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Comparative Assessment between Oral Health Education and Oil Pulling with Oral Health Education in Maintaining Periodontal Health: A Double Blinded Randomised Clinical Trial

Dr. Ayushi Pathak[1], Dr. Pulkit Chaturvedi*[2], Dr. Nitin Dungarwal[3], Dr. Reenu Joshi[4], Dr. Poly Pratah Sonowal[5], Dr. Rohit Pasari[6]

[1]Post graduate, Dept. of Public Health Dentistry, Darshan Dental College and Hospital, Udaipur.

[2*]Professor, Dept. of Public Health Dentistry, Darshan Dental College and Hospital, Udaipur

[3]Professor & Head, Dept. of Orthodontics and Dentofacial Orthopaedics, Darshan Dental College and Hospital, Udaipur

[4]Sr. Lecturer, Dept. of Public Health Dentistry, Darshan Dental College and Hospital, Udaipur

[5]Post graduate, Dept. of Public Health Dentistry, Darshan Dental College and Hospital, Udaipur.

[6]Post graduate, Dept. of Public Health Dentistry, Darshan Dental College and Hospital, Udaipur.

***Corresponding Author:**

Dr. Pulkit Chaturvedi,

Darshan Dental College and Hospital, Udaipur.

Email ID: pulkit2487@gmail.com

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ABSTRACT

Background: Oil pulling is an ancient Ayurvedic practice that involves swishing oil in the mouth to improve oral health. Traditionally, sesame oil and coconut oil have been the most commonly used oils due to their antimicrobial and anti-inflammatory properties. This practice is believed to reduce plaque accumulation, gingival inflammation, and improve overall oral hygiene by eliminating toxins and harmful bacteria from the oral cavity.

Aim: This study aims to evaluate the effectiveness of oil pulling as an adjunct to oral health education in maintaining periodontal health compared to oral health education alone.

Methodology: A double-blinded, randomized clinical trial was conducted over a 45-day period at the Department of Public Health Dentistry, Darshan Dental College and Hospital, Udaipur. Forty participants were randomly assigned to two groups: the control group (oral health education only) and the test group (oral health education with oil pulling). Participants in the test group performed oil pulling with coconut or sesame oil daily for 8–10 minutes. Gingival Index (Löe and Silness, 1963), Plaque Index (Silness and Löe, 1964), and Oral Hygiene Index-Simplified (OHI-S, Greene and Vermillion, 1964) were assessed at baseline (T0), 15 days (T1), and 30 days (T2). Data were analysed using SPSS software, with ANOVA and post-hoc tests determining statistical significance ($p < 0.05$).

Results: The oil pulling group showed a significant reduction in plaque levels ($p = 0.001$), gingival inflammation ($p = 0.002$), and improved oral hygiene scores ($p = 0.000$) compared to the control group. The most significant improvements occurred between baseline and 15 days, with a continued but slower improvement from 15 to 30 days. The control group, which received only oral health education, showed no significant changes in any indices over the study period ($p > 0.05$).

Conclusion: Oil pulling significantly enhances oral hygiene and reduces gingival inflammation and plaque levels when combined with oral health education. These findings suggest that oil pulling can be an effective, natural, and cost-effective adjunctive oral hygiene practice. Further long-term studies are recommended to establish standardized protocols and assess its broader clinical benefits.

Keywords: *Oil pulling, health education, adjunctive practises, plaque index, gingival index..*

1. INTRODUCTION

Periodontal diseases are among the most common chronic inflammatory conditions affecting individuals worldwide, contributing significantly to the global burden of oral health issues. Gingivitis, the early stage of periodontal disease, is

characterized by inflammation of the gingival tissues and is primarily caused by microbial plaque accumulation. If left untreated, it can progress to periodontitis, leading to tooth loss and systemic complications such as cardiovascular diseases and diabetes mellitus. Effective plaque control through mechanical methods like tooth brushing and flossing remains the cornerstone of periodontal disease prevention. However, due to limitations in technique, compliance, or accessibility, adjunctive measures such as chemical and herbal mouthrinses have gained popularity to enhance oral hygiene practices.[1]

