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Review Article

Oil pulling and importance of traditional medicine in oral health maintenance

Mustafa Naseem[1], Muhammad Faheem Khiyani[2], Hiba Nauman[3], Muhammad Sohail Zafar[4,5], Altaf H Shah[6,7], Hesham S Khalil[8]

[1]Department of Community & Preventive Dentistry, Dar Al Uloom University Riyadh, Saudi Arabia, [2]Oral Health and Rehabilitation Research Unit, Faculty of Dental Medicine, Universite de Montreal, Montreal, Canada, [3]Department of Community & Preventive Dental Sciences, Ziauddin University, Karachi, Pakistan, [4]Department of Restorative Dentistry, College of Dentistry, Taibah University, Madinah Munawwarah, Saudi Arabia, [5]Department of Dental Materials, Adjunct Faculty, Islamic International Dental College, Riphah International University, Islamabad 44000, Pakistan, [6]Department of Preventive Dental Sciences, Division of Community & Special Care Dentistry, Dar Al Uloom University, Riyadh, Saudi Arabia, [7]Fellow Pacific Academy of Higher Education and Research University, Udaipur, Rajasthan, India, [8]Department of Oral and Maxillofacial Surgery, College of Dentistry, King Saud University, Riyadh, Saudi Arabia

Address for correspondence:
Mustafa Naseem,
Department of Community & Preventive Dentistry, Dar Al Uloom University Riyadh, Exit 7 Riyadh, Saudi Arabia.
Phone: +966598108160.
E-mail: m.naseem@dau.edu.sa

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ABSTRACT

Dental diseases have detrimental effects on the functionality and quality of life of individuals. In addition, a strong relationship has been established between various oral and systemic diseases. In fact, the prevention and treatment of dental caries and periodontal disease have been shown to reduce the risk of diabetes and heart disease significantly. This goes beyond the role of oral health as a means to identify early manifestations of systemic diseases in the oral cavity. It highlights the necessity of maintaining an optimal oral hygiene to significantly modify the risk factors for serious systemic diseases. The use of oil pulling can be frequently found in ancient medical text and is supported by recent studies for its efficacy and long-term use for maintaining and improving oral health. This article provides an overview on the concept of oil pulling or oil swishing, its mechanism of action and a summary of the evidence available, which highlights the role of oil pulling in specific oral diseases. The goal of this review is to highlight the ancient procedure that has the potential to be used as an adjunct to conventional chemical means of dental plaque control, such as mouth rinses. Incorporating oil swishing as a component of daily oral hygiene can significantly improve oral and general health, specifically in lower socioeconomic groups and rural communities that may have interrupted access to health-care services and dental products such as dentifrices and mouth washes due to various factors; availability and affordability being the most important.

Keywords: Prevention, oil pulling, oral disease, oral hygiene

Introduction

It is a common belief that oral health serves as a gateway to general health. This implies that oral health significantly impacts the general health and wellbeing of an individual.[1] In recent years, various studies have provided unequivocal evidence on the strong relationship between systemic and oral diseases. It is believed that this relationship is due to common risk factors shared between various diseases.[2]

Periodontal diseases (such as gingivitis and periodontitis), and dental caries are the most common forms of oral diseases.[3] The incidence of periodontal disease is found to be greatest in diabetic patients and those with heart diseases, as compared to the healthy population.[4] In fact, various studies have identified periodontal disease as a risk factor for the etiology of coronary heart disease.[5] Similarly, a thorough examination of the gingival tissue can point toward a significant deficiency of Vitamin C and other nutritional deficiencies.[5] Dental caries,

which is also one of the most common forms of infectious diseases globally, has been found to significantly affect the systemic health, and quality of life of individuals.[6]

The oral cavity serves as a focal point of entry for pathogens into the systemic circulation.[7] While the host immune system of a healthy individual prevents the body from virulent microorganisms, a breach in the physical barriers in the oral cavity may provide access to into the systemic circulation.[3] Similarly, a lack of oral hygiene allows an increase in virulent microbial colonization of the oral biofilm.[8] Therefore, mechanical and chemical means of controlling the quantity and quality (virulence) of the oral biofilm is important in preventing systemic diseases and particularly periodontal diseases such as gingivitis and periodontitis. An emphasis on preventing oral diseases can lead to a reduction in the incidence of various systemic diseases as well. Similarly, routine screening and oral examinations may help in identifying early manifestations of systemic diseases in the oral cavity and help in preventing disease progression.

