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The Potential Threat of Excessive Use of Disinfectants : A Review

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ABSTRACT

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the virus responsible for the 2019 pandemic which devastated the global economy. The virus is enveloped in an outer layer of lipid that is deemed to be more sensitive to disinfectants. With this, chemical disinfectants have been widely used to sterilize public spaces and avoid infection. However, a number of factors should be taken into account when using disinfectants such as the concentration of the chemical used to serve its sanitary function, and the right amount of the chemical to avoid intoxication. To investigate this issue, a systematic literature search was conducted utilizing prominent databases and was thoroughly examined in order to offer information in a clear and orderly manner. Furthermore, Chemical disinfectants are widely accessible and efficient against viruses on water and even on surfaces [2]. However, among all other concerns hand sanitizers containing alcohol cause skin infection, and alcohol toxicity. It is the children who are the most vulnerable among all age groups (1). Different chemicals used for disinfectants have their advantages and disadvantages. They are efficiently safe and effective on the most common viruses and bacteria however, constituents of these chemicals can be toxic when used immoderately and excessively producing potential threats to humans it also has detrimental effects on the environment as there was no established study to support its effectivity towards COVID-19 hence putting the ecosystem in danger.

Key words: Disinfectant, Chemical, Sanitize

Introduction

The coronavirus outbreak was declared a global public health emergency by the World Health Organization (WHO) on January 30. The pathogen's quick spread across towns has shocked the whole world [1]. The recent global spread of the Coronavirus prompted governments, local communities, and public health institutes to launch disinfection programs in public buildings and community-shared areas. Due to the (COVID-19) outbreak, chemical disinfectants have been widely used to sterilize public spaces and avoid infection [2]; the European detergents and maintenance products business wants to remind people about the need for basic hygiene [3]. According to a recent study, the novel coronavirus can survive for up to three hours in the air and up to three days on surfaces such as cardboard, plastic, and stainless steel. Even if not leaving the house, the Centers for Disease Control (CDC) suggests washing and sanitizing high-touch surfaces at least once a day. This is because there is a risk of exposure whenever things or people enter and exit their homes [4].

Chemicals are used to kill or inactivate microorganisms on surfaces or items during disinfection [5]. A disinfectant is a substance or compound used to kill or inactivate germs on inert surfaces [6]. Disinfectants can also be used to kill bacteria on the skin and mucous membranes, as the word "disinfectant" originally just meant "to kill microbes" [6]. The capacity of a disinfectant to deactivate a microbe is determined by the chemical's mechanism of action, the pathogen's surface molecular structure, and the pathogen's internal vulnerability [2]. Disinfectant cleaning products are meant to kill a variety of germs and viruses. If the disinfectant destroys cold and flu viruses, it will say so on the label. Products that claim to eliminate COVID-19 using EPA-approved emerging viral infections claim, according to the CDC. Disinfectants in the form of sprays, such as Lysol Disinfecting Spray, destroy 99.9% of fungus, viruses, and bacteria. Simply spray the potentially infected places, such as doorknobs and furniture, and allow the spray to do its job, making cleanup a breeze [7].

The Global Pandemic emphasizes the need to be able to immediately stop the virus from spreading and contaminating others. Disinfectants, often known as biocidal chemicals, are essential for this [3]. A strong enough disinfectant solution should be used to keep surfaces wet and untreated long enough for germs to be inactivated [1]. Disinfectants are frequently mishandled and overused, with incorrect concentrations and solutions being among the most common examples. More is not always better; sometimes, all that's required is a good cleaning. COVID-19 can be prevented by proper cleaning and disinfection. People who use these goods, as well as others who are in close proximity to them, can become unwell or develop ailments, including asthma. Others are harmful to reproductive health or can cause cancer if overexposed. Some of them cause harm to the skin or other parts of the body [8].

