

# Efficacy of Oil Pulling With Sesame Oil in Comparison with Other Oils and Chlorhexidine for Oral Health : A Systematic Review

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## Abstract:

**Background:** Oil pulling is an Ayurveda technique which was originated back over thousands of years. Many common oils have been used as agents for oil pulling through their antimicrobial properties. Sesame oil being one of the most traditional folk remedy, possess various properties to improve oral health.

**Aim:** To assess the effectiveness of sesame oil as an agent for oil pulling when compared to other oils and chlorhexidine formulas as one of the interventions for oral hygiene.

**Methods:** A literature search was performed using PubMed, Cochrane Central Register of Controlled Trials (CENTRAL), Science direct, Lilacs, Grey literature and Scopus using MeSH terms- Oil Pulling, Sesame Oil, Oral health care. Of a total of 1017 articles screened, 103 were full-text articles assessed for eligibility and 8 articles were taken for the qualitative analysis. This review was reported according to the PRISMA guidelines. Eight randomized controlled trials were included for the review process.

**Results:** The sesame oil was compared with various oils and chlorhexidine in all the studies and sesame oil showed statistically significant results in comparison with other oils ( $p < 0.05$ ). No meta-analysis was performed due to the clinical heterogeneity and differences in the reporting of data among the included studies.

**Conclusion:** Sesame oil was found to be effective in improving the oral health and equally effective to the other oils and the gold standard chlorhexidine.

**Keywords:** Chlorhexidine, Oil Pulling, Oral health, Sesame oil

## INTRODUCTION

Oil pulling is an ancient ayurvedic technique described in the textbook written by "Charaka Samhita" mentioned in the names gandoosha and kavalagraha. <sup>[1]</sup> These are the two effective techniques used in oil pulling as a method of cleansing to treat or prevent oral diseases. In Gandoosha, a mouthful of medicated oil is taken and held for a specific period of time until lacrimation and nasal discharge occurs and then the oil is spit out. <sup>[2]</sup> Whereas in Kavalagraha, an individual's mouth is filled only three-fourths with the medicated oil; which is swished for some time and spit out. <sup>[3]</sup>

The use of Oil pulling was popularized by Dr. F. Karach <sup>[4]</sup> and he claimed the use of oil pulling to cure oral diseases; however, it was not supported by evidence. A variety of many common oils have been used as agents for oil pulling. The antimicrobial activity of various edible oils that includes coconut oil, olive oil, groundnut oil, mustard oil, sunflower oil, sesame oil and extracts of gooseberries and mango leaf extracts has been proven in laboratory in-vitro studies. <sup>[5,6,7]</sup>

Sesame oil has been used as traditional folk remedy for years. Sesame oil contains three lignans namely sesamin, sesamol and sesaminol which possess antioxidant properties, potentiate vitamin E; it also contains high amounts of polyunsaturated fatty acids; which reduces lipid peroxidation, thereby reducing free radical injury to the oral tissues. <sup>[8,9]</sup> Moreover sesame oil has antibacterial property; which emulsification process may be responsible in forming a soapy layer that contains microbes. The emulsification process alters the adherence of bacteria to the tooth surface and removes the superficial worn out squamous cells and hence improves oral hygiene. <sup>[10]</sup>

## Objective

To assess the effectiveness of sesame oil as an oil for oil pulling when compared to other oils and chlorhexidine as one of the interventions for oral hygiene.

## MATERIALS AND METHODS

**STUDY DESIGN:** Systematic review of randomized controlled trials.

**ELIGIBILITY CRITERIA:**

**Inclusion Criteria**

- Randomized controlled trials and pilot studies from 2008 onwards till the recent update.
- Full-text article available in search engine mentioned in the search strategy were included.
- Studies in which sesame oil was used as one of the interventions for oil pulling.

**Exclusion Criteria**

- Non-randomized studies
- Studies in which oil pulling was used for other purposes than oral health.

