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Utilization of physical and chemical microbial load reduction agents for SARS-CoV-2: Toxicity and development of drug resistance implications

Sani Yahaya Najib[1], Yusuf Oloruntoyin Ayipo[1], Abubakar Shaaban[2], Mohd Nizam Mordi[1], Abdullahi Rabiu Abubakar[3], Adekunle Babajide Rowaiye[4], Sayeeda Rahman[5], Rahnuma Ahmad[6], Bushra Ayat Meghla[7], Nihad Adnan[7], Mainul Haque[8*]

[1]Centre for Drug Research, Universiti Sains Malaysia, Pulau Pinang, Malaysia
[2]Department of Pharmaceutical and Medicinal Chemistry, Bayero University Kano, Kano, Nigeria.
[3]Department of Pharmacology and Therapeutics, Faculty of Pharmaceutical Sciences, Bayero University Kano, Kano, Nigeria.
[4]National Biotechnology Development Agency, Abuja, Nigeria.
[5]School of Medicine, American University of Integrative Sciences, Bridgetown, Barbados.
[6]Department of Physiology, Medical College for Women and Hospital, Dhaka, Bangladesh.
[7]Department of Microbiology, Jahangirnagar University, Dhaka, Bangladesh.
[8]Faculty of Medicine and Defence Health, Universiti Pertahanan Nasional Malaysia (National Defence University of Malaysia), Kem Perdana Sungai Besi, Kuala Lumpur, Malaysia.

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ABSTRACT

The novel human coronavirus (CoV) 2019, similar to previous severe acute respiratory syndrome corona virus-1 outbreaks, has posed the unprecedented challenges that have shaped global action on preventive and easy to employ measures and policies, including regular disinfection. There is an indiscriminate use of antimicrobial agents, which may pose toxicity to humans, environmental hazards, and, in some cases, development antiviral drug resistance. This review comprehensively highlights the physical and chemical countermeasures applied to prevent various CoV infections and their potential toxicity on humans and the environment, as well as the danger of developing drug resistance. Literature information was sourced from PubMed, ScienceDirect, Embase, MEDLINE, and China National Knowledge Infrastructure databases using Google Scholars and Free Full PDF as search engines. Articles written in the English language were retrieved and included in the study. Researches covering the literature on physical and chemical severe acute respiratory syndrome corona virus-2 preventive measures, their toxicity, and possible ways of developing drug resistance were also discussed. The literature review reveals that physical inactivation under the influence of temperature, humidity, and light, especially ultraviolet-C radiation, has proven effective in reducing the spread of CoV infections. Similarly, chemical countermeasures such as the use of alcohol- and iodine-based disinfecting agents have demonstrated inhibitory potentials of the viruses on surfaces depending on nature, dose, and exposure time. The inactivation occurs through the interference of these agents with the lipid envelope, thereby disrupting the viral activity. A vast majority of the antimicrobial agents are reported to contain corrosive chemicals that are toxic to humans, especially children, and the environment. The toxicity is due to the unhealthy accumulation and pollution caused by the inappropriate disposal of biomedical waste. This study showed that chemicals might have long-term effects on public health, such as reproductive disorders, chronic obstructive pulmonary disease, cancers, skin damage, and central nervous system impairment. Therefore, further research on long-term preventive alternatives such as the formulation of these agents with natural products as active ingredients is necessary to mitigate the effects of alcohol- and iodine-based chemicals on humans and the environment.

*Corresponding Author
Mainul Haque, Faculty of Medicine and Defence Health, Universiti Pertahanan Nasional Malaysia (National Defence University of Malaysia), Kem Perdana Sungai Besi, Kuala Lumpur, Malaysia E-mail: runurono @ gmail.com

INTRODUCTION

The outbreak of severe acute respiratory syndrome corona virus-2 (SARS-CoV-2) disease, mostly called coronavirus disease-19 (COVID-19), has proven that new infectious diseases

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