The fields of medicine and dentistry have witnessed major technological advancements in recent years. Despite this fact, on a larger public health scale basic protocols of patient care continue to focus on and highlight the importance of simple, preventive and behavioral modification strategies.[9,10] Recently, various forms of alternative or traditional medicinal treatments, such as Ayurveda have started to gain popularity, due to their natural origin, cost effectiveness, negligible side effects, and improved patient compliance.[11]

Ayurveda is a form of traditional holistic medicinal system originating in the Indian subcontinent region. Its advent and practice in the region reportedly date back about 3000-5000 years. Recently, it has gained popularity as complementary medicine in other parts of the world.[12,13] The aim of this review is to identify the potential uses of oil pulling therapy in the prevention of various oral diseases and to pinpoint its use as an adjunct to conventional oral hygiene aids.

Study Selection

An electronic search was carried out via the PubMed (Medline) and ISI web of knowledge databases using various keywords including "oil pulling," "dental," "dentistry," "prevention," and "oral health" in combination. Papers published in English language in past 20 years were considered. The studies relevant to our review were critically analyzed and summarized. Further, duplicate studies found were removed.

What is Oil Pulling?

Oil pulling or oil swishing, as the name suggests involves vigorous swishing of oil in the oral cavity to achieve local and systemic benefits, similar to the modern day use of mouthwashes and oral rinses. It has been used for centuries for the treatment and prevention of various oral and systemic diseases, using edible oils derived from either sunflower, sesame, and coconut.[10,14] The process of oil swishing is believed to cure or control 30 different types of systemic diseases including headaches, migraine, and chronic diseases such as asthma and diabetes mellitus.[10,11] The effects of oil pulling on oral health, as an adjunct to conventional oral hygiene measures have been exemplary. Scientific evidence suggests that oil pulling therapy may reduce the total oral bacterial count and reduce plaque and gingival scores. Furthermore, it has also shown to diminish the susceptibility to dental caries from marked to slight or moderate level.[9,15,16] Table 1 presents various properties of oil pulling in comparison to mouthwashes.

The Procedure

Oil pulling is performed preferably in the morning on an empty stomach. One tablespoon (approximately 10 ml), of sesame oil, being the recommended dose for adults is sipped, and swished between the teeth for a duration of approximately 15-20 min and spat out. Swishing the oil for the recommended duration in the oral cavity changes the viscosity of the oil, which turns milky white with a thin consistency.[17,18] Swallowing the oil should be avoided as it may have toxins and bacteria, which are harmful to general health. This should be followed by rinsing, conventional tooth brushing and flossing.[19] The practice should preferably be performed 3 times daily for acute diseases. While there are no suggested contraindications, it is not advisable for children below the age of 5 years to perform oil pulling.[17,19]

Mechanism of Action

While there are numerous theories, the exact mechanism of action is unclear. One theory speculates a mechanism involving alkali hydrolysis of fat, resulting in saponification or "soap making" process. Since the oils used for oil pulling contain fat, the alkali hydrolysis process emulsifies the fat

Table 1: Comparison between oil pulling and chlorhexidine mouthwashes

Attributes	Mouthwashes	Oil pulling
Natural	No[30]	Yes[18]
Side effects	Yes[18,38]	No[17,38]
Bacterial resistance	Yes[17]	No[17]
Cost effective	No[9]	Yes[9]
Easily available	No[17]	Yes[9]
Prescription needed	Yes[16]	No[9]
Contraindicated in pregnancy	May be[37]	No[37]
Availability in rural areas	No/may be[39]	Yes[39]
Unpleasant taste	Yes[39,38]	No[9,38]
Time consuming	No[30]	Yes[9]
Contraindicated in other diseases	Yes[18]	No[39]

into bicarbonate ions, normally found in the saliva. Soaps which are effective cleaning agents blend in the oil, hence increasing the surface area of the oil, and in turn increasing the cleansing action.[10] Another theory suggests that the viscous nature of the oil inhibits plaque accumulation and adhesion of bacteria.[10,18] 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 and potentiating the action of Vitamin E in the oral cavity.[17]

Chemical Composition of Commonly Used Oils for Oil Pulling

Sesame oil

Sesame oil contains three lignans (sesamin, sesamolin, and sesaminol). These lignans contain Vitamin E and polyunsaturated fatty acids. In addition, linoleic acid and oleic acid are also major components of sesame oil.[20,21] The components of sesame oil possess antioxidative properties that reduce lipid peroxidation by diminishing the free radical injury to oral tissues.[21] Figure 1 shows chemical and function composition of sesame oil.

