

BIBLIOGRAPHIC REVIEWS**Effectiveness of ozone therapy in pediatric patients positive to covid-19 in the year 2021**Aliyen Cachimaille Ortiz^{1*} , Marian Gainza Cintra¹ , Leonardo Hinojosa Sabournin¹ ¹ University of Medical Sciences of Guantánamo. Faculty of Medical Sciences of Guantánamo. Guantánamo. Cuba.* Corresponding author: cachimaillea@gmail.com**Received:** march 16, 2023**Approved:** april 19, 2023**ABSTRACT**

Introduction: Ozone therapy is the application of medical ozone through minimal punctures or direct application for therapeutic purposes to improve the functioning of organs and tissues. The use of ozone therapy as a complementary treatment is fully validated in diseases such as: osteoarthritis, lumbar and cervical disc herniation, chronic pain, delayed healing, and COVID-19 was added to the list.

Objective: To determine the results obtained through the application of ozone therapy as a complementary treatment in patients positive for COVID-19. **Method:** A documentary study was carried out where the bibliography published in web format and available in ScieELO, articles published in the Cuban Journal of Biomedical Research, Cuban Journal of Pharmacy, Elsevier Journal, as

well as the newspapers Granma, Juventud Rebelde and Overcome. The synthesis analysis method was used.

Development: The main results of studies worldwide indicate that ozone decreases inflammation rates and assisted breathing time, improves oxygen saturation and makes CRP negative in shorter periods. It is par excellence a broad-spectrum germicide. And it could reduce mortality. **Conclusions:** Ozone therapy is capable of improving clinical, laboratory and radiological variables, such as those referred to above. There is no doubt that it represents a supportive or compassionate option in the management of positive patients for COVID-19.

Keywords: Ozone, ozone therapy, COVID-19, treatment

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INTRODUCTION

Ozone therapy is the application of medical ozone through minimal punctures or direct application for therapeutic purposes to improve the functioning of organs and tissues, treating multiple diseases¹. In some cases, it is applied as the only therapy, while in others it acts as support for another treatment⁽²⁾.

Although ozone therapy began to be practiced in medicine in Argentina around 20 years ago, the therapeutic benefits of ozone have been known and used since the mid-19th century throughout the world⁽³⁾.

The application of ozone therapy as a medical practice is currently being developed and implemented in more than 50 countries. Among the main ones we can mention: Germany, Cuba, Spain, Russia, Italy and the United States⁽³⁾.

It should be noted that since the first half of the 70s of the last century, Cuba began to venture into this line of research, when the National Center for Scientific Research (CNIC) developed what would later be the first ozone group in the country, whose initial mission consisted of validating the properties and therapeutic uses of the so-called blue gas⁽⁴⁾.

Today, ozone therapy is widespread as a complementary and adjuvant treatment throughout the Cuban archipelago, and its use covers a wide group of specialties, including orthopedics, neurology, dentistry, pediatrics, ophthalmology, dermatology, rheumatology, and oncology, to name a few ⁽⁴⁾.

Ozone is a gas that is naturally present in our atmosphere. Each ozone molecule contains three oxygen atoms and its chemical formula is O₃. By its very nature, it is highly oxidizing, so it is responsible for disinfecting, purifying and eliminating pathogenic microorganisms such as viruses, bacteria, fungi, mold, spores; all of them responsible for health problems in humans ^(5,6).

Medical ozone is composed of a mixture of low concentrations of ozone with medical oxygen. Many bibliographies state that it has a “vaccine effect” on the body, since it stimulates antioxidant defenses by causing a small controlled oxidation, in other words, it stimulates cellular oxidative pre-conditioning ⁽⁷⁾.



It has been shown that oxidative pre-conditioning activates molecules in our cells that activate genes for cell repair and defense, such as antioxidants, anti-inflammatories, antitumor agents or reoxygenants⁽⁷⁾.

Ozone can be administered by any route, depending on the indication, except for inhalation: it is strictly prohibited to breathe ozone, since it can irritate the lungs and throat, cause dyspnea, as well as an increased risk of respiratory infection^(7,8).

It is generally infiltrated in pain medicine, helping to regenerate and reduce inflammation of muscles, tendons, ligaments, intervertebral discs and joints. Topically it is used to promote wound healing processes. Even through systemic application, rectal enemas or by indirect intravenous route, it is used for the complementary treatment of numerous diseases and has a great future in preventive medicine⁽⁷⁾.

Today, the use of ozone therapy as a complementary treatment is fully validated in diseases such as: bronchial asthma, bronchitis, allergies, Down syndrome, infantile cerebral palsy, autism spectrum disorders, and recently COVID-19 was added to the list ⁽⁹⁾.

The objective: is established: To determine the results obtained through the application of ozone therapy as a complementary treatment in pediatric patients positive for COVID-19.

METHOD

In the present bibliographical review, a documentary study was carried out where the bibliography published in web format and available in SciELO, articles published in the Cuban Journal of Biomedical Research, Cuban Journal of Pharmacy, Elsevier Magazine, as well as the Granma, Juventud Rebelde newspapers, were consulted. and Venceremos, and in the portals of each publication, through the EndNote search engine and reference manager. The recommendations made by the World Health Organization (WHO) were also taken into account. Publications made up to the year 2022 were considered. The synthesis analysis method was used to extract the information and thus analyze the most important.

DEVELOPMENT

At the end of December 2019, local health centers in Wuhan, Hubei Province, China were reporting clusters of patients presenting with pneumonia of unknown etiology. From the beginning, it was noted that these groups of patients were epidemiologically linked to a wholesale seafood market in the city. Chinese scientists later identified the causative agent as a novel coronavirus (CoV) and its genomic sequence was made public by the World Health Organization (WHO), which later announced the official name of the new disease as "CoV disease." coronavirus 2019" (COVID-19); and The International Committee on Taxonomy of Viruses named it SARS-CoV-2⁽¹⁰⁾.



