



A Comparative Evaluation of Flax Seed and Coconut Oil Pulling Therapy on Plaque-Induced Gingivitis: A Preliminary Report

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Article History	Abstract
Received: 06 June 2023 Revised: 25 Sept 2023 Accepted: 05 Oct 2023	<i>Oil pulling is a traditional shown promising result in controlling bleeding and reducing inflammation of periodontium. Hence, the present study was aimed to compare and evaluate the efficacy of flax seed and coconut oil as an anti-inflammatory agent with chlorhexidine gluconate in the treatment of plaque-induced gingivitis. The randomized controlled clinical trial involved 45 participants divided into three groups, each with 15 participants. Clinical parameters like Plaque index (PI), Gingival index (GI), Sulcular Bleeding Index (SBI) were assessed at baseline, 1 month, 3 months and 6 months. Statistical analysis was carried out using SPSS software 22.0. Results showed a significant decrease in pre- and post-treatment clinical parameters, indicating that flax seed and coconut oil pulling used as adjunctive oral hygiene aids were effectively decreased plaque formation and gingivitis.</i>
CC License CC-BY-NC-SA 4.0	Keywords: Flax seed, Coconut oil, Mouthwash, Gingivitis, Chlorhexidine gluconate

1. Introduction

Gingivitis is a common oral cavity disease caused by microbial plaque accumulation in the teeth's cervical area, with herbal mouthwashes offering a more effective alternative to chemical ones like listerine and chlorhexidine. Oil pulling is a traditional Indian folk remedy used to strengthen teeth, gums, throat dryness, and cracked lips. It is mentioned in Ayurveda text Charaka Samhita and claims to cure 30 systemic diseases. Dr. F. Karach introduced the concept in Russia in the 1990s. The therapy involves holding oil in the mouth, spitting it out, and brushing teeth (Shanbhag, V.K. et al., 2017).

Flax seed 'Linum usitatissimum' is an imperative functional food component, abundant in omega-3,6 and 9 polyunsaturated fatty acids (PUFA), alpha-linolenic acid (ALA), lignans and fibre, offers numerous health benefits, including reducing cardiovascular disease, atherosclerosis, arthritis, osteoporosis, diabetes, cancer, autoimmune, and neurological disorders (Goyal, A. et al., 2014). Coconut oil, a staple in tropical countries, is highly sought after in India due to its medium chain fatty acid composition. It contains 92% saturated acids, with 50% being lauric acid, which has anti-inflammatory and antimicrobial properties (DebMandal, M., et al. 2011). Chlorhexidine is the gold standard for chemical plaque control, but prolonged usage can cause taste changes, tooth discoloration, and oral bacteria resistance (Lang, N.P., et al. 1986). Natural oral hygiene products are needed for long-term, natural, and economical plaque control, as flax seed and coconut oil have

limited literature. Hence, this study was conducted to compare and evaluate the efficacy of flax seed and coconut oil as an anti-inflammatory agent with chlorhexidine gluconate in the treatment of plaque-induced gingivitis.

2. Materials And Methods

Study population: The study, a randomized controlled clinical trial, was conducted at Rama Dental College Hospital & Research Centre in Kanpur, India, obtaining written informed consent from all patients. The study was approved by the Institutional Ethical Committee. **Study design:** A total of 45 patients were assessed for eligibility for the study. Simple random sampling technique was used to include 15 individuals each. They were divided into three groups randomly using the chit method - Group A received Scaling and Flax seed mouthwash (test group) and Group B received Scaling + Coconut oil mouthwash (test group) and Group C received Scaling + Chlorhexidine mouthwash (control group).

The inclusion criteria for the study were patients aged between 18-35 years, diagnosed with Chronic generalized gingivitis, full mouth bleeding score ≥ 1 , who had not undergone dental treatment for the past three months and who had not taken any antibiotic or anti-inflammatory drug therapy in the preceding 6 months were included in the study. Participants with any systemic diseases/ conditions or fibrotic gingival enlargement or if allergic to flax seed were excluded from the study. Also, participants who were smokers, pregnant or lactating women were excluded from the study. **Procedure to Practice Oil Pulling:** Participants were instructed to use one tablespoon (5 ml) each of flax seed oil (Woodfress flax seed oil, India) and edible coconut oil (Patanjali's Tejas edible coconut oil, Haridwar, India) for mouth swishing on empty stomach in the morning before brushing. Subjects were instructed to use flax seed oil and edible coconut oil for mouth swishing before brushing. The oil was swished for 5 minutes, and then rinsed with warm water. They were asked to swish till the initially viscous oil becomes thin and milky white before spit out. The procedure was repeated daily for 30 consecutive days.