Coconut oil

Coconut oil is composed of 92% saturated acids, with lauric acid making up for 50% of these saturated acids. Monolaurin and monoglycerides of lauric acid have been identified to have antimicrobial activity against a range of microorganisms.[22] These include *Helicobacter pylori, Staphylococcus aureus, Escherichia vulneris*, *Enterobcater,* and *Candida* species, including *Candida glabrata, Candida albicans, Candida stellatoidea, Candida parapsilosis, Candida tropicalis,* and *Candida krusei* and various viruses.[22,23] Figure 2 demonstrates the chemical composition of coconut oil.

Effects of Oil Pulling on Oral Health

Dental caries

The oral cavity is always covered with a biofilm. The chemical and mechanical removal of the oral biofilm is important in maintaining the ecological equilibrium of the oral cavity and preventing the initiation of the carious process. An estimated 700 different species of bacteria are found in the oral microbiome, inhabiting the oral biofilm.[24] Of these, bacitracin producing *Streptococcus mutans* and lactic acid producing *Lactobacilli* are the most common pathogens that cause dental caries.[25] The demineralization process starts after the pH of plaque drops below the "critical value" (5.5 for hydroxyapatite, 4.5 for fluorapatite, and 6.7 for cementum), causing disintegration of the calcium phosphate ions in the hydroxyapatite crystals. The demineralized form of enamel is known as dental caries.[24,25]

Oil pulling is shown to have antibacterial activity against *C. albicans* and *S. mutans* using coconut oil, while sesame oil also has similar activity against *S. mutans* and *Lactobacilli*.[25] Following a 40-day regimen of oil pulling, an average reduction of 20% was observed in the total microbial count in the oral cavity.[26] Similarly, another study testing the susceptibility to dental caries before and after oil pulling showed that in 50% of the subjects the susceptibility was reduced from "marked" to "slight." Whereas, in the other 50% of the subjects the susceptibility reduced from "marked" to "moderate."[26]

Plaque-induced gingivitis

Plaque-induced gingivitis is one of the most common types of gingival disease caused due to the interaction of microorganisms in the plaque biofilm with the inflammatory cells of the host.[27] A recent randomized controlled trial showed a significant decrease in modified gingival index scores and plaque scores following oil pulling therapy when compared to chlorhexidine group.[28] Another study also showed a reduction in plaque scores following 45 days of oil pulling therapy with sunflower oil.[15] The plaque scores reduced by 18-30%, whereas gingivitis decreased by 52-60%.[28] Furthermore, evidence from both clinical and biological assessments showed that oil pulling was effective against plaque-induced gingivitis.[29]

Halitosis

Halitosis or bad breath is a common problem that can often cause social embarrassment. The malodor is produced from volatile sulfide compounds especially dimethyl sulfide, hydrogen sulfide, and methyl mercaptan, originating from the proteolytic degradation of the peptides present in food debris, saliva, plaque, and desquamated epithelial cells. Gram-negative proteolytic bacteria responsible for periodontitis and gingivitis are also known to produce sulfide compounds.[14,30] Oil pulling therapy using sesame oil was found to be as effective against halitosis and associated pathogens, as chlorhexidine rinses which are considered a gold standard.[31,32] Moreover, oil pulling is also more cost-effective than chlorhexidine, with no associated side effects like allergic reactions, and mucosal staining following prolong use.[9,29,30,33]

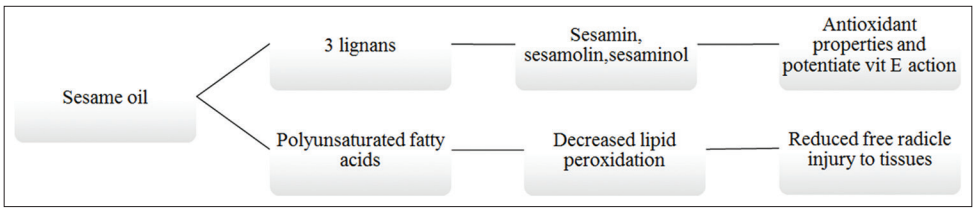

Figure 1: Function and chemical composition of sesame oil

Oral thrush

Oral thrush or oral candidiasis is a non-contagious fungal infection caused by *Candida* species. It is commonly seen in individuals taking medications that may alter the oral microflora over extended periods. Denture wearers, patients, undergoing prolonged antibiotic treatment or using inhaled corticosteroid for asthma, and patients undergoing chemotherapy or radiotherapy reportedly have a higher incidence of oral candidiasis.[34] Evidence suggests that oil pulling therapy improves symptoms of oral thrush in two ways. First, it traps or pulls the toxins and other pathogens during oil swishing and therefore aids in the mechanical removal of the pathogens from the oral cavity. Second, the antifungal properties of the oils used, particularly coconut oil, kills the yeast in the oral cavity and therefore plays a role in eliminating the candida pathogens.[35,36]

