



Research Article

Evaluation of ozone oil irrigation as an adjunct to Scaling and Root Planing in the treatment of chronic periodontitis – a randomized clinical trial

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ABSTRACT

Objectives: With increasing numbers of various periodontal problems one of the most frequently encountered is chronic periodontitis. Although the benchmark for treatment is always scaling and root planing, non-invasive adjuncts to Scaling and Root Planing (SRP) in the form of various irrigations have shown promising results. Ozone, a potent oxygen scavenger, is used in this study as an adjunct to non-surgical periodontal therapy.

Materials and Methods: A total of 60 patients with 186 sites were selected with PPD >5 mm, PI >2, GI >2. Scaling and root planing was performed meticulously and on the same day ozonated olive oil irrigation was performed and the healing of gingiva was checked by clinical parameters after 1 month.

Results: Statistically significant reduction in PPD, plaque index has been seen at the end of period of 1 month.

Conclusion: Use of ozonated olive oil irrigation as an adjunct to scaling and root planing showed good results in reduction of clinical parameters, in patients with chronic periodontitis.

Keywords: Local drug delivery, Ozone oil, Periodontitis

INTRODUCTION

Periodontitis is an infectious inflammatory disease characterized by progressive clinical attachment loss; recession followed by mobility and ultimately tooth loss.^[1]

The aim of treating periodontitis is primarily focused on decreasing the virulent microbial overload and symptoms of inflammation, that is, pain, bleeding, and mobility.^[2]

For years benchmark for treatment of periodontitis is non-surgical periodontal therapy, but clinicians are always in search of new and less time-consuming alternatives for quick result in patients. Subgingival irrigation with medicaments is still a subject of discussion in the treatment of periodontitis.^[1]

The versatile gas ozone, the protective layer in the atmosphere, is an excellent medicament with many medicinal uses. The tri-atomic gas constitutes mainly 99–99.5% of O₂ and 0.05–0.5% of O₃, respectively for medical uses.^[3] Although ozone is mainly a gas, suspensions in oil, gel and

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liquid forms are available for medical uses. Ozone is not only useful in treating periodontal problems, it is also useful in treatment of osteoradionecrosis of jaw.^[4]

The mechanism by which ozone works includes antibiotic property, analgesic property, detoxification, and immune activation by increasing catabolic and anabolic in body.^[5]

The main reason behind using ozonated olive oil is its biocombining activity with epithelial and connective tissue component of oral mucosa.^[6] Ozone has been found to be a beneficial antiseptic agent in many ways. Placing the toothbrush in ozonated water keeps the toothbrush sterile, it is the material of choice for sterilizing heat sensitive materials.^[7] Sub-gingival irrigation of ozonated water has been supported by many authors to have more beneficiary effect than chlorhexidine, Povidone-iodine sub-gingival irrigation not only has healing effect but also alters quantity of various forms of plaque thereby reducing signs of inflammation of gums.^[8] This study differs from other sub-gingival irrigational studies because of its use of ozonated olive oil which is having high substantivity in the sub-gingival areas. This study has shown minimum side effects compared to other irrigants that caused mucosal desquamation, taste alteration and discoloration of gingiva.^[9] Furthermore, its economically reasonability has make it affordable for large strata of population.

MATERIALS AND METHODS

This study is a randomized control clinical trial in which patients from Outpatient Department of Periodontology of New Horizon Dental College, Bilaspur, Chhattisgarh were included in the study. Written and signed informed consent were taken from the patients. Out of the selected 60 patients, a total of 186 sites were selected for study with PPD >5 mm, PI >2, and GI >2.

Ethical clearance for the study was taken from the Ethical Clearance Committee of New Horizon Dental College and Research Institute, (2018-01/02/20).

Inclusion criteria

The following criteria were included in the study:

- Patients above age of 30 years
- Systemically healthy individuals
- Clinical and radiographical evidence of patients with chronic periodontitis^[10]
- At least 4–8 sites with PPD of 5 mm or more
- Patient having at least 28 teeth in dental arch.

Exclusion criteria

The following criteria were excluded from the study:

- Patients with systemic illness
- Patient with use of systemic antibiotics in past 12 months
- Pregnancy and lactation.

