ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 10, Issue, 04, pp. 35060-35063, April, 2020

RESEARCH ARTICLE OPEN ACCESS

OZONE THERAPY IN DENTISTRY: REVIEW OF MAJOR SCIENTIFIC CONSIDERATIONS

Camila Barbosa da Silva[1], Isabele Gomes Paschoalotto[1], Bruna Lopes Dalto[1], Italo Gomes Paschoalotto[1], Mirilaini Lino Brancini[1], Júlia Fenerich Alberghini[1], Paula Renata de Souza[1], Idiberto José Zotarelli Filho[2], Patricia Garani Fernandes[1,2]

[1] University Center North Paulista (Unorp) – Graduate in Dentistry - São José do Rio Preto – SP, Brazil; [2] Post Graduate and Continuing Education (Unipos), Postgraduate in dentistry, Street Ipiranga, 3460, São José do Rio Preto SP, Brazil 15020-040

ARTICLE INFO

Article History:
Received 15th January, 2020
Received in revised form
17th February, 2020
Accepted 06th March, 2020
Published online 29th April, 2020

Key Words:

Ozone. Therapy Efficiency Periodontal.

Corresponding author: Camila Barbosa da Silva,

ABSTRACT

The purpose of this content was to verify the literature available in the PUBMED, ABOZ and SciELO databases on the efficacy and biological effects of periodontal and dental implant ozone treatment. Ozone has unique properties that provide a wide application to biological systems and clinical treatments. In dentistry, it can be indicated for the treatment of initial carious lesions, root canal irrigation, periodontal pocket irrigation and to improve epithelial healing in ulcers and herpetic lesions. Such a substance may be applied in gaseous, aqueous and oily forms. Despite its convincing efficacy, further study is needed to make a definitive conclusion about its applicability and protocols of use.

Citation: ***Camila Barbosa da Silva, Isabele Gomes Paschoalotto, Bruna Lopes Dalto et al.,*** "Ozone therapy in dentistry: review of major scientific considerations*", International Journal of Development Research*, 10, (04), 35060-35063.

