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RATIONAL HAND HYGIENE DURING COVID- 19 OUTBREAK -A REVIEW

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ABSTRACT :

The 2019 novel coronavirus (2019-nCoV) or serious acute respiratory syndrome coronavirus 2 (SARS-CoV-2), as it is now called, is quickly spreading to the rest of the world from its roots in Wuhan City, Hubei Province of China. About 216, 919 cases of coronavirus disease 2019 (COVID-19) and 6088 deaths (6 percent of active cases) were registered in India until 04/06/2020. Fortunately, children have been severely killed with no deaths so far. Yet the virus' potential path is uncertain. This article provides a bird's eye view of this new virus as well as addressing the beneficial interplay between the soap and the enveloped virus that serves as a major preventive measure at present. Since the awareness about this virus is growing rapidly, readers are encouraged to periodically update themselves. One of the easiest ways to avoid transmission is to shorten the spread cycle. Transmission mode is through air, often through dirty hands. The major advantage of killing the enveloped virus is using surface acting agents such as soaps. This article discusses the importance of hand washing over other methods of prevention.

KEYWORDS: Hand-sanitizer; pandemic; prevention; SARS-CoV-2; soap

INTRODUCTION :

Coronavirus disease 2019 (COVID-19) is characterized as a disease caused by a novel coronavirus, now known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; formerly known as 2019-nCoV), first described in the wake of a respiratory disease outbreak in Wuhan City, Hubei Province, China. (Rabie and Curtis, 2006) It was first mentioned to the WHO on 31 December 2019. The WHO announced the COVID-19 outbreak as a global health emergency on 30 January 2020. The WHO declared COVID-19 a global pandemic on 11 March 2020, the first such declaration since declaring H1N1 an influenza pandemic in 2009

(Doebbeling *et al.*, 1992). Illness caused by SARS-CoV-2 was referred to by the WHO as COVID-19, an acronym derived from 'coronavirus disease 2019.' The name was chosen to avoid stigmatizing the origin of the virus in terms of population, geography or animal associations. (Foddai, Grant and Dean, 2016).

Respiratory viruses such as coronavirus disease (COVID-19) spread through your eyes, nose or throat when mucus or droplets containing the virus touch your body. What happens most frequently with your mouth. Hands, too, are one of the most common ways the virus spreads from person to person. (Steere and Mallison, 1975) One of the fastest, quickest, and most effective ways of preventing the spread of a virus during a global pandemic is to wash your hands regularly with soap and water (Brundha and Nallaswamy, 2019). One of the quickest and most efficient ways to prevent a virus from spreading during a global pandemic is to regularly wash your hands with soap and water (Shreya and Brundha, 2017) Since proof of the preventive effectiveness of wearing a facemask is not definitive, hand hygiene is considered the simplest and most efficient measure to prevent SARS-CoV-2 from spreading (Voss and Widmer, 1997) . Several lines of evidence point to the effectiveness of hand washing, particularly during respiratory infection outbreaks, in preventing contagion. Hands are considered to be vectors of disease that bring respiratory pathogens shed from the mouth or nose to the new hosts' nasal mucosa, conjunctiva or mouth and microbiological studies have identified respiratory pathogens on hands. It is well known that by washing with soap or other cleaning agents viruses and bacteria can be washed from hands. Hand-washing also decreases respiratory infections. (Larson and Killien, 1982).

Previously our team had conducted numerous surveys on various pathological conditions in different demographic populations (Balaji, Brundha and Path, 2016; Kalaiselvi and Brundha, 2016; Shenoy and Brundha, 2016; Harsha and Brundha, 2017; Preethikaa and Brundha, 2018), carried out various retrospective studies (Shreya and Brundha, 2017; Brundha, Pathmashri and Sundari, 2019), performed extensive comparative research (Brundha, 2015; Prashaanthi and Brundha, 2018), analysed the knowledge of the general population by means of questionnaires (Kumar and Brundha, 2016; Ravichandran and Brundha, 2016; Brundha and Nallaswamy, 2019)and reviews (Hannah *et al.*, 2019; Timothy, Samyuktha and Brundha, 2019) over the past 5 years. Now we are focussing on relevant reviews to gain comprehensive knowledge on unfamiliar concepts. The idea for this review stemmed from the current interest in our community. This article gives a bird 's eye over the latest SARS-CoV-2 virus whilst discussing the beneficial interplay between the soap and enveloped virus that is currently serving as a major preventive measure.