Scheduled Recall: At baseline, patients underwent standardized oral hygiene procedures, mouthwashes, and maintenance instructions. After 1 month, 3 months, and 6 months, patients were recalled for reassessment of clinical parameters Plaque index (Silness, J., & Loe, H. et al., 1964), Gingival index (Loe, H., & Silness, J. et al., 1963) and Sulcular bleeding index (Muhlemann, H.R., & Son, S. et al., 1971) and reinforcement of oral hygiene instructions.

Statistical Analysis

It was carried out statistically using statistical package SPSS® version 22.0. Independent student t test was used to compare PI, GI, and SBI between three groups at different time intervals. Student paired t' test was used to compare the mean PI, GI and SBI levels between different time intervals within each study group. The level of significance (P-value) was set at $p < 0.05$.

3. Results and Discussion

The study subjects' average plaque index was 1.59 at baseline, which decreased gradually over 1 month, 3 months, and 6 months, as shown in Table 1.

Table 1: Means of Plaque index score at various intervals

Follow-up Intervals	Mean (n=45)	Standard deviation	Standard error of mean
Baseline	1.59	0.74	0.09
1 month	1.48	0.72	0.08
3 months	1.39	0.71	0.08
6 months	1.28	0.69	0.07

The study subjects' mean gingival index was 1.08 at baseline, which decreased over time at 1 month, 3 months, and 6 months Table 2.

Table 2: Means of Gingival index score at various intervals

Follow-up Intervals	Mean (n=45)	Standard deviation	Standard error of mean
Baseline	1.08	0.50	0.06
1 month	1.0	0.47	0.05
3 months	0.91	0.45	0.05
6 months	0.87	0.41	0.04

The study found that the mean sulcular bleeding index for all subjects was 1.01 at baseline, but it decreased over time Table 3.

Table 3: Means of Sulcular bleeding index score at various intervals

Follow-up Intervals	Mean (n=45)	Standard deviation	Standard error of mean
Baseline	1.01	0.47	0.05
1 month	0.91	0.44	0.04
3 months	0.86	0.41	0.04
6 months	0.81	0.39	0.03

Table 4 depicted Plaque index (PI), Gingival index (GI) and Sulcular bleeding index (SBI) values at baseline, 1 month, 3 months, and 6 months intervals, with independent student t test comparing mean values among three groups. The test results revealed that there was no statistically significant difference demonstrated among three groups at baseline, 1 month, 3 months and 6 months for PI and GI. At 6 months, Group A and Group B showed statistically significant lesser mean SBI scores (0.3358 ± 0.12945), (0.3488 ± 0.11524) than compare to group C (0.4213 ± 0.13452) at $p=0.015$. However, the mean PI and GI score did not significantly differ among three groups. Hence, from this tabular data, we can infer that Group A and Group B was significantly effective in reducing the Sulcular bleeding score compared to Group C.

Table 4: Comparison of mean scores of PI, GI, SBI between three study groups at baseline, 1 month, 3 months and 6 months

Time	Parameter	Group	N	Mean	S.D	P Value
Baseline	PI	GROUP A	15	1.308	0.14233	0.369
		GROUP B	15	1.316	0.15366	
		GROUP C	15	1.3759	0.19825	
	GI	GROUP A	15	1.2145	0.07212	0.057
		GROUP B	15	1.2312	0.0881	
		GROUP C	15	1.3114	0.2065	
	SBI	GROUP A	15	1.3657	0.1438	0.037*
		GROUP B	15	1.2373	0.15692	
		GROUP C	15	1.2009	0.16327	
1 month	PI	GROUP A	15	0.6137	0.16778	0.377
		GROUP B	15	0.6663	0.15048	
		GROUP C	15	0.6841	0.14326	
	GI	GROUP A	15	0.5462	0.16833	0.19
		GROUP B	15	0.6295	0.17186	
		GROUP C	15	0.6874	0.1893	
	SBI	GROUP A	15	0.5358	0.14945	0.016*
		GROUP B	15	0.6788	0.15524	
		GROUP C	15	0.6933	0.16452	
3 months	PI	GROUP A	15	0.5137	0.12778	0.411
		GROUP B	15	0.5663	0.13048	
		GROUP C	15	0.5841	0.14326	
	GI	GROUP A	15	0.4462	0.15833	0.211
		GROUP B	15	0.4395	0.14186	

		GROUP C	15	0.5274	0.1693	
		GROUP A	15	0.4858	0.13945	
	SBI	GROUP B	15	0.5388	0.14524	0.017*
		GROUP C	15	0.5733	0.15452	
	PI	GROUP A	15	0.4137	0.11778	
		GROUP B	15	0.4663	0.12048	0.654
		GROUP C	15	0.4941	0.13326	
6 months		GROUP A	15	0.4162	0.12833	
	GI	GROUP B	15	0.4795	0.10186	0.611
		GROUP C	15	0.5174	0.11932	
		GROUP A	15	0.3358	0.12945	
	SBI	GROUP B	15	0.3488	0.11524	0.015*
		GROUP C	15	0.4213	0.13452	

PI- Plaque index, GI- Gingival index, SBI- Sulcular bleeding index, SD- Standard deviation *P value: level of significance at $p < 0.05$ was considered statistically significant.

