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## Effect of Sanitizer on obliteration of SARS –CoV2/COVID 19: A mini review

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### ABSTRACT

Corona virus is a respiratory virus which causes infectious Covid-19 (Corona Virus –2019) disease and globally the virus continues to pose major risks of mortality. It is lucid that close links are the key aspect for transitory of communicable Corona virus. Rapid research is in progress to identify prolific drugs and vaccine for Covid-19 however, it is a time consuming process. Social distancing and Sanitizers are helpful in combating virus and safeguarding the human health. Hand sanitizers are prolific when hands washing with soaps are not possible. Sanitizers are effective antibacterial agents and classified into two types as alcohol based and alcohol free. Among which alcohol based sanitizers are prospective in persuading the public needs. Efficient use of alcohol-based sanitizers during this epidemic season could significantly reduce the propagation of corona virus. This review aims at explaining the interactions of virus with hand sanitizers.

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## 1. Introduction

Communicable Covid 19 disease is the major risk to the public health which causes Severe Acute Respiratory Syndrome (SARS). Current reports indicate that there are roughly 8, 00,000/- reported COVID 19 cases and increasing every day. WHO has recommended alcohol based hand sanitizers has effective hygiene to prevent SARS-CoV2 and stay safe. Research shows that there is an increased usage of hand sanitizers globally, due to the epidemic COVID-19 and there exists a scarcity of sanitizers [1,2]. COVID-19 is transmitted from person to person who are in close contact, spreads from contact with contaminated surfaces etc. To prevent, routine hand washing using sanitizer is advised and encouraged to reduce the spread of COVID-19 disease and to improve healthy living [3].

Hands are primary mode of transmission of virus and have been considered to be the most important spread of COVID-19[4–6]. During 2003, spread of SARS CoV virus the researchers have found that the virus was active on the surfaces for a period of 24–72 h and the spread of it was controlled and reduced by hand sanitizers [7,8]. Current CDC guidelines and WHO promotes hand hygiene as

the most important measure for preventing COVID 19. There are two kinds of hand sanitizers: alcohol-based and non-alcohol-based. [9]. As a result of denaturing the microbes and viruses, alcohol-based sanitizers are effective in preventing COVID 19 transmission. [10,11].

Hand sanitizers are made up of the following active ingredients propanol, ethanol, n-propanol, thickening agent (such as polyacrylic acid for gels), humectants (such as glycerin for liquid rubs) or propylene glycol and essential oils of plants [12,13]. Alcohols are antibacterial and antiviral agents, and it plays a vital role in denaturing, coagulating the proteins, disruption of tissue membranes, and dissolution of several lipids [1,14]. The aim of this review is to summarize the sanitizer's and their antiviral efficacy of SARS-CoV2.

## 2. Covid-19

COVID 19 is caused by the virus SARS-CoV2. SARS-CoV2 is the seventh corona virus that affects humans, and its structure resembles a crown, hence the name corona. [15]. Viruses are of five types which includes blood borne viruses, respiratory route viruses, fecal-oral route viruses, enteroviruses, and hepatitis A virus [16]. SARS-CoV2 is a respiratory route virus. Hands are the primary source for transmitting blood borne, respiratory route, fecal-oral

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route viruses. The respiratory route viruses are often found on hands and it is transmitted from people with cold [17]. The persistence of the virus on the surfaces depends on various factors such as room temperature, air humidity, and type of surface. Most of the viruses are transmitted easily from hand to hand, food, etc. Since the SARS-CoV2 is an enveloped virus with RNA, Protein and a fatty outer layer of lipid, it can better persist on hands. As per the recommendations of WHO sanitizers with 80% ethanol or 75% 2-propanol are found to be effective against SARS-CoV and MERS-CoV [18].

### 3. Sanitizers

Sanitizers are the essential one in preventing the outbreak of SARS-CoV2 viral infections. Schlegal noted that in sanitizers the alcohols play a major role in inactivating microorganisms by denaturation of proteins with the initial site of action on the cell membrane [19]. The antiviral mechanism of hand sanitizer is shown in Fig. 1.