**SEARCH STRATEGY**

Published literature on assessing the effectiveness of sesame oil as an oil for oil pulling in maintaining oral health which includes original articles and research papers in databases such as Pubmed, Central, Cochrane Register of Controlled Trials (CENTRAL), Science Direct, Lilacs, Grey literature and Scopus were taken into study for

review from August to September 2018. A literature search to collect relevant data was performed using MeSH terms “Oil pulling, Sesame oil and oral health care”.

**SEARCH ENGINE**

- Pubmed
- Cochrane Central Register of Controlled Trails(CENTRAL)
- Science direct
- Lilacs
- Grey Literature
- Scopus

**RESULTS**

The search yielded 1017 records and 103 full-text articles were independently assessed. Among these 103 articles, 8 articles were included for the review. Figure 1 shows the flow diagram of the reports that were identified, duplicates removed, screened, excluded, assessed for eligibility and included in the review.

**Figure 1: Flow diagram showing the number of studies identified, screened, assessed for eligibility, excluded and included in the systematic review**

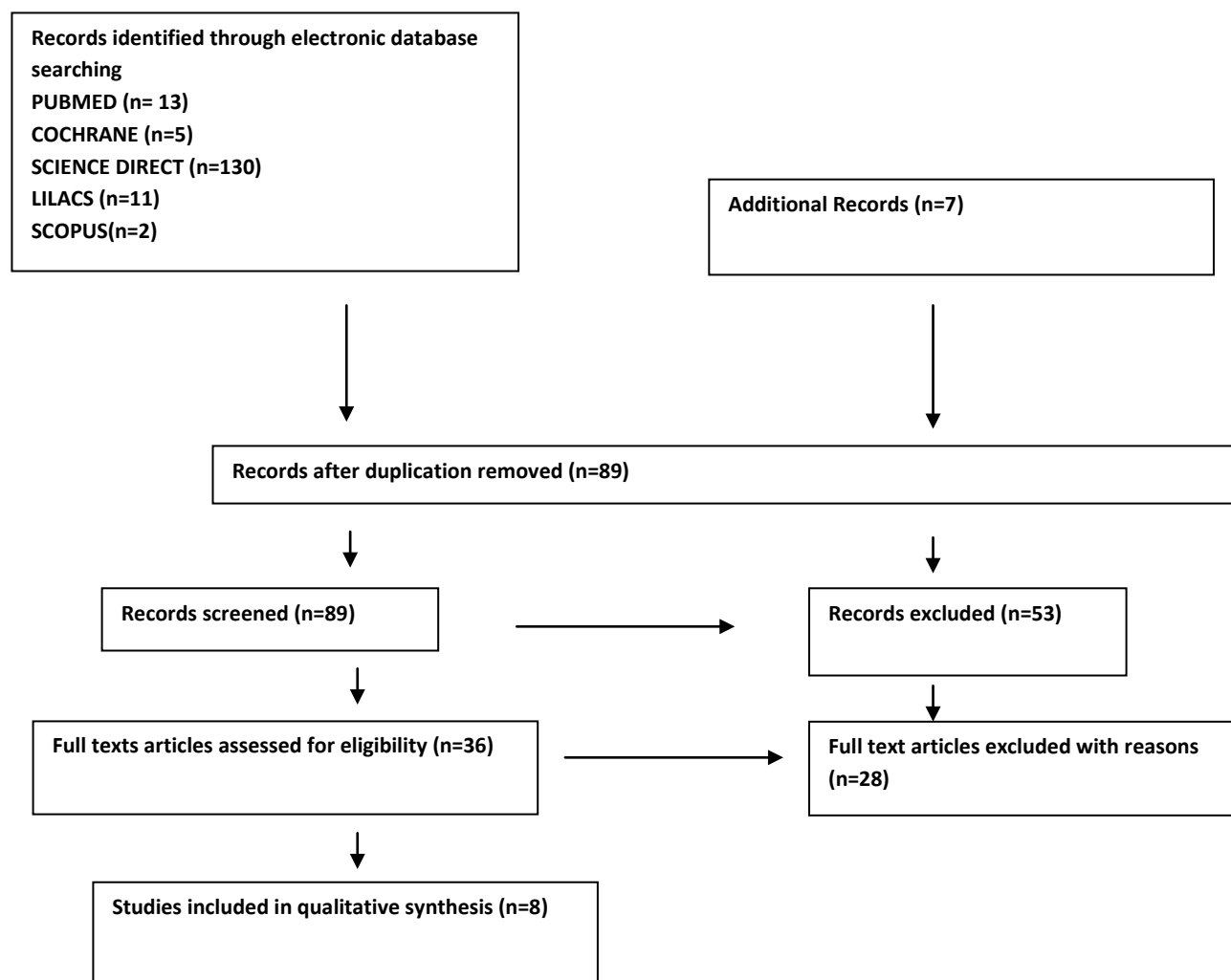


Table 1 shows the characteristics of the interventions in the included studies. In all the 8 studies, sesame oil was compared with chlorhexidine mouthwash and other oils such as coconut oil, olive oil and Rice bran oil. But the studies differed individually regarding the sample size, age

of the population and the duration of the intervention. Seven of the trials were performed among healthy adolescents [11-17] and one study among pregnant women. [18] The subjects participated in the studies had baseline mild to moderate plaque induced gingivitis or one or two decayed missing filled teeth.

**TABLE 1: CHARACTERISTICS OF THE INTERVENTIONS IN THE INCLUDED STUDIES**

AUTHOR NAME	YEAR	SAMPLE SIZE	PATIENT CHARACTERISTICS	DURATION	NUMBER (CASE/CONTROL)
S.Asokan et al. <sup>[11]</sup>	2008	20	Adolescent male, aged about 16-18 years who were willing to participate and those who had a DMF score ranging from 1 to 2	2 weeks	Group I (study group-oil pulling)- 10 subjects Group II (control group– chlorhexidine) – 10 subjects
S.Asokan et al. <sup>[12]</sup>	2009	20	Adolescent boys aged about 16-18 years who were willing to participate and those who having plaque-induced gingivitis	10 days	Group I (study group) – 10 subjects (oil pulling with sesame oil) Group II (Control group) – 10 subjects (Chlorhexidine)