Among these alternatives, oil pulling—a traditional Ayurvedic practice—has resurfaced as a potential adjunctive method for maintaining oral and periodontal health. Referred to as *Kavalagraha* or *Gandoosha* in classical Ayurvedic texts such as the *Charaka Samhita* and *Ashtanga Sangraha*, oil pulling involves swishing edible oils like coconut or sesame oil in the mouth for a specific duration, typically 10–20 minutes.[2] The practice is believed to draw out toxins and bacteria, cleanse the oral cavity, and improve oral health by promoting tissue healing and reducing inflammation.[3]

Coconut oil contains lauric acid, a medium-chain fatty acid known for its potent antimicrobial, anti-inflammatory, and antioxidant properties. These properties contribute to its effectiveness in reducing oral bacterial load, especially *Streptococcus mutans*, which plays a pivotal role in the initiation of dental caries and gingival inflammation.[4] Similarly, sesame oil is rich in polyunsaturated fatty acids and exhibits antibacterial effects against oral pathogens, making it a beneficial choice for oil pulling.[5]

The primary mechanism underlying oil pulling is the emulsification of oil with saliva, leading to the trapping of lipophilic bacterial cell walls and debris, which are expelled upon spitting out the oil. This process is thought to reach inaccessible areas within the oral cavity, thereby contributing to improved oral hygiene and reduced microbial colonization.[6] In contrast to chemical mouthwashes such as chlorhexidine, which are associated with side effects like tooth staining, altered taste sensation, and mucosal irritation, oil pulling is considered a safer and more natural alternative with minimal adverse effects.[7]

Several clinical studies have demonstrated the effectiveness of oil pulling in reducing plaque index, gingival index, and microbial counts when practiced regularly. A randomized controlled trial by Gosavi et al. showed that cold-pressed coconut oil significantly reduced salivary *Streptococcus mutans* counts, comparable to the effects of fluoride-based mouthrinses.[8] Similarly, Ripari et al. observed significant improvements in plaque and gingival indices among participants who used coconut oil for 30 days.[9]

Despite promising findings, oil pulling remains under-researched in modern dentistry. There is a need for more robust, double-blinded randomized clinical trials to evaluate its clinical efficacy and long-term outcomes. This study aims to assess the effectiveness of oil pulling as an adjunct to oral health education in maintaining periodontal health, compared to oral health education alone, among dental students in Udaipur, Rajasthan.

2. METHODOLOGY

Study Design and Setting

This study was designed as a double-blinded, randomized clinical trial conducted over a period of 45 days at the Department of Public Health Dentistry, Darshan Dental College and Hospital, Udaipur, Rajasthan. The aim was to assess the effectiveness of oil pulling as an adjunct to oral health education in improving periodontal health.

Photograph 1: Armamentarium used in the study

Ethical Approval

Prior to the commencement of the study, ethical clearance was obtained from the Institutional Ethical Committee of Darshan Dental College and Hospital. Written informed consent was obtained from all participants after providing a detailed explanation of the study's purpose and procedures.

Sample Size and Sampling Technique

A total of 40 participants were selected using simple random sampling. The sample size was determined based on previous studies showing significant reduction in plaque and gingival indices using oil pulling. Participants were randomly divided into two equal groups (n=20 each):

Photograph 2: Participants

- Group A (Control Group): Received oral health education only.
- Group B (Test Group): Received oral health education plus oil pulling therapy.

Inclusion Criteria

- Age group: 18–25 years.
- Healthy individuals with mild to moderate gingivitis.
- Willingness to participate and adhere to the study protocol.
- No history of periodontal therapy in the last six months.

Exclusion Criteria

- Presence of systemic diseases or conditions affecting periodontal health.
- Ongoing antibiotic or anti-inflammatory therapy.
- Allergies to coconut or sesame oil.
- Pregnant or lactating women.
- Individuals with orthodontic appliances or prosthetic restorations.

Photograph 3: Examination of the participants on Day-0.

Randomization and Blinding

Participants were randomized using a computer-generated randomization table. The study was double-blinded, meaning neither the participants nor the clinical evaluators were aware of the group assignments. Coding of oil containers and sealed envelopes was used to maintain blinding.

Intervention Protocol

- All participants were given standardized oral health education, including brushing techniques and oral hygiene instructions.
- Group B participants were instructed to perform oil pulling daily in the morning on an empty stomach using either cold-pressed coconut oil or sesame oil, swishing approximately 10 mL of oil for 8–10 minutes before spitting it out and rinsing with warm water.
- Compliance was monitored through weekly telephonic follow-ups and a participant log sheet.