INTRODUCTION

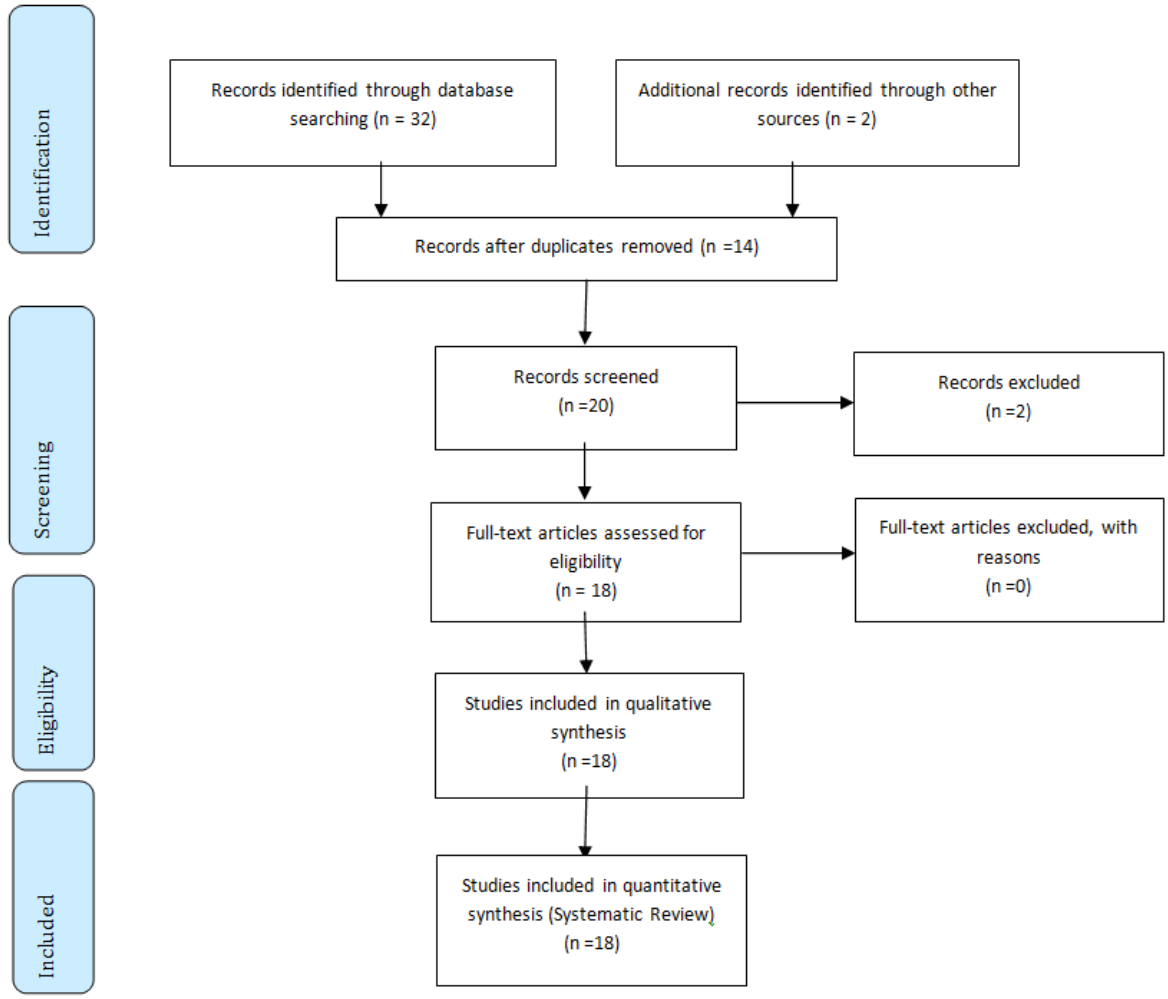
Ozone therapy is increasingly piquing the interest of healthcare professionals [1]. Because it is a chemical compound with a high capacity for oxidative reactions that are lethal to bacteria, viruses, and fungi, its therapeutic use is valuable. Its proportion of tissue proliferation and vascularization make it a healing inducer, which allows both the elimination of bacteria and the repair of anatomical structures, reducing inflammation resulting from the increase in leukotrienes and prostaglandins that ozone causes [2]. Ozone therapy can be applied to dental pathologies in patients of all ages, taking into account the forms of administration [3]. Ozone can be administered in three ways, ozone gas, ozonated water and ozonated oil. It can be used, with numerous benefits, for the treatment of early mucosal lesions, periodontitis, periimplantitis, for the aid in endodontic procedures, wound care and implantology [4]. Thus, treatment with this therapeutic approach has opened new perspectives for diagnostic solutions, has made prognoses more favorable and led to greater comfort and acceptance of results [5]. Therefore, the present study aimed to analyze the main considerations of ozone therapy in dentistry through literary review.

Methods

Study Design: The present study followed a model of literary review presenting and discussing case series, prospective, retrospective, randomized, double-blind, placebo-controlled trials in humans with a publication time of the last ten years were selected and analyzed, with total of 18 articles.

Search Strategy and Information Sources: In general, as an example, the search strategy in MEDLINE / Pubmed, Web of Science, ScienceDirect Journals (Elsevier), Scopus (Elsevier), OneFile (Gale) followed the following steps: - search for *mesh terms (Ozone. Therapy. Efficiency. Periodontal)*, - use of the booleans "and" between mesh terms and "or" among historical findings.

Flow Chart



DISCUSSION

Ozone History: Ozone gas was discovered in 1785 by Martins Van Marum and baptized in 1840 by Christian Friedrich Schönbein when he observed the appearance of a strong, penetrating bluish-colored gas when releasing electric discharges in an oxygen-containing glass hood. which he called ozone. It was first used in World War I through direct contact with gas to treat post-traumatic gangrenous ulcers, infected wounds, burns and fistulas of soldiers [1]. Following this milestone, Dentist Edward A. Fisch published the first treatise on the applications of ozonated water, thus representing the beginning of clinical ozone practice in dentistry [2]. In Brazil, the Brazilian Association of Ozone Therapy (ABOZ) was created in 2006 to legalize the practical use of medical ozone therapy. In 2015, the Federal Council of Dentistry recognized ozone therapy as a dental procedure. (Resolution CFO-166/2015, recognizes and regulates the use by the dentist of ozone therapy practice) [3].