DESIRABLE ANTIMICROBIAL ACTIVITY OF SOAP'S HYDROPHILIC HEAD ON LIMITING CONTAMINATION AND INFECTION

Soap contains fat-like compounds, known as amphiphiles, some of which are structurally similar to the virus membrane lipids. The soap molecules inside the virus membrane interact with the lipids. The soap effectively dissolves the glue which holds together the virus (Doebbeling *et al.*, 1992) . The soap often outstrips the virus' contacts with the surface of the skin. Because of the combined action of soap and water the virus soon gets separated and falls apart. The skin is raw and wrinkled, so a reasonable amount of rubbing and soaking is required to ensure that the soap reaches every nook and cranny on the surface of the skin that may contain active viruses (Rabie and Curtis, 2006) . Ethanol and other forms of alcohol are not only readily forming hydrogen bonds with the substrate of the virus but are more lipophilic

than water as a solvent. Therefore, the lipid membrane is dissolved by alcohol and other supramolecular interactions in the virus. Unlike soap, however, only a relatively high alcohol concentration (maybe 60 percent -plus) will cause the virus to dissolve rapidly (Larson and Killien, 1982) .

Morphologically recognizable proof has an essential influence on understanding the pathology. Hence, it is necessary to link the morphology of the SARS- CoV-2 with the desirable preventive measure to gain viable results (Fendler and Groziak, 2002) Several studies have identified a correlation between improved hand hygiene and community reduced levels of infectious diseases. (Larson, 1988) Dozens of research show that hand-washing can avoid harmful illnesses and even save lives. Reviews of the study, taking a gander on the effect of hand-washing on respiratory diseases, found that hand hygiene decreased pollution by around 15 to 20 per cent. And it's not just respiratory diseases like Covid-19: a 2008 research review looked at some of the best evidence for diarrhea-causing diseases; it found that strict hand-washing procedures on average decreased diarrhea outbreaks in high-income countries by 29 percent and in low- and middle-income countries by 31 per cent. Those declines matter. (Larson, Cohen and Baxter, 2012) .

Every day, more than 2,000 children die from diarrhea-related diseases, and every year, respiratory diseases such as pneumonia kill millions. Hygiene measures will also minimize the number of school sick days. For a survey of elementary school students for Denmark, researchers asked the children three times a day to use hand sanitizers (Park *et al.*, 2010). Compared to the previous year, there were 66 percent fewer school kids with at least four off days, and 20 percent more with zero off days. "There is more evidence behind cleanliness of hands than there is for various kinds of disease prevention," says Elaine Larson, senior nursing research associate at Columbia University.

VARIOUS EXISTING HYPOTHESES THAT EXPLAIN THE PROPITIOUS INTERPLAY BETWEEN HYBRID MICELLE OF SOAP AND DOUBLE ENVELOPED VIRUS

Infections, for example, coronavirus, flu causing infections, Ebola, Zika have their hereditary material encased in a layer of fat called the lipid envelope. Cleanser atoms are pin-formed with a hydrophilic head and an oleophilic tail. Being oleophilic, the tail part of the atom will in general have a proclivity for and 'contends with' the lipids in the infection envelope (Foddai, Grant and Dean, 2016) . Since the compound bonds holding the infection together are not extremely solid, the long oleophilic tail gets embedded into the envelope and will in general have a 'crowbar' impact that breaks the lipid envelope of the infection. The tail additionally contends with the bond that ties the RNA and the lipid envelope subsequently dissolving the infection into its parts which are then evacuated by water (Larson *et al.*, 2000) .

Certain infections don't have the lipid envelope and are known as the non-enveloped infections. Rotavirus which causes severe diarrhea, poliovirus, adenovirus that causes pneumonia, and even human papillomavirus (HPV) doesn't contain the lipid envelope (Simmons *et al.*, 1990) . The oleophilic tail of the cleanser particle likewise disturbs the bond that ties soil and non-encompassed infections to the hand. The earth and infections are encircled by a few tails causing them to stay suspended particles. Flushing with water washes away the suspended particles promoting clean hands (Won *et al.*, 2004) .

Similarly, the alcohol present in the sanitizers breaks up the lipid envelope, therefore inactivating the infection. Moreover, the alcohol changes the shape or denatures the mushroom-shaped protein structures that stick out of the lipid envelope. The mushroom-shaped protein structures help the infection to bind to special structures found on human cells and enter the cells. To have a significant outcome, the sanitizers ought to contain in any event 60% alcohol. (Hannah *et al.*, 2019)

A proposed technique for the inactivation of any viral infection must consider the active antigenicity of the inactivated infection as well as the attributes possessed by the effective acid. (Simmons *et al.*, 1990) At present, the mechanism which appears to be most legitimate is that the inactivation of the virus by a soap might be because of a pretty much explicit adsorption of the soap by the proteins related to the virus. This adsorption would presumably be dependent upon the arrangement of the unsaturated fat atom and that of the viral protein. It has been said that the dependability of protein monolayers (which represents the surface of the virus) is because of the common relationship of these particles and that this affiliation might be separated by more grounded affiliation reactants, such as oleic acid, bringing about a dispersion of the monolayer as protein reactant complex. (Liu *et al.*, 2010) A long-chain unsaturated fat, for instance, was found split overduin and set free astacin and a protein as a lipo-protein. Rideal likewise reports that the organic action of long-chain mix matches film entrance capacity and arrives at the greatest worth when 18 carbon particles are in the atom. Altogether, a soap is effective in the inactivation of a virus when it contains 18 carbon particles in the atom. All things considered, it is as yet a genuinely late revelation and along these lines requires further research on its natural capacity (Savolainen-Kopra *et al.*, 2012).

