

Ozone Therapy in the Huge Concern of Multidrug Resistant (MDR) Bacteria. The Worldwide Perspective

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To the Editor,

Multidrug resistant (MDR) bacteria represent a huge concern for public health worldwide [1,2] as selective pressure to new resistant microbial strain is directly linked to the mandatory increase in adopting anti-microbial in hospital and healthcare contexts, inducing scientific research to new challenging solutions [3]. Ozone is widely used to counteract microbial diffusion in healthcare indoor environments [4] but even in eradicating MDR bacteria in skin infections, which may occur in post-surgical wounds [5]. Despite the intriguing possibility of using ozone to address bacterial indoor pollution and reduce MDR bacterial spreading, the consideration of ozone in infectious disease is yet challenging. Ozone has also been used for its potential antibacterial properties in various applications. It is a strong oxidizing agent, which means it can interact with and break down organic molecules, including bacteria and other microorganisms. Due to its reactivity, ozone can damage the cell walls and structures of bacteria, leading to their inactivation [6].

The worldwide awareness of ozone as a strategic tool to counteract MDR bacterial concern is summarized in (Figure 1). This survey was conducted using Google Trends search engine, spanning a time range including the latest 5 years worldwide in the field health (A) and science (B). In health topics, the delta searching items/week, calculated from the averaged values upon the bar charts, is sensitively lower than the same estimated in the science field (12.54 ± 3.53 SD Vs 46.17 ± 8.55 SD), so suggesting that, while the interest in considering ozone as a medical adjunct treatment against MDR bacterial infection is increasing alongside the awareness of the problem in healthcare services, hospitals and caregivers, its scientific impact is greatly dismissed (Figure 1A, Figure 1B). Figure 1C shows that ozone therapy (light blue) is widely used in some limited countries. Actually, from a scientific point of view, its use is much wider than expected (Figure 1D) and includes the most of civilized countries experienced MDR bacterial concern as a topic in science (Figure 1E, light brown).

The logistic regression calculated by applying the formula:

$$P = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x_1)}}$$

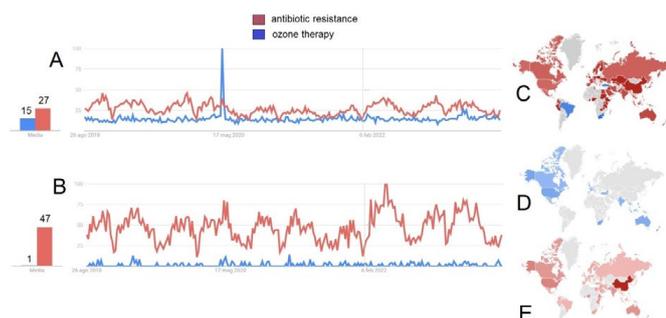


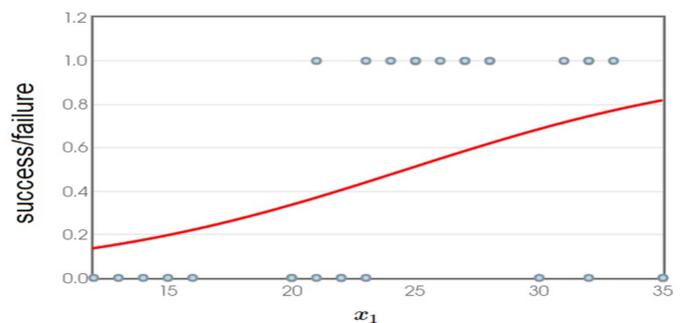
Figure 1: The worldwide awareness of ozone.

On the relationship between the needs to use ozone as an adjunct therapy and the needs to address successfully MDR bacterial infections, particularly in post-surgical infections, was calculated considering that, for search frequencies under 51% of the estimated value in the latest 5 years (= 23 for science), the logistic value is a failure (0), whereas for values higher than the threshold, the value is 1 (success).

Figure 2 shows that the relationship between ozone therapy and MDR bacterial infection, i.e., antibiotic resistance, fails significantly ($p = 0.0224$) in reporting good results if it is not particularly stressed as a scientific interest in the worldwide community.

Increasing the interest in science in the use of ozone as an adjunct therapy to fight microbial infections in post-surgical or traumatic wounds is of paramount importance, due the ability of ozone to act as a wide-spectrum anti-microbial agent.

The consideration we could forward is therefore to increase the investigation efforts in the scientific field to expand the debate and improve the endowment of data and evidence regarding the ability of topical or systemic ozone to reduce the concerning impact of MDR bacterial infections in hospital care and clinical therapy.



Chi-Square = 5.2120 df = 1 p-value = 0.0224

Figure 2: The relationship between ozone therapy and MDR bacterial infection.

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Conflict of Interest

The Authors state they have no conflict of interest.

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