ORIGINAL RESEARCH PAPER

Health Science

OZONE THERAPY FOR PREVENTION OF CONTACT OF SARS- CoV2 VIRUSES IN CLINICS OF DIALYSIS QUITO 2020

KEY WORDS: ozone, viruses, bacteria, covid 19, dialysis, chronic kidney failure, ozone therapy.

Pablo Llerena Jara	MD General Practicioner,
Nicole Barragan Cisneros*	MD General Practicioner *Corresponding Author
Gabriela Monroy Acosta	MD General Practicioner,
Ricardo Cutus Mullo	MD General Practicioner,
Mariana Belen Vasquez campaña	MD General Practicioner,
Jessica Monserrate Reinoso	MD General Practicioner,
Nataly Elizabeth Simbaña	MD General Practicioner,
Mayra Viviana Saa Alvarez	MD General Practicioner,
Wendy Armas Rodriguez	MD General Practicioner,
Carlos Andrade Villalba	MD General Practicioner,
Tania Pinchao Guerrero	MD General Practicioner,
Viviana Sandoval Espinoza	MD General Practicioner

ABSTRACT

ozone is a colorless, odorless gas made up of three oxygen atoms; it acts as a filter, or protective shield, for harmful, high-energy radiation reaching the planet; Ozone is the second most powerful and useful oxidant known after fluoride, but unfortunately the use of fluoride is dangerous, and like chlorine, increases the pH water, increases mineral content, and chemical reactions by substitution can produce dissolved fluorinated organic compounds that oppose greater resistance to oxidation; currently within the body it has a virucidal or bactericidal capacity, stimulating the immune system and not due to its direct attack on the microorganism, which is essential to complete its immunomodulatory action, since it is capable of modulating the immune response by stimulating the activity of leukocytes and the production of cytokines, interferons and TNF-a. The H2O2 that forms after its decomposition, enhances the body's defensive capacity.

INTRODUCTION

Ozone. Colorless, odorless, low-molecular-weight gas consisting of three oxygen atoms, the nomenclature of which is O3. It is an allotropic form of Oxygen, from which the scientific name is derived: trioxygen. It requires certain conditions of pressure and temperature to be able to form.

It acts as a filter, or protective shield, for harmful, high-energy radiation that reaches the planet, allowing others to pass through, such as the long-wave ultraviolet, which thus reaches the surface. This ultraviolet radiation is what allows life on Earth, facilitating the photosynthesis of terrestrial vegetation, algae and marine phanerogams, which is at the base of the trophic pyramid.

OZONE CHARACTERISTICS

- Ozone is the second most powerful and useful oxidant known after fluoride, but unfortunately the use of fluoride is dangerous, and likechlorine, increases the pH water, increases mineral content, and chemical reactions by substitution can produce dissolved fluorinated organic compounds that oppose greater resistance to oxidation.
- It has high chemical reactivity, which is related to the stable electronic configuration that drives it to search for electrons from other molecules. During the reaction with

other molecules, ozone is destroyed. The end products of this oxidation of organic molecules are carbon dioxide and water.
- It is a chemical oxidation water purifier, destroying all types of microbes, the colloids they are destabilized by neutralization and the dissolved organic materials are partially oxidized.
- The highest ozone concentration is between 15 and 40 ppm, with a value of 2-8 particles per million, in the area known as Ozone layer. If all ozone were compressed to air pressure at sea level, this layer would be only 3 mm thick.
- It acts as a filter, or protective shield, for harmful, high-energy radiation that reaches Earth, allowing others to pass through, such as the long-wave ultraviolet, which reaches the surface. This ultraviolet radiation is what allows life on the planet, since it is the one that facilitates the photosynthesis of the plant kingdom, which is at the base of the trophic pyramid.
- High absorption capacity of strange flavors and odors in the water. This is simply due to the rapid destruction of the organic compounds responsible for the odor. For air treatment, ozone is an effective deodorizer, contributing not only to sterilize environments but also destroys all kinds of odors formed by tobacco smoke, organic odors, charged environments and bad odors in general.
- For water treatment, ozone treatment may be suitable for the removal of heavy metals such as iron and manganese, which precipitate rapidly as oxide. * It is a natural flocculant, facilitating the water treatment filtration processes, causing the formation of flocs, that is, groups of suspended matter, which facilitates filtration, improving clarity and decreasing water turbidity, eliminating nitritestrihalome thane e pesticides, chloramines, etc.