Systemic Effects

The benefits of oil pulling are not limited to the oral cavity. In fact, according to ancient Indian Ayurveda text, oil pulling can be used for the prevention and treatment of more than 30 different diseases, which vary from headaches, migraines, thrombosis, and eczema; to fatal diseases such as diabetes and asthma.[9,15,17,18,37] Figure 3 exhibits systemic effects of oil pulling.

Discussion

Literature related to oil pulling and dental health is sparse. Oil pulling has roots back to ancient Hindu texts and scriptures. Oil pulling and other such alternative healing approaches deserve appropriate scientific interest as there are few studies to date evaluating the oral health benefits. In addition, oil pulling has been reported to improve the oral hygiene remarkably.[15,29,40]

Oil pulling therapy is a simple and cost effective method to improve and maintain good oral health with no strict precautions required to follow the regimen. Compared to other forms of detox methods, it is effortless, simple and harmless. In addition, most of the oils used in this form of therapy have no side effects, lingering after taste or associated allergies.[28,35] Moreover, it does not require any specialized oil and any household oil (such as sunflower or any other vegetable oil) can be used. Hence, the additional benefits are an ease of practice at home and cost effectiveness (the costs refined oil ranges 1-2 USD/L); the cost of oil pulling per rinse is significantly less than other commercially available remedies.[41] Furthermore, it is not associated with any alteration of taste perception and sensation.[10,35]

Chlorhexidine mouthwashes are used as an adjunct to the clinical management of caries and periodontal diseases. However, it is associated with slightly lower compliance due to its unpleasant taste and unwanted effects (staining).

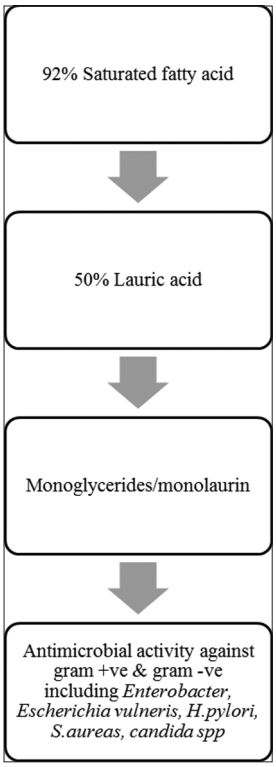

Figure 2: Chemical composition of coconut oil

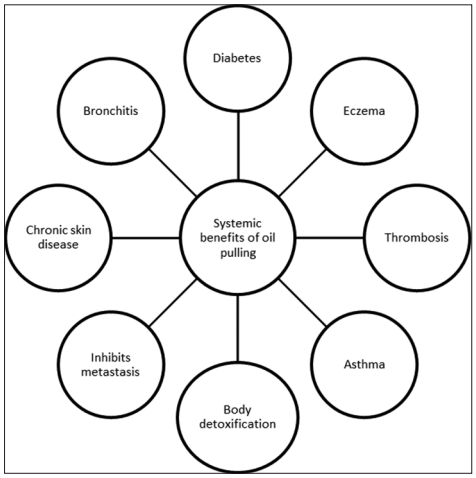

Figure 3: Systemic effects of oil pulling

In addition, the stannous within this oral rinse is associated with extrinsic staining of teeth, while the zinc and stannous salts have organoleptic properties, limiting its use to only concentrations. Using oil pulling techniques has not been associated with any such side effects.[41]

At present, there is a lack of clinical guidelines as alternative forms of oral hygiene measures such as oil pulling are under-researched. In general, however, it is not recommended for children <5 years of age, as there is a chance of swallowing. Similarly, for individuals who suffer from various allergies should be cautious regarding the origin of the oil as they may

be processed in facilities that produce oils from nuts and seeds. A few cases of lipoid pneumonia have been reported in individuals who readily practiced oil pulling.[42] These cases have been associated with the unintentional aspiration of small amounts of oil, which generally should not pose any risk to the general health since it is readily excreted through feces.[10,29]