Alcohols are lipid solvents with virucidal activity against lipophilic viruses. Compared to propanol and isopropanol, ethanol is found to be more effective against lipophilic viruses [20]. Recent studies, cites that isopropyl alcohol are effective against enveloped virus and ineffective against non enveloped whereas ethanol is effective against both enveloped and non enveloped viruses [21]. Ethanol has both polar and non polar end. The non polar end of ethanol interacts with virus protein wall and denatures it [22]. SARS COV2 virus has outside glycoprotein spikes which protect the inner nucleic acids. When this glycoprotein interacts with non polar end of alcohol its wall is ruptured and the virus become inactive. Alcohols are not sporicidal and reports conclude that the inclusion of water enhances the virucidal activity by delaying the evaporation of alcohol and increase the interaction with virus and bacteria [23]. The studies conclude the efficacy of alcohol has 60% to 90% by solution in water [24]. The activity of alcohols against non-enveloped viruses may be accompanied by changes in structural proteins, which lead to changes in capsid structure and infectivity.

Goyal et al has investigated the virucidal efficacy of alcohol and non alcohol based hand sanitizers. They found that 99.5% ethanol based sanitizers are more effective in reducing the virus compared to other alcohol based hand sanitizers, non alcohol hand sanitizer or antimicrobial soaps [14]. Also the alcohols in hand sanitizers are destructing the outer cell membranes of antibiotic resistant

viruses. Cheeseman et al investigated the antibacterial efficacy of three different alcohol based hand sanitizers against *Staphylococcus aureus* [25]. They found that alcohol based hand sanitizers causes irreversible bacterial damage with 5 mins of hand wash. Larson and Morton. reported that when the alcohol concentration is higher than 80% in sanitizers, then it becomes less potent to denature the proteins[3]. They also stressed that alcohol based sanitizers have minimal activity against bacterial spores, protozoan oocytes and some non-enveloped (non-lipophilic) viruses.

SARS-CoV2 virus is a lipophilic virus hence; the alcohol based hand sanitizers must be effective, as per the research findings of Larson [3]. Further, Kampf et al. also stated that 95% ethanol based sanitizers have higher viral reduction compared to others [26]. To the best of our knowledge this write up collected all the relevant literatures about alcohol based sanitizers and its possible efficacy towards SARS-CoV2.

Nanoparticles based hand sanitiser are now emerging as effective solutions for COVID 19. As nanoparticles size are analogous to COVID 19 virus and its functionalities can be tailored for disinfection and drug delivery. Silver based nanoparticles possess strong antibacterial and antiviral activity [27,28] at very low concentrations and can be considered as potential disinfectant for COVID 19 infections.

### 4. Conclusions

The SARS CoV-2 virus is made of three components; RNA encased by a protein and enveloped with lipid bilayer. The three component connections are weak as there is no covalent bond to make it stable and the self-assembly is a weak non-covalent interaction. The interactions with alcohol based sanitizers with lipids of the SARS CoV2 will break up the weak interactions and make the viral part to disengage from the hands. In general, lipids are soluble in polar solvents and solubility increases with increasing polarity.

In conclusion, hand sanitizers are efficient in absence of soap and water in preventing transmission of virus from the hands of individuals. Their role is significant and could be a better alternative to hand washing. Hence, emphasizing proper hand hygiene is an imperative first-line defense against the spread of SARS CoV-2

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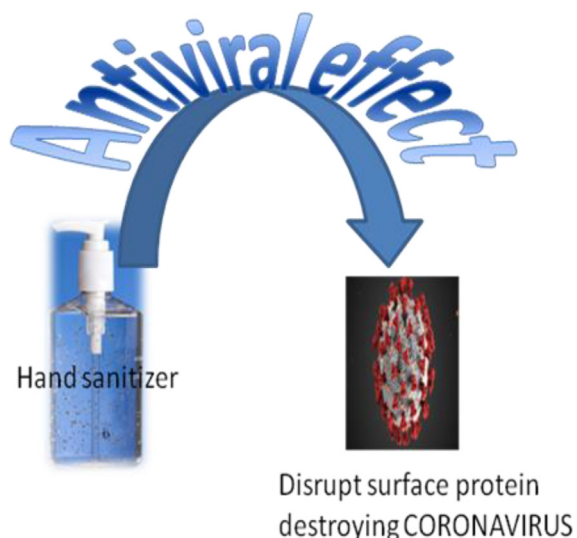


Fig. 1. Antiviral mechanism of Hand sanitizer.

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