Etiology:

SARS-CoV-2: It belongs to the genus Coronavirus of the Coronaviridae family whose name is due to the crown-shaped protuberances that the virus presents in its envelope, which encloses the RNA genome. Its shape is round or oval and often polymorphic. The new coronavirus has a diameter of 60 to 140 nanometers⁽¹¹⁾.

Several authors suggest that coronaviruses constitute the largest family with an RNA genome^(12,13,14).

Transmission:

Routes of person-to-person transmission of the SARS-CoV-2 etiologic agent include direct transmission by inhalation of droplets released through coughing, sneezing, breathing, or speaking, or by hand contact with contaminated surfaces, which are then touch the oral, nasal or ocular mucous membranes. It can also be transmitted through saliva, and possibly by the fecal-oral route. A study with 2143 children suggests that this population group may be a critical factor in the rapid spread of the disease⁽¹²⁾.

Symptomatology:

The onset of COVID-19 manifests mainly as fever, but sometimes only chills and respiratory symptoms occur due to mild dry cough and gradual dyspnea, as well as fatigue and even diarrhea. Other very frequent symptoms, as registered by the World Health Organization (WHO), are expectoration (33%), sore throat (14%), headache (14%), myalgia or arthralgia (15%), nausea or vomiting (5%), nasal congestion (5%)⁽¹⁵⁾.

The clinical spectrum of SARS-CoV-2 varies from asymptomatic or paucisymptomatic forms to clinical conditions characterized by respiratory failure requiring mechanical ventilation and support in the ICU with systemic manifestations such as sepsis, septic shock, multiple organ failure^(16,17,18).

Treatment:

Currently there is no specific treatment for treated patients and the experiences achieved in the management of other respiratory viral infections have provided information for the treatment of COVID-19^(19,20).

Numerous potential therapies, including supportive intervention, immunomodulatory agents, antiviral therapy, and convalescent plasma transfusion have been tentatively applied in clinical settings. Several of them have provided benefits in the treatment of patients with COVID-19 infection, but controlled clinical studies have not shown the real efficacy of most of the more than 254 drugs under study⁽²⁰⁾.

To date, there are only a few clinically approved vaccines for children, among which stand out Pfizer-BioNTech, Moderna (both authorized by the United States Food and Drug Administration, FDA), and the Cuban vaccines: Soberana 02 and Soberana Plus with more



than 90% effectiveness. Despite the wide variety of drugs under investigation, the pharmacological arsenal to deal with this disease is very restricted^(21,22,27).

In this context, different countries have approached complementary and traditional treatment methods and various compounds of natural origin are being studied both in the prevention and in the treatment of COVID-19^(20,30).

Application and results of ozone therapy in the treatment of COVID-19:

Ozone therapy, as a complementary therapeutic method in pediatric patients, has also had broad support as a therapeutic proposal. With half a dozen trials, two of them completed, ozone therapy is one of the remedies that was immediately tested in China^(20,23).

The experts detail that the recommended systemic administration has as order: ozonated saline solution, major autohemotherapy and extracorporeal blood oxygenation-ozonation. Clinical protocols must comply with the standard doses and procedures defined in the Madrid Declaration on Ozone Therapy, approved by the International Meeting of Ozone Therapy Schools, held at the Royal National Academy of Medicine in June 2020^(24,28).

In the treatment of COVID-19, ozone therapy is applied in two categories. One of them is disinfection, both in contaminated environments and in aqueous solutions. The other category consists of systemic application, especially as complementary medicine to improve the health status of patients⁽²⁴⁾.

Today, this modality of Traditional Natural Medicine (TNM) has extensive support from toxicological, molecular, preclinical, and clinical studies; reasons why the World Health Organization has officially recognized the potential use of ozone therapy as a complementary action, based on available scientific data, it is a contribution to combat the disease^(21,24).

The main results of studies worldwide indicate that ozone decreases inflammation indices and assisted breathing time, improves oxygen saturation, and renders PCR negative in shorter periods. It is par excellence a broad spectrum germicide. And it could reduce mortality^(25,29).

It was also possible to verify that the patients who underwent these studies, after one month improved their body mass index, and blood chemistry indicators such as uric acid and hemoglobin levels normalized⁽²⁶⁾.

On the other hand, it was confirmed that those convalescent from COVID-19 presented oxidative redox imbalance, restored by the combination of therapies (rectal ozone therapy plus BIOPLA, the latter is a protein-mineral concentrate extracted from the human placenta at term), fundamentally, by increasing or stimulating the endogenous antioxidant system⁽²⁶⁾.

It was also possible to verify that there were no adverse effects, thus demonstrating not only the efficacy but also the safety of the therapy^(23,26).

Based on these results, Cuba incorporates ozone therapy, a modality already widespread in the country and approved within the Natural and Traditional Medicine of the Ministry of Public Health, in the treatment protocol for patients with COVID-19, and registers the first clinical trial internationally, in which rectal insufflation is the only route of application^(24,30).

CONCLUSIONS

Different therapeutic schemes are being evaluated not only in the care phase for the infected patient but also as a preventive treatment and as a treatment to speed up the recovery phase. Science does not rest in its battle to face COVID-19, and in it, the use of ozone plays an active role.

Ozone therapy is capable of improving clinical, laboratory and radiological variables, such as those referred to above. It is undoubtedly an adjuvant or compassionate option in the management of pediatric patients positive for COVID-19.

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