AIR TREATMENT WITH OZONE

- Ozone in environmental technology is used as a method of air purification, in such a way that it is possible to eliminate all kinds of odors while destroying all kinds of bacteria and fungi that may exist, not allowing their development.
- For environmental treatment, it can be injected directly into the air from ozone generators, or it can be injected through the air conditioning. It is suitable for types of premises, with either people habitually, to eliminate fumes from tobacco, heavy smells, fishmongers, bathrooms, restaurants, etc.
- The rapid removal capacity of microorganisms, makes ozone an effective air purifier, destroying viruses, bacteria and avoiding allergies, headaches and conjunctivitis.
- It is used infood preservationsuch as fruits, vegetables, fish, meats etc. An adequate concentration of ozone in the cold rooms lengthens the life of these foods due to the elimination of the bacteria responsible for putrefaction.

CONTRAINDICATIONS OF OZONE TREATMENT IN HUMANS

Like all treatment it has some contraindications such as:
- hyperthyroidism.
- Cerebral stroke recent.
- In menstrual periods.
- Hypoglycemia.
- Hypotension

OZONE THERAPY

Ozone therapy (OT) is the technique that uses ozone (O3). The basis of this therapy is at the cellular level, it has become popular and there are articles published in various impact journals that confirm its efficacy in the treatment of pain related to herniated discs, vascular ischemia, retinitis pigmentosa and skin diseases.

Human beings cannot do without oxygen for more than three minutes. Oxygen is used in biological oxidation, it is essential for obtaining energy in cells and, therefore, in organs. The special chemical properties of oxygen and its metabolites are exploited in O3 therapy. The novelty of OT lies in its proven effect against free radicals, a function aimed at restoring and improving the natural defensive effects of cells against oxidants and radicals. This is accomplished by stimulating some of the basic protective enzyme systems themselves, such as: glutathione peroxidase, glutathione reductase, catalase, and superoxide dismutase. This free anti-radical effect gives it its anti-degenerative and anti-aging action.

Another novel effect in this therapy is the revitalizing and energy-producing action, Controlled applications of medical O3 have been scientifically shown to improve antioxidant cell activity by directly rebalancing the cell oxide-reduction gradient with its application, promoting the elimination of free radicals and other reactive oxygen species. According to this concept, preventive OT would have a "cellular anti-aging effect".

EFFECTS OF OZONE ON IMMUNE SYSTEM CELLS

The immune system is in charge of defending ourselves against pathogens, that is, elements that cause us harm, such as bacteria, viruses and fungi. When the immune system is weak, we usually say that the person has "low defenses", and that he is predisposed to contract an infection, because leukocytes, or white blood cells, which are the cells that protect him, do not work well. On the contrary, when the immune system is activated by others, it does not work well either, because it ignores the cells of the body itself and attacks them; this is the case of the well-known autoimmune diseases.

O3 activity on immunocompetent cells was investigated by Bocci et al. The results obtained contributed to the understanding of how ozone works in the human organism by demonstrating that after different incubation periods ozonated blood releases interferons:

- alpha (INF-a)
- beta (INF- b)
- gamma (INF-g)
- tumor necrosis factor alpha (TNF-a)
- transforming growth factor beta (FGT-b)
- granulocyte-monocyte colony stimulating factor (GM-FEC)
- interleukins (IL) - 6,2,4,8,10 and 1â.

The main signaling agent generated by ozone is H2O2, its chemical name is hydrogen peroxide, and this compound is commonly known as hydrogen peroxide. H2O2 induces the proliferation of immune cells, and its presence, together with lipoperoxides, is a biological marker associated with the improvement of the immune system. Lipoperoxides are formed when ozone oxidizes unsaturated fatty acids present in the cell membrane, this occurs in fractions of seconds. These compounds have been reported to promote neutrophil activity and phagocytic function.

Cytokine release is an expression of different fundamental biological functions. IL-6, for example, favors the differentiation of B lymphocytes in plasma cells and accelerates the synthesis of antibodies and acute phase proteins. FEC-GM produces leukocytosis and interferons, with their antiviral activity, prevent viral replication and activate basic immunomodulatory functions together with IL-2 and TNF-a, such as cytogenetic stimulation of immune cells.

During chronic (long-lasting) infections, the defensive processes of phagocytic cells are no longer capable of destroying bacteria, due to insufficient formation of H2O2; It is at this level that the positive influence of the peroxides formed during O3 treatment can be seen. An increase in the production of antibodies related to ozone therapy has also been evidenced.