Methods

Systematic review on literature available online was done utilizing leading databases such as PubMed, Elsevier, and MDPI. The search for articles fit for this review started on March 18,2022 and lasted until May 4, 2022. The papers were thoroughly examined for a clear and structured presentation. Articles that did not relate to the possible issue of excessive disinfectant use were omitted from the review to guarantee that the study centered on genuine data on the topic of concern such as (1) Characteristics of Coronavirus, (2) Environmental

Cleaning and Disinfection, (3) Disinfectants and their actions against viruses, (4) Disinfectants' effects and threats on human, (5) Risk factors for children, (6) Overuse leading to antimicrobial resistance, and (7) Toxic impact on the environment. The inclusion of journals was evaluated based on their abstract, title and references within relevant articles were examined for further resources.

Characteristics of Coronavirus

Coronavirus is a generic term for a large family of viruses. Under the microscope, such viruses appear to have spikes that form a crown on their exterior [41]. Some members of the broad family of coronaviruses such as MERS-CoV and ARS infect both animals and humans (SARS-CoV). It was formally renamed SARS-CoV-2 on February 11, 2020, by the International Committee for the Classification of Viruses (ICCV) [12]. The surface of the COVID-19 virus is more receptive to the degrading effects of disinfectants when compared to other known viruses [1]. Glycoproteins and transmembrane proteins, two types of post-translationally modified proteins, make up the surface of the virus [13]. Antigenic proteins function as the major mediators, they bind to particular receptors on the host [1]. The virus begins to replicate within the host cell after integrating the genetic RNA coding. Structural integrity controls protein topology and tertiary structure. Hence, any substances that impede the encapsulated virus's ability to penetrate a vial particle may reduce or eliminate its infectiousness [14].

Environmental Cleaning and Disinfection

Cleaning is the primary way of disinfecting surfaces. It helps remove wastes and macro debris in our working areas. Liquid, detergent, and conventional methods such as scrubbing and wiping may decrease organic material (blood, fluids, and excrement), sludges, and scraps [1]. However, they cannot kill all types of bacteria [15]. The germicidal properties or modes of action of numerous disinfectants may be inactivated or inhibited when the organic matter comes into contact with the surface to be disinfected. Then, chemical disinfectants such as alcohol and chlorine may be used to eliminate the remaining bacteria on surfaces [1]. An adequate amount of disinfectant solution should be used so that the disinfectant may inactivate microorganisms on the surfaces it is applied. Due to the potential for adverse health effects, chlorine-based chemicals, quaternary ammonium compounds, or formaldehyde must not be sprinkled or clouded on COVID-19 [16]. Use detergent or bleach to eradicate organic materials from surfaces before disinfecting, according to environmental cleaning methods and principles [1]. A sodium hypochlorite solution with a concentration of 1000 parts per million (ppm) sodium hypochlorite may be utilized in non-healthcare situations [17]. Alternatively, 70%and 90% alcohol may be used to disinfect surfaces as a disinfectant. Numerous nations have authorized the use of UV irradiation and vaporized hydrogen peroxide in hospital settings [18].

Chlorine-based products and their effect on virus

The antibacterial activity of hypochlorite is wide; it is effective against a variety of common infections at varying concentrations. This chemical compound is available in three forms: powder form (calcium hypochlorite), solid, and liquid form (sodium hypochlorite) [1]. Hypochlorous acid (HOCl) is produced by dissolving these formulae in water [24]. When COVID-19 is contained at a frequency sufficient enough to neutralize the vast majority of other viruses in a medical setting, a concentration of 0.1% (1,000 parts per million) is recommended [42]. A suggested concentration of 0.5 percent (5000 ppm) should be used for blood and bodily fluids that leak more than 10 mL. Concentration may vary depending on in agreement with the nationally established directives and as imposed by the product manufacturer [25]. Before applying any quantity of hypochlorite, the surface must be thoroughly cleaned with water and soap or a surfactant using compressive force (such as scrubbing) [1]. In terms of pH levels, chlorine as a disinfectant has a larger effect at lower pH levels (<8) than at higher pH values (>9). At temperatures between 25 and 35 degrees Celsius, chlorine solutions of 0.5% and 0.05% are demonstrated to be stable for more than 30 days when the pH is above 9 [26].

