

Short Communication

Potential spreading risks of Covid-19 and chemical-based disinfection challenges to the environment, ecosystem and human health

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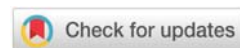
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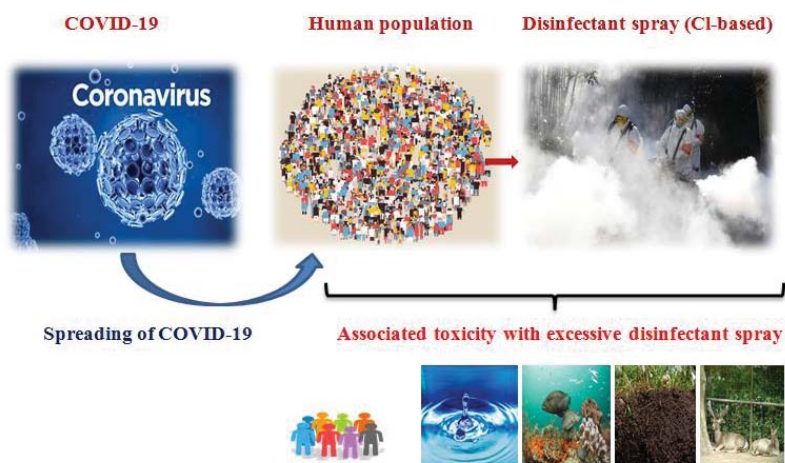
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Abstract

Because of the current situation regarding the Covid-19 pandemic in more than 200 countries and territories, an early discussion is proposed on the use of chlorine-based disinfectants as an important precautionary measure to disinfect the surfaces and kill the Covid-19. However, the excessive use of chlorine-based disinfectants will surely make the highest residual concentrations in the water, soil, and other environmental components by various means such as surface runoff and leaching, etc. Crossing the permissible limits in water and soil system and in other environmental components will pose risks to human health in the form of skin, eyes, cancer, and other associated diseases. Similarly, it may also decline the agricultural production by excessive salt (Cl) accumulations (salinization) and will also threaten the aquatic and wild ecosystems. Therein, the ecological integrity assessments regarding the use of chlorine-based disinfectants in the current situation are very much important. Meanwhile, this will open a new area of interest for the researcher and would be of great importance to investigate its critical levels in the environmental components and its potentially toxic effects.

Graphical Abstract



Discussion

From Covid-19 epidemic in Wuhan to the pandemic in more than 200 countries and territories through mostly of travelers continue and the rate of new confirmed cases, recoveries, and deaths increases in seconds [1]. It is huge pressure on the governments, leaders, and stakeholders of every country to control the spread of Covid-19 outbreak by different ways such as lockdowns of countries, traveler restrictions, social distancing, isolation, quarantine, hand washing, face masks and using chemical-based disinfectants [2]. Till date, each control measurement is discussed by various researchers in details with its merits and demerits. However, concerns with the application of chemical-based disinfectants, there is still a huge gap exists and need to be identified and addressed on an urgent basis, applicable now and in the coming future.

It is reported that China has dispensed more than 5000 tons of disinfectants in Wuhan city alone [3]. Similarly, Almost every country around the world is using a huge amount (in tons) of chlorine-based surface disinfectants to control the spread of Covid-19, which has a very prominent role in the disinfection process; however, most of these countries especially developing countries can't take the Environmental Protection Agencies (EPAs) guidelines and directives in priority with the use of disinfectants. Pakistan has installed several sanitizing gates that will spray chlorine disinfectants on people before entering the areas [4]. Disinfecting surface should be rapid, simple, easy handling, and without any worry to kill the coronavirus. What happens, when these disinfectants begin to leave behind residues on surfaces? Once these chlorine-based chemicals come in contact with the surface, it's completely killing or inactivating the coronavirus; however, it remains on the surface for a long time which causes the formation of chemical residues build-up that hereafter refers to the residual disinfection levels and move into the water reservoirs (drinking water, rivers and lakes), soil and other environmental components through a variety of ways such as surface runoff via unusual heavy rainfalls according to the climate of every country and leaching process which is putting the human health, agricultural production, environmental quality, aquatic and wild ecosystem and economies at potential harmful risks. Rhea. 2020 [5], reported that more than 100 wild animals in China died from poisoning in a mass die-off seemingly triggered by coronavirus disinfectants. Chlorine-based disinfection by-products have been shown to be carcinogenic in laboratory animals [6].

In line with the above brief discussion, it is reported that the disinfection treatment of drinking-water with chlorine-based chemicals has been successfully used worldwide because of its low-cost, effectiveness, and dramatic decline in waterborne disease rates. However, according to the World Health Organization (WHO) the indiscriminate chlorination of drinking-water leads to the formation of certain toxic Disinfection Byproducts (DBPs) and chemical compounds [7] which have a potentially toxic effects on the ecosystem, agricultural production, environmental quality and consequently on human health (skin disease, eyes, cancer, etc) [8-12].

Chlorine-based disinfectants threaten human health, agricultural production, environmental quality and aquatic ecosystem health in a variety of ways by (1) reaction with Natural Organic Matter (NOM) or bromide in raw-water leads to the formation of DBPs such as Trihalomethanes (THMs), bromates, effluent and other chemical compounds which poses acute toxicity to human health, aquatic ecosystem and other consumers [13-17]. (2) The direct toxic effect of chlorine-based chemicals on the aquatic organisms including vegetative bacteria, mycobacteria, viruses, and fungi by destroying their cell membranes, the cell hydrophobicity, as well as total Adenosine Triphosphate (ATP) [18,19]. (3) Formation of carcinogenic nitrosamines and chloramine from chlorine have been observed in drinking water and human blood in Washington, DC, and other cities [20]. (4) The environmental risk of chlorine-based products for soil and plants appears to be small, and any toxicity is usually short term, as these products are easily neutralized by soil organic matter [21]. However, in the current Covid-19 pandemic environmental considerations of chlorine-based products must take into account because of its excessive applications.

Conclusion

Taking altogether, it is concluded that the excessive use of chlorine-based disinfectants to control the spread of Covid-19 is a threat because of its toxic behavior and reactions in the water system. Before it gets worst, the leaders, stakeholders, and Environmental Protection Agencies (EPAs) should take the use of chemical-based disinfectants in priority as soon as possible and to make sure the ecological integrity assessments before the application of disinfectants. The guidelines and directives based on ecological assessments recommended by EPAs regarding the use of chemical-based disinfectants will save the overall ecosystem and subsequently, human health from cancer, skin, eyes infections and other associated diseases.

Highlights

1. First early discussion report on the use of chemical-based disinfection to the spread of Covid-19 control and challenges to agriculture, environment and human health.
2. Excessive use of Cl-based disinfectants will make the possible highest residual concentration in the environmental components.
3. Excessive residual concentration of Cl-based disinfectants will pose the potential risks.

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