Clinical Parameters and Data Collection

Clinical parameters were recorded at three time points:

- T0 – Baseline (Day 0)
- T1 – Day 15
- T2 – Day 30

The following indices were used:

1. Gingival Index (Löe and Silness, 1963) – To assess the severity of gingival inflammation.

2. Plaque Index (Silness and Löe, 1964) – To evaluate plaque accumulation.
3. Oral Hygiene Index-Simplified (OHI-S, Greene and Vermillion, 1964) – To assess overall oral hygiene status.

All assessments were carried out by a single calibrated examiner using sterile mouth mirrors and WHO periodontal probes under standardized lighting conditions.

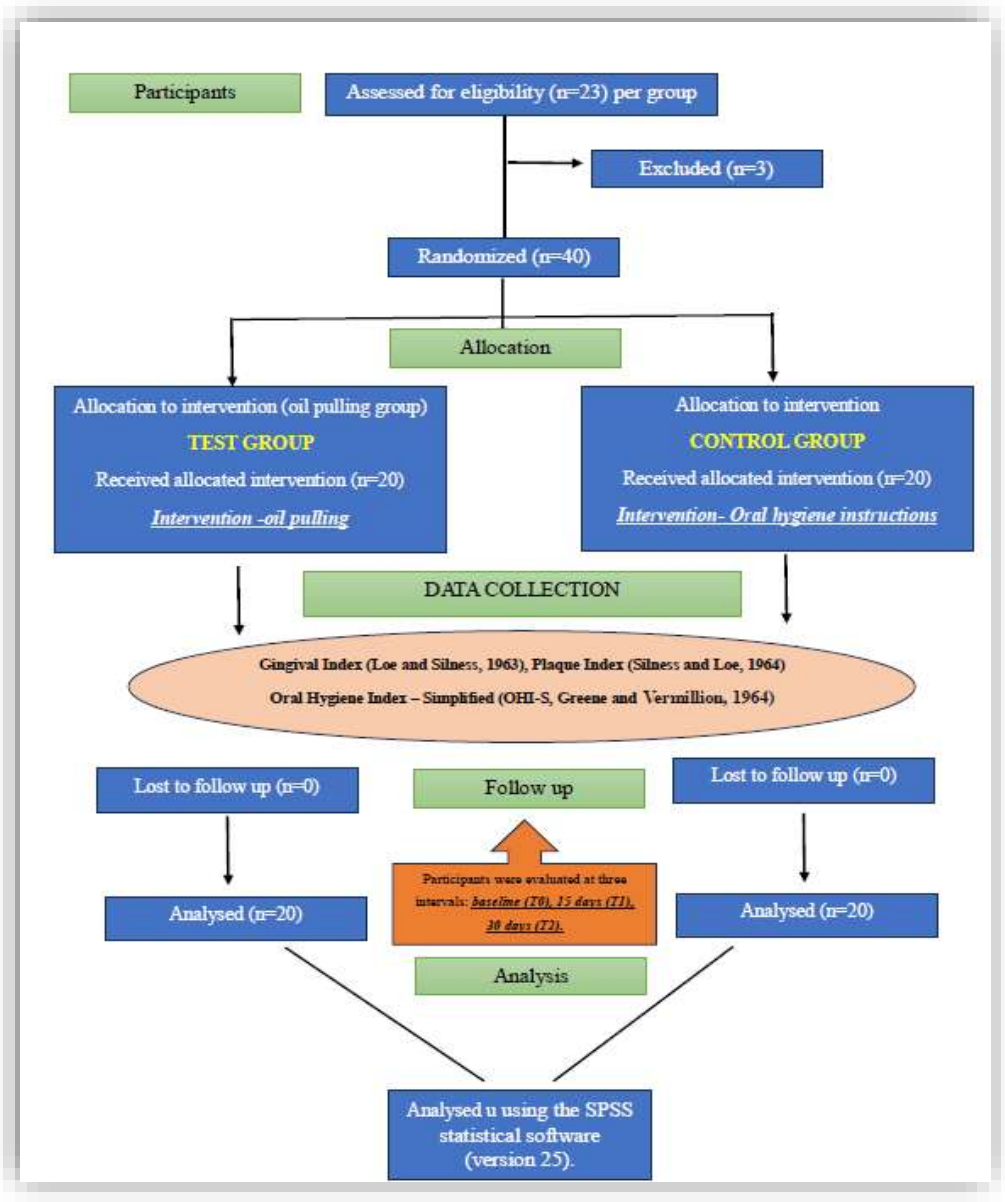
Photograph 4: Examination of the participants on Day-15.

