

## **Efficacy of Ozonated Olive Oil in Oil Pulling Technique in Patients with Generalized Chronic Gingivitis To Improve Oral Hygiene**

<sup>1</sup>Dr. Sanjna B. Sharma, Postgraduate Student, Department of Periodontology, Chhattisgarh Dental College and Research Institute, Rajnandgaon

<sup>2</sup>Dr. Shruti Bhatnagar, Reader, Department of Periodontology, Chhattisgarh Dental College and Research Institute, Rajnandgaon

<sup>3</sup>Dr. Aniket Sharan, Department of Periodontology, Kasturi Dental Clinic, Ranchi

<sup>4</sup>Dr. Bhawna Shyamsukha, Postgraduate Student, Department of Periodontology, Chhattisgarh Dental College and Research Institute, Rajnandgaon

<sup>5</sup>Dr. Shashank Rai, Postgraduate Student, Department of Periodontology, Chhattisgarh Dental College and Research Institute, Rajnandgaon

**Corresponding Author:** Dr. Sanjna B. Sharma, Postgraduate Student, Department of Periodontology, Chhattisgarh Dental College and Research Institute, Rajnandgaon

**Citation of this Article:** Dr. Sanjna B. Sharma, Dr. Shruti Bhatnagar, Dr. Aniket Sharan, Dr. Bhawna Shyamsukha, Dr. Shashank Rai, “Efficacy of Ozonated Olive Oil in Oil Pulling Technique in Patients with Generalized Chronic Gingivitis To Improve Oral Hygiene”, IJDSIR- October – 2025, Volume – 8, Issue – 5, P. No. 166 – 171.

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**Type of Publication:** Original Research article

**Conflicts of Interest:** Nil

### **Abstract**

**Introduction:** Oil pulling or oil swishing therapy is a traditional procedure in which the patient will rinse or swish oil in their mouth. Ozonated olive oil is known for its anti-inflammatory properties, may be considered for management of gingivitis.

The objective of this study was to assess efficacy of ozonated olive oil in oil pulling technique using plaque index and gingival index.

**Methodology:** Total 60 patients with generalized chronic gingivitis were selected and were divided into 2 equal

groups (Group 1-control group (30 patients received only oral Clinical parameters used are plaque index and modified gingival index, at baseline & 30<sup>th</sup> day. Participants have to perform daily oil pulling with ozonated olive oil for 1 mi. Statistical analysis was performed.

**Results:** The results showed decreased in gingival inflammation and plaque score in both the groups at the end of 30 days. The oil pulling shown better improvement compared to SRP alone.

**Conclusion:** Ozone oil can be good anti-gingivitis agent

**Keywords:** Oil Pulling, Ozonated Olive Oil, Chronic Gingivitis

## **Introduction**

Maintaining optimal oral health is paramount for individuals. It is most dependable and widely accepted techniques for preserving oral hygiene globally are mechanical tooth cleaning methods. Nonetheless, the pursuit of adjuvants that aid in reducing plaque formation and sustaining oral hygiene has been ongoing. However, the current chemotherapeutic adjuvants employed for plaque reduction are not without their drawbacks.<sup>1</sup>

Gingivitis, a reversible inflammatory condition, manifests clinically as redness, swelling, bleeding, and discomfort. In the absence of intervention, it may progress to more severe periodontal disease, resulting in the loss of supporting structures such as periodontal ligaments and alveolar bone.<sup>2</sup>

Oil pulling techniques have historically been employed to mitigate gum diseases. Kavala Graha, an Ayurvedic oral hygiene practice, involves holding or swishing a comfortable amount of oil or medicated oil in the mouth until it becomes thin and milky white, then expectorating it without swallowing. Dr. F. Karach popularized this method. Recent research using sunflower and sesame oils in oil pulling therapy has demonstrated efficacy in reducing plaque-induced gingivitis.<sup>3</sup>

Olive oil has been acknowledged for its positive impact on general well-being. The synergistic combination of olive oil and ozone presents a comprehensive approach to achieving optimal health and wellness, making it a valuable asset in any health and beauty regimen. Ozonated olive oil is a distinctive natural product that merges the therapeutic attributes of olive oil with the potent effects of ozone. This innovative blend is meticulously crafted by infusing extra-virgin olive oil with ozone gas, resulting in a viscous, gel-like substance

that offers a spectrum of health benefits. Olive oil is renowned for its potent antibacterial, antifungal, and anti-inflammatory properties.<sup>4</sup>

The ozonated olive oil is a powerful and versatile natural product that provides a variety of health benefits. Renowned for its wealth of antioxidants, vitamins, and beneficial fats, olive oil serves as an exceptional carrier for ozone. When combined, the ozone interacts with the fatty acids in olive oil, resulting in the formation of ozonides. These compounds have the unique ability to release oxygen when applied to the skin or ingested, enhancing cellular function and facilitating the healing process. Additionally, the inherent antimicrobial properties of this combination make it an effective natural remedy for wounds and ulcers, accelerating healing and reducing the risk of infection. Beyond topical applications, ozonated olive oil can be used for oral hygiene to reduce bacteria in the mouth and promote healthier gums.

