



Assessment of Antibacterial Effect of Ozonated Olive Oil Gel on Subgingival Anaerobic Bacteria in Moderate Chronic Periodontitis Clinical, Microbiological and Radiographic Study.



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Abstract:

Aim: This study evaluates the effect of subgingival application of ozonated olive oil gel as an adjunct to scaling and root planning (SRP) in moderate chronic periodontitis .

Subjects and methods: Thirty participants were involved in this study. fifteen subjects with moderate chronic periodontitis as study cases, and other fifteen healthy subjects were introduced in the study as a negative control group. a split mouth randomized clinical study was conducted in 15 patients with moderate chronic periodontitis receiving scaling and root planning alone in randomly selected quadrants and scaling and root planning associated with subgingival application of ozonated olive oil gel in the other quadrants. Periodontal Clinical parameters , plaque sample were performed at baseline, 1 month for all patients while the panoramic radiograph was taken for chronic periodontitis patients only. Plaque Samples were cultured anaerobically for detection of p.gingivalis and p.intermedia

Results: scaling and root planning combined with Ozonated olive oil gel showed no advantages in improving the clinical parameters except for Plaque index , no effect on alveolar bone level but it showed more favorable results microbiologically .

Conclusion:

Hence, adjunctive application of ozonated olive oil gel represents a promising natural product

Introduction

Periodontitis is a chronic multifactorial provocative infection caused by an exchange between periodontal microflora and immune system reaction.[1] It affects the uprightness of the periodontium Manifested by irritation and degeneration of the gingiva, periodontal ligament, alveolar bone and dental cementum. [2] The subgingival plaque consists of anaerobic Gram-negative, bacteria such as Porphyromonas gingivalis which has a high relation to the pathogenesis of chronic periodontitis [3] and Prevotella intermedia, which has been realized to be related with different types of destruction conditions affecting the periodontium (Haffajee and Socransky 1994) .

scaling and root planning a alone frequently leaves behind a considerable quantity of bacteria owing to the ability of bacteria to enter into deeper tissues, also bacteria translocate from the tongue [6]

The mode of action of ozone depends on the powerful oxidizing capability of ozone to set off damage of cell walls and cytoplasmic coverings of bacteria .resulting in bacterial death. [8] In oral and maxillofacial surgery, O3 therapy was considered to be helpful in the healing of bone defects[10]

Patients and methods

30 apparently healthy patients of both genders (6 males and 9 females) , aged >25 years. 15 patient were selected from those attending the Department of Oral Medicine and Periodontology, Faculty of Dentistry, Mansoura University. they were diagnosed as having moderate chronic periodontitis. Another 15 apparently healthy patients (6 males and 9 females) were chosen as healthy subjects with no signs or symptoms of periodontal disease represent

(negative control group) . Panoramic X ray was done for each patient to confirm the diagnosis.

after explaining the objectives of the study for each patient and obtaining a written consent, the participating subjects were grouped as follow:

Group (I) (study group): n=15 . The selected quadrants received scaling and root planning and adjunctive subgingival application of ozonated olive oil gel .

Group (II) (positive control group) : n=15 .The opposite quadrants received SRP only

Group (III) (negative control group):n=15 . apparently healthy patients were chosen as periodontally healthy subjects aged >25 years . patients were designated healthy if their periodontal pocket depth <3mm, and clinical attachment loss = 0.

Methods

At first visit , plaque and gingival indices were evaluated and recorded for Group I and Group II . The subgingival plaque sample from all subjects in all groups including Group III before starting the treatment and after four weeks of treatment from (group I) and (group II) . PPD and CAL were measured for all groups. Radiographical assessment Panoramic x-ray was be taken for all subjects in group 1 and group 2 at baseline and after 1 month. ozonated olive oil gel were applied sub gingivally in the deepest selected periodontal pocket in the selected quadrant using disposable plastic syringe. Gel application was performed after initial SRP and at 7, 14 and 21 days. The samples are inserted in 1.5 ml of thyoglycolate broth transport media and sent immediately to department of microbiology and immunology for sample processing . Samples will be

cultured anaerobically for detection of *p.gingivalis* and *p.intermedia*.

Material :

Ozonated olive oil is prepared by bubbling a steady flow of ozone-oxygen mixture in the ratio of 5:95 % until olive oil transforms from the greenish-colored liquid status to the whitish gel status

Results :

There was a high statistically significant difference between SRP & SRP and ozonated olive gel groups regarding PI & PG after treatment with higher mean value among SRP only group (11.07 & 26.67) versus (5.93 & 15.33) for PI & PG after treatment for SRP only and SRP + ozonated olive oil gel groups, respectively.

There was a statistically significant difference between SRP only and SRP & ozonated olive oil gel groups regarding plaque index after treatment with higher mean value for SRP only than SRP ozonated olive oil gel group (0.88 & 0.76, respectively).