Alcohols

Disinfectants such as ethanol and isopropyl alcohol (isopropanol) are used to kill viruses, germs, and fungi while disinfecting surfaces. Concentration and affinity have a role in the disinfectant's ability to kill bacteria. 60–80 percent of alcohol is the ideal bactericidal concentration [27]. Isopropanol appears to be less effective against hydrophilic viruses. On the other hand, ethanol has a greater effect on coronaviruses, HIV, and rotaviruses than does isopropanol. In the fight against lipid-dispersible pathogens like infectious hepatitis A and poliomyelitis, isopropanol is more effective [28]. In a suspension test conducted, 70–90% concentration of the alcohols mentioned shows bactericidal action over the COVID-19 virus. [29]. Alcohol is believed to destroy viral RNA, cell membrane, and structural vectors such as protein [43]. The amphoteric property of such cleaning agents breaks strong hydrogen bonds within proteins, hence destroying their functional group. [30].

Oxidizing agents

Hydrogen peroxide is one of the most common oxidizing agents used as disinfectants. At a concentration of 1% to 3%, hydrogen peroxide possesses virucidal action and inactivates SARS-CoV within one minute. Hydrogen peroxide is significantly more effective in the gaseous state [31]. Another agent, peracetic acid, is commonly used to sterilize medical equipment because it has a higher potency and is more effective against a wider range of bacteria at lower concentrations (0.3%) [32]. These disinfectants act by oxidizing disulfide bonds of thiol groups and proteins.

Quaternary ammonium compounds

Quaternary ammonium compounds (QACs) are powerful antimicrobial substances that can be found in a variety of home cleansers, including disinfectant wipes, sprays, and other products. These compounds have a wide variety of applications because of the large range of substituents on amino groups that may be combined with alkyl, aryl, and/or heterocycles. Substitutes often have a lengthy alkyl chain as one of their four substituents. Using this structure, micelles may be formed that can lyse the pathogen's membrane. Alkyl dimethyl ammonium chloride is a QAC family member commonly utilized as a biocide because of the structural shift it undergoes based on the alkyl group's length [33]. In terms of its performance against coronaviruses, exposure of less than one minute and concentrations of less than 1% are used.

Ethanol

Ethanol is extensively utilized in healthcare applications for hand sanitizers for hand hygiene. As alcohol, it has an admirable potency against non-enveloped pathogens compared to propanols. An article [19] states that this compound's range of virucidal action at high fixations covers most clinically pertinent infections. Adding acids can significantly work on the virucidal action against, for instance, poliovirus, FCV, polyomavirus, and FMDV, albeit some infections like HAV might, in any case, be excessively safe. The same article [19] suggested that the determination of a competent hand rub ought to be founded on the most common viruses in a unit and the consumer adequacy of the item and the continued use of the disinfectant]. Moreover, ethanol has more favorable outcomes against hydrophilic infectives as compared to isopropanol. Pathogens such as Coronavirus, Rotavirus, and Human Immunodeficiency Virus are, to a greater extent, inclined to ethanol than isopropanol [1].

Isopropanol

Isopropanol, also known as Isopropyl alcohol, has a clear and colorless characteristic release scent similar to acetone. It is mainly detected as a 70% mixture in topical antiseptics. It is also rarely linked to death. However, it is related to ketosis with no acidosis. Absorption of Isopropyl is rapid, just like other toxic alcohols, wherein 80% of it is absorbed within 30 minutes of ingestion and reaches a blood peak level 0.5 to 3 hours after intake. Isopropanol's longevity ranges from 3 hours to 7 hours [20]. A study [19] stated that isopropanol has an overall poor virucidal action against Feline calicivirus (FCV). Moreover, enteroviruses have been considered impervious to isopropanol at different strengths within 10 minutes.