Photograph 5: Examination of the participants on Day-30.

Photograph 6: Site of Examination

Statistical Analysis

Data were compiled and analysed using IBM SPSS Statistics version 20.0. Descriptive statistics (mean and standard deviation) were used to summarize the data. Analysis of Variance (ANOVA) followed by post-hoc Tukey's test was used to compare mean scores between and within groups at different time points. A p-value of < 0.05 was considered statistically significant.



3. RESULTS

Oil Pulling Group

Participants in the oil pulling group showed a significant improvement in all clinical parameters over the 30-day period:

- Plaque Index decreased from 1.60 ± 0.73 (baseline) to 1.11 ± 0.71 (15 days) and further to 0.76 ± 0.57 (30 days) ($p = 0.001$), indicating substantial plaque reduction.
- Gingival Index dropped from 1.87 ± 0.68 to 1.38 ± 0.69, and then to 1.11 ± 0.59 ($p = 0.002$), reflecting a significant decline in gingival inflammation.
- Oral Hygiene Index-Simplified (OHI-S) improved from 1.89 ± 0.68 to 1.40 ± 0.69, and finally 1.11 ± 0.59 ($p =$

0.002), indicating better oral cleanliness.

Post hoc analysis confirmed statistically significant improvements between baseline and 30 days ($p < 0.05$). However, changes between 15 and 30 days were not significant ($p > 0.05$), suggesting that most benefits occurred in the first half of the study.

Health Education Group

In contrast, the control group receiving only oral health education showed no statistically significant changes:

- Plaque Index remained stable (1.97 ± 0.51 to 1.97 ± 0.55; $p = 0.963$).
- Gingival Index showed minimal variation (1.775 ± 0.607 to 1.85 ± 0.813; $p = 0.948$).
- OHI-S fluctuated inconsistently (3.09 ± 1.28 to 3.53 ± 1.41; $p = 0.507$).

Post hoc comparisons also revealed no significant differences at any time point ($p > 0.05$), confirming the limited effectiveness of health education alone in improving periodontal parameters.

Overall, oil pulling combined with oral health education resulted in significant reductions in plaque, gingival inflammation, and improvement in oral hygiene, particularly within the first 15 days. In contrast, oral health education alone showed no significant impact on periodontal health.

Table-1 Effect of oil pulling on Plaque levels

	Mean	Standard deviation	P-value
Baseline	1.60	±0.73	0.001*
15 days	1.11	±0.71	
30 days	0.76	±0.57	
Total	1.15	±0.75	

Tests applied (Repeated measures ANOVA) *Statistically significant (p < 0.05)

Table-2 Effect of oil pulling on Gingival levels

	Mean	Standard deviation	P-value
Baseline	1.87	±0.68	0.002*
15 days	1.38	±0.69	
30 days	1.11	±0.59	
Total	1.45	±0.72	

Tests applied (Repeated measures ANOVA) *Statistically significant (p < 0.05)

Table-3 Effect of oil pulling on Oral Hygiene levels

	Mean	Standard deviation	P-value
Baseline	1.89	±0.68	0.002*
15 days	1.40	±0.69	
30 days	1.11	±0.59	
Total	1.45	±0.72	

Tests applied (Repeated measures ANOVA) *Statistically significant (p < 0.05)

Table- 4 Comparing gingival levels, plaque levels and OHIS

Time	PI mean difference	P-value	GI mean difference	P-value	OHIS mean difference	P-value
0 days- 15 days	0.49 (0.21)	0.07	0.49 (0.20)	0.06	0.48 (0.20)	0.06
0 days- 30 days	0.84 (0.21)	0.001*	0.76 (0.20)	0.002	0.76 (0.20)	0.002*
15 days- 0 days	-0.49 (0.21)	0.07	-0.48 (0.20)	0.06	-0.48 (0.20)	0.06
15 days-30 days	0.35 (0.21)	0.32	0.27 (0.20)	0.58	0.27 (0.20)	0.58
30 days- 0 days	-0.84 (0.21)	0.001*	-0.76 (0.20)	0.002	-0.76 (0.20)	0.002*
30 days- 15 days	-0.35 (0.21)	0.32	-0.27 (0.20)	0.58	-0.27 (0.20)	0.58