Conclusion

Oil pulling therapy is a form of ayurvedic procedure that promotes good oral and systemic health through incorporating the use of oil based oral rinses in the daily oral hygiene routine. Numerous studies have been conducted recently supporting this ancient technique for its health benefits. For modern day practices, oil pulling can be suggested for adjunct use, with tooth brushing and flossing, to maintain the standard oral health care. In developing countries and rural communities, access to oral care is minimal, and the use of toothbrushes, toothpaste, and mouthwashes are still not accessible in all cases, therefore oil pulling can serve as an affordable option and improve oral health outcomes.

References

1. Scully C, Ettinger RL. Oral Health in America: A Report of the Surgeon General. Washington, DC, USA: Department of Health and Human Services, US Public Health Service; 2000.
2. Sheiham A, Watt RG. The common risk factor approach: A rational basis for promoting oral health. Community Dent Oral Epidemiol 2000;28:399-406.
3. Li X, Kolltveit KM, Tronstad L, Olsen I. Systemic diseases caused by oral infection. Clin Microbiol Rev 2000;13:547-58.
4. Engebretson SP, Vossughi F, Hey-Hadavi J, Emingil G, Grbic JT. The influence of diabetes on gingival crevicular fluid beta-glucuronidase and interleukin-8. J Clin Periodontol 2006;33:784-90.
5. Kinane DF. Periodontal diseases' contributions to cardiovascular disease: An overview of potential mechanisms. Ann Periodontol 1998;3:142-50.
6. Segata N, Haake SK, Mannon P, Lemon KP, Waldron L, Gevers D, *et al.* Composition of the adult digestive tract bacterial microbiome based on seven mouth surfaces, tonsils, throat and stool samples. Genome Biol 2012;13:R42.
7. Xu X, He J, Xue J, Wang Y, Li K, Zhang K, *et al*. Oral cavity contains distinct niches with dynamic microbial communities. Environ Microbiol 2015;17:699-710.
8. Jenkinson HF. Beyond the oral microbiome. Environ Microbiol 2011;13:3077-87.
9. Alaka H, Keluskar V, Shetti A. Oilpulling-unravalling the path of mystic cure. J Int Oral Health 2010;2:10-4.
10. Tomar P, Hongal S, Jain M, Rana K, Saxena V. Oil pulling and oral health: A review. Int J Sci Study 2014;1:33.
11. Pal SK, Shukla Y. Herbal medicine: Current status and the future. Asian Pac J Cancer Prev 2003;4:281-8.
12. Wieckiewicz W, Miernik M, Wieckiewicz M, Morawiec T. Does propolis help to maintain oral health? Evid Based Complement Alternat Med 2013;2013:351062.
13. Niazi F, Naseem M, Khurshid Z, Zafar MS, Almas K. Role of Salvadora persica chewing stick (miswak): A natural toothbrush for holistic oral health. Eur J Dent 2016;10:301-8.
14. Khurshid Z, Zafar MS, Zohaib S, Najeeb S, Naseem M. Green tea (*Camellia sinensis*): Chemistry and oral health. Open Dent J 2016;10:166-73.
15. Amith HV, Ankola AV, Nagesh L. Effect of oil pulling on plaque and gingivitis. J Oral Health Community Dent 2007;1:12-8.
16. Asokan S, Rathan J, Muthu MS, Rathna PV, Emmadi P; Raghuraman; Chamundeswari. Effect of oil pulling on *Streptococcus mutans* count in plaque and saliva using Dentocult SM Strip mutans test: A randomized, controlled, triple-blind study. J Indian Soc Pedod Prev Dent 2008;26:12-7.
17. Asokan S, Rathinasamy TK, Inbamani N, Menon T, Kumar SS, Emmadi P, *et al.* Mechanism of oil-pulling therapy-*in vitro* study. Indian J Dent Res 2011;22:34-7.
18. 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.
19. Hebbar A, Keluskar V, Shetti A. Oil pulling-unraveling the path to mystic cure. J Int Oral Health 2010;2:11-5.
20. Namiki M. The chemistry and physiological functions of sesame. Food Rev Int 1995;11:281-329.
21. Sankar D, Sambandam G, Ramakrishna Rao M, Pugalendi KV. Modulation of blood pressure, lipid profiles and redox status in hypertensive patients taking different edible oils. Clin Chim Acta 2005;355:97-104.
22. Carpo BG, Verallo-Rowell VM, Kabara J. Novel antibacterial activity of monolaurin compared with conventional antibiotics against organisms from skin infections: An *in vitro* study. J Drugs Dermatol 2007;6:991-8.
23. 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.
24. Merritt J, Qi F. The mutacins of *Streptococcus mutans*: Regulation and ecology. Mol Oral Microbiol 2012;27:57-69.
25. Claesson MJ, van Sinderen D, O'Toole PW. The genus *Lactobacillus*--a genomic basis for understanding its diversity. FEMS Microbiol Lett 2007;269:22-8.
26. An TD, Pothiraj C, Gopinath RM, Kayalvizhi B. Effect of oil-pulling on dental caries causing bacteria. Afr J Microbiol Res 2008;2:63-6.
27. Hinrichs JE, Novak MJ. Classification of diseases and conditions affecting the periodontium. Carranza's Clinical Peridontology. 11th ed. New Delhi: Reed Elsevier India Private Limited; 2012. p. 41.
28. Lakshmi T, Rajendran R, Krishnan V. Perspectives of oil pulling therapy in dental practice. Dent Hypotheses 2013;4:131.
29. Shanbhag VK. Oil pulling for maintaining oral hygiene - A review. J Tradit Complement Med 2016;7:106-9.
30. Asokan S, Kumar RS, Emmadi P, Raghuraman R, Sivakumar N. Effect of oil pulling on halitosis and microorganisms causing halitosis: A randomized controlled pilot trial. J Indian Soc Pedod Prev Dent 2011;29:90-4.
31. Roldán S, Herrera D, Santa-Cruz I, O'Connor A, González I, Sanz M. Comparative effects of different chlorhexidine mouth-rinse formulations on volatile sulphur compounds and salivary bacterial counts. J Clin Periodontol 2004;31:1128-34.
32. Roldán S, Winkel EG, Herrera D, Sanz M, Van Winkelhoff AJ. The effects of a new mouthrinse containing chlorhexidine, cetylpyridinium chloride and zinc lactate on the microflora of oral halitosis patients: A dual-centre, double-blind placebo-controlled study. J Clin Periodontol 2003;30:427-34.
33. Sood P, Devi MA, Narang R, V S, Makkar DK. Comparative efficacy