Gingival index, periodontal probing depth & clinical attachment loss after treatment illustrate a non statistically significant difference between studied groups ($p > 0.05$). There was a statistically significant decrease of all clinical indices after treatment as compared to pre treatment results (2.36±0.19, 1.83±0.18, 4.90±0.79 & 3.39±0.44) versus (0.88±0.15, 0.35±0.07, 3.87±1.2 & 2.22±0.58) for plaque index, gingival index, periodontal probing depth & clinical attachment loss, respectively among SRP only group and SRP+ ozonated olive oil gel group. There was a statistically significant higher mean values among SRP only than control group while SRP + ozonated olive oil gel showed non- statistically significant difference from control group both for PI & PG indices.

Discussion :

. At base line there were a significant dissimilarity elevated pocket depth and clinical attachment loss in chronic periodontitis groups compared to negative control group and even after 4 weeks. These result came in agreement with [12] they established that the clinical periodontal indices were better after SRP but still significantly different in contrast to healthy subjects. This is due to mechanical periodontal debridement does have restrictions including the lack of ability to sufficiently instrument deep periodontal pockets leaving remaining bacteria in soft tissue lining the periodontal pocket, root cementum and root dentin.

Our findings showed a significant reduction in mean values for, (PI, GI, PPD and CAL) in both groups (study and positive control group), after 1 month as compared to pre treatment results but there was non- significant difference between both groups after treatment and that is in agreement with [13] showed that treatment of chronic with adjunctive ozone did not offer greater benefits in terms of all recorded clinical parameters when compared with mechanical periodontal debridement alone.

Our finding disagree with Patel et al. (2012) and Shoukheba et al (2014) showed that, the adjunctive use of the Ozonated olive oil gel (OZO) with SRP in treatment of chronic

periodontitis resulted in a significant improvement of clinical parameters over the time and in comparison to the control groups [14] this may be explained by our short follow up duration of our study as the other studies stated for the superior improvement in periodontal clinical indices of ozone treated cases in the following 2-6 months. [14] [15] The significant improvement in the mean of PI score in favor to study group as compared to positive control group is in agreement with [16] [17] the use of ozonated olive oil can delay the repopulation of bacteria beside that the remarkable anti-hypoxic properties of ozone which cause the rise of pO₂ in tissues and improves moving of oxygen in the blood, which results in change of cellular metabolism activation of aerobic processes that prevent re-population of anaerobic bacteria [18]

regarding the microbiological assessment, *P.gingivitis* and *P.intermedia* count in the present study revealed significant differences, between moderate chronic periodontitis groups at baseline and the healthy subjects (negative control group). These results agree with [19] where *P.gingivitis* and *P.intermedia* were identified in a big numbers in subgingival biofilm samples in chronic periodontitis.

In our study there was a statistically significant decrease in the count of PI & PG in positive control group after treatment as compared to baseline results this is due to the excellent response to SRP which lowers the bacterial load this confirms the results of previous studies [20] while in assessment of positive control group result after treatment with negative control illustrates that there is a statistically significant higher mean values of PG and PI among positive control than negative control group in agreement with [21].

The count of Pi and Pg after 1 month showed high significant reduction in study group (SRP+ozonated olive oil) when compared to baseline result or with positive control group. Our results agree with [16] whose results showed that subjects managed with oxygen-ozone had complete suppression or a significant reduction in (*Tannerella forsythensis*, *Treponema denticola* and *Prevotella intermedia*), (Nagayoshi et al who found that it was efficient for killing gram-negative, gram-positive and oral candida albicans [8] Ramzy et al found that major amount of reduction in bacterial count in sites treated with ozonized water + SRP [22] [14]. [17, 23] [15] Our results can be explained by The antibacterial effect of ozone is as a result of destroying the bacterial cell membrane, subsequently producing intracellular leakage and eventually causing cell lysis. [24]

Our results oppose with Kshitishand Laxman who found that there is no antimicrobial effect of the used ozone on *P. gingivalis* and *T. forsythia*. The possible explanation for the difference from that study results may be due to dissimilar concentration as he used ozonated water, viscosity of applied ozone form and dissimilar study plan [Kshitish and Laxman 2010](#))

The contrast of PI & PG indices in SRP + Ozonated olive oil gel group after treatment with negative control group showed non-statistically significant dissimilarity between the two groups that is due to the ozone is known to have an anti-hypoxic effect in tissues [25] This

transformation in the sub-gingival atmosphere hold back the activity of anaerobic bacteria so it inhibit the recolonization.

all the studies found were applying ozone directly on bone or within a bone defect and did prove that ozone has a great influence in bone healing ((Ripamonti et al. 2009) [26] [11] . but our negativereults results of the effect of ozonated olive oil on alveolar bone can be explained in agreement with [27] who concluded that the topical application of ozone resulted in no differences in the alveolar bone regeneration process. They attributed that for the preoperative application of ozone was too distant to affect the alveolus . in our study 1month was not enough for assessing the effect of ozone on bone

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