Ozone: Ozone (O3) is a molecule consisting of three oxygen atoms in a dynamically unstable structure due to the presence of mesomeric states that can be used in three forms [4], Gaseous through a tube system for subgingival irrigation;Oz Ozonated water used as mouthwash, periodontal pocket irrigation during scraping, and surgical irrigation. (Higher biocompatibility when compared with some antiseptics like chlorhexidine 2% and sodium hypochlorite 5.25%); Oz Ozonated oil: irrigation of periodontal and peri-implant pockets.Its basic function is to protect humans from the harmful effects of UV radiation. In dentistry, it has been beneficial to many fields for its wide range of benefits. Ozone has antibacterial, antifungal and antiviral effects. Its local application has analgesic and anti-inflammatory properties, and its therapy can improve oxygen metabolism, reducing cell permeability, edema and pain, as it is a cycloxygenase II inhibitor [4-6]. For its medicinal production, an ozone generator is required, in which oxygen passes between a high voltage with electrodes that create an electromagnetic field called corona [2]. The energy of the electric discharge allows dissociation of the numerous oxygen molecules, leading to the formation of ozone. Finally, there is a mixture of a maximum of 5% ozone and 95% oxygen ready for use in ozone therapy [7-9]. Ozone concentration may range from 1 to 100 mg/mL. The ozone generator consists of the following items: medical oxygen torpedo, medical ozone generator, fittings, syringes, needles (0.30 x 13), probes, equipment, aseptic material, cap/bag, and the bathtub. There are three different systems for producing ozone gas. The ultraviolet system in which produces low concentrations of ozone, used in aesthetics and air purification. Cold plasma system: used in air and water purification. Corona discharge device that produces high concentrations of ozone [11,12].

Biological actions

Its properties are exceptional acting directly on antimicrobial, immunostimulant, analgesic, antihypnotic, detoxifying,

bioenergetic and biosynthetic actions [13. It disrupts the integrity of the bacterial cell envelope by oxidizing phospholipids and lipoproteins. Low concentration ozone of 0.1 ppm is sufficient to inactivate bacterial cells, including their spores. In fungi, O3 inhibits cell growth in certain stages, being the most sensitive cells and in viruses, O3 damages the viral capsid and disturbs the reproductive cycle, interrupting the virus-cell contact with peroxidation in addition to degrading bacteria, viruses. and protozoa [13]. Ozone activates the Krebs cycle by enhancing pyruvate oxidative carboxylation, stimulating ATP production [2]. The weak enzyme coatings on cells that make them vulnerable to virus invasion make them susceptible to oxidation and elimination from the body, which replaces them with healthy cells [14]. In addition to its ability to react with blood components such as erythrocytes, leukocytes, platelets, endothelial cells, and the vascular system [7], ozone also leads to high expression of cytokines (molecules responsible for triggering immune responses) and interferons. (a protein produced by leukocytes and fibroblasts to interfere with the replication of bacteria, viruses, and fungi), important for wound healing [1], providing nutrients in the affected area, thereby increasing the sensitivity of macrophages to phagocytosis.

