

COVID-19

PAHO Does Not Recommend Taking Products that Contain Chlorine Dioxide, Sodium Chlorite, Sodium Hypochlorite, or Derivatives 16 July 2020

The information included in this note reflects the available evidence at the date of publication.

KEY MESSAGES

- The Pan American Health Organization (PAHO) does not recommend oral or parenteral use of chlorine dioxide or sodium chlorite-based products for patients with suspected or diagnosed COVID-19 or for anyone else. There is no evidence of their effectiveness and the ingestion or inhalation of such products could cause serious adverse effects.
- People's safety should be the main objective of any health decision or intervention.
- PAHO recommends strengthened reporting to the national drug regulatory authority or to the office of the Ministry of Health responsible for drug regulation in the event of any adverse event linked to the use of these products. PAHO also recommends that products containing chlorine dioxide, chlorine derivatives, or any other substance presented as a treatment for COVID-19 should be reported.
- The health authorities should monitor media marketing of products claiming to be therapies for COVID-19 in order to take the appropriate actions.

Information on the subject

Context

- Chlorine dioxide is a yellow or reddish-yellow gas used as bleach in paper manufacturing, in public water treatment plants, and for the decontamination of buildings. Chlorine dioxide reacts with water to generate chlorite ions. Both chemical species are highly reactive, which means that they have capacity to eliminate bacteria and other microorganisms in aqueous media (Agency for Toxic Substances and Disease Registry [ATSDR], 2004).
- This gas has been used as a disinfectant in low concentrations for the treatment of water (WHO: 2008, 2016) and in clinical trials for buccal antiseptics (National Library of Medicine, 2020).
- Sodium hypochlorite is a product used to disinfect the surfaces of inanimate objects, marketed as household bleach at different concentrations, from 3% to 6%.
- Over the years, products containing chlorine dioxide or its derivatives have been marketed as "therapies" to cure various conditions, although there is no scientific evidence of their effectiveness. Since the appearance of COVID-19, numerous products

COVID-19

containing chlorine dioxide or its derivatives have been marketed alone or in combination with other products, with false claims that they can cure COVID-19 and other associated ailments.

Toxicity

- Chlorine dioxide and sodium chlorite react rapidly in human tissues and, if ingested, can cause irritation of the mouth, esophagus, and stomach, causing severe gastrointestinal illness, including nausea, vomiting, and diarrhea. There can also be serious hematological (methemoglobinemia, hemolysis, etc.), cardiovascular, and renal disorders. A drop in blood pressure can result in severe symptoms such as respiratory complications due to a change in the blood's capacity to transport oxygen (FDA, 2020; ATSDR, 2004). Furthermore, inhalation through nebulizers can generate pulmonary edema, bronchial spasms, chemical pneumonitis, edema of the glottis, and even death if exposure is above the occupational exposure limits (WHO et al., 1994; WHO, ILO, 2000). Prolonged exposure can result in chronic bronchitis and tooth erosion. High concentrations can cause adverse effects in different organs (Peck, B. et al., 2011).
- The Food and Drug Administration (FDA) of the United States has received reports of serious adverse events in patients who have consumed chlorine dioxide, including: respiratory insufficiency, alterations in the electric activity of the heart, hypotension, liver insufficiency, anemia, and severe vomiting and diarrhea (FDA, 2020).

Recent developments in the Region of the Americas

- On 19 November 2019, the Ministry of Health of Peru issued an alert on the serious risk to health associated with the consumption of products containing sodium chlorite or chlorine dioxide (Ministry of Health of Peru, 2019).
- On 8 April 2020, the FDA recommended that consumers neither purchase (particularly through the internet) nor ingest chlorine dioxide-based products of any kind, because there is no scientific evidence of their efficacy or safety. The FDA specifically mentioned the product Miracle Mineral Solution (MMS). The identified websites were promoting a liquid sodium chlorite product at 28% strength in distilled water, with instructions to mix it with lemon or lime juice or other acidic solutions (FDA, 2020). The FDA continues to monitor the online marketing of such products.
- On 20 April, the Central American Network of Centers for Information and Advice on Toxicology (*Red de Centros de Información y Asesoría Toxicológica de Centroamérica* –REDCIATOX), together with other Latin American networks of poison control centers, issued an alert on the health hazards of consuming chlorine dioxide or sodium chlorite to prevent or treat COVID-19 (REDCIATOX, 2020).

COVID-19

- On 29 April, the Argentine Network of Medicine Information Centers (*Red Argentina de Centros de Información de Medicamentos—RACIM*, 2020) published an alert on the toxicity of sodium chlorite and chlorine dioxide-based products.
- On 1 May, the National Institute for the Monitoring of Medicines and Food (*Instituto Nacional de Vigilancia de Medicamentos y Alimentos—INVIMA*) of Colombia issued an alert on the possible promotion and sponsorship in that country of clinical research—in human beings—on chlorine dioxide as a treatment for COVID-19, without the necessary authorization (INVIMA, 2020).
- Similarly, on 8 May, the National Agency for Health Regulation, Control, and Surveillance (*Agencia Nacional de Regulación, Control y Vigilancia Sanitaria—ARCSA*) of Ecuador announced that Miracle Mineral Solution was being marketed on virtual platforms in the country (ARCSA, 2020).
- On 12 May, the Toxicological Information Center of the National Autonomous University (*Centro de Información Toxicológica de la Universidad Nacional Autónoma—CENTOX*) of Honduras issued a technical opinion on hypochlorite solutions in the context of the COVID-19 pandemic (CENTOX, 2020).
- On 8 June, the Official School of Pharmacists of Madrid (2020) issued a note about the health hazards of chlorine derivatives.
- On 26 June, the Ministry of Health of the Plurinational State of Bolivia issued a bulletin warning that the product called Miracle Mineral Solution (advertised and marketed as chlorine dioxide and sodium chlorite) was not a medicine and had no health registration (*Ministerio de Salud del Estado Plurinacional de Bolivia*, 2020).
- In June 2020, the National Directorate of Health Surveillance (*Dirección Nacional de Vigilancia Sanitaria*) of Paraguay also discovered the unauthorized promotion and marketing of Miracle Mineral Solution (MMS). Consequently, it issued resolution 278 of 2020 (Ministry of Public Health and Social Welfare, 2020) banning the importation, marketing, and use of the product, as well as the production of sodium chlorite-based preparations with or without the addition of acids (hydrochloric, citric, or others). A bulletin was also issued to alert the population.

CONCLUSIONS

PAHO recommends that the health authorities facilitate the reporting of adverse events related to these substances and issue the necessary alerts and regulatory actions, including possible sanctions, in order to avoid the recurrence of such events.

PAHO recommends that the population not consume products containing chlorine dioxide or related substances (sodium hypochlorite, bleach, etc.) and that all marketing of such products for therapeutic purposes should be reported.

COVID-19

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COVID-19

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