The ozonated olive oil demonstrates anti-inflammatory, antioxidant, and antimicrobial characteristics. The ozonated water effectively inhibits plaque accumulation *in vitro*, exhibiting high efficacy against Gram-positive and Gram-negative oral microorganisms. This combination can be effectively utilized in the treatment of microbial-induced inflammatory conditions such as gingivitis.<sup>[5]</sup> Therefore, this study aims to evaluate the efficacy of ozonated olive oil using the oil pulling technique in patients with chronic generalized gingivitis.

## **Materials and Methodology**

A prospective clinical study was conducted. A total of 60 patients were recruited from the outpatient department of Periodontology, Chhattisgarh Dental College and Research Institute, Rajnandgaon, Chhattisgarh, India. The patients selected had generalized chronic gingivitis. Ethical approval was obtained from the institutional

review board. The patients were informed about study procedures and informed consent was provided. Once consent was obtained, the patients were categorized and enrolled according to the selection criteria.

G power software, version 3.1.9.7 (Heinrich-Heine-Universitat Dusseldorf, Dusseldorf, Germany) was used. Power was kept at 0.80 (as per previous study), confidence interval was kept at 95%, and alpha error was considered to be 0.05. A priori computation was done to calculate for t test, an actual power of 0.802 at effect size of 0.31 yielded a sample size of 60 for two groups (30 per group).

#### **Inclusion criteria**

- [i] Patients with generalized chronic gingivitis;
- [ii] No history of antibiotic or periodontal therapy in previous 6 months.

#### **Exclusion criteria**

- [i] Patients taking medications that could affect their periodontal health;
- [ii] Known allergy to ozonated olive oil;
- [iii] Patients with aggressive periodontitis;
- [iv] Patient with adverse habits (i.e. smoking, tobacco, gutka chewing, alcohol consumption);
- [v] Pregnant or nursing females.

Total subjects were divided into two groups i) Group 1- Control group [30 patients receiving only oral hygiene routine instructions; Group 2 -Test group [30 patients receiving oral hygiene instructions+ oil pulling by ozonated olive oil. The patients were asked for swishing 2 ml ozonated olive oil in the morning for 1 min daily after brushing of teeth for 30 days.

#### **Clinical Parameters**

The clinical parameters included were:

- Silness and Loe plaque index [PI][1964]
- Loe and Silness gingival index [GI] [1963]

All the parameters were recorded at baseline and 30<sup>th</sup> day. Clinical examination was carried out by the same Periodontist. On baseline the clinical parameters were recorded in both groups. Group 1-control group-patients received, only oral hygiene routine instructions and Group 2-Test group-patients received oral hygiene instructions + oil pulling by ozonated olive oil.

Clinical changes were expressed using the mean difference from initial recording of parameter at baseline to final outcome after the therapy at 30<sup>th</sup> day. This was done for the clinical parameters. (Flow chart 01)

#### **Results**

The results showed that there is decrease in gingival inflammation and plaque score in both the groups at the end of 30<sup>th</sup> day. The intergroup comparison showed that SRP + oil pulling had superior effect as compared to SRP alone. (Table 1 & 2)

#### **Discussion**

The development of plaque-induced gingival disease is a complex interplay between plaque, the gingival tissues, and the host's inflammatory response. It is associated with subtle microbial changes as plaque matures.<sup>6</sup>

By employing chemico-mechanical procedures, oral hygiene measures effectively reduce the occurrence of plaque-related diseases through attenuation of plaque accumulation. In this study, we utilized ozonated olive oil to evaluate effectiveness of the ozonated olive oil pulling technique in plaque score assessment and to gauge the efficacy of ozonated olive oil in oil pulling for gingival inflammation.

Olive oil is primarily composed of monounsaturated fats, predominantly oleic acid (65-85%), linoleic acid, and palmitic acid (up to 18-21%). It is also rich source of bioactive substances such as tocopherols and phenolic compounds. When exposed to ozone, the double carbon-carbon bonds in unsaturated fatty acids undergo reactions

that result in the formation of various oxygenated compounds, including peroxides, aldehydes, and ozonides. These compounds contribute to increased biological activity of ozonated olive oil (OZO), particularly its antimicrobial properties.<sup>7</sup> The extent of these reactions and the resulting biological activity are influenced by several factors, including the duration of the ozonation process, temperature, ozone concentration, flow rate, and the type and value of the olive oil.

