Therapeutic applications of ozonated products
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Abstract
Ozone gas has a high oxidation potential and has the capacity to stimulate blood circulation and the immune response. It can be used for the treatment of alveolitis as a replacement for antibiotic therapy, as a mouthwash for reducing the oral micro flora, as well as the adherence of microorganism to tooth surfaces. This paper gives a brief review on the therapeutic applications of ozonated products in dentistry.

Key Words: Ozone; Periodontitis; Ozone therapy

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The work ozone was first introduced by Schonbein in 1840.(1) He subjected oxygen to electrical discharges and noted “the odour of electrical matter”. Schonbein concluded that odour was due to a gas which he named ozone, from the Greek Ozein.(2,3) Ozone is a gas composed of three atoms of Oxygen and present naturally in the upper layer of atmosphere in abundance.(4) It absorbs the harmful ultra-violet rays present in the light spectrum from the sun and protects the living creatures from the ultra-violet rays. It has got a high oxidation potential which is 1.5 times greater than chloride when used as an antimicrobial agent. It also stimulates blood circulation and the immune response.(4)

Ozone gas is immunostimulating, potent analgesic, detoxicating, antimicrobial, bioenergetics and biosynthetic properties as it causes activation of the metabolism of carbohydrates, proteins and lipids.(1,4) In dentistry it has three basic forms of application - ozonated water, ozonated olive oil, and oxygen/ozone gas.(5) Ozonated water and olive oil forms an ideal delivery system as they have the capacity to entrap and then release oxygen/ozone. These forms of application are used alone or in combination for the treatment of dental disease.(1, 4, 5)

Results from the study conducted by M.Arita et al showed that the microbial plaques have the tendency to accumulate on the denture surfaces which consists mainly of c.albicans thus causing denture stomatitis.(6) The bacterial count can be effectively reduced by rinsing the dentures with flowing ozonated water (2 or 4 mg/l) for one minute. Application of Ozonized water and Ozonated oil daily accelerate the healing rate thus effective in the treatment of alveolitis. It also reduces the post-extraction healing time by forming a pseudo-membrane over the socket, so protecting it from any physical and mechanical insults.(6)

The use of Ozone solution in the form of gargles and local application showed favourable results in healing of fracture of the mandible.(5,7) Additionally there was established immunomodulating action of ozone on the local immunity factors in oral cavity, demonstrated by the rise of the secretory immunoglobulin A (IgA) level.(7)

Ramzy M. et al showed that the use of oral hygiene instructions, scaling and root planning together with subgingival irrigation with ozonized water is useful in the management of aggressive periodontitis.(8) Ozonated water (4mg/l) strongly inhibits the formation of dental plaque and reduces the number of sub gingival pathogens. Ozonated water has strong bactericidal activity against bacteria in plaque biofilm so it shows considerable improvement when applied in cases of chronic gingival and periodontal diseases. Both gaseous and aqueous ozone can be used as additional treatment modality along with mechanical debridement.(9)

Macedo et al. described the application of ozonated oil on mandibular osteomyelitis and demonstrated faster healing times than conventional protocols. The results of other studies also proven that the use of ozone tend to accelerate the healing of soft tissue conditions, i.e. aphthous ulcers, herpes labialis, ANUG and other oral infections.(9)

Oxygen/ozone therapy has an inhibiting effect in the development of pit and fissure caries, root caries, and interproximal carious lesions.(10) Ozone has been shown to attack extrinsic discoloration, but has not much useful in intrinsic stains. The use of ozonated water followed by peroxide treatment significantly increases the efficacy and reduces the time necessary to generate the desired effect. Smear layer present over the exposed root surface prevents the penetration of ionic Calcium and Fluorine deep into the dentinal tubules. Ozone removes this smear layer, opens up the dentinal tubules, broadens their diameter and then Calcium and Fluoride ions flow into the tubules easily, deeply and effectively to plug the...
dentinal tubules, preventing the fluid exchange through these tubules. For this purpose, ozone spray is done onto the exposed dentine for 60 seconds followed by mineral wash repetitively.(11, 12)

A valuable antimicrobial activity against all tested micro-organisms especially against Mycobacterium by ozonized sunflower oil (Oleozon) was noted by L.A. Sechi, et al. Ozonized oils can be used to sterile the root canals and to clear the canals of necrotic debris by its effervescent properties. Irrigation is more quick and efficient than the conventional irrigation by the sodium hypochlorite and sodium peroxide combination. (3)

Indications of ozone therapy in medicine has based on case reports and clinical trial. Arterial circulatory disorders, inflammatory conditions are some common conditions where ozone has been shown better results. It is important to keep in mind while dealing with Ozone, injections of Ozone/oxygen may result in air embolism and sometimes lead to fatal situations. The ozone therapy in the form of Gas bath was most important aspect in the treatment of external wounds and skin diseases. But in certain systemic conditions such as, asthma, bleeding disorders, Acute alcohol intoxication, history of recent myocardial infarction, in pregnancy etc the ozone therapy is strictly contraindicated(3, 4)

The use of ozone has been advocated in Medical and Dental science due to its excellent antimicrobial, disinfectant and effervescent properties. Widely relevance of ozone as for Medical treatment is still not well popularized especially in the developing countries. Therefore more clinical studies were necessary to validate the uses of Ozone in turn to provide painless, effective management of our patients in future.

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