Hydrogen peroxide

Hydrogen Peroxide is a peroxide as well as oxidizing agent known to have disinfectant, antiviral and antibacterial actions. It deploys its oxidizing activity and thus produces free radicals which elicit oxidative damage to proteins and membrane lipids. This activity may inactivate and impair pathogens and prevent the spreading of infection [21]. It works against Coronaviruses such as SARS and MERS by inactivating it in inoperative areas with a strength of 0.5% within 1 minute [22].

Formaldehyde & Glutaraldehyde

Formaldehyde and glutaraldehyde are chemicals seen as modern sanitizers for medical and surgical paraphernalia due to their capability to disinfect microorganisms. Coronavirus exposure to these compounds within two minutes in a concentration range of 0.5-3% will alkylate its proteins and nucleic acids [1]. Formaldehyde is a broadly utilized high production chemical that is likewise delivered as a side-effect of burning, off-gassing of different structure items, and as a fixative for pathologists and embalmers. What is not frequently acknowledged is that formaldehyde is additionally created as an ordinary physiologic compound in every living cell. In 1980, persistent inward breath of high centralizations of formaldehyde was demonstrated to be cancer-causing, inciting a high frequency of nasal squamous cell carcinomas in rodents. A few epidemiologic investigations have likewise found expanded quantities of nasopharyngeal carcinoma and leukemia in people presented to formaldehyde that brought about formaldehyde being viewed as a Known Human Carcinogen. This article audits the information for rat and human cancer-causing nature, early Mode of Action studies, later atomic investigations of endogenous and exogenous DNA adducts, and epigenetic studies. It proceeds to exhibit the force of these examination studies to give basic information to work on our capacity to foster science-based malignant growth risk evaluations rather than default draws near. The intricacy of consistent physiologic openness to a realized cancer-causing agent expects that better approaches for believing be joined into conclusions of disease risk appraisal for formaldehyde, other endogenous cancer-causing agents, and the job of foundation endogenous DNA harm and mutagenesis.

Iodophors/Iodine-releasing agents

Iodophors are solutions that contain iodine and a solubilizing agent. Along these lines, a limited quantity of iodine is gradually delivered in solution. They are regularly utilized at fixations going from 6 to 75 ppm. Iodophors infiltrate the cell dividers and layers of microorganisms and disrupt DNA combinations. Iodophors additionally tie to proteins, causing their inactivation. Nonetheless, they are less powerful against biofilms than different disinfectants. One of the most generally utilized iodophors is povidone-iodine, which is frequently utilized for the sanitization of surfaces in bottling works and dairy enterprises. Iodophors are by and large less harmful than different sanitizers, yet they leave a yellow buildup on surfaces. [9] The most well-known iodophor, povidone-iodine (Betadine), is utilized most generally as a 10% arrangement (which contains just 0.001% free iodine). Since iodine is firmly bound to the transporter or carrier, iodophors have extremely low rates of iodine discharge. These substances are accordingly non-irritating after ingestion and, for the most part, have low harmfulness. Nonetheless, in light of the fact that they, in all actuality, do contain significant measures of iodine. Iodophors are disinfectants with a broad antimicrobial range. Nonetheless, they are less powerful against sporogenous microscopic organisms and infections. They are inactivated by organic matter [10].

Commercial solutions are frequently acidic. They can be destructive, which relies on the formulation. It ought not to be utilized at temperatures of more than 45 °C on the grounds that that prompts the release of free iodine. On the off chance that iodophors interact with caustic agent residue (generally due to improper washing and being in the dead zones), an upsetting smell is made (so-called phenol smell) [11].