Ozone actions in the oral cavity

Periodontal diseases are one of the most prevalent oral health problems in the world. It is the leading cause of dental mortality in the adult population. Chronic periodontitis is an inflammatory disease that leads to damage to periodontal tissue and bone loss as a result of complex interactions between pathogenic bacteria and host immunity [15]. It refers to the progression of the disease over time without treatment. Irrigation with ozonated water on cell proliferation in the periodontal ligament adhering to root surfaces of single teeth shows satisfactory effect and (Streptococcus, P. gingivalis, and Endodontalis, Actinomyces actinomycetemcomitans, C. albicans) in culture and in biofilms and resulted in ozonated water. It is highly effective for killing Gram-positive and Gram-negative microorganisms. Gram-negative bacteria are more sensitive compared to gram-positive bacteria [12,15]. The goal of traditional periodontal therapy is to reduce plaque accumulation and eliminate pathological bacteria that occupy periodontal pockets, however, there are limitations to this mechanical procedure due to the depth variation of pockets and other difficult-to-reach regions in the mouth. Thus, the application of ozone to solve such problems becomes more viable due to the possibility of using it through irrigation of periodontal pockets and mouthwash [3,16], being simpler techniques and causing less discomfort to the patient.

Desired outcomes in patients undergoing this procedure include reduced clinical signs of inflammation, reduced probing depth, and gain in clinical insertion around the affected tooth [5] because ozone has an oxidizing effect. strong with remarkable antimicrobial potential, and can be used as a disinfectant having the potential to be used as an adjunctive tool in non-surgical periodontal therapy in patients with periodontitis [6]. Ozone therapy can promote hemostasis, increase growth factor release and local oxygen supply, positively regulate cellular antioxidant enzymes, and inhibit bacterial proliferation [17]. Peri-implant diseases aredescribed as inflammatory processes in the surrounding tissue of the implant. Peri-implant mucositis is defined as an inflammatory reaction triggered by microbial biofilms based on the parameter of bleeding on probing without any loss of peri-implant bone, whereas peri-implantitis is characterized by suppuration with the bone loss [18]. The goal of ozone periimplantitis therapy is to achieve a resolution of inflammation by decontaminating the implant surface while preserving the implant support tissues. Patients with systemic diseases or any health compromise such as those with heart problems, ozone allergic, severe anemia, and pregnant/lactating women should be cautious when using therapeutic ozone [2]. Even at therapeutic doses, there is a possible chance of an adverse reaction, especially by not oppressing antioxidant defenses. To avoid toxicity, the optimal ozone concentration range should be 40-70 mg/ml, depending on the stage of the disease. toxicity, side effects may present through airway irritation, rhinitis, cough, headache and nausea. In this situation, the patient should be placed in the supine position, inhale moist oxygen and take ascorbic acid, which is a hydroxylation vitamin C from various biochemical reactions [18]. Despite having advantages for being a noninvasive treatment and with numerous benefits, ozone therapy has a disadvantage as its high cost, and need for the professional skill of the Ozone Therapy Dentist [3].

Conclusion

It is extremely important that the dentist recognizes and controls the cause of infection/inflammation and can associate effective techniques with treatment such as ozone therapy, where its unique properties include immunostimulant, detoxifying, antimicrobial, bioenergetic and biosynthetic actions, bringing a good result. recovery and tissue repair processes. It can be concluded that the nature of ozone for use in dentistry is atraumatic, painless, noninvasive and relative to the absence of discomfort in the patient providing its acceptability and adherence. Ozone is used as a supplement in the treatment of periodontal disease, peri-implantitis, dentistry (caries), endodontics (ducts), osteonecrosis, prosthesis, orthodontics and other numerous procedures that we observe within dentistry. Ozone therapy showed satisfactory results in dental procedures and positivealso in treatments with the presence of microorganisms, providing rehabilitation of the affected tissue processes and ensuring good patient acceptance during treatment.

Conflict of interests: There is no conflict of interest between authors.

REFERENCES

ALEMÃO IJS, RODRIGUES AC, ANDREO JC, POMINI KT, AHMED FJ, BUCHAIM DV, ROSA JÚNNIOR GM, GONÇALVES JBO, BUCHAIM RL. Terapia de Ozônio em odontologia: uma revisão sistemática. INT. J. Odontostomat, 7 (2): 267-278 de 2013.

BELEGOTE, I.D.S.; PENEDO, G.D.S.; SILVA, I.C.B.; BARBOSA, A.A.; BELO, M.T.N.B.; NETO, O.I.. . Tratamento de doença periodontal com o ozônio. Brazilian Journal of Surgery and Clinical Research – BJSCR Vol.23,n.2,pp.101-104 (Jun - Ago 2018).