Tests applied (Post hoc Bonferroni test) *Statistically significant (p < 0.05)

Table- 5 Effect of Health Education on Plaque levels

	Mean	Standard deviation	P-value
Baseline	1.97	±0.51	0.963
15 days	1.92	±0.54	
30 days	1.97	±0.55	
Total	1.95	±0.52	

Tests applied (Repeated measures ANOVA) *Statistically significant ($p < 0.05$)

Table-6 Effect of Health Education on Plaque levels

	Mean	Standard deviation	P-value
Baseline	1.7750	±0.60774	0.948
15 days	1.8150	±0.74217	
30 days	1.8500	±0.81338	
Total	1.8133	±0.71437	

Tests applied (Repeated measures ANOVA) *Statistically significant ($p < 0.05$)

Table-7 Effect of oil pulling on Oral Hygiene levels

	Mean	Standard deviation	P-value
Baseline	3.0900	±1.27935	0.507
15 days	4.2300	±5.01336	
30 days	3.5350	±1.41766	
Total	3.6183	±3.08091	

Tests applied (Repeated measures ANOVA) *Statistically significant ($p < 0.05$)

Table- 8 Comparing gingival levels, plaque levels and OHIS

Time	PI mean difference	P-value	GI mean difference	P-value	OHIS mean difference	P-value
0 days- 15 days	0.04 (0.169)	1.00	-0.40 (0.22)	1.00	-1.14 (0.97)	0.74
0 days- 30 days	0.00 (0.169)	1.00	-0.75 (0.22)	1.00	-0.44 (0.97)	1.00
15 days- 0 days	-0.04 (0.169)	1.00	0.40 (0.22)	1.00	1.14 (0.97)	0.74
15 days-30 days	-0.04 (0.169)	1.00	-0.35 (0.22)	1.00	0.69 (0.97)	1.00
30 days- 0 days	0.00 (0.169)	1.00	0.75 (0.22)	1.00	0.44 (0.97)	1.00
30 days- 15 days	0.04 (0.169)	1.00	0.35 (0.22)	1.00	-0.69 (0.97)	1.00

Tests applied (Post hoc Bonferroni test) *Statistically significant ($p < 0.05$)

Graph 1: The first bar graph illustrates the impact of oil pulling on plaque levels across different time intervals. A noticeable reduction in plaque scores is observed post-intervention, indicating that oil pulling significantly helps in decreasing plaque accumulation. The decline in values over the duration of the study suggests consistent improvement in oral cleanliness among participants who practiced oil pulling.

Graph 2: This graph presents the effect of oil pulling on gingival levels, showing a marked decrease in gingival inflammation. The bar heights decline steadily from baseline to the final evaluation, implying that oil pulling positively influences gum health, possibly by reducing microbial load and improving oral hygiene behavior.

Graph 3: The third bar graph demonstrates changes in oral hygiene status due to oil pulling. The decreasing trend in scores suggests that regular oil pulling contributes to an overall improvement in oral hygiene, likely due to its mechanical cleaning action and antibacterial properties.

Graph 4: This graph shows plaque levels in the control group that received only health education. A slight reduction is noted, but not as significant as in the oil pulling group, indicating limited effect of education alone in reducing plaque without an adjunctive cleaning method.

Graph 5: The fifth graph focuses on gingival levels in the health education group. While there is some improvement, it is

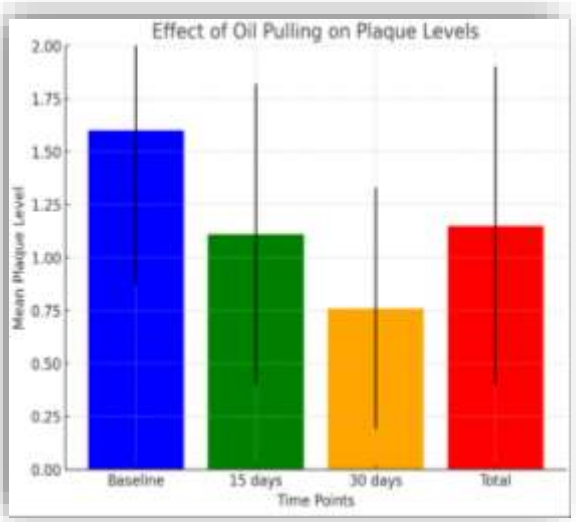
modest compared to the oil pulling group, suggesting that education alone may promote awareness but is less effective in reducing gingival inflammation.

