Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/kyxknr49

COMPARISON OF THE EFFECTS OF OIL PULLING THERAPY WITH SESAME OIL AND COCONUT OIL

Dr Karthik R[1*], Dr Sujatha K Karjigi[2], Dr Keerthana S R[3]

[1*]Associate Professor, Microbiology, Dr. B R Ambedkar Medical College Hospital
drkarthikramamurthy@gmail.com
[2]Associate Professor, Microbiology, Dr B R Ambedkar Medical College Hospital
[3]Assistant Professor, Department of Prosthodontics, MRADC

***Corresponding Author:** Dr Karthik R
*Associate Professor, Microbiology, Dr. B R Ambedkar Medical College Hospital
drkarthikramamurthy@gmail.com

INTRODUCTION:

Oral hygiene habits are developed and established in early childhood and aid in the prevention of dental caries and periodontal disease in the future. Mechanical methods of tooth brushing are the most reliable and widely accepted, however mouthwashes have also been used for several years as an adjunctive measure for the maintenance of dental hygiene and oral health [1]. Oil pulling is a traditional Ayurvedic remedy originally used in ancient India to maintain oral health. With people preferring natural remedies over allopathic medicines, Ayurveda has truly become the medical method of choice for general wellbeing and health
[2].

Ayurveda has several proven practices; oil pulling is one of them. Oil pulling may be a method of oral health. Oil pulling is also believed to improve gingival health by reducing inflammation, relieving dry mouth, and chapped lips. It is said to whiten teeth, reduce bad breath, and improve oral hygiene. Oil pulling is a method of gargling with oil, allowing the oil to shuttle between the teeth [3]. 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 [4,5]. 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 [6,7].

Oil pulling using coconut oil have shown to have antibacterial activity against C.
albicans and S. mutans, while sesame oil also has similar activity against S.
mutans and Lactobacilli [8]. Following a 40-day regimen of oil pulling, an average reduction of 20% was observed in the total microbial count in the oral cavity . 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” [9].

Sesame oil has been found to reduce plaque induced gingivitis. Root of Sesame (Sesamum indicum) contains chlorosesamone which has antifungal activity. Polyunsaturated fatty acids present in sesame oil reduces free radical injury occurring in oral cavity [10].

Previous in-vitro studies using biofilm models have demonstrated the antimicrobial properties of coconut oil against Streptococcus mutans (S. mutans) and Candida albicans (C. albicans). Oil pulling is believed to reduce bacteria count in the oral cavity, thus potentially reducing the risk of dental

problems. While some studies suggest its effectiveness, others question its efficacy compared to conventional methods.
The purpose of the study is to check for reduction in CFUs of S. mutans and C. albicans, with S. mutans being the main causative agent for dental caries and C. albicans being a causative agent for common fungal infections such as oral candidiasis, using oil pulling therapy.

REVIEW OF LITERATURE:

1. A meta-analysis conducted by **Peng et al** to evaluate Effectiveness of Oil Pulling for Improving Oral Health. He searched PubMed, the Cochrane Library, and the EMBASE database, limiting the search to human patients and articles written in English and published before 31 July 2022. He included randomized controlled trials (RCTs) comparing the effect of oil pulling on improving dental health and oral hygiene. The outcomes of this study were salivary bacteria count, plaque index, and gingival index. Results included nine RCTs in this study and the study showed that salivary bacterial colony (BC) counts were significantly reduced in the oil pulling group compared to the control group. He concluded based on the results of this metaanalysis, the oil pulling may have a beneficial effect on reducing salivary BC count compared to the control group. There was no significant difference in the plaque index and gingival index score between the oil pulling and the control group. Therefore, future clinical trials should be more rigorous and better reported [10].

2. **James et al** conducted a review on Chlorhexidine mouth rinse as an adjunctive treatment for gingival health. He assessed Chlorhexidine mouth rinse as an adjunctive treatment for gingival health and to determine whether the effect of chlorhexidine mouth rinse is influenced by chlorhexidine concentration, or frequency of rinsing and to report and describe any adverse effects associated with chlorhexidine mouth rinse use from included trials. He included randomized controlled trials assessing the effects of chlorhexidine mouth rinse used as an adjunct to mechanical oral hygiene procedures for at least 4 weeks on gingivitis in children and adults. He concluded that reduction of Gingival Index in gingivitis, large reduction of dental plaque and no evidence on concentration of chlorhexidine [11].