S.Asokan et al. <sup>[13]</sup>	2011	20	Healthy adolescents aged about 17-19 years who were willing to participate and those who had at least 24 permanent teeth with gingival probing depth <3 mm and having a gingival and plaque index score = 1mm more than 10% of the sites	14 days	Group I(study group- oil pulling with sesame oil) – 20 individuals Group II (positive control group – Chlorhexidine.) – 20 individuals
D.Saravanan et al. <sup>[14]</sup>	2013	40	Students aged about 18 to 21 years who were willing to participate, and those who had atleast 20 permanent natural teeth having mild to moderate plaque and gingivitis and those who had not used mouthwashes/rinses for past 6 months	45 days	Group A( Control Group) – 20 individuals Group B (experimental Group)- 20 individuals
N.Singla et al. <sup>[15]</sup>	2014	40	House-keeping personnel aged about 18-55 years who were willing to participate, and those who had atleast one or two carious teeth and moderate to severe gingival inflammation.	3weeks	1.Control group: 10individuals (chlorhexidine gel - hexigel) 2.Test Group 1: 10 individuals (pure form of sesame oil) 3.Test Group 2: 10 Individuals (pure form of coconut oil.) 4.Test Group 3: 10 individuals (pure form of olive oil.)
P.Sood et al. <sup>[16]</sup>	2014	60	Students aged about 18 years and above who were willing to participate, and those who had atleast 24 permanent teeth with gingival probing depth <3mm, gingival and plaque index scores of =>1 in 10% of the sites and intrinsic malodor of oral origin two or more hours after eating, drinking or brushing of teeth or any other oral activity	21 days	Group A (Chlorhexidine -CHX, 0.2%, Hexidine) – 20 individuals Group B (Oil- Sesame oil) – 20 individuals Group C (Placebo) – 20 individuals
N.Dani et al. <sup>[17]</sup>	2015	40	Subjects who are systematically healthy with plaque induced gingivitis and a having atleast 20 permanent teeth	14 days	Test Group (Sesame Oil)- 20 individuals Control Group (Chlorhexidine mouthwash) – 20 individuals
F.S.Sheik et al. <sup>[18]</sup>	2016	30	Healthy pregnant women who were willing to participate.	14 days	Group A (Rice bran oil) – 10 individuals Group B (Sesame oil) – 10 individuals Group c (Chlorhexidine gluconate mouthrinse) 10 individuals