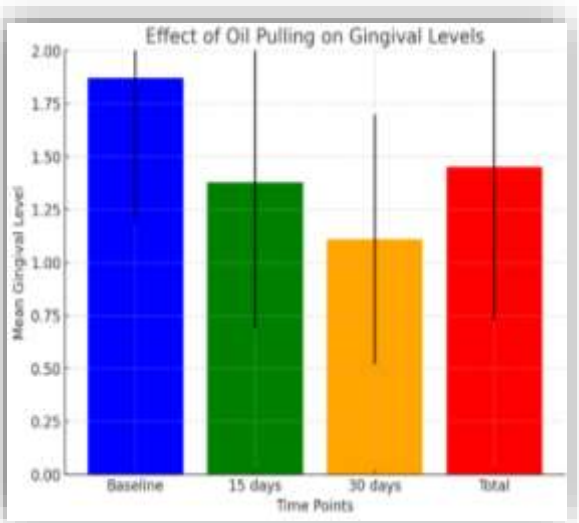
Graph 6: This graph assesses oral hygiene improvements in the health education group. Though a mild improvement is evident, it is not as pronounced as that observed with oil pulling, highlighting that behavioral change from education alone may not yield substantial hygiene improvements.

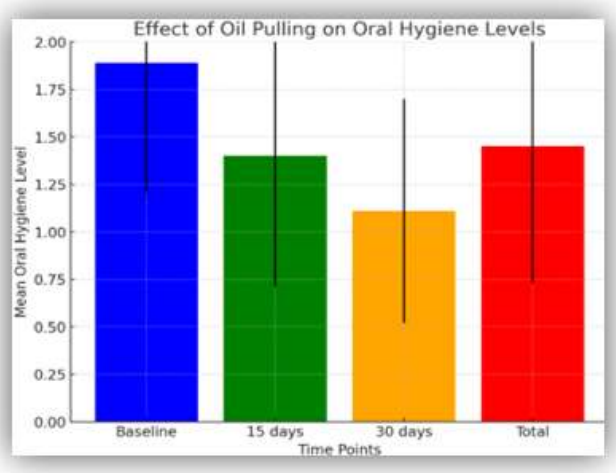
Graph 7: The comparative graph between oil pulling and health education on plaque levels clearly shows that oil pulling is more effective. The bar representing the oil pulling group is significantly lower, suggesting it has a greater impact in reducing plaque compared to health education alone.

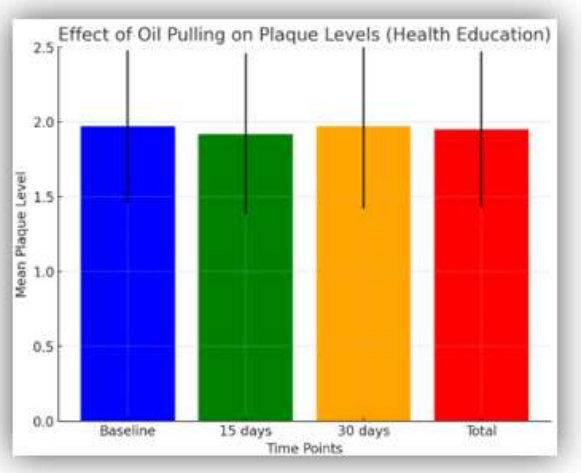
Graph 8: This graph compares the effects of oil pulling versus health education on gingival health. The oil pulling group demonstrates a larger reduction in gingival scores, underscoring its superior anti-inflammatory benefits in improving gum health.

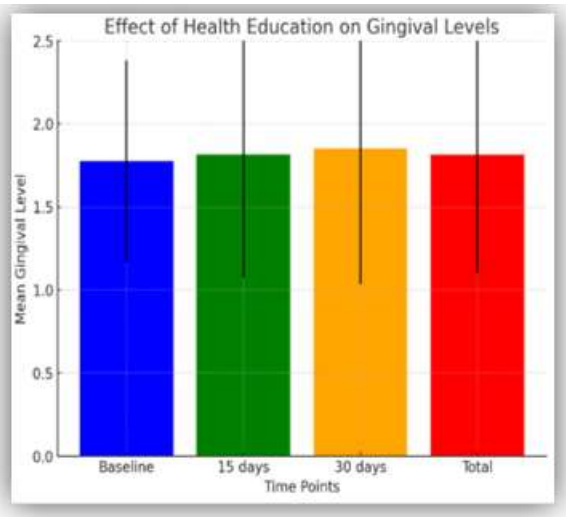
Graph 9: In the final comparative graph, oral hygiene scores are lower for the oil pulling group, reaffirming that oil pulling offers a more substantial improvement in overall oral hygiene than health education. This highlights oil pulling's potential as an adjunctive preventive oral care measure.