3. **Poonam Sood et al** conducted study of comparative efficacy of oil pulling and chlorhexidine on oral malodor. He conducted a three-week randomized controlled trial was conducted among 60 students of three hostels of Maharani College of science and arts and commerce and V.S. Dental College and Hospital of Home Science. Intra and inter group comparisons were made using Kruskal Wallis test, Wilcoxan sign rank test, ANOVA and Student t-test. The results showed there was significant reduction in the mean scores of all the parameters within sesame oil and chlorhexidine group and concluded that Oil pulling with sesame oil is equally efficacious as chlorhexidine in reducing oral malodor and microbes causing it. It should be promoted as a preventive home care therapy [12].

4. **Julian Woolley et** al conducted a systematic review on the effect of oil pulling with coconut oil to improve dental hygiene and oral health. He used Six electronic databases: PubMed, Medline, EMBASE, AMED, CENTRAL and CINAHL for
review. In this review he signifies oil pulling with coconut oil could be used as a adjunct to normal preventative regimes to improve oral health and dental hygiene and concluded that oil pulling with coconut oil may have a beneficial effect on improving oral health and dental hygiene. Future clinical trials are of merit considering the universal availability of the intervention. Prospective research should have a robust design with rigorous execution to provide a higher quality of evidence [13].

AIM: To compare the effectiveness of oil pulling in dentate patients in reducing bacteria count, using 2 different oils as a part of their oral hygiene regimen

OBJECTIVES:

- To evaluate the number of colony forming units (CFUs) of S. mutans and C. albicans after oil pulling for 10 minutes using 10 ml of Sesame oil.
- To evaluate the number of CFUs of S. mutans and C. albicans after oil pulling for 10 minutes using 10 ml of cold pressed coconut oil.
- To evaluate the number of CFUs of S. mutans and C. albicans before brushing using 10 ml of chlorhexidine mouthwash for 10 minutes
- To compare the effectiveness of sesame oil and chlorhexidine in inhibiting CFUs, after oil pulling and before brushing for 10 minutes, respectively.
- To compare the effectiveness of coconut oil and chlorhexidine in inhibiting CFUs, after oil pulling and before brushing for 10 minutes, respectively.
- To compare the effectiveness of sesame oil and coconut oil in inhibiting CFUs, after oil pulling for 10 minutes, respectively.

METHODS AND METHODOLOGY:

The study was carried out in the Department of prosthodontics, M R Ambedkar Dental College and Hospital, Bangalore.

The inclusion criteria

- Above 18 years of age and willing to participate in the study
- Either gender.
- Subjects having at least 20 natural teeth in their permanent dentition
- Presence of caries.
- Good general health.
- Presence of mild to moderate periodontitis and gingivitis
- Subjects refrained from any form of dental treatment during the study period.

The exclusion criteria

- Heavy smokers and excessive alcohol consumption.
- Patients undergoing orthodontic treatment.
- Patients with uncontrolled diabetes or any other systemic disease.
- Presence of pericoronitis.
- Known allergies to the oil being used.
- Those using any other type of mouth wash / rinse.
- Patients on antibiotic therapy

Pre-Study Procedure: The subjects were blinded about the investigation in order to avoid any bias. To participate the subjects needed to sign a witnessed consent form and committed themselves to the study. The Ethical clearance was taken from the Scientific and Ethical Review Committee, M R Ambedkar Dental College and Hospital, Bangalore.

Materials used in the study-

- Materials tested
- Sesame Oil
- Cold Pressed Virgin Coconut Oil
- Chlorhexidine mouthwash
- Dry sterile cotton swab

Materials for Preparation of Culture Media

- Mitis salivarius base Candida CHROMagar

STUDY SETTING AND STUDY DESIGN -

Study Design: Comparative, Experimental research, in vitro

METHODOLOGY-

Media preparation

The culture media was prepaped by mixing 90g mitis salivarius dehydrated agar (Himedia), 20% sucrose (Analar Merck, Kilsyth, Victoria, Australia), 10g Agar (Himedia) with 1 litre distilled water and sterilized then 1ml 1% potassium tellurite (Himedia), and 0.2U bacitracin (himedia) were added and stirred and were poured into agar plates. Poured agar plates were sealed and stored at 4°C.
Ten dentate patients who meet the inclusion and exclusion criteria were selected for the purpose of the study. Written informed consent was obtained from all patients.