The active mechanism of O3 on immunocompetent cells has been described as being through the ozonolysis of the unsaturated fatty acids that make up the cell membrane, and that it occurs in fractions of seconds. The breaking of the double bonds of unsaturated fatty acids gives rise to shorter chain hydrophilic peroxides, hydrogen peroxide (H2O2), aldehydes and ozonides. Short-chain hydroxy hydroperoxides enter the intracellular space and activate protein kinase that phosphorylates specific inhibitory factor (IkB), which is usually bound to nuclear factor kappa B (FN-kB). FN-kB is a transcription factor that induces the synthesis of many proteins and mediates the immune and inflammatory response. It was first identified as a regulator of the kappa light chain gene in B lymphocyte and subsequently in endothelial cells, macrophages, hepatocytes, leukocytes, and epithelial cells. It is a cytosolic heterodimer consisting of two protein subunits called P65 and P50. Its activation leads to the activation of different proteinases that degrade the inhibitor. Once FN-kB is free, it is translocated to the nucleus and binds to the promoter region of genes that mediate cytokine synthesis. The activation of NF-íâ by H2O2 is one of the mechanisms of action of ozone. Its activation leads to the activation of different proteinases that degrade the inhibitor. Once FN-kB is free, it is translocated to the nucleus and binds to the promoter region of genes that mediate cytokine synthesis. The activation of NF-íâ by H2O2 is one of the mechanisms of action of ozone. Its activation leads to the activation of different proteinases that degrade the inhibitor. Once FN-kB is free, it is translocated to the nucleus and binds to the promoter region of genes that mediate cytokine synthesis. The activation of NF-íâ by H2O2 is one of the mechanisms of action of ozone.

The decomposition products of O3, especially H2O2 and lipoperoxides, behave as biological markers associated with the improvement of the immune system. These compounds have been reported to promote neutrophil activity and phagocytic function. Phagocytosis is the nonspecific effector defense mechanism where microorganisms and cellular debris are captured, encompassed and introduced into the phagocytic cell in order to eliminate them.

H2O2 is lethal to bacterial cells, causing cell wall lysis, bursting, and destruction; they also have a very important role in activating kinases and transcription factors that induce the synthesis of cytokines and growth factors.

Medical ozone can be used as one more drug with general regulatory activity, which exerts its effects by stabilizing the cellular redox balance. POL (lipid oxidation products) and H2O2, generated by the decomposition of O3, behave as stress signaling molecules, which improves the cellular energy balance and the immune system in benefit of diseases such as psoriasis, asthma and rheumatoid arthritis. It is considered by various authors as a drug capable of modifying the biological response due to the multiplicity of action and the generation of intermolecular signaling.

GERMICIDAL ACTION OF THE OZONE

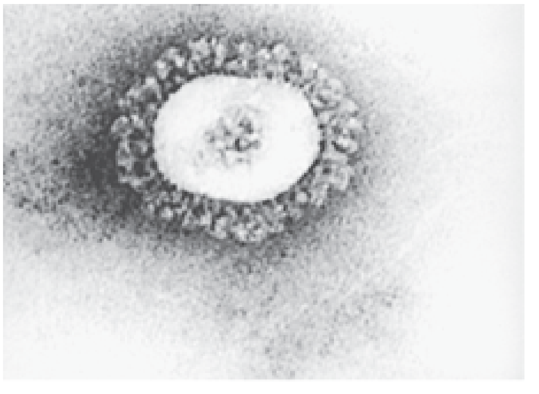
Broad spectrum germicidal activity is another of the properties of OT and O3 metabolites. O3 is considered to be the largest germicide in nature when it comes in direct contact with viruses and bacteria, in local wound treatments and in contaminated waters, as it has a direct oxidizing action on microorganisms, and is used as an antiseptic agent. In addition, it interacts with unsaturated organic compounds during ozonolysis, which favors its antimicrobial action.

Antiviral activity includes damage to the capsid, oxidation of the lipid envelope, modifications in the structure that prevent binding to the receptor, and penetration into a new cell. Antiviral action is observable at concentrations lower than bactericidal action. This is because viruses have less structural complexity in the walls than bacteria.

Within the body, the virucidal or bactericidal capacity of O3 is achieved by stimulating the immune system and not by its direct attack on the microorganism, which is essential to complete its immunomodulatory action, since it is capable of modulating the immune response by stimulating the activity of leukocytes. and the production of cytokines, interferons and TNF-a. The H2O2 that forms after its decomposition, enhances the body's defensive capacity.