Table 5 showed intragroup comparisons of mean scores at baseline, 1 month, 3 months, and 6 months, with student paired t test performed for PI, GI, and SBI within three groups. The test results demonstrated a statistically significant lesser mean PI, GI and SBI levels in the post intervention period compared to the baseline period in three groups at $P < 0.001$. Hence, we can infer that both Flax seed and coconut oil were equally potent in significantly reducing the clinical parameters during 6 months period of the study.

Table 5: Intragroup comparison of mean scores of PI, GI and SBI at baseline, 1 month, 3 months and 6 months within each study group using Student paired t test

Time	Group	N	Mean	S.D	P value
Baseline	GROUP A	15	12.053	4.013	0.193
	GROUP B	15	15.63	7.294	
	GROUP C	15	16.31	9.893	
1 month	GROUP A	15	3.713	2.449	0.708
	GROUP B	15	3.891	2.637	
	GROUP C	15	4.466	3.165	
3 months	GROUP A	15	2.349	2.122	0.875
	GROUP B	15	2.895	2.193	
	GROUP C	15	3.167	2.287	
6 months	GROUP A	15	1.217	1.176	1.231
	GROUP B	15	1.543	1.348	
	GROUP C	15	1.897	1.547	

PI- Plaque index, GI- Gingival index, SBI- Sulcular bleeding index, SD- Standard deviation P value: level of significance at $p < 0.05$ was considered statistically significant.

Periodontal diseases are multifactorial, influenced by multiple risk and vulnerability factors, with mechanical plaque control being the gold standard for periodontal therapy. Mechanical plaque control effectiveness depends on patient's dexterity and motivation, making it insufficient. Oil pulling therapy, which claims to activate enzymes and remove toxins from the blood, is not effective due to the oral mucosa's non-permeable membrane. Its mechanism for plaque inhibition is unclear, but it may inhibit bacterial adhesion and plaque co-aggregation. Studies have shown that sesame oil therapy is equally effective as chlorhexidine in decreasing plaque-induced gingivitis and gingival index (Asokan, S. et al., 2009). The current study has attempted to evaluate the efficacy of flax seed and coconut oil as an anti-inflammatory agent with chlorhexidine gluconate in the treatment of plaque-induced gingivitis.

Flax seed, originating from India and domesticated in the Middle East, is a fibrous crop rich in omega-3 fatty acid alpha-linolenic acid. It is used as food, used in grain stews, porridge, and edible oil. Flax seeds have antioxidant activity, potentially treating diabetes, acne, high cholesterol,

cardiovascular disease, cancers, and psychological disorders (Negash, W. et al., 2012). Coconut oil, with its high saponification value, is commonly used in soap production due to its lathering and cleansing properties. Its lauric acid reacts with sodium hydroxide, forming sodium laureate, which reduces plaque accumulation and reduces gingivitis. This study used chlorhexidine as a control to compare oil pulling therapy on plaque-induced gingivitis. Chlorhexidine is a gold standard for reducing plaque and gingivitis, as demonstrated by (Axelsson, P. et al., 1987).

The study found that both Group A (Flax seed mouthwash) and Group B (Coconut oil mouthwash) consistently decreased mean scores of PI, GI, and SBI levels at baseline, 1 month, 3 months, and 6 months, with improvement observed in clinical parameters. This was in accordance with a previous study comparing CHX and flax seed mouthwash efficacy (Deepika, A. et al., 2018). This study supports previous research on flaxseed extract's antimicrobial activity against periodontal pathogens, including *P. gingivalis* (Apoorva, B. et al., 2019). It also found that flaxseed extract can be an adjunct to periodontal therapy. Another study found that flax seed extract gel, when used as an adjunct, was equally effective as flurbiprofen gel after three months (Pappu, R. et al., 2019).