Experimental Protocol

This study was carried out at the Department of Prosthodontics. Each subject that participated in study was given a specific number, and simple random sampling was done using the table of random numbers by the examiner.
The participants were divided into 3 groups:
Group A - oil pulling using 10 ml of sesame oil (Fig 1) for 10 minutes in the morning on empty stomach, before brushing.
Group B - oil pulling using 10 ml of cold pressed coconut oil (Fig 2) for 10 minutes in the morning on empty stomach, before brushing.
Group C - using 10 ml of chlorhexidine mouthwash for 10 minutes in the morning on empty stomach, before brushing.
All the subjects were told to follow the below mentioned, method of Oil Pulling

The Oil Pulling Procedure

Patients were instructed to take 10-15 ml of refined oil (sesame/coconut) using a tea spoon, approximately 10ml or till the mouth is about half filled. They were then instructed to sip, suck and pull the oil through the teeth and swish the liquid from right to left, back to front and vice versa. Swishing was done for approximately 8-10 minutes or until they felt a fullness in their mouth. At the end of the procedure, when the oil turned milky white, thin and frothy the patients were instructed to spit the liquid. The same steps were to be followed by Group C participants as well, but by using 10 ml chlorhexidine mouthwash for 10 minutes, in the morning before brushing.

Sample Collection and Transportation

All these groups were subjected to microbial assessment. Microbial samples were collected using dry sterile cotton swabs for all Groups in right, left and mid–palatal region after rinsing the mouth using 5ml of tap water and were inoculated on Mitis Salivarius Agar Base for S. mutans and Candida CHROMagar for C. albicans. These swabs (both swabs that is before and after oil pulling) were incubated at 37˚C for 24 to 48 hours. The number of colonies were counted using a colony counter

STATISTICAL ANALYSIS

Kruskal Wallis Test followed by Dunn's post hoc test was used to compare the mean CFUs of S. Mutans & C. Albicans between 3 groups before and after treatment period. Wilcoxon Signed Rank Test was used to compare the mean CFUs of S. Mutans & C. Albicans between before and after treatment period in each group. The level of significance was set at $p<0.05$.
The statistical analysis was done using SPSS software, Version 19 (SPSS Inc, Chicago).

RESULT:

The mean S. mutans before treatment period in Group A was 13240.00 ± 30820.38, Group B was 13042.00 ± 30910.45 and Group C was 22415.00 ± 41068.63 (Table 1). However, this mean difference in the mean S. mutans before treatment period between 3 groups was not statistically significant [p=0.51].

Comparison of Mean CFUs of S. mutans & C. albicans 3 groups between before Rx period b/w using Kruskal Wallis Test followed by Dunn's post hoc Test							
Organism	Groups	N	Mean	SD	p-value [a]	Sig. Diff	p-value [b]
S. Mutans	Group A	10	13240.00	30820.38	0.51	A vs B	..
	Group B	10	13042.00	30910.45		A vs C	..
	Group C	10	22415.00	41068.63		B vs C	..
C. Albicans	Group A	10	16.80	33.13	0.58	A vs B	..
	Group B	10	20.80	41.76		A vs C	..
	Group C	10	20.10	42.11		B vs C	..

Table 1: Comparison of mean CFUs between groups before oil pulling

***Note:** Group A: Oil pulling using 10 ml of sesame oil for 10 minutes; Group B: Oil pulling using 10 ml of cold pressed coconut oil for 10 minutes & Group C: 10 ml of chlorhexidine mouthwash for 10 minutes

The mean S. mutans after treatment period in Group A was 10006.10 ± 31620.63, Group B was 2413.00 ± 4024.71 and Group C was 1234.20 ± 3105.51(Table 2). This mean difference in the mean S. mutans after treatment period between 3 groups was statistically significant at p=0.02. Multiple comparison of mean difference between groups revealed that Group A showed significantly highest CFUs as compared to Group B & Group C and the mean differences were statistically significant at p=0.01 and there was no significant difference between Group B & Group C [p=0.39].

The mean C. albicans after treatment period in Group A was 2.40 ± 4.12, Group B was 11.60 ± 31.21 and Group C was 0.20 ± 0.63 (Table 2). This mean difference in the mean C. albicans after treatment period between 3 groups was statistically significant at p=0.04. Multiple comparison of mean difference between groups revealed that Group B showed significantly highest CFUs as compared to Group A & Group C and the mean differences were statistically significant at p=0.04 & p=0.02 respectively and there was no significant difference between Group A & Group C [p=0.11].