Ozonated olive oil has demonstrated anti-inflammatory, antioxidant, and antimicrobial properties. Ozone's ability to eliminate bacteria, viruses, fungi, and other pathogens makes it a potent antimicrobial agent.<sup>8</sup>

Nagayoshi et al. demonstrated the remarkable efficacy of ozonated water in inhibiting plaque accumulation in vitro. This innovative approach exhibits, exceptional effectiveness against both Gram-positive and Gram-negative oral microorganisms.<sup>9</sup> Furthermore, our studies on oil pulling with sunflower oil have yielded promising results, indicating a significant reduction in plaque index and gingival index over a 45-day period. Additionally, the findings of Dr. Asokan and colleagues suggest that oil pulling therapy utilizing sesame oil can be equally effective as chlorhexidine in mitigating plaque-induced gingivitis.<sup>10</sup>

Ozonated olive oil has demonstrated greater efficacy in diminishing clinical indicators (plaque index and modified gingival index) and enhancing general oral health, potentially attributable to its anti-inflammatory properties.<sup>11</sup>

## Results

Table 1: Intra-Group Comparison

			Mean	Std. Deviation	Mean difference	t	P value
Control	Plaque index	Baseline	1.99	0.49	0.56	7.035	0.000
		30 days	1.43	0.30			
	Gingival index	Baseline	2.03	0.55	0.83	9.161	0.000

In addition to the notable characteristics of ozone gas broken down in oil, it is plausible that oil pulling's independent mechanism of action could be attributed to the oil's viscosity, potentially impeding bacterial adhesion and plaque co-aggregation. Additional mechanisms may include saponification, or the "soap-making" process resulting from the alkaline hydrolysis of fat. Furthermore, emulsification significantly increases the oil's surface area, enhancing its cleansing effect.<sup>12</sup>

Peedikayil et al<sup>1</sup>, Sezgin Y et al<sup>12</sup> indicates that the oil pulling technique using coconut oil may be an effective complementary procedure in reducing plaque formation and plaque-induced gingivitis. Furthermore, Akash N. suggests that ozonated olive oil is equally effective in reducing plaque and gingivitis as chlorhexidine mouthwash.<sup>13</sup>

The positive outcomes of the present study align with existing literature. Consequently, further research should be conducted, taking into account the limitations of this traditional, cost-effective, and advantageous technique. It can be safely utilized as an adjunct to maintain proper oral hygiene when consistently combined with tooth brushing and flossing.

## Conclusion

Ozonated olive oil has demonstrated greater efficacy in ameliorating clinical parameters, including plaque index and modified gingival index, while simultaneously enhancing overall oral health. This favorable impact is potentially attributed to its remarkable anti-inflammatory properties.

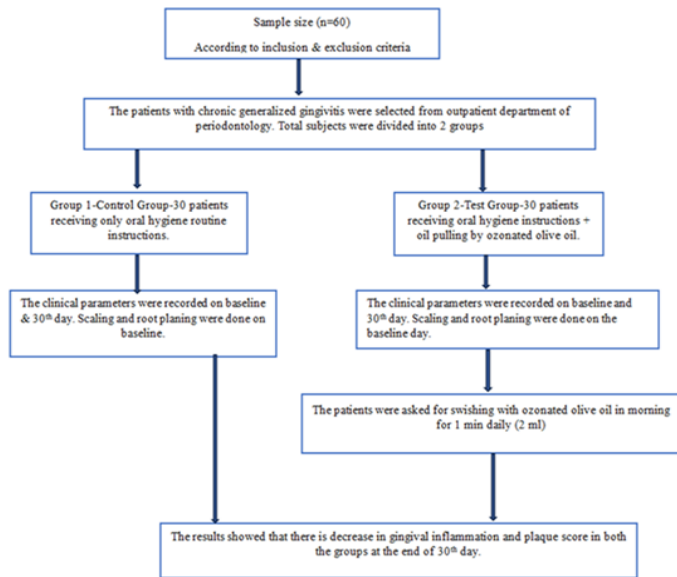
		30 days	1.19	0.48			
Test	Plaque index	Baseline	2.02	0.58	0.90	8.806	0.000
		30 days	1.11	0.39			
	Gingival index	Baseline	1.94	0.56	1.12	12.985	0.000
		30 days	0.81	0.50			

Table 2: Inter-Group Comparison

		T	Sig. (2-tailed)	Mean Difference between test and control	Std. Error Difference
Baseline	Plaque index	-.162	.872	-.02267	.14022
	Gingival index	.650	.518	.09433	.14510
30 days	Plaque index	3.490	.001	.31800	.09112
	Gingival index	2.978	.004	.38100	.12793

**Study Outline**

Flow chart 1:



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