining and altered taste like commercially available products [4]. However, certain precautions that need to be taken include, not swallowing the solution, using a different brand of oil in case of allergies, using a smaller quantity of oil (1 teaspoon/5 mL) for children of five years and above [4].

The viscosity of the oil is said to inhibit bacterial adhesion and plaque coaggregation. The process of saponification that occurs as a result of the alkali hydrolysis of fat, causes cleansing action against microbes. Activation of lipid digestion by lingual lipase may potentially initiate the release of antimicrobial fatty acids [14]. Monolaurin, which is the monoglycerides of LA from coconut oil [4,14] has antimicrobial activity against various gram positive and gram negative organisms as well as enveloped viruses. It was hypothesised that monolaurin has the capacity to alter bacterial cell walls, penetrate and disrupt cell membranes, inhibit enzymes thus leading to the death of the bacteria [14]. MCFAs have also known to exhibit antifungal effects against *Candida* and other fungi by inhibition of spore germination and radial growth, at monolaurin concentrations of 0.5 mg/mL [1]. The virucidal effects of monolaurin are due to solubilising of lipids and phospholipids in the envelope leading to disintegration of the virus particles [1].

A few testimonies and literature based on personal experiences in oil pulling therapy have been stated by various authors. Ogbolu DO et al., conducted an in vitro study on the antimicrobial properties of VCO on *Candida* species in Nigeria by agar dilution method which showed 100% susceptibility of *C. albicans* to VCO at 1:4 dilution as compared with 1:2 dilution of fluconazole [15]. An Iranian in vitro study on the effect of coconut flour on oral microflora by Taheri JB et al., showed no antimicrobial effect of coconut flour in oral cavity

at any concentration [16]. Thaweeboon S et al., conducted an in vitro study to analyse the effect of various edible oils on the biofilm models formed by *S. mutans*, *L. casei* and *C. albicans*. Results showed that coconut oil had both antibacterial and antifungal effects against *S. mutans* and *C. albicans* respectively, while sesame oil and sunflower oil had either antibacterial or antifungal effect and not both. However, none of the oils tested showed any effect on *L. casei* [17]. Hughes PI et al., evaluated the efficacy of various vegetable oils and their respective fatty acids separately on *S. mutans* in vitro and concluded that bacterial growth was not affected by any of the oils tested, while individual fatty acids showed bacteriostatic activity. LA, which is the predominant fatty acid in coconut oil, was the most effective against *S. mutans* [14]. Peedikayil FC et al., conducted a study on 60 patients to evaluate the effects of coconut oil pulling on plaque induced gingivitis for over a month period, where baseline to 30 days plaque and gingival indices showed significant reduction [2]. Later, Singla N et al., demonstrated the efficacy of gum massage by using sesame oil, olive oil, coconut oil and chlorhexidine gel to assess the microbial count of saliva samples along with the plaque and gingival indices in study subjects. The three weeks follow up showed a statistically significant decrease in microbial count and the indices in all the four groups, without much difference among the groups [18]. Peedikayil FC et al., conducted an in vivo study to determine the antibacterial effectiveness of coconut oil against *S. mutans* as compared with chlorhexidine in children aged 8-12 years and the results showed a statistically significant decrease in *S. mutans* count from coconut oil as well as chlorhexidine group from baseline to 30 days. Hence, coconut oil was seen to be as effective as chlorhexidine in the reduction of *S. mutans* [19]. Shino B et al., in their in vitro study conducted in 3-6 year old children with early childhood caries aimed at isolating *Candida* species and studying the antifungal effect of coconut oil, probiotics, *Lactobacillus*, and 0.2% chlorhexidine on *C. albicans* in comparison with ketoconazole using disc diffusion method. The mean zone of inhibition for coconut oil, chlorhexidine and ketoconazole was 16.8, 21.8 and 22.8 mm respectively. Thus, concluded that chlorhexidine and coconut oil have shown significant antifungal activity which is comparable with ketoconazole [20]. Lappano R et al., attempted to understand the anticancer effect of LA in coconut oil and showed that LA triggers antiproliferative and proapoptotic effects in cancer cells by increasing reactive oxygen species and promoting morphological changes associated with apoptotic cell death [21].

CONCLUSION

Studies have shown that coconut oil is effective in reducing oral microbial load and decreasing plaque and gingival indices but the number of studies remain a few. Oil pulling using coconut oil is promising as it is easily available, safe and cost-effective adjuvant in oral hygiene maintenance in developing countries like India where this product is available in abundance and more readily accepted by the population as an integral part of their culture.

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Date of Submission: Jul 06, 2017

Date of Peer Review: Sep 20, 2017

Date of Acceptance: Oct 16, 2017

Date of Publishing: Jan 01, 2018

FINANCIAL OR OTHER COMPETING INTERESTS: None.