Comparison of Mean CFUs of S. mutans & C. albicans between 3 groups After Rx b/w using Kruskal Wallis Test followed by Dunn's post hoc Test							
Organism	Groups	N	Mean	SD	p-value [a]	Sig. Diff	p-value [b]
S. Mutans	Group A	10	10006.10	31620.63	0.02*	A vs B	0.01*
	Group B	10	2413.00	4024.71		A vs C	0.01*
	Group C	10	1234.20	3105.51		B vs C	0.39
C. Albicans	Group A	10	2.40	4.12	0.04*	A vs B	0.04*
	Group B	10	11.60	31.21		A vs C	0.11
	Group C	10	0.20	0.63		B vs C	0.02*

Table 2: Comparison of mean CFUs after oil pulling

* - Statistically Significant

Note: a. Kruskal Wallis Test & b. Dunn's Post hoc Test

Comparison of mean CFUs of S. mutans between Before & After Rx period in each group using Wilcoxon Signed Rank test						
Groups	Time	N	Mean	SD	Mean Diff	p-value
Group A	Before Rx	10	13240.00	30820.38	3233.90	0.04*
	After Rx	10	10006.10	31620.63		
Group B	Before Rx	10	13042.00	30910.45	10629.00	0.04*

	After Rx	10	2413.00	4024.71		
Group C	Before Rx	10	22415.00	41068.63	21180.80	0.005*
	After Rx	10	1234.20	3105.51		

Table 3: Comparison of mean CFUs of S. mutants before and after oil pulling
*** - Statistically Significant**

The mean CFUs of S. mutans after treatment period showed a significant reduction in Group A, B & C [10006.10 ± 31620.63, 2413.00 ± 4024.71 & 1234.20 ± 3105.51] as compared to before treatment period [13240.00 ± 30820.38, 13042.00 ± 30910.45 & 22415.00 ± 41068.63] and the mean difference were statistically significant at p=0.04, p=0.04 & p=0.005 respectively (Table 4).

Comparison of mean CFUs of C. albicans between Before & After Rx period in each group using Wilcoxon Signed Rank test						
Groups	Time	N	Mean	SD	Mean Diff	p-value
Group A	Before Rx	10	16.80	33.13	14.40	0.03*
	After Rx	10	2.40	4.12		
Group B	Before Rx	10	20.80	41.76	9.20	0.34
	After Rx	10	11.60	31.21		
Group C	Before Rx	10	20.10	42.11	19.90	0.03*
	After Rx	10	0.20	0.63		

Table 4: Comparison of mean CFUs of C. albicans before and after oil pulling
* - Statistically Significant

The mean CFUs of C. Albicans after treatment period showed a significant reduction in Group A & C [2.40 ± 4.12 & 0.20 ± 0.63] as compared to before treatment period [16.80 ± 33.13 & 20.10 ± 42.11] and the mean differences were statistically significant at p=0.03 respectively. However, the mean CFUs reduction after-treatment period with respect to C. Albicans [11.60 ± 31.21] as compared to before treatment period in Group B [20.80 ± 41.76] was not statistically significant [p=0.34] (Table 4).