Disinfectants' effects and threats on human

An article [23] has reported that a broad examination has been done on the exposure to the most often utilized sanitizer compounds such as Quats, Sodium hypochlorite, Hydrogen peroxide, alcohol, and glutaraldehyde. Regular use of these compounds is linked to a heightened risk of developing the chronic obstructive pulmonary disease (COPD), asthma, and eye aggravation in healthcare workers and the general public. Surface cleaning can leave substance deposits which in turn become airborne then breathed in, and frequently add to the poor indoor air quality with ramifications to vulnerable individuals, e.g., asthmatic, hypersensitive, and delicate people. These deposits contain substances that can cause cancer, reproductive disorders, respiratory problems including occupational asthma, eye and skin irritation, an impedance of the central nervous system, oxidative damage, and other impacts on human wellbeing. Quats have been reported to cause fertility problems in males and issues in regenerative processes in females. There is also information that several people used disinfectants such as bleach and hand sanitizers to clean their food and tried to ingest them. Utmost measures like these pose a menace and generate significant health problems like irreversible blindness, seizures, coma, irreparable destruction of the nervous system, and death. Bleach solutions are exceptionally unforgiving to the skin and can irritate skin, eyes, and other body parts. A handful of cleaning agents have harsh materials that coincidental ingestion can result in serious gastrointestinal poisoning.

Bleach ingestion is accounted for causing hypernatremia, hyperchloremia, acute respiratory distress syndrome, and lung injury. It has also been additionally expressed that exposure to chlorine bleach results in mucosal abrasion, gastrointestinal disturbance, ear, nose, and throat lesions, and indications of asthma. Further, glutaraldehyde and ethylene oxide have been demonstrated to give rise to severe lung illness. Combining bleach with ammonia-based agents leads to the development of chloramines and ammonia that can volatilize. Meanwhile, acid-base cleansers with bleach can deliver vaporous chlorine or hypochlorous acid that when breathed in even in little amounts, may bring about acute pulmonary damage. Further, chlorine sanitizers may mix with nitrogen, forming chloramine or N-nitrosodimethylamine that is distinguished as a cancer-causing agent. The blending of bleach and alcohol may form chloroform that is harmful as well as risky when breathed in or when it comes in contact with skin.

Synthetic constituents of hand rub usually incorporate 60-90% of alcohol, alongside glycerin and other substances for aroma and variety. Frequent use of these hand rubs causes its constituents to get aerosolized, resulting from frequent and vigorous rubbing and may create probable harm to the skin as well as the eyes which may also lead to hypersensitivity, subtle infectious impact comparable to the sensitivity of the conjunctiva. In another study [1], it has been stated that reaction and resilience to ethanol are dependent on an individual, thus making it hard to identify the level of harm of ethyl alcohol moist towelette. Collision of the dermis with ethyl alcohol can result in dermal and optic sensitivities, at the same time extended exposure will potentially lead to dermal parchedness or cracking and erythema or irritation. In an event where an individual utilizes ethyl alcohol disinfectants time and time again every day for a considerable length of time, skin assimilation can cause toxicity because of preventive actions against COVID-19. In the same article [1], it is reported that Isopropyl alcohol penetration to the skin can lead to discomfort in the dermis over a long period. Its frequency of use has a similar result to that of ethanol-based products. Lastly, it was also revealed in studies cited by the same article [1] that Hydrogen peroxide becomes poisonous through the generation of gas and tissue impairment in a specific area of the body, in which it combines with tissue peroxidases and degrades into oxygen in addition to aqua.

