

KNOWLEDGE, ATTITUDE, AND PRACTICE ON THE EFFECTS OF OIL PULLING FOR MAINTAINING ORAL HYGIENE AMONG GENERAL PUBLIC

Running title: Effects of Oil Pulling for Maintenance of Oral Hygiene among General Public

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All authors gave final approval and agreed to be accountable for all aspects of the work.

Conflict of interest:

The authors declare no conflict of interest.

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ABSTRACT:

Objective: Oil pulling involves the rinsing of the mouth with oil in order to eliminate bacteria and promote oral hygiene and thereby improve general dental health. It plays a vital role in the prevention of dental caries or cavities and also in the reduction of inflammations or ulcers and improves gum health. Oil pulling was demonstrated to have side effects like diarrhea, sore jaw or even an upset stomach. The main objective of this study is to create awareness among the general public about the mechanism of oil pulling and its benefits and side effects.

Materials & Methods: This cross-sectional survey based-study setting was done through an online survey, among the general public. There were 100 participants involved in the survey and a questionnaire comprising 15 questions was posted on the online survey platform. The data obtained was plotted in the form of pie charts & bar graphs.

Results: The results of the survey were plotted in the form of pie charts. It was observed that 92% of the participants were aware of oil pulling. 91% of them think that it is indeed effective against dental caries. 50% of the respondents assumed that there are no side effects to oil pulling. Majority of the participants had preferred sesame oil as the oil of choice for oil pulling. 60% of them responded that it eliminates bacterial, environmental as well as chemical toxins.

Conclusion: This study conducted based on the benefits and awareness of oil pulling has concluded that oil pulling is very beneficial in multiple ways to an individual, not only in treating oral diseases, but also in the metabolism of the body.

Keywords: Bacteria, Coconut oil, Dental caries, Diseases, Eco-friendly, Halitosis, Oil pulling

INTRODUCTION:

Oil pulling, also known as "Kavala" or "Gundusha", is an ancient or Ayurvedic practice that involves the gargling of the mouth with oil in order to eliminate bacteria and promote oral hygiene ^{[[1]]}. Oil pulling can kill bacteria in the mouth and improve dental health. Some common benefits observed after oil pulling include whitening of teeth, reduction of halitosis, aids in improving temporomandibular joint pain and eases headaches and skin-related disorders like psoriasis, acne and eczema. Oil pulling plays a vital role in the prevention of dental caries or cavities and also in the reduction of inflammations or ulcers and improves gum health ^{[[2]]}. *Streptococcus mutans*, the key bacteria and the causative organism of dental caries or plaque, can be destroyed by oil pulling ^{[[3]]}, ^{[[4]]} It also exerts a powerful cleansing effect and healing action on the mouth and sinuses and the rest of the body ^{[[5],[6]]}.

The mechanism of oil pulling is to first measure one tablespoon of oil, preferably sesame oil, coconut oil, or olive oil. It must be gargled in the mouth for about 15-20 minutes, without swallowing any amount of it ^{[[7]]}. The oil must be spat out after swishing it around the mouth. One must not brush their teeth prior to oil pulling as it can possibly remove bacteria from the

mouth. But it is mandatory to brush teeth after practicing oil pulling ^{[[8]]}. According to a study conducted by the Indian Journal of Dental research, it was proven that swishing of oral cavity with sesame oil reduced plaque, modified gingival scores, and reduced the number microorganisms in the plaque of adolescents ^{[[9]]} with plaque-induced gingivitis as compared to mouthwashes ^{[[10]]}. But oil pulling was also demonstrated to have side effects. The American Dental Association reported that oil pulling could more likely cause lipoid pneumonia ^{[[11]]}, which can develop if the oil exudes into the lungs. Oil pulling can possibly result in diarrhea or upset stomach as well. During the initial days of practice of oil pulling, sore jaw or headache is a much anticipated side effect. Our research and knowledge have resulted in high-quality publications from our team ^{[[12-26]]}

This research can prove to be beneficial in the assessment of the advantages and disadvantages of oil pulling and how it can be incorporated into the daily regimen of an individual. It also evaluates the risks as well as the repercussions of oil pulling. The main objective of this study is to create awareness among the general public about the mechanism of oil pulling and its benefits and side effects.