Methodology

The study period of total 30 days included the recording of PI, GI, PPD, at baseline or first visit of patients, then on the same day scaling was performed and patient was recalled after 7 days for root planing and adjunctive ozonated olive oil [Figure 1] irrigations was performed [Figure 2]. Patients were followed up after 21 days' time period and again the recordings were re-checked for the results [Figure 3].

RESULTS

The statistical analysis was performed using statistical software SPSS V 22.0 by applying paired *t*-test with $P < 0.05$ considered as statistical significance.

The mean comparison between probing pocket depth at the baseline and after ozonated olive oil therapy showed significant reductions showing the positive relation of using ozonated olive oil irrigation therapy [Table 1 and Graph 1].

Mean PPD at baseline was 6.10 ± 1.06 and 2.85 ± 1.17 after 1 month, which was found to be significant ($P = 0.000$).

Mean plaque index was found to be 2.42 ± 0.50 at baseline and 1.18 ± 0.39 after 1 month, which was found to be significant ($P = 0.000$).

The gingival index taken at the baseline was 1.30 ± 0.46 and 1.27 ± 0.44 after 1 month which was found to be significant ($P = 0.000$).

DISCUSSION

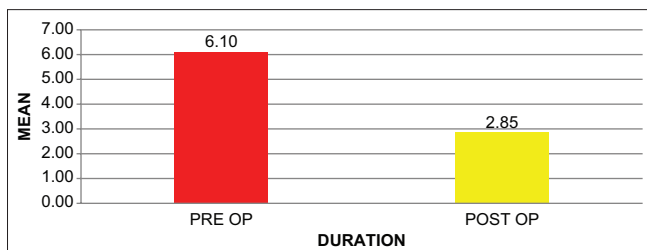
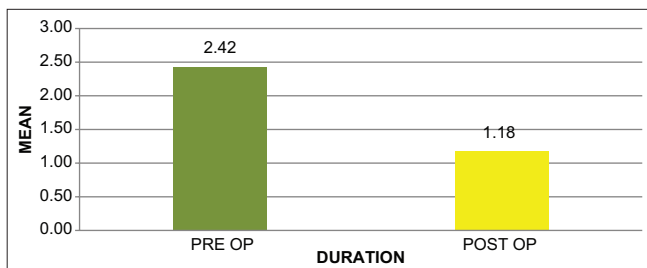
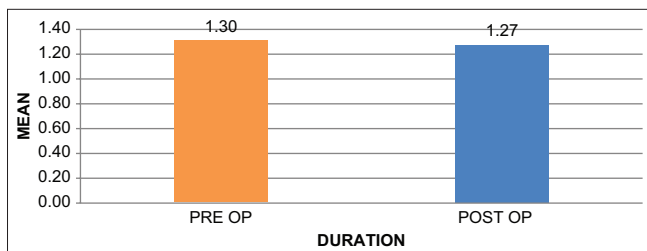
Ozonated water has emerged as an important oral antibacterial agent and adjunct to periodontal therapy. In the present trial, the results show that the decrease in plaque index and gingival index was comparable in the two treatment groups. There was also improvement in the control group.

The good response to non-surgical therapy in the present study confirms the results of previous studies As root surface roughness resulting from instrumentation by manual curettes and ultrasonic scalers may influence the rate of plaque retention (33), the end point of SRP was considered as the achievement of smooth tooth surfaces on tactile sensation with a periodontal explorer (35,36). Using medicaments in sub-gingival irrigation decreases plaque indices, but does not completely eliminate signs of inflammation (8,9). Mean PPD at baseline was 6.10 ± 1.06 and 2.85 ± 1.17 after 1 month,

Table 1: Mean comparison between pre-operative and post-operative in probing depth.

Clinical variables	Duration	Min	Max	Mean	SD	Difference mean±SD	% of Mean change	P-value
Probing depth	PRE OP	5.00	11.00	6.10	1.06	3.25±0.11	-53.28	0.000 Significant
	POST OP	2.00	7.00	2.85	1.17			

Statistical Analysis: Paired *t*-test. Statistically significant if $P < 0.05$

**Graph 1:** Mean comparison between pre-operative and post-operative in probing depth.**Graph 2:** Mean comparison between pre-operative and post-operative plaque index.**Graph 3:** Mean comparison between pre-operative and post-operative gingival index

which was found to be significant ($P = 0.000$) as shown in [Table 1 and Graph 1].