Risk factors for children

Some reports cited in an article [1] stated that isopropanol could cause unconsciousness associated with topical use to relieve high body temperature for pediatrics. Moreover, there was this study conducted in South Korea about several types of chemical disinfectants that had been widely used in humidifiers since 1994 and were viewed as related to lung injury and far-reaching lung fibrosis. After the humidifier disinfectants (HDs) were viewed as the reason for the lung injury, they were removed from the market in 2011, after which no new instances of lung injury have been accounted for. Although much exploration has inspected the intense lung injury coming about because of HD openness as far as results, for example, mortality and HD-induced lung injury (HDLI), the drawn-out outcomes of HD utilization on wellbeing impacts have not been accounted for. Patients with HDLI and individuals who present to HDs have complained of asthma side effects, yet just a single instance of word related asthma coming about because of isothiazolinone exposure has been accounted for. One report has shown that around 30% of small kids in the overall Korean populace were presented with HDs; nonetheless, little is known of some significant awareness of the connection between early-life HD exposure and asthma symptoms after. They investigated [35]. These liquid formulations where it can be added routinely to water in the tank of indoor humidifiers to lessen the development of microorganisms in the tank. Some disinfectant items contained different groupings of antimicrobial synthetics produced for ingestion or application to the skin, including oligo(2-(2-ethoxy) ethoxyethyl guanidinium chloride (PGH), polyhexamethylene guanidine phosphate (PHMG), methylisothiazolinone (MIT), and didecyldimethylammonium chloride. Of the 374 cases that went through a clinical record survey, free appraisals of pathologic, radiologic, and clinical elements could be joined collectively for 329 cases. In this first round of clinical evaluation, these 329 cases were delegated as follows: 117 distinct, 34 plausible, 38 potential, and 140 impossible, in light of the earlier settled upon analytic standards. For the excess 45 cases, autonomous evaluations were not consistent, and reassessments were organized to arrive at an agreement order for each case by board survey. A bigger number of females than males, and a larger number of infants younger than four years of age, were incorporated among the positive and plausible cases. Those cases with the definite and probable disease had fewer underlying diseases (3.4%) than the possible (22.2%) and unlikely (25.0%) cases [36].

Overuse leading to antimicrobial resistance

The World Health Organization pronounced the Covid disease 2019 (COVID-19) a pandemic in March 2020. In the shadows of the COVID-19 pandemic, there has been a continuous antimicrobial opposition pandemic [37]. Satisfactory hand cleanliness is the primary line of guard against the COVID-19 pandemic. In 20 s, the surfactants in cleansers disintegrate the lipid bilayer, an indispensable piece of the SARS-CoV-2 infection envelope, hence deactivating the infection. These viral particles are typified inside micelles and washed away. All cleansers accessible in the commercial center have the fundamental fixings expected to deactivate the infection; consequently, antibacterial cleansers are pointless. In any case, there was a sharp expansion in the offer of antibacterial cleansers and sanitizers around the world, demonstrating their expanded and superfluous use [37]. Cleanliness rehearses, for example, those carried out during the COVID-19 pandemic may slow the scattering of antimicrobial opposition; however, alternately, they can uphold arising drug obstruction coming about because of the raised utilization of such antimicrobial items, i.e., biocides. The more prominent utilization of these items prompts higher convergences of biocide-based items in soil, water, lakes and, all the more critically, in the microecosystems and microecological specialties where different bacterial species are available, underground waters and wastewater treatment frameworks. It is assumed that high centralizations of such microbicidal specialists could kill most bacterial species that offer useful types of assistance to the biological system and other living creatures. Moreover, if the centralizations of microbicidal specialists are at the subminimum inhibitory focus, this might expand the specific strain and drive the rise of antimicrobial opposition [38]. The major line of defense against the COVID-19 pandemic is good hand hygiene. Surfactants in cleansers dissolve the lipid bilayer, an essential component of the SARS-CoV-2 infection envelope, in 20 seconds, thus killing the virus. These virus particles are recognized and washed away inside micelles. Antibacterial cleansers are unnecessary since all commercially available cleansers include the basic ingredients required to destroy the illness. In any event, the availability of antibacterial cleansers and sanitizers has increased dramatically over the world, proving their widespread and unnecessary usage[39]. Hygiene techniques, like those used during the COVID-19 pandemic can help limit the spread of antimicrobial resistance. However, they can also help foster growing drug resistance caused by the increased use of antimicrobial chemicals, such as biocides. Higher concentrations of biocide-based products in soil, water, ponds, and, more significantly, in micro-ecosystems and micro ecological niches where numerous bacterial species are found, subterranean waterways, and wastewater treatment systems, resulting from increased usage of these chemicals. High doses of such microbicidal substances are thought to be capable of killing most bacterial species that benefit the environment and other living beings. Furthermore, if the concentrations of microbicidal drugs are below the subminimum inhibitory concentration, the selection pressure may be increased, resulting in the appearance of pathogens.