STRUCTURE AND COMPOSITION COVID 19

Coronaviruses are enveloped 120 to 160 nm particles that contain a positively polarized, single-stranded, unsegmented RNA genome (27 to 32 kb), the largest genome among ribonucleic acid viruses. The genomes are polyadenylated at the 3 end. Isolated genomic RNA is infectious. The helical nucleocapsid is 9-11 nanometers in diameter. On the outer surface of the envelope are widely spaced projections in the shape of a golf club or petal, 20nm long, suggestive of a solar corona. The structural proteins of the virus comprise a phosphorylated nucleocapsid (N) protein of 50 to 60 kDa, a membrane glycoprotein (M) of 20 to 35 kDa that serves as a matrix protein embedded in the lipid double layer of the envelope and that interacts with the nucleocapsid, and the spike glycoprotein (S; 180 to 220 kDa) constituting the petal-shaped peplomers. Some viruses, including the human coronavirus OC43 (HCoV-OC43), contain a third glycoprotein (HE; 65 kDa) that causes hemagglutination and has acetyl esterase activity.



Fuente: Geo. F. Brooks, Karen C. Carroll, Janet S. Butel, Stephen A. Morse, Timothy A. Mietzner: Microbiología médica, 26e: www.accessmedicina.com
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COVID SYMPTOMS 19

Common symptoms:
- fever
- fatigue
- dry cough

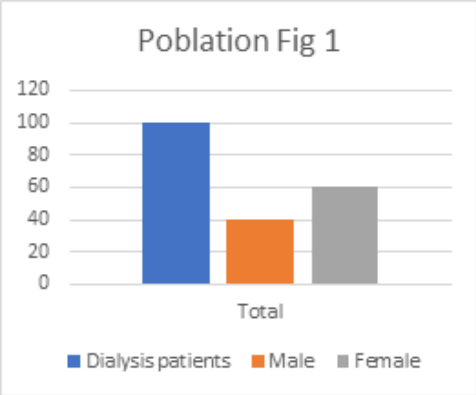
Some people may also experience:
- aches and pains
- nasal congestion
- abundant runny nose
- sore throat
- diarrhea

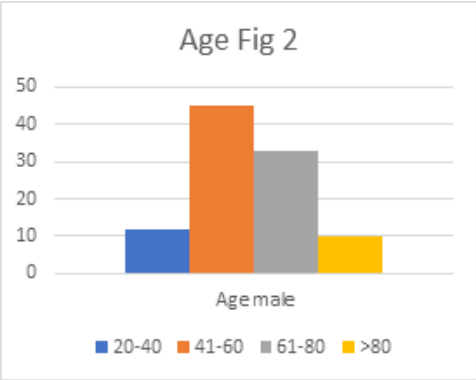
When a person becomes infected with the virus, symptoms take an average of 5 to 6 days to appear but can take up to 14 days.

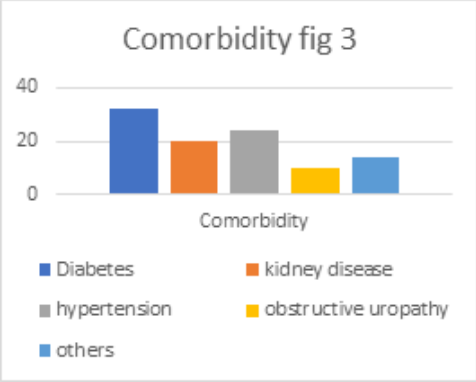
People with mild symptoms who are otherwise healthy should be isolated. Get medical attention if you have a fever, cough, and shortness of breath.

STUDY IN PATIENTS ON DIALYSIS

100 patients with chronic kidney disease were assessed in a dialysis clinic, which were 60% women, 40% men (figure 1), age ranges 20-40 12%, 41-60 45%, 61-80 33% ,> 80 10% (figure 2); The main comorbidities were: diabetes mellitus 32%, nephropathy 20%, hypertension 24%, obstructive uropathy 10% and others 14% (Figure 4).







In the dialysis room a disinfection is carried out every change of shift of patients with soap and alcohol, in addition that the room is disinfected with ozone from 6:00 p.m. to 6:00 a.m. and with ultraviolet light, the Measured ozone levels were less than 0.06 ppm which meets the TLV standard for 8 hours.

RESULTS

Of the 100 patients exposed to ozone in the ward, only 20% had flu-like symptoms that were treated by medical personnel, 80% had no discomfort from the presence of ozone, only the adverse effects of dialysis itself, which are headache for hypertension, general malaise, generalized itching, which are attributed to the dialysis process; so far, no patient has presented symptoms of covid 19, due to the use of ozone and constant disinfection of the room and the quarantine measures adopted by each one.

CONCLUSIONS

The use of ozone as a disinfectant works by eliminating any microorganism from the surfaces, in addition to having an effect on the immune system which gives us greater protection against infections; Patients with kidney failure, having a weakened immune system, are at higher risk of mortality from covid 19, but being constantly exposed to ozone improves their immune system, making it stronger in the face of external aggressions.

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