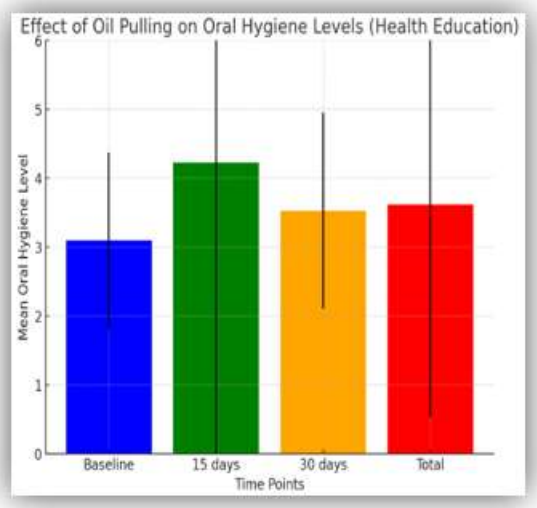




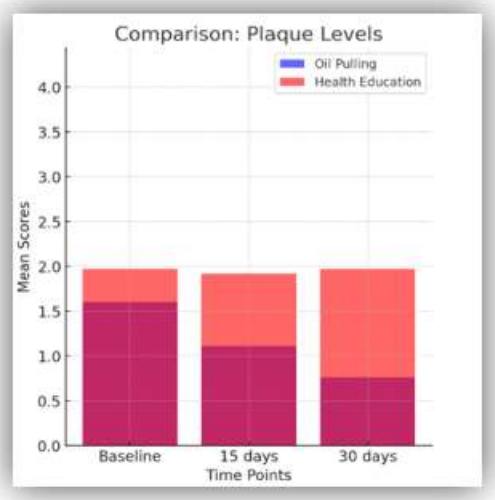


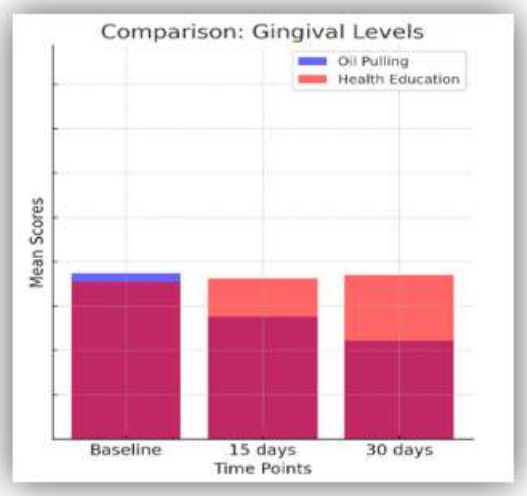


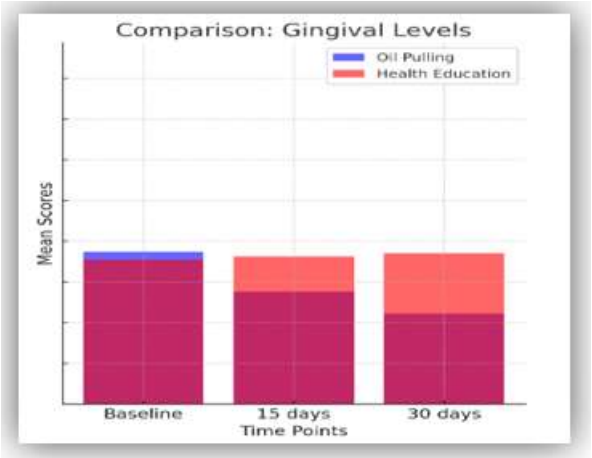




COMPARATIVE ANALYSIS OF OIL PULLING VERSUS HEALTH EDUCATION ON PLAQUE LEVELS, GINGIVAL LEVELS, AND ORAL HYGIENE LEVELS.