A recent study found that coconut oil, rich in monolaurin, exhibits significant antimicrobial activity against various bacteria, including *Escherichia vulneris*, *Enterobacter* spp., *Helicobacter pylori*, *Staphylococcus aureus*, and *Candida* spp., was in accordance with the study of (Chalke, S. et al., 2017) who were reported that coconut oil has demonstrated significant antifungal activity which is comparable with ketoconazole against various strains of *Candida* spp. The study found oil pulling therapy is equally effective as chlorhexidine in treating plaque-induced gingivitis. Chlorhexidine can cause staining on teeth and mucous membranes, while flaxseed and coconut oil offers no staining or allergy, and has no disadvantages except for longer procedure duration.

4. Conclusion

Oil pulling therapy improves clinical parameters and shows significant differences in developing countries like India, promising better preventive home therapy. Larger, longer-term clinical trials are needed to confirm its effectiveness.

Source of support: Nil

Conflict of interest: None

References:

- Asokan, S., Emmadi, P., & Chamundeswari, R. (2009). Effect of oil pulling on plaque induced gingivitis: A randomized, controlled, tripleblind study. *Indian Journal of Dental Research*, 20,47-51. <https://doi.org/10.4103/0970-9290.49067>
- Axelsson, P., & Lindhe, J. (1987). Efficacy of mouthrinses in inhibiting dental plaque and gingivitis in man. *Journal of Clinical Periodontology*, 14(4), 205-12. <https://doi.org/10.1111/j.1600-051x.1987.tb00968.x>
- Apoorva, B.B., Triveni, M.G., Rajarajeshwari, S., Satish, S.M., Tarun, K., & Mehta, D.S. (2019). Antimicrobial effect of flaxseed (*Linum usitatissimum*) on periodontal pathogens: An in vitro study. *International Journal of Herbal Medicine*, 7, 16-9.
- Chalke, S., Sameer, A., Suragimath, G.Z., Varma, A.S., Abbayya, K., Kale, V. (2017). Effect of coconut oil pulling on plaque-induced gingivitis: A prospective clinical study. *International Journal of Green Pharmacy*, 11 (4), S750. <https://doi.org/10.22377/ijgp.v11i04.1355>
- DebMandal, M., & Mandal, S. (2011). Coconut (*Cocos nucifera* L: Arecaceae): In health promotion and disease prevention *Asian Pacific Journal of Tropical Medicine*, 4, 241-7. [https://doi.org/10.1016/S1995-7645\(11\)60078-3](https://doi.org/10.1016/S1995-7645(11)60078-3)
- Deepika, A. (2018). Effect of flaxseed oil in plaque induced gingivitis- a randomized controlled double-blind study. *Journal of Evidence Based Medicine and Healthcare*, 5, 882-5. <https://doi.org/10.18410/jebmh/2018/179>
- Goyal, A., Sharma, V., Upadhyay, N., Gill, S., & Sihag, M. (2014). Flax and flaxseed oil: an ancient medicine & modern functional food. *Journal of Food Science Technology*, 51, 1633-53. <https://doi.org/10.1007/s13197-013-1247-9>
- Lang, N.P., & Brex, M.C. (1986). Chlorhexidine digluconate- an agent for chemical plaque control and prevention of gingival inflammation. *Journal of Periodontol Research*, 1, 74-89. <https://doi.org/10.1111/j.1600-0765.1986.tb01517.x>
- Loe, H., & Silness, J. (1963). Periodontal disease in pregnancy I, Prevalence and severity. *Acta Odontologica Scandinavica*, 21, 533-51. <https://doi.org/10.3109/00016356309011240>

- Muhlemann, H.R., Son, S. (1971). Gingival beeding a leading symptom in initial gingivitis. *Helvetica Odontologica Acta*, 15, 107-13. PMID: 5315729
- Negash, W., Asfaw, Z., & Yibrah, H. (2012). Linseed (*Linum usitatissimum*) ethnobotany and cultivation status in Ethiopia. *International Journal of Agricultural and Applied Sciences*, 4, 48-57. <https://doi.org/10.1007/s10722-018-0636-3>
- Pappu, R., Varghese, J., Koteswara, K.B., Kamath, V., Lobo, R., & Nimmy, K. (2019). Evaluation of biodegradable gel containing flax seed extract (*Linum usitatissimum*) as a targeted drug delivery for management of chronic periodontitis. *Journal of Herbal Medicine*, 15. <https://doi.org/10.1016/j.hermed.2018.100254>
- Silness, J., & Loe, H. (1964). Periodontal disease in pregnancy II, correlation between oral hygiene and periodontal condition. *Acta Odontologica Scandinavica*, 4, 487-95. <https://doi.org/10.3109/00016356408993968>
- Shanbhag, V.K. (2017). Oil pulling for maintaining oral hygiene-A review. *Journal of Traditional and Complementary Medicine*, 7, 106-9. <https://doi.org/10.1016/j.jtcme.2016.05.004>