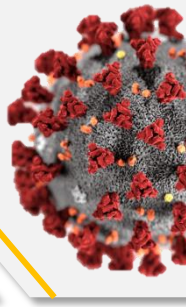
HYPOCHLORUS ACID FOR INDOOR AND OUTDOOR DISINFECTANT

Based on available evidence up to 20 May 2020



INTRODUCTION

Hydro33 is a hypochlorous acid (HOCI) solution which also known as electrolysed water containing monovalent chlorine that acts as an oxidizing or reducing agent. It is produced by the electrolysis of water-sodium chloride solution. The solution is commonly used in wound care in health setting. Hypochlorous acid is known to be detrimental to bacterial cells resulting from destructive oxidation of membrane bound complexes involved in ATP generation and maintenance of cellular electrical charge.[1] The United States Food Drug Administration (US FDA) approved usage of hypochlorous acid in food safety, food produce, seafood, meat and poultry sanitation.[2] Hypochlorous acid containing solution has been listed by the United States Environmental Protection Agency (EPA) for disinfectants for use against SARS-CoV-2 however, Hydro33 itself is not registered with the agency.[3]

This rapid literature review was conducted to determine the efficacy, safety and cost effectiveness of Hydro33 as surface indoor and outdoor disinfectant for COVID-19 or coronavirus infection.

EVIDENCE ON EFFECTIVENESS AND SAFETY

The systematic search for new evidence from the scientific databases such as Medline, EBM Reviews, EMBASE via OVID, PubMed and from the general search engines [Google Scholar and US Environmental Protection Agency (US EPA)], and yielded two articles related to effectiveness of hypochlorous acid as surface disinfectant indoor or outdoor. However, there was no study retrieved on the safety and cost-effectiveness.

Park et. al (2007) conducted an evaluation to determine effectiveness of liquid- and fog-based application of Sterilox hypochlorous acid solution for surface inactivation of Human Norovirus. Virus carrier of Human Norovirus, coliphage MS2, and Murine Norovirus on ceramic tile (porous) and stainless steel (nonporous) was exposed to solution of hypochlorous acid solution 20 to 200ppm for 10 minutes contact time. In another sets of experiment, hypochlorous acid solution contained 180 to 200ppm available free chlorine (AFC) was used to generate fogs at a 0.4

liter/min in a confined space (9ft x 9ft) with generated droplet size between 20 and 50 µm with the virus carrier exposed in the room. It was found that after 10 minutes of contact time with HOCl solution, >99.9% (>3 log10) reduction of both infectivity and RNA titers of tested viruses in ceramic tile (porous) and stainless steel (nonporous) observed. In fogged HOCl experiment, Infectivity and RNA titers of NV, murine NV, and MS2 on these carriers were reduced by at least 99.9% (3 log10) regardless of carrier location and orientation.[4] However, there was no control virus carrier included in this experiment.

Chen et. al (2012) determined the efficiency of weak acid hypochlorous water (WAHW) in reducing fungal and bacterial in indoor air of childcare center. Hypochlorous solution with concentration of 50ppm was sprayed at flow rate of $600ml^{-1}$ in the corner of classroom of 96 m^2 floor area. Air sampling was done using Bukard portable air sampler and malt agar at a flow rate of 10 1 min-1 for 30 second and incubated afterwards. Comparison was done before and after the intervention. Intervention with WAHW was found to significantly reduce the concentration of fungi and bacteria indoor with a decrease of 4407$\pm$124000 and 2662 $\pm$10790 CFUm-3 ($p<0.05$) respectively.[5]

In line with the Ministry of Health Guidelines on COVID-19 Management No.5/2020 updated on 25 March 2020, sodium hypochlorite with concentration of 1% and 0.5% is used as indoor and outdoor disinfectant respectively. Sodium hypochlorite also known as household bleach and it may produce ocular irritation or oropharyngeal, oesophageal, and gastric burns. Other disadvantages of hypochlorites include corrosiveness to metals in high concentrations (>500 ppm), inactivation by organic matter, discoloring or “bleaching” of fabrics and release of toxic chlorine gas when mixed with ammonia or acid. The Centre for Disease Control and Prevention (CDC) mentioned ‘superoxide water’ or hypochlorous acid in Guideline for Disinfection and Sterilization in Healthcare Facilities 2008 and noted that the antimicrobial activity of the solution is strongly affected by concentration of the active ingredient (available free chlorine). The CDC suggested additional study needed to determine whether hypochlorous acid solution could be used as an alternative to other disinfectant or antiseptics for hand washing, skin antiseptic, room cleaning or equipment disinfection.[6]

CONCLUSION

There was limited evidence on the effectiveness of hypochlorous acid solution as indoor disinfectant. There was no retrievable evidence for its effectiveness as outdoor disinfectant, as well as evidence on safety and cost effectiveness. Nevertheless, hypochlorous acid solution is

listed by the United States Environmental Protection Agency (EPA) in List N as a disinfectant for use against SARS-CoV-2.

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Disclaimer: This rapid assessment was prepared to provide urgent evidence-based input during COVID-19 pandemic. The report is prepared based on information available at the time of research and a limited literature. It is not a definitive statement on the safety, effectiveness or cost effectiveness of the health technology covered. Additionally, other relevant scientific findings may have been reported since completion of this report.

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