4. DISCUSSION

This study demonstrated that oil pulling, when combined with oral health education, significantly improves oral hygiene status, reduces plaque accumulation, and lowers gingival inflammation. The intervention group that practiced daily oil pulling showed statistically significant reductions in plaque index (PI), gingival index (GI), and oral hygiene index-simplified (OHI-S) over 30 days, with the most substantial changes occurring within the first 15 days. This rapid response suggests that oil pulling exerts an early and strong antimicrobial and anti-inflammatory effect, which may plateau with continued use.

These results are consistent with previous research by **Gosavi et al. (2024)**, who found that oil pulling using cold-pressed coconut oil significantly reduced *Streptococcus mutans* counts and improved plaque control in children. Their randomized controlled trial reported that oil pulling was as effective as commercially available fluoride mouthwashes in reducing microbial load, suggesting that oil pulling can be a natural, economical alternative for maintaining oral hygiene.[8]

In contrast, **Kim and Ji (2022)** performed a meta-analysis and found that while oil pulling did reduce salivary bacterial colony counts, it did not result in significant changes in clinical indices such as plaque and gingival scores. This discrepancy might be attributed to variations in study design, the type of oil used, adherence levels, or differences in baseline oral health status among participants.[10]

The findings of our study also highlight the limitations of oral health education as a standalone intervention. The control group, which received only oral health education, did not demonstrate any statistically significant improvements in PI, GI, or OHI-S throughout the study duration. These results are in line with the findings of **Gao (2017)** and **Kay and Locker (1996)**, who concluded that traditional health education programs had limited or only short-term effects on clinical oral health outcomes.[11,12] This reinforces the importance of coupling education with actionable and practical oral hygiene strategies, such as oil pulling, to achieve meaningful clinical results.

Mechanistically, oil pulling may benefit oral health through emulsification and saponification. When oil is swished in the mouth, it mixes with saliva and emulsifies, trapping bacteria and debris. Coconut oil, in particular, contains lauric acid, known for its antibacterial, antiviral, and anti-inflammatory properties, which may explain the reduction in plaque and gingival inflammation observed in this study.[13]

Although chlorhexidine is widely regarded as the gold standard in chemical plaque control, long-term use is associated with side effects such as tooth staining, altered taste sensation, and increased calculus formation. Oil pulling offers a natural, side-effect-free alternative that can be easily adopted, especially in low-resource settings.

Nevertheless, this study is not without limitations. It had a relatively small sample size and short follow-up duration. Participant compliance with the oil pulling regimen could not be directly monitored, and microbiological analysis was not performed. Future studies should investigate long-term outcomes, compare oil pulling with medicated mouthwashes, and include microbial assays to better understand the underlying mechanisms.

In conclusion, oil pulling appears to be an effective adjunct to conventional oral hygiene education in improving periodontal health. Its simplicity, affordability, and safety make it a viable option in community-based oral health programs.

5. CONCLUSION

Oil pulling represents a promising adjunctive therapy in oral healthcare, offering antimicrobial, anti-inflammatory, and systemic health benefits. Its affordability, accessibility, and natural composition make it particularly appealing for use in underserved populations and as a sustainable alternative to chemical mouthwashes. However, further high-quality research is essential to establish standardized guidelines and fully integrate oil pulling into evidence-based dental practice.

Oil pulling is emerging as a promising adjunctive therapy in oral healthcare, offering a range of benefits, including antimicrobial, anti-inflammatory, and systemic health advantages. This ancient practice, rooted in traditional medicine, has gained renewed interest due to its potential to reduce oral microbial load, improve gingival health, and contribute to overall well-being. Its affordability and ease of access make it an attractive option, particularly in resource-limited settings where conventional dental treatments may not be readily available. Additionally, the natural composition of oils used in this practice, such as coconut, sesame, or sunflower oil, provides a chemical-free alternative to conventional mouthwashes, reducing the risk of adverse effects associated with synthetic formulations.

Beyond its localized effects on oral health, emerging evidence suggests that oil pulling may also support systemic health by reducing oral inflammation, which is increasingly recognized as a contributing factor to conditions such as cardiovascular disease and diabetes. Despite these promising benefits, the current body of research lacks high-quality, large-scale clinical trials to establish definitive efficacy, optimal protocols, and standardized guidelines for practice. To fully integrate oil pulling into evidence-based dental care, further rigorous scientific investigations are necessary to clarify its mechanism of action, establish recommended duration and frequency, and assess its long-term impact on oral and systemic health.

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