EXIGENCIES OF COVID-19 THAT PUT HAND SOAPS OVER ALCOHOL SANITIZERS

Numerous examinations reveal that ethanol-based hand sanitizers have been a viable barrier to the transmission of viral infections before. Be that as it may, By a long shot, soap paired with running water is the most suitable solution for washing off germs from our faces. That is because hand lathering and scrubbing generated through friction helps lift and wash away dirt , grease and microbes under running water (Liu *et al.*, 2010). Though hand sanitizers based on alcohol are safe when used as directed, otherwise they can cause alcohol poisoning whenever gulped, especially when a person swallows excessively. Around 2011 and 2015 the U.S. poison control centers received nearly 85,000 requests for hand sanitizer poisoning by children. Hand sanitizers should be kept from the immediate reach of children (Grayson *et al.*, 2009).

Alcohol based hand sanitizer (containing at any rate 60% alcohol) is useful in ensuring against the spread of germs and infections. Be that as it may be, soap and water hand-washing is still the most convincing option. Hand sanitizer is a viable option to resort to when soap and water are not accessible. This includes taking open transportation where it's hard to get to a restroom (plane, train, transport). Carrying a portable container of hand sanitizer makes it simple to clean your hands in these circumstances. A few people use it when they plunk down to eat at an eatery. (Simmons *et al.*, 1990) Others use it when they are within the sight of groups (games, community gathering, school gatherings). In spite of the fact that the recurrence of alcohol sanitizer use is abstract, numerous examinations reported that sanitizers with alcohol concentrations in the range of 60 percent and 95 percent are higher than those with lower

fixation or no alcohol when removing germs. Less convergences of alcohol actually inhibit the production of germs instead of killing them inside and out (Grayson *et al.*, 2009) . Progressively troubling is that a few microorganisms have started to demonstrate resilience to low measures of ethyl alcohol (Park *et al.*, 2010)

A particular research that led to an evaluation of the effectiveness of sanitizers showed that in clinical environments, where hands are not actively dirty or sticky, hand sanitizers work efficiently. Nevertheless, sanitizers don't prove adequate in work and network settings — where individuals manage gear, food, or play sports. Hand sanitizer is often ineffective if too little is applied or if cleaned off before letting it dry (Savolainen-Kopra and Korpela, 2012) Hand sanitizers likewise presumably can't evacuate or inactivate unsafe synthetic compounds We can get in touch with them. For another study , it was found that individuals who reported using hand sanitizers for washing their hands had increased amounts of exposure to pesticides. In case you have contacted destructive synthetic compounds, specialists suggest washing cautiously with cleanser and water or as coordinated by a toxic substance control focus (Larson, Cohen and Baxter, 2012). Not at all like cleanser foam, the alcohol doesn't interact with all pieces of the hand. So care should be taken to utilize adequate sanitizer to expand the inclusion. In contrast to water, alcohol run doesn't expel the dead infections from the hand. While a soap can decrease the number of microorganisms rapidly, it does not have a large range of germs and is "not as effective when hands are clearly grim or oily." Most will eventually consent to wash hands with a cleanser and fundamental stands for water. (Savolainen-Kopra *et al.*, 2012)

ADOPTING HAND HYGIENE AND HAND- DECONTAMINATION AS A KEY HEALTH PRACTICE

Hand cleanliness is by far the most critical and convincing measure for the prevention of contamination to prevent transmission of nosocomial pathogens in social insurance settings. The after-effects of emergency clinic-based investigations, reported somewhere between 1977 and 1995, were tested by Larson on the impact of cleanliness of hands on the danger of nosocomial disease (Larson and Killien, 1982) . Notwithstanding this, continuity with methods of hand washing by social security workers has been and continues to be, unacceptably poor. Despite the value of cleanliness of the hand, a few inquiries have led to the problem of rebelliousness of laws for cleanliness of the hands. The use of waterless hand sanitizers and alcohol rubs rather than soap and water was observed to break these constraints to cause significantly higher levels of cleanliness of hands among social security staff and decrease truancy due to illness among elementary school students. (Patnayak *et al.*, 2008)

As of late, Pittet and Boyce assessed the use of sanitizers and rubbers and were seen as the most practical methods for enhancing quality in the hand cleanliness (Savolainen-Kopra *et al.*, 2012) . A few studies have shown a worldly link between enhanced soap and water handwashing practices and infection levels, indicating that cleanliness consistent with alcohol hand rubs exhibited close improvement due to decreased disease rates. (Won *et al.*, 2004) . Nonetheless, no clinical tests on the effect of using an alcohol gel hand sanitizer for manual cleanliness on contamination levels