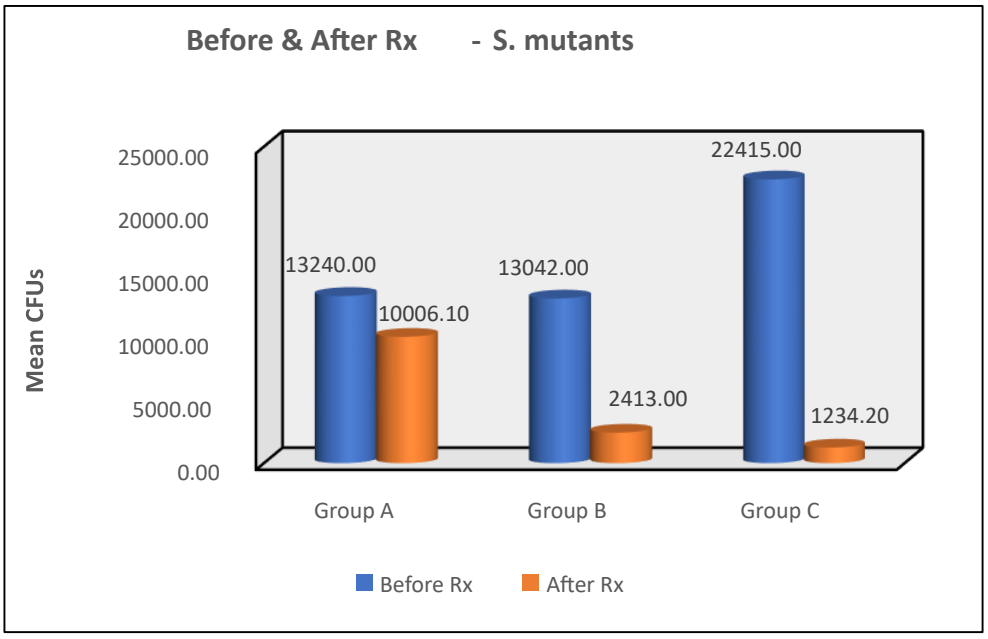

Fig 1: Mean CFUs of S. mutans before & after Rx in each group

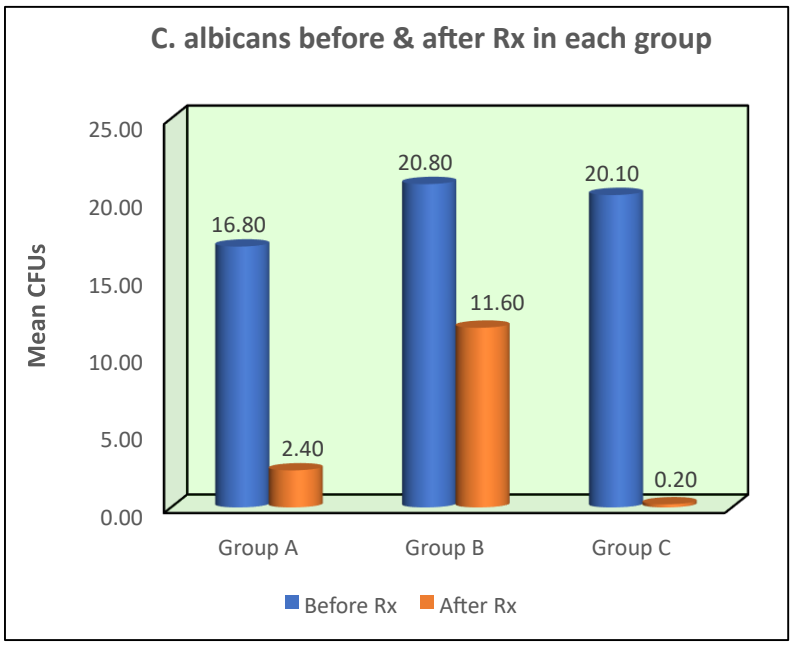

Figure 2: Mean CFUs of C. albicans before & after Rx in each group

Discussion:

Dental hygiene plays a crucial role in preventing oral diseases such as caries and periodontal diseases. Traditional methods like brushing and flossing are commonly practiced, but alternative methods like oil pulling have gained popularity. Oil pulling, an ancient Ayurvedic practice, has garnered attention in recent years for its potential benefits in oral health. It involves swishing oil around in the mouth to remove bacteria and promote oral hygiene. With the growing interest in natural oral care remedies, the effectiveness of oil pulling has become a subject of scientific inquiry [14].

The mechanism of the action of oil pulling therapy is not very clear. It has been claimed that swishing of oil in the mouth activates enzymes and then draws the toxins out of the blood. The bottom line is that the oil pulling procedure actually cannot pull the toxins out of the blood because of oral mucous membrane, that does not act as a semi permeable membrane to allow the toxins to pass through. The antioxidants present in it are sesamin, sesamolin and sesaminol. These lignans have actions on the living tissues like - Detoxification of toxins, antioxidant effect, potentiating the action of vitamin E, which prevents lipid peroxidation and antibiotic effect in that it helps in the destruction of microorganisms [6].

In the present study, all groups showed reduction in bacterial counts after treatment (Figure 1&2). For S. mutants, Sesame oil was the most effective, no statistical difference was seen in oil pulling between coconut oil and Chlorhexidine. Patil et al observed that, oil pulling therapy can also be done using oils like sesame oil. The effectiveness of sesame oil may be due to saponification or emulsification that occurs during oil pulling therapy [15]. Wolley et al studied efficacy of oil pulling and found that, oil pulling therapy as an adjunct to oral hygiene protocol is efficient in treating periodontal diseases in future [13]. Group 2 (coconut oil pulling group) showed significant reduction in C. albicans (Table 4). This may be due to the presence of monolaurin, a monoglycerides of lauric acid from coconut oil which shown antimicrobial activity against various gram positive and gram-negative microorganisms. Puneeta Duggal reviewed coconut oil and found that Oil pulling using coconut oil can help in the prevention of halitosis, decay progression and gingivitis. It exerts a saponification and emulsification on bacteria like S. mutans. Coconut oil emulsifies the lipid present in the cell membranes [16]. Bruce Fife found out that the coconut oil acts like a cleanser. When you suck it in your mouth and swish it around your teeth and gums, it “pulls” out bacteria and other debris [17]. Group 3 Chlorhexidine group showed no significant difference in reduction of bacterial counts (Table 3& 4).