CHAVES RM, ESTRELA C, CARDOSO PC, BARATA TdeJE, SOUZA JB, TORRES EM, ESTRELA CRA, MAGALHÃES APR, LOPES LG. Efeito do gás ozônio no conteúdo da dentina exposta a Streptocooccus Mutans biofilme: Uma energia dispersiva de avaliação de raios-x.

The Journal of Contemporary Dental Practice, abril de 2017; 18 (4): 265-269.

DEMIR ZT, ALKAN BA, ALBAYRAK, H. Efeitos da terapia de ozônio sobre o início do período de cura sem epitélio gengival: um ensaio clínico randomizado controlado por placebo. J Periodontal dói:10.1902/ jop.2016.150217.

ELVIS, A. M.; EKTA, J. S. "Ozone Therapy: A clinical Review"Journal of Natural Science,Biology,and Medicine,p 66-70, 2017.

FERREIRA R, SANTANA ACP, REZENDE MLRG, SEBASTIÃO LA, ZANGRANDO MSR, DAMANTE CA. Ozonioterapia:uma visão crítica e atual sobre sua utilização em periodontia e implantodontia-Revisão de Literatura. Innov Implante J. Biomater Esthet. 2014; 9 (2/3): 35-39.

FERREIRA, S.; MARIANO, R.C.; GARCIA, I.R.J. & PELLIZER, E.P. . Ozônioterapia no controle da infecção na cirurgia geral. Revista Odontológica de Araçatuba, v.34, n.1, p. 36-38, Janeiro/Junho, 2013.

NESI AN. Ozonioterapia: O uso do ozônio na Odontologia.Porto Velho-RO 2018.

NIMER HYY. O uso da ozonioterapia nas diversas especialidades da odontologia.Santa Cruz do Sul 2018.

OLIVEIRA LEA, QUEIROZ HMA, FEITOSA EA, CHAGAS RB, BRÍGIDO JÁ, SALDANHA ADD. Ozonioterapia e odontologia: novas perspectivas.Conexão Fametro 2018: inovação e criatividade issn:2357-8645.

SANTOS, A.C.S.V.; Ozonioterapia como terapia adjunta à raspagem no tratamento periodontal de pacientes com Diabetes mellitus – Série de casos. Trabalho de Conclusão de Curso apresentado ao Departamento de Odontologia da Faculdade de Ciências da Saúde da Universidade de Brasília., 2018.

SHOEMAKER JM. Ozone therapy: History, physiology, indications, results. [cited in 2010].

SMITH, N.; WILSON, A.; GANDHI, J. VATSIA, S. & KHAN, S.A. Ozonioterapia:uma visão geral de farmacodinâmica, atual pesquisa e utilidade clínica.Med Res gás, 2017; 7 (3): 212-219.

SPOZITO, P.; CRUZ, N.; SOUZA, B.& GALHARDO, G. . A ação do ozônio no tratamento de doenças periodontais. Rev. Bras. Odontol. 2019;76:(Supl.2):32.

SRINIVASAN, K & CHITRA, S. Aplicação de Ozônio em odontologia: uma revisão de literatura. Sch. J. Dent. Sci, 2015.:2 (6): 373-377.

TIWARI S, AVINASH A, KATIYAR S, IYERC A, JAIN S. Dental applications of ozone therapy: a review of literature. Saudi J Dent Res 2017; 8(1-2):105-11.

TOKEDE O, JADOTTE Y, CAINE R. Eficácia de ozônio, um adjuvante anti-microbina no tratamento não cirúrgico da periodontite crônica e agressiva. Jornal Internacionl de Odontologia e Pesquisa, 2016, Vol. 4, nº2, 24-27.

UNSAL B, SOYSAL F, OZCAN G, ISLER SC, PEKER E, KARACA IR. Os efeitos da terapia de ozonio como um adjuvante para o tratamento cirúrgico de periimplantite. J Periodontal Implante Sei. 2018 Jun, 48 (3): 136-151.

****