Mean plaque index was found to be 2.42 ± 0.50 at baseline and 1.18 ± 0.39 after 1 month' which was found to be significant ($P = 0.000$) as shown in [Table 2 and Graph 2].

The gingival index taken at the base line was 1.30 ± 0.46 and 1.27 ± 0.44 after 1 month which was found to be significant ($P = 0.000$) as shown in [Table 3 and Graph 3].

The effectiveness of ozonated olive oil as an adjunct to SRP has been hence proved in this study. The results of the study

were in accordance with various authors who investigated ozone therapy in periodontitis. Durga *et al.* (2010) also found the similar reduction in GI, PI. The reduction in mean PI was 0.16 ± 0.33 , GI 0.34 ± 0.38 , which was similar to our study in which we found reduction of PI 1.24 ± 0.11 , GI 0.03 ± 0.02 , respectively.^[11] Dhingra and Vandana (2011) also conducted a similar study on gingival inflammation in orthodontic patients. He also found similar reductions in clinical parameters as mean PI reduction was 1.03 ± 0.14 , GI 0.71 ± 0.14 , and PPD 0.19 ± 0.04 which was similar to our study in which we found reduction of PI 1.24 ± 0.11 , GI 0.03 ± 0.02 , and PPD 3.25 ± 0.11 , respectively.^[12]

Carinci *et al.* (2015) also found same results in reduction of clinical parameters and lesser *Tannerella forsythia* count compared to SRP alone the $P = 0.021$ which was significant.^[13] Isler *et al.* (2018) found that ozone can be used even as adjunct to regenerative therapy for peri-implantitis and has shown significant reduction in clinical parameters. The reduction in mean PI was 0.99 ± 0.17 , GI 0.016 ± 0.06 , and PPD 2.75 ± 0.07 which was similar to our study, in which we found reduction of PI 1.24 ± 0.11 , GI 0.03 ± 0.02 , and PPD 3.25 ± 0.11 , respectively.^[14]

Saeed *et al.* (2017) found similar results of reduction in clinical parameters and *P. gingivalis* count on moderate to severe chronic periodontitis patients. These results were attributed because of the scavenging action of the reactive oxygen radical in ozone oil.

While there are many authors who support use of ozone as adjunct to SRP for chronic periodontitis there were some studies that did not yield positive results using ozone as an adjunct.^[15]

Muller *et al.* (2007) found that there was no significant reduction in use of ozone + SRP in clinical parameters, that is, PPD, CAL, BI, and PI also it has minimum effects on viability of bacteria.^[16] Dengizek *et al.* (2018) also found that there were no reductions in clinical and biochemical parameters of using ozone as compared to SRP alone.^[17] Oskaybas *et al.* (2019) had similar results he also did not find any reduction significant in clinical parameters when he used ozone as adjunct to SRP.^[18]

These results can be because of the inability of the patient for compliance to follow the oral hygiene instructions and also the period of the interventional trial for which the patients were recruited.

Table 2: Mean comparison between pre-operative and post-operative in plaque index.

Clinical variables	Duration	Min	Max	Mean	SD	Difference mean±SD	% of Mean change	P-value
Plaque index	PRE-OP	2.00	3.00	2.42	0.50	1.24±0.11	-51.24	0.000 Significant
	POST-OP	1.00	2.00	1.18	0.39			

Statistical Analysis: Paired *t*-test. Statistically significant if $P < 0.05$

Table 3: Mean comparison between pre-operative and post-operative in gingival index.

Clinical variables	Duration	Min	Max	Mean	SD	Difference mean±SD	% of Mean change	P-value
Gingival Index	PRE-OP	1.00	2.00	1.30	0.46	0.03±0.02	-2.31	0.424 Not Significant
	POST OP	1.00	2.00	1.27	0.44			

Statistical Analysis: Paired *t*-test. Statistically significant if $P < 0.05$



Figure 1: Probing pocket depth after 1 month follow up.



Figure 2: Ozonated olive oil irrigation.



Figure 3: Ozonated olive oil syringe.

CONCLUSION

Ozonated olive oil can be used as adjunct to scaling and root planing in moderate chronic periodontitis patients. Further studies need to be conducted with larger sample size, different concentrations of ozonated olive oil. Microbial and biochemical parameters also need to be checked with use of ozonated olive oil in chronic periodontitis.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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