MATERIALS & METHODS:

This cross-sectional survey based-study setting was done through an online survey, among the general public. The use of online surveys is time-saving, highly convenient & also involves different groups of people. The cons of online surveys is the uncertainty over the validity of the data. There were 100 participants involved in the survey and the sampling was done by the simple random sampling method. A questionnaire comprising 15 questions was posted on the online survey platform. The questionnaire validity checking was performed by consulting an expert.

The data collection was done through Google forms and the data manipulation through MS Excel. The data obtained was plotted in the form of pie charts & bar graphs. The data was verified by referring to experts. Age and education were considered as independent variables whereas awareness about oil pulling were categorized under the list of dependent variables. Descriptive analysis was analyzed using SPSS software.

RESULTS:

The table represents the participants' responses to various questions such as their age, gender, the awareness of oil pulling among the general population, amount of oil used for oil pulling and its side effects, the participants' opinion regarding the effectiveness of oil pulling against dental caries-causing bacteria, most common preferred oil for oil pulling, the time taken for this process to show results, the link between whitening of teeth and oil pulling, etc. Figure 1 depicts the association between gender and awareness of oil pulling among the general population. The age group of 15-30 years were comparatively more aware than the other age categories, and was known to give statistically insignificant values. Figure 2 illustrates the

association between age and the time taken to see results from oil pulling, and it is statistically significant.

DISCUSSION:

Participants of the survey were questioned about the oil that is commonly used for oil pulling. 48% of the participants preferred to employ sesame oil for oil pulling. Previous research has proved that sesame oil evidently reduced the incidence of plaque induced gingivitis. The root of sesame (*Sesamum indicum*) contains chlorosesamone, a quinone lipid which is known to have antifungal activity ^{[[27]]}. The polyunsaturated fatty acids present in sesame oil also reduces free radical injury occurring in the oral cavity. Oil pulling initiates the production of antioxidants which causes damage to the cell wall of microorganisms and ultimately kills them. It also has anti-adhesion and anti-growth properties against bacteria, especially caries-causing bacteria like *Streptococcus mutans*. It is also noted to comprise anti-inflammatory and anti-anxiety effects. The tyrosine in sesame oil is linked to serotonin and aids in boosting mood levels as well as in relief of anxiety. Sesame oil is also high in copper, and known to reduce inflammation. Consumption of sesame seed is also known to increase the plasma gamma tocopherol level and enhance vitamin E activity, which has been proven to be beneficial in the prevention of cancer and heart disease ^{[[28]]}.

When inquired whether oil pulling can be advantageous in detoxification of the body, the majority of the participants responded affirmatively. Oil pulling works by detoxing or cleansing the body through the mouth. In this way, disease-promoting toxins can be removed, allowing the body to heal itself. Researches conducted precedingly stated that oil pulling helps in the excretion of toxic heavy metals by saliva. It also activates salivary enzymes which helps in the absorption of chemical, environmental and bacterial toxins ^[29]. Oil pulling is also proven to help individuals affected with asthma, allergies, chronic fatigue, diabetes, migraine headaches, PMS, and chronic skin problems ^{[[30]]}. Hence, it has been verified that oil pulling not only detoxifies, but also purifies the entire human body.

79% of the general public have responded to using coconut oil as an alternative to sesame oil. Coconut oil is a monounsaturated fatty acid that is composed of 92% saturated acids, out of which 50% is approximately composed of lauric acid ^{[[31]]}. The monoglycerides in lauric acid from coconut oil has antimicrobial activity against various gram-positive and gram-negative organisms, including *Escherichia vulneris*, *Enterobacter spp.*, *Helicobacter pylori*, *Staphylococcus aureus*, *Candida albicans*, etc ^{[[32]]}. According to various researches, coconut oil is known to possess strong anti-inflammatory and antibacterial properties that can be especially useful for oil pulling ^{[[33]]}. On the other hand, few other studies have stated that gurgling and swishing large amounts of dense oils such as coconut oil can produce nausea and swallowing these contaminated oils can result in an upset stomach. Oil pulling using coconut oil can also result in lipid pneumonia, which can develop if the oil gets into the lungs. Hence, coconut oil is not an effective alternative to sesame oil.