Table 2 shows the outcome data of plaque and gingival scores in the included studies. There was a progressive decrease in the plaque and gingival scores in sesame oil group compared to the control group from baseline till the end of the intervention period in five of the

studies [13,14,16,17,18] with a significant p value. Table 3 shows the bias assessment of the included studies. None of the studies had low risk of bias and most of the domains had an unclear risk of bias.

**TABLE 2: OUTCOME DATA AS REPORTED IN INCLUDED STUDIES**

AUTHOR NAME	YEAR	EFFECT MEASURE	RESULTS
S.Asokan et al. <sup>[11]</sup>	2008	S.mutans count	The reduction in the S. mutans count in the plaque of the study group was statistically significant after 1 and 2 weeks (P = 0.01 and P = 0.008, respectively); the control group showed significant reduction at all the four time points (P = 0.01, P = 0.04, P = 0.005, and P = 0.005, respectively, at 24 h, 48 h, 1 week, and 2 weeks). In the saliva samples, a significant reduction in S. mutans count was seen in the control group at 48 h, 1 week, and 2 weeks (P = 0.02, P = 0.02, P = 0.008, respectively).
S.Asokan et al. <sup>[12]</sup>	2009	Plaque index, modified gingival index	A statistically significant reduction in the plaque index score and modified gingival score was seen in both the groups (p<0.05). But there was no statistically significant difference between these groups for a considerable reduction in colony count however there was a considerable reduction in the same for the oil pulling group.
S.Asokan et al. <sup>[13]</sup>	2011	Plaque index, Gingival index, ORG 1, ORG 2, BANA Test	The comparisons of the pre and post-therapy values of plaque and modified gingival index score showed a statistically significant difference (p=0.005 and 0.007, respectively) in both group I and II, there was a reduction in ORG I, ORG 2, BANA test scores which concluded with the fact that oil pulling was equal to that of chlorhexidine mouthwash.
D.Saravanan et al. <sup>[14]</sup>	2013	Comparison of Plaque index, Gingival index, No.of colonies before and after oil pulling	In the experiment group, There was a significant decrease in the plaque index of 13.13%, gingival index of 19.84% and no. of colonies with 16.44%, with a p value of <0.01 after 45 days, showing the acceptability of oil pulling statistically as 70%
N.Singla et al. <sup>[15]</sup>	2014	Microbial culture, Plaque index, Gingival index	There was a significant reduction in mean streptococcus mutans count, lactobacillus count, plaque scores, and gingival scores in all four groups after the study. However, there was no significant difference found in percentage reduction of these variables between the four groups.
P.Sood et al. <sup>[16]</sup>	2014	Plaque index, Gingival Index, Organoleptic intensity scale.	There was a significant reduction in the gingival scores, mean objective organoleptic scores and anaerobic bacterial colony count (p<0.05)
N.Dani et al. <sup>[17]</sup>	2015	Plaque index, gingival index, total colony count	The percentage difference between the baseline and 14 days later for plaque index, gingival index and colony forming units for the test group (SOP) were 51.6%, 53.37%, 44.5% respectively. While for the control group (CHX) were 47.61%, 44.58%, 41.3% respectively which showed that sesame oil
F.S.Sheik et al. <sup>[18]</sup>	2016	TANITA breath checker	A statistically significant reduction in the grades of halitosis at baseline and 14 days after intervention for all the three groups, namely, chlorhexidine mouth rinsing (p = 0.004), oil pulling with sesame oil (p = 0.004), and oil pulling with rice bran oil [(p = 0.002)

