

OZONE THERAPY IN DENTISTRY

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Abstract

Treatment and prevention are the key to successfully eradication of any disease condition and one such novel therapy which plays a role as a non- invasive therapy in the treatment of various oro-dental disorders is ozone therapy. Oxidative modality and an effective therapeutic method of ozone therapy that helps in immune stimulation, increase oxygenation and detoxification. Its role in almost conditions, whether pathological or physiological and in purview of dentistry. Ozone therapy could be used in various aspect of treatment modalities like Temporomandibular joint disorders ,bleaching agent in discoloured teeth, desensitization, root canal treatment and in the treatment of soft tissue infections.

Thus, a great deal of difference in treating patients with ozone which cuts off the treatment time. Moreover, it is completely painless, therefore, increasing the patients acceptability and compliance. It eliminates the bacterial count more precisely.

Definitely, Ozone seems to be a promising treatment modality for various dental problems in future. The present review focuses role of ozone therapy in various areas of dentistry.

Keywords: Ozone therapy, Ozonated water, Ozonated oil.

Introduction

Ozone terminology has evolved from “ozein” which is a greek word meaning odor and was first described by friedrich schonbein in 1840.¹Ozone layers the planet earth and is among the gases which are essential for survival. It is a natural gas consisting of triatomic oxygen molecule (O₃).^{2,3} Due to inherent steric hindrance , the oxygen atoms are attached with single bond resulting in a negative charge on ozone molecule. Hence the structure is highly unstable and releases nascent oxygen depending upon the systemic conditions such as temperature and pressure .⁴The ozone found in abundance in stratosphere layer and it protects the living from ultra violet rays radiation and also cleans the air.⁵

The exclusive chemical structure of this compound gives it unique properties such as immune stimulation regulation of pain and infection, detoxication , anti-hypnotic , bio-energetic and bio-synthetic properties. The uniqueness of this compound makes it a nobel therapeutic alternatives for various ailments related to the pain control in oro-facial region.^{3,6,7}

Ozone Generation and Mode Of Administration⁸

Generation of ozone mechanically can be done by the use of three systems namely

Ultra violet system which produces ozone in low concentrations and mostly used in aesthetics & air purification

Cold plasma system is another unit which is used for ozone generation and its main role is in air and water purification

High concentration of ozone are produced with Corona discharge system which are the most common system used in the medical/dental field. Fig: 1 showing the corona discharge system of ozone .



Figure 1: A Medical Grade Oxygen Fed Corona Discharge Ozone Unit

Administration of Ozone

It is basically present in 3 forms such as:⁸



Figure 2: Modes of ozone administration

- Ozone gas
- Ozonated water
- Ozonated oil

Mechanism Of Action Of Ozone

A multitude of actions such as anti-microbial, anti-inflammatory , immunologic ,detoxicating, bio-energetic, and bio-synthetic (which includes activation of carbohydrates , protein and lipid metabolism) .

Anti –microbial action: The ozone acts by lysing the cytoplasmic membrane of unhealthy cells such as cancer

cells and cells infected with bacteria, virus, fungi, parasites etc.⁹ Since, The mechanism of action is such that there is no resistance strains. The viruses such as HIV, Herpetic group and other lipid envelop viruses are readily destroyed by ozone due to intolerance cells and changes in the activity of reverse transcriptase enzyme.¹⁰

Anti-inflammatory and analgesic action: synthesis of interleukins, leukotriens, and prostaglandins which are chemical mediators of inflammation is done by ozone which provides relieving pain and inflammation.¹¹

Immuno stimulating Action: Owing to the electromagnetic action of ozone stimulation and modulation leading to production of interleukins by lymphocytes takes place also activation of macrophages leading to increase phagocytosis occur. Hence, medical ozone becomes important for immune stimulation in patients with decreased immunity of immune deficiency.^{12,13}

Anti-hypoxic action: Due to increased oxygenation of blood. The oxygen act as a super oxygenator and increases natural healing process.¹⁴

Uses of Ozone In Dentistry

Ozone is used in dentistry owing to its unique properties which are mainly attributed to absolute absence of pain, marked reduction in bacterial count in case of infectious pathologies and patient acceptability and compliance.

Treatment of Dental Caries

Ozone causes oxidation of bacterial cell wall and also leads to the oxidation of pyruvic acid to acetate and CO₂ due to which it is effective in the treatment of pit and fissure caries, root canal treatment and inter-proximal caries.

The local delivery of ozone for this purpose is done by using the equipments as shown in figure3.



Figure 3: Local Ozone Application Apparatus

Endodontic treatment: the role of ozonated oils, ozonated water, ozonated sunflower oil, olive oil, ground nut oil has been reported in the irrigation and sanitization of root canal treatment.^{15,16,17}

Periodontics: the effect of Ozone water and gas on the periodontal microorganisms as well gram +ve and gram -ve and Candida albicans are being killed by ozone in

pure cultures. Ozone was found that it inactivate microorganisms which causes periodontitis. It show antifungal effect when compared to chlorhexidine, but it did not show any antiviral effect.^{18,19,20}

Prostodontics

Due to its anti-candidal and antimicrobial activity Ozonated water and Gaseous O₃ ultrasonication is used to disinfect dentures. It also maintain the hygiene which appears to be an effective method to lower the incidence of denture stomatitis.²¹

Oral medicine

Ozonated water or oils are used in Soft tissue lesions like Herpes, Aphthae, Cuts, Cheilitis, denture stomatitis, Candidiasis and Traumatic wounds. Ozonated water and its disinfectant and healing properties help in the healing of these soft tissue lesions.²²

Implants

In some literature it has been proven that gaseous Ozone showed efficacy to reduce adherent bacteria like Porphyromonas gingivalis and Streptococcus sanguis on from Titanium and Zirconia without affecting adhesion and proliferation of osteoblastic cells from all surfaces with in 24 sec to below the detection limit while streptococcus was more resistant and showed the highest reduction on zirconia substrates.

Contraindications of ozone therapy

In some condition like Ozone allergy, severe myasthenia, Pregnancy, Glucose 6 phosphate dehydrogenase deficiency, hyperthyroidism, severe anemia, recent myocardial infarction, hemorrhage from any organ, acute alcohol intoxication.^{23,24}

Ozone toxicity

Inconsistent use of Ozone was reported to cause certain side effects like rhinitis, occasional nausea, vomiting, poor circulation, cardiac problems, respiratory tract irritation, at times stroke. Therapeutic administration of Ozone do not have any deleterious effects. So, Ozone societies prohibited the intravenous injections of Ozone gas due to risk of air embolism. In case of Ozone intoxication the patient must be placed in the supine position, inhale humid oxygen and take ascorbic acid, vitamin E and N acetyl cysteine.²⁵

CONCLUSION

Ozone appear to be promising in the treatment of various oro dental problems and minor post surgical recoveries but still its use is limited and underprivileged.

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