The limitations of this study are that it is a preliminary survey and the utilization of a small sample size. A larger sample size can be utilized in the forthcoming studies. The future scope of this research is that it can be used to create more awareness among the general public based on oil pulling and its advantages and disadvantages. Education programs have to be conducted on the beneficial effects and the correct techniques of Oil pulling.

CONCLUSION:

Within the limits of the study, it can be concluded that oil pulling is very beneficial in multiple ways to an individual. It not only treats any diseases of the oral cavity, but also indirectly improves the whole body functioning. Though oil pulling is known to have a number of side effects, it can be practiced for the prevention of various diseases.

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TABLES & FIGURES:

Table 1 represents the responses for each of the questions by the participants of the survey.

S. No.	Questions	Choices	Responses (%)
1.	Age	< 15 yrs 15-30 yrs 31-50 yrs 51-70 yrs	17 31 29 23
2.	Gender	Female Male	62 38
3.	Awareness based on oil pulling	Yes No	91 9
4.	Amount of oil used for oil pulling	1 tablespoon 1 teaspoon 2 tablespoons 2 teaspoons	37 28 16 19
5.	Which oil do you prefer for oil pulling	Coconut oil Olive oil Sesame oil Sunflower oil	28 13 48 11
6.	Effectiveness of oil pulling against dental caries-causing bacteria	Yes No	99 1
7.	Side effects of oil	Diarrhoea	23

	pulling	Sore jaw Upset stomach None of the above	23 4 50
8.	Potential of coconut oil to reverse or heal cavities	Yes No	64 36
9.	Types of toxins removed by oil pulling	Bacterial toxins Chemical toxins Environmental toxins All of the above	28 5 7 60
10.	Association of oil pulling in weight loss	Yes No	63 37
11.	Does oil pulling help in whitening of teeth	Yes No	80 20
12.	Do you think Oil pulling causes muscle relaxation and reduction of jaw pain	Yes No	77 23
13.	Opinion about oil pulling curing halitosis or bad breath	Yes No	90 10
14.	How long does it take to see results from oil pulling	1 day 1 week 2 weeks 1 month	12 16 35 37
15.	Do you prefer Coconut oil as an efficient alternative to sesame oil	Yes No	79 21