of oil pulling and chlorhexidine on oral malodor: A randomized controlled trial. J Clin Diagn Res 2014;8:ZC18-21.

34. Takakura N, Sato Y, Ishibashi H, Oshima H, Uchida K, Yamaguchi H, *et al.* A novel murine model of oral candidiasis with local symptoms characteristic of oral thrush. Microbiol Immunol 2003;47:321-6.
35. Coleman M. Oil Pulling Revolution: The Natural Approach to Dental Care, Whole-Body Detoxification and Disease Prevention. Berkely, CA, USA: Ulysses Press; 2015.
36. Ogawa T, Nishio J, Okada S. Effect of edible sesame oil on growth of clinical isolates of *Candida albicans*. Biol Res Nurs 2014;16:335-43.
37. Thaweboon S, Nakaparksin J, Thaweboon B. Effect of oil-pulling on oral microorganisms in biofilm models. Asia J Public Health 2011;2:62-6.
38. Kaushik M, Reddy P, Sharma R, Udameshi P, Mehra N, Marwaha A. The effect of coconut oil pulling on *Streptococcus mutans* count in saliva in comparison with chlorhexidine mouthwash. J Contemp Dent Pract 2016;17:38-41.
39. Singh A, Purohit B. Tooth brushing, oil pulling and tissue regeneration: A review of holistic approaches to oral health. J Ayurveda Integr Med 2011;2:64-8.
40. Gbinigie O, Onakpoya I, Spencer E, McCall MacBain M, Heneghan C. Effect of oil pulling in promoting oro dental hygiene: A systematic review of randomized clinical trials. Complement Ther Med 2016;26:47-54.
41. Kraft K. Complementary/alternative medicine in the context of prevention of disease and maintenance of health. Prev Med 2009;49:88-92.
42. Kuroyama M, Kagawa H, Kitada S, Maekura R, Mori M, Hirano H. Exogenous lipoid pneumonia caused by repeated sesame oil pulling: A report of two cases. BMC Pulm Med 2015;15:135.