**TABLE 3: BIAS ASSESSMENT AS INCLUDED IN THE STUDIES**

Author name, year	Random sequence generation	Allocation concealment	Blinding of outcome	Incomplete outcome data	Blinding of participants and personnel	Selective reporting	Judgemental Bias
S Asokan et al.,2008	+	+	?	?	-	-	-
S Asokan et al.,2009	+	-	-	+	-	?	+
S Asokan et al.,2011	+	+	+	-	+	?	?
Saravanan et al.,2013	+	+	?	-	?	?	-
Singla et al.,2014	+	-	-	?	-	?	?
Sood et al.,2014	+	+	+	-	+	+	+
Dani et al.,2015	+	?	-	-	-	?	?
Sheikh et al.,2016	+	+	?	?	?	-	-

+ = low risk of bias; - = high risk of bias; ? = unclear risk of bias

### DISCUSSION

In the ancient self-care regime of Ayurveda, oil pulling takes up the essentiality for oral health care. Oil pulling began as an ancient Ayurveda gargling treatment over 3,000 years ago. These treatments had prescribed to treat imbalances of the doshas, which are the three elements that come together to create a person's overall health. This 3000-year-old practice has now been a topic of interest among the present generation.

This Systematic review found conflicting results of using sesame oil as an agent for oil pulling for improving the oral health. Among the Eight included studies, five studies reported statistically significant effect with a reduction in scores of the conditions measured from that of the baseline scores. Four of these studies reported a reduction in plaque index, gingival index, colony forming units and organoleptic scores from the scores that showed in the baseline, among the study subjects who used sesame oil for oil pulling.<sup>[13,14,16,17]</sup>

Asokan *et al.* reported a statistically significant reduction in plaque index and modified gingival index scores in both sesame oil and chlorhexidine groups, but the differences in colony count reduction were not statistically significant. This could be due to the short intervention period of 10 days which was the least of all the studies.<sup>[12]</sup> An in-vitro study conducted by Asokan *et al.* had stated that sesamin and sesamol isolated from sesame oil did not have any antibacterial properties and that, the myth claiming the effect of oil pulling therapy on oral health was just a placebo effect.<sup>[19]</sup> Whereas an in-vivo study conducted by Asokan *et al.* later in the year reported the effectiveness of sesame oil by comparing the pre and post-therapy values of plaque index, gingival index, ORG I, ORG II and BANA test scores which showed equal effectiveness to that of Chlorhexidine mouthwash.<sup>[13]</sup>

Dani *et al.* reported there was an increased percentage difference between the baseline and post-therapy values among sesame oil pulling group compared to the chlorhexidine group where the difference was little lesser. But the study failed to report the effectiveness of sesame oil was superior compared to chlorhexidine as the differences were not major.<sup>[17]</sup>

Sheik *et al.* reported a statistically significant reduction in the halitosis grades from baseline to 14 days with the use of sesame oil as equal to the effectiveness

evident with chlorhexidine and rice bran oil. However, the study did not measure other variables and the intervention period was not long enough to conclude the results.<sup>[18]</sup> Singla *et al.* reported there was no significant difference observed in the s.mutans count, lactobacillus count, plaque and gingival scores among sesame oil, coconut oil, olive oil and chlorhexidine groups after 3 weeks of intervention. A significant difference was not found as the subjects received the intervention only for a period of 3 weeks though the subjects had moderate to severe gingival inflammation.<sup>[15]</sup>

There is conclusive evidence that sesame oil is effective in reducing gingival inflammation if it is used as an agent for oil pulling. It is also evident that sesame oil has equal effectiveness to that of other oils and to the gold standard chlorhexidine mouthwash.

### CONCLUSION

The antimicrobial activity of Sesame oil can be effective against s.mutans in reducing plaque induced gingivitis if used for oil pulling. It can also be used as an alternative to the gold standard chlorhexidine, without the adverse effect of teeth staining.

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