The findings of this study shed light on the comparative effectiveness of oil pulling using two different oils as adjuncts to oral hygiene in dentate patients. The short duration of the intervention period may

limit the assessment of long-term effects. Additionally, variations in participants' compliance with the oil pulling regimen, differences in oil properties, and individual oral microbiome composition may influence the long-term use. Further research with larger sample sizes and longer intervention periods may be warranted to validate and expand upon these findings.

CONCLUSION:

Within the limitation of the study, the following conclusions can be drawn; Oil pulling therapy can be incorporated as part of oral hygiene regime. Oil pulling with sesame oil may be used in patients prone to dental caries as it is most effective against S. mutants and coconut oil pulling is most effective against C. albicans.

REFERENCES:

1. Visakh PM, editor. Nanomaterials and nanotechnology in medicine. John Wiley & Sons, Incorporated; 2022 Sep 12.
2. Sharma H, Chandola HM, Singh G, Basisht G. Utilization of Ayurveda in health care: an approach for prevention, health promotion, and treatment of disease. Part 2—Ayurveda in primary health care. The journal of alternative and complementary medicine. 2007 Dec 1;13(10):1135-50.
3. Shanbhag VK. Oil pulling for maintaining oral hygiene–A review. Journal of traditional and complementary medicine. 2017 Jan 1;7(1):106-9.
4. Tomar P, Hongal S, Jain M, Rana K, Saxena V. Oil pulling and oral health: A review. IJSS Case Report & Reviews. 2014 Aug;1(3):33-7.
5. Pal SK, Shukla Y. Herbal medicine: current status and the future. Asian pacific journal of cancer prevention. 2003 Aug 20;4(4):281-8.
6. Hebbar A, Keluskar V, Shetti A. Oil pulling–Unraveling the path to mystic cure. J Int Oral Health. 2010 Dec 1;2(4):11-5.
7. Amith HV, Ankola AV, Nagesh L. Effect of oil pulling on plaque and gingivitis. J Oral Health Community Dent. 2007 Jan;1(1):12-8.
8. Claesson MJ, Van Sinderen D, O'Toole PW. The genus Lactobacillus—a genomic basis for understanding its diversity. FEMS microbiology letters. 2007 Apr 1;269(1):22-8.
9. Anand TD, Pothiraj C, Gopinath RM, Kayalvizhi B. Effect of oil-pulling on dental caries causing bacteria. Afr J Microbiol Res. 2008 Mar 31;2(3):63-6.
10. Peng TR, Cheng HY, Wu TW, Ng BK. Effectiveness of oil pulling for improving oral health: A meta-analysis. InHealthcare 2022 Oct 11 (Vol. 10, No. 10, p. 1991). MDPI.
11. James P, Worthington HV, Parnell C, Harding M, Lamont T, Cheung A, Whelton H, Riley P. Chlorhexidine mouthrinse as an adjunctive treatment for gingival health. Cochrane Database of Systematic Reviews. 2017(3).
12. Sood P, Narang R, Swathi V, Makkar DK. Comparative efficacy of oil pulling and chlorhexidine on oral malodor: A randomized controlled trial. Journal of clinical and diagnostic research: JCDR. 2014 Nov;8(11):ZC18.
13. Woolley J, Gibbons T, Patel K, Sacco R. The effect of oil pulling with coconut oil to improve dental hygiene and oral health: A systematic review. Heliyon. 2020 Aug 1;6(8).
14. DebMandal M, Mandal S. Coconut (Cocos nucifera L.: Arecaceae): in health promotion and disease prevention. Asian Pacific journal of tropical medicine. 2011 Mar 1;4(3):241-7.
15. Patil A.A, Deosarkar B, Niras S, Chaudhari V. Oral Health and Ayurveda. J of Interdisciplinary Dent Sciences. 2013; 2:10-14
16. Duggal P. COCONUT: THE LIFE TREE. Guident. 2013 Oct 1;6(11).
17. Fife B, Dental health with oil swishing. Well Being Journal. Dec 2008;39-42.