Effect of ozone therapy upon clinical and bacteriological parameters of the oral cavity: an update.


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Abstract
Objective: To review the literature on ozone therapy in oral health, as assessed by different clinical and bacteriological parameters.

Material and methods: A PubMed literature search was made using the key words “ozone dental”, and establishing as limits “randomized controlled trial” and “dental journal”. Thirteen articles were identified, with access to only 6 of them.

Results: Four studies used ozone for the treatment of caries. One study examined its effect upon dental hypersensitivity, while another evaluated the efficacy of ozone as a tooth whitening technique. Five studies explored the bacteriological actions of ozone therapy in reference to different types of bacteria.

Conclusion: The reviewed literature yields a number of studies describing a high antimicrobial potential of ozone therapy in different dental areas, though very few in vivo studies have evidenced the success of such treatment. Further studies are therefore needed in this field.

Key words: Ozone therapy, dental ozone, biofilm.
Introduction
Ozone has been successfully used in Medicine for over a hundred years, thanks to its microbiological effects (1). Its use has been investigated in the treatment of ocular diseases, viral, fungal and bacterial infections, dermatological disorders, and in pulmonary, renal, hematological and neurodegenerative pathologies (2).

In dental practice ozone therapy was first evaluated in 1933 for the treatment of oral lesions and chronic periodontal infections (1). The bactericidal, fungicidal and viricidal properties of ozone are the result of its intense oxidizing capacity, with the formation of free radical and direct destruction of almost all microorganisms. In addition, ozone favors tissue healing and increases blood perfusion. Intraorally, ozone can be used to treat chronic periodontitis, caries, infections after dental extractions, lesions caused by radiotherapy, aphthae and mycoses, and can be used for disinfecting root canals (1-6).

The literature does not contain sufficient evidence of the benefits of ozone in oral surgery and implantology. Nevertheless, some articles underscore the potent antimicrobial action of ozone in application to Staphylococcus aureus (7), Lactobacillus, Streptococcus mutans (8) Porphyromonas gingivalis, Candida albicans (6) and Porphyromonas endodontalis (4).

The present study offers a review of the literature on ozone therapy in oral health, as assessed by different clinical and bacteriological parameters.

Material and Method
A PubMed literature search was made using the key words “ozone dental”, and establishing as limits “randomized controlled trial” and “dental journal”. Thirteen articles were identified, with access to only 6 of them (Table 1).

Discussion
Effect of ozone in relation to clinical parameters
Some authors have compared the effects of ozone versus other treatments such as chlorhexidine (9) and the air in the syringe (10), in application to caries. Neither of the studies recorded significant differences in the results obtained. Manton et al. (11) examined the whitening effect of combining carbamide peroxide with ozone. The addition of ozone did not increase whitening effectiveness versus carbamide peroxide alone. Holmes (12) concluded that the regular application of ozone during 40 seconds, and the use of remineralizing products, arrests the progression of non-cavitary root caries, without the need for removal. Other authors such as Azarpazhooh et al.

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Type of study</th>
<th>Microbiology</th>
<th>Ozone effect</th>
<th>P</th>
<th>No. patients</th>
<th>No. teeth</th>
<th>In vivo / In vitro</th>
<th>Mean age</th>
<th>Sex</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kshitish et al. 2010 (6)</td>
<td>Randomized, double-blind split-mouth clinical trial</td>
<td>A. actinomyces, P. gingivalis, T. forsythensis, Herpes simplex virus, Epstein-Barr virus, Cytomegalovirus, C. albicans</td>
<td>Greater reduction of plaque, gingival and bleeding indexes versus chlorhexidine. Reduction of A. actinomyces, P. gingivalis and C. albicans</td>
<td>0.05</td>
<td>16</td>
<td>_</td>
<td>_</td>
<td>In vivo</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Estrela et al. 2006 (7)</td>
<td>Randomized clinical trial</td>
<td>S. Aureus</td>
<td>Effective in eliminating S. aureus</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>In vitro</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Hauser-Gerspach et al. (9)</td>
<td>Randomized clinical trial</td>
<td>Streptococci, Lactobacilli, Actinomyces</td>
<td>Not effective in reducing the presence of microorganisms</td>
<td>_</td>
<td>40</td>
<td>At least 2 per patient</td>
<td>_</td>
<td>In vivo</td>
<td>5.1±1.5</td>
<td>23 males, 17 females</td>
</tr>
<tr>
<td>Baysan et al. 2007 (10)</td>
<td>Randomized clinical trial</td>
<td>Streptococci, Lactobacilli, Actinomyces</td>
<td>No decrease in bacteria in dentin after ozone therapy</td>
<td>&lt;0.001</td>
<td>_</td>
<td>104</td>
<td>_</td>
<td>In vitro</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Manton et al. 2008 (11)</td>
<td>Randomized clinical trial</td>
<td>Streptococci, Lactobacilli, Actinomyces</td>
<td>Not effective in increasing whitening effect</td>
<td>_</td>
<td>_</td>
<td>60</td>
<td>_</td>
<td>In vitro</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Holmes 2003 (12)</td>
<td>Randomized, double-blind clinical trial</td>
<td>Streptococci, Lactobacilli, Actinomyces</td>
<td>Arrested progression of caries</td>
<td>&lt;0.01</td>
<td>89</td>
<td>_</td>
<td>_</td>
<td>In vivo</td>
<td>60</td>
<td>_</td>
</tr>
</tbody>
</table>

Table 1. Summary of the effects of ozone therapy in randomized clinical studies.
Ozone therapy of the oral cavity.

No studies examining the effects of ozone in relation to immunological parameters have been found in our review of the literature. The reviewed literature yielded a number of studies describing a high antimicrobial potential of ozone therapy in different dental areas, though very few in vivo studies have evidenced the success of such treatment. Further studies involving randomized and controlled designs are therefore required in this field.

References