Toxic impact on the environment

The boundless act of spraying disinfectants and alcohol in the air, on streets, on vehicles, and on faculty have not been demonstrated to diminish the gamble of COVID-19. These synthetics can get into sewage frameworks and can dirty drinking water assets. Both the immediate spillover and aberrant sewage effluents will ultimately wind up in lakes and waterways, putting sea-going biological systems and untamed life at risk[23]. As COVID-19 spreads over the world, greater disinfectant usage might result in global secondary disasters in human health and ecosystems. Chemical residues on a surface can become airborne and absorbed, contributing to poor indoor air quality, harming asthmatics, allergic, or sensitive individuals. These residues contain compounds that can cause cancer, reproductive problems, respiratory problems (including occupational asthma), eye and skin irritation, CNS impairment, oxidative damage, and other human health problems. COVID-19 outbreaks have caused chaos, and people are cleaning their homes and environment with many disinfectants at the same time. Adults have significant knowledge gaps in the proper preparation of cleaning and disinfectants [40]. Mixing various cleaning chemicals might produce dangerous fumes/gasses, which can have serious negative consequences. Asthma and chronic bronchitis can be caused by long-term exposure to these gasses. When bleach is used with ammonia-based cleansers, chloramines and perhaps ammonia are produced, which might be volatile. When bleach is used with an acid-based cleaning, gaseous chlorine or hypochlorous acid is released, which can be breathed even in tiny doses[40].

Results and Discussions

After thoroughly reading the articles reviewed in this paper, it has been found out that several disinfectants are utilized and are effective against different viruses through various mechanisms [1,19,22,28,29]. However, despite the protection it gives to the consumers, it is capable of inflicting toxicity to both the user and the environment. Repeated application of disinfectants has been reported in several studies [1,23] to cause irritation in the skin and eyes. Additionally, most of the studies revealed that most of these commonly used sanitizers can cause lung injury and symptoms of asthma [8,23,35,40]. It was also found out that extended exposure to ethanol and isopropanol can cause skin cracking, redness, and irritation [1]. Further, mixtures of sanitizers also pose significant danger to human health [23]. Moreover, humidifier disinfectants have been associated with lung injury and asthma symptoms in children [35]. Hygiene techniques can help limit the spread of antimicrobial resistance. However, they can also help foster growing drug resistance caused by the increased use of antimicrobial chemicals. Higher concentrations of biocide-based products are thought to be capable of killing most bacterial species that benefit the environment and other living beings [37]. Mixing various cleaning chemicals might produce dangerous fumes/gasses, which can have serious consequences [23]. Further, chemical residues on a surface can become airborne and absorbed, contributing to poor indoor air quality, harming asthmatics, allergic, or sensitive individuals. Finally, the boundless spraying of disinfectants can get into sewage frameworks and can dirty drinking water assets [40]. Both the immediate spillover and aberrant sewage effluents will ultimately wind up in lakes and waterways, putting sea-going biological systems and untamed life at risk [23].

Conclusion

The recent global spread of Coronavirus (SARS-CoV-2) prompted a massive effort by governments, local governments, and public health institutes to sanitize public buildings and community-shared places. To reduce the risk of infection, public health organizations have urged and suggested that people practice good personal hygiene by washing their hands regularly with soap, sanitizers or using disinfectants that can deactivate and destroy the virus and erase its infectivity. Chemical disinfectants are widely accessible and efficient against SARS-CoV viruses on surfaces or in water. Several of these disinfectants, such as alcohols and hypochlorite solutions, have demonstrated excellent biocidal action in a short period. Different chemicals used for disinfectants have their advantages and disadvantages. The chemicals induce antiviral and antibacterial activities that are of great help for the spread of COVID-19. These chemicals are efficiently safe and effective on the most common viruses and bacteria and differ mostly in their affinity and effectiveness. However, the constituents of these chemicals can be toxic when used immoderately and excessively, producing potential threats to humans, giving rise to minor complications and diseases to serious outcomes such as death. Moreover, it also has detrimental effects on the environment as it was not proven to minimize the risk of COVID-19 when spraying directly to the surroundings hence putting the ecosystem in danger.

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