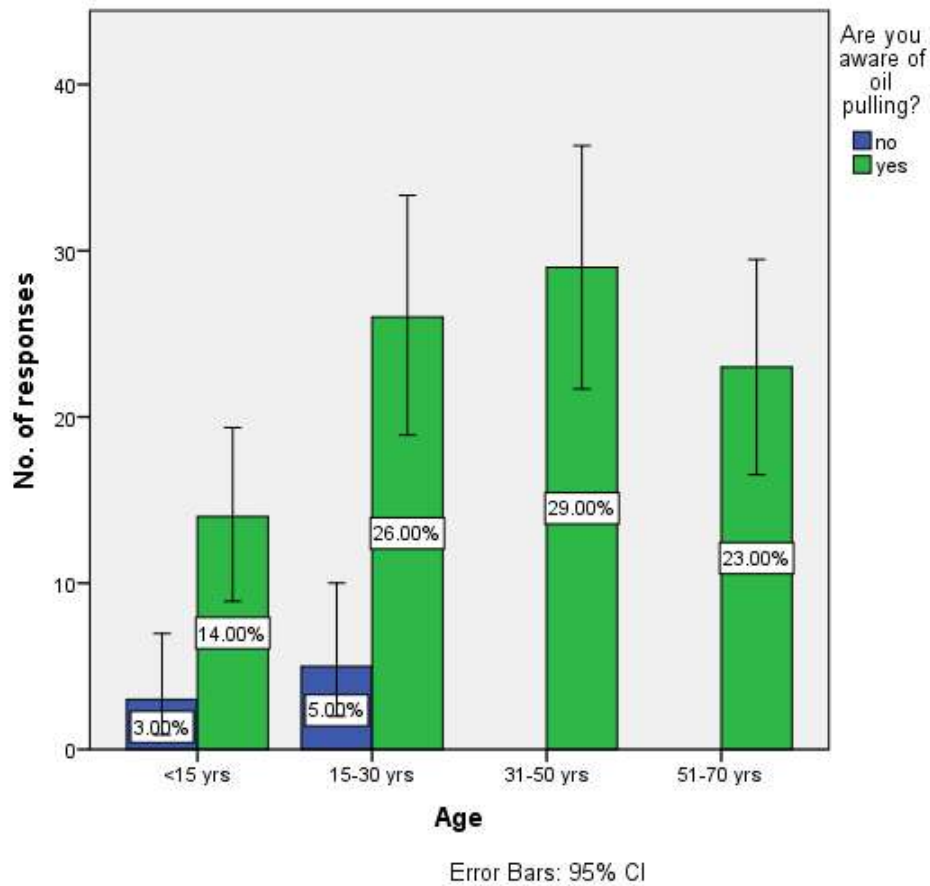


Figure 1 : The graph depicts the association between gender and awareness of oil pulling among the general population. X axis - age, Y - axis - Number of responses. Blue represents no, and green colour - yes. The age group of 15-30 years were comparatively more aware than the other age categories. Chi Square test - $p = 0.004$ ($p < 0.05$) and it is statistically significant.

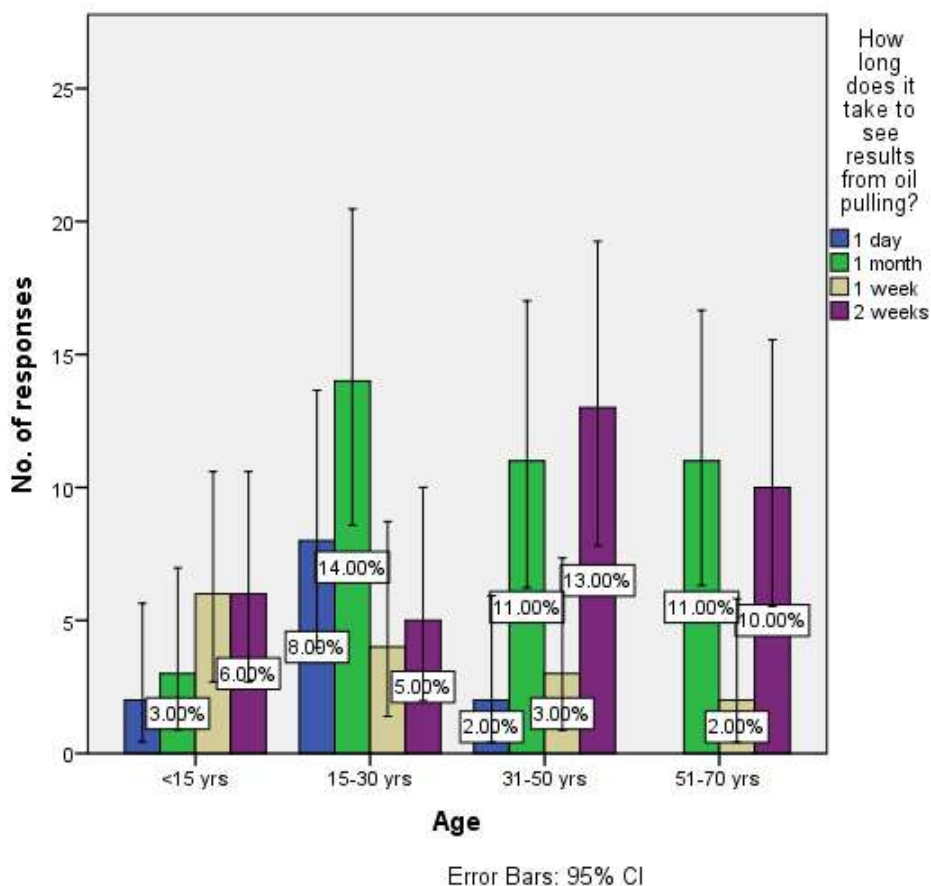


Figure 2: The graph illustrates the association between age and the time taken to see results from oil pulling. X axis - age, Y - axis - Number of responses. Blue represents 1 day, and brown colour - 1 week; purple- 2 weeks; green- 1 month. The age group of 15-30 years were comparatively more aware of the time taken to see results from oil pulling. Chi Square test - $p = 0.001$ ($p < 0.05$) and it is statistically significant.