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REVIEW ARTICLE

Iodine Oral and Nasal Rinsing: A Potential Therapeutic for COVID19

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ABSTRACT

There is a growing list of pharmaceuticals and nutraceuticals that may protect against severe COVID-19 and increase the likelihood of remaining asymptomatic. Iodine is one such nutraceutical. It is a recognized biocide and is speculated to play a role in protecting against COVID-19 by deactivating the virus and limiting viral replication. This paper reviews the in-vitro, in-vivo, empirical and clinical trial evidence supporting the use of iodine in COVID-19. This data suggests that iodine-based oral and nasal rinses are a highly effective, safe, and simple application to improve protection against coronavirus infection and even a broader range of viral infections.

INTRODUCTION

Iodine is a scientifically recognized biocide that eliminates fungi, bacteria, and viruses including enveloped viruses (Kariwa, Fujii and Takashima 2021; Wang et al. 2021; Chang et al. 2021). It has long been used to support the innate immune system to protect from bacterial and viral infections (Flynn 2003, Menon 1957, Derscheid et al 2014, Fischer et al 2011). One form of over-the-counter (OTC) iodine found in retail pharmacies and medical settings is Povidone-iodine (PVP-I) or iodoprovidone, and is also sold under the trade name Betadine. Iodine is a water-soluble compound, has a well-documented broad spectrum of antimicrobial actions and is efficacious against several resistant pathogenic micro-organisms (Durani and Leaper, 2008).

In the context of SARS-CoV-2, if viral replication and thus viral load is minimized, the patient will likely remain asymptomatic. It has been demonstrated that the lower the viral load the lower the risk is for severe COVID (Fajnzylber et al. 2020). Rinsing the oral and nasal passages with an iodine-based rinse deactivates the virus almost on contact also reduces the virus's ability to replicate and aerosolize into the respiratory tract. The pharmacodynamics of iodine allows for quick penetration of the cell wall of microorganisms and disrupts protein-nucleic acid synthesis and structure, causing them to become denatured and deactivated (Edis et al. 2019).

The concept of therapeutic oral rinsing with iodine originated in Japan. For more than 40 years Japan's Ministry of Health, Labour, and Welfare has strongly recommended the use iodine mouth rinses for healthcare workers and patients to reduce airborne illness, and it remains a standing practice. Oral and nasal iodine applications have no approved claims in Europe, however, Betadine is a Registered E.U. Approved Biocide for external use and a proven antiviral element against "enveloped viruses (The European Chemicals Agency Europa Listing on Povidone-iodine). Coronaviruses are enveloped viruses.

At the outset of the Pandemic, the Centers for Disease Control (CDC), the World Health Organization (WHO), The American Dental Association (ADA) and The Australian Dental Association issued guidance for dentists to use a Preprocedural Mouth Rinse (PPMR) consisting of Providone-iodine to lower viral load of SARS-CoV and reduce aerosolization (Kariwa et al. 2006). Similar guidance was given for MERS (Eggers et al. 2015). The organizations did disclaim that at the time of the guidance more testing was necessary. However, in-vitro research during prior SARS outbreaks had already demonstrated 99.99% deactivation of viruses using iodine (Eggers et al. 2018; Eggers 2019). This evidence

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has since been supported by various other researchers and real-world observations (Ribeiro Reis et al. 2020; Induri et al. 2021; Parhar et al. 2020).

IN-VITRO IODINE STUDIES

In-vitro studies of nasal and oral PVP-I antiseptic solutions at concentrations of 1-5% have been tested for inactivation of the SARS-Cov-2 virus. These concentrations were found to be effective at inactivating the SARS-CoV-2 virus after 60-seconds of exposure. Another study has demonstrated that a PPMR with 100 ppm molecular iodine could play a vital role in combating COVID-19 pandemic by preventing the spread of infection (Moskowitz and Mendenhall 2020). Both support the therapeutic potential of iodine formulations to reduce the viral load, infection and the transmission of SARS-CoV-2 (Pelletier et al. 2021).

In-vitro data related to iodine rinsing showed that 0.5% PVP-I is effective in reducing SARS-CoV-2 in the nasal cavity, nasopharynx, oral cavity, and oropharynx (Chopra et al. 2021). Since oropharyngeal PVP-I is safe, simple, and inexpensive, the authors recommended its use among all patients infected with SARS-CoV-2 to reduce the viral load and subsequent risk of transmission of SARS-CoV-2 viral particles (Chopra et al. 2021). In addition, they recommended healthcare professionals and frequent travellers use PVP-I mouth rinse to minimize the risk of cross-infection (Chopra et al. 2021).

CLINICAL TRIALS AND IN-VIVO TESTING

Understanding iodine's mechanism of action has led to several clinical studies in which iodine has been observed to be an efficient OTC product available for treating early onset coronavirus infection by immediately reducing viral load at the origin of incubation. A small in vivo study with four patients demonstrated a clear reduction in viral load in three of four subjects following the use of OTC iodine (Martinez Lamas et al. 2020). A randomized clinical study then compared the reduction in the viral load of 57 patients with COVID-19 when using nasopharyngeal iodine solution compared to 33 controls. It was found that nasopharyngeal decolonization may reduce the carriage of infectious SARS-CoV-2 in adults with mild to moderate COVID-19. Notably, thyroid dysfunction occurred in 42% of the patients exposed to PVP-I, so caution is warranted. (Guenezan et al. 2021).

Another larger study containing 189 participants compared outcomes of those using iodine-based nasal irrigation and/or spray versus a control group using only water. A statistically significant percentage of nasopharyngeal clearance was observed with all strengths (0.4, 0.5 & 0.6%) of PVP-I nasally compared to the corresponding controls. (Arefin et al. 2021). As such, oral and nasal iodine rinses demonstrate promising efficacy in COVID-19 patients by reducing viral load and eliminating the virus altogether. These findings were validated by negative PCR test results.

EMPIRICAL EVIDENCE FOR ODINE ORAL AND NASAL RINSING

Several examples of empirical evidence further support the use of iodine oral and nasal rinsing as a potential prevention and therapeutic for viral infections, including COVID-19. One such example includes anecdotal observations of success in using nasopharyngeal spray iodine solution to reduce both recovery time and spread in community based COVID-19 prevention initiatives in Israel. Reported recovery time was reduced by approximately 50% with a lower likelihood of spread to household members when nasopharyngeal spray iodine was added to the prevention strategy. These observations were made in over 1,000 COVID patients as part of a health promotion and preventative care education programs delivered by Rabbi Yehoshua Gazi, a community leader in one of the largest synagogues located in Beit Shemesh, Israel, and Mr. Chaim Sidman, who works in an ambulatory care program within the same city.

CONCLUSION

Iodine has been used as antiseptic for over 150 years and has a broad range of antimicrobial effects. In-vitro, in-vivo and clinical trials have demonstrated that it has antiviral effects against SARS-CoV-2 and can safely reduce viral load when applied orally and intranasally. Initial guidance from leading global health organizations called for the institution of a safe sanitary protocol consisting of rinsing the oral and nasal mucosa to reduce viral load and transmission of the virus. The guidance has since been validated by in-vitro testing and subsequently confirmed by several clinical trials [Seet et al. 2021; Elzein et al. 2021; Seneviratne et al. 2021, Chaudhary et al. 2021). More recently, a systematic review of controlled clinical trials concluded that the current evidence supports povidone iodine as effective against SARS-CoV-2 in saliva, and could be implemented as a mouth wash before other interventions to reduce the risk of cross-infection in healthcare sites (Garcia-Sanchez et al. 2022).

The research summarized in this manuscript suggests that iodine-based rinses are a highly effective, safe, and simple intervention to protect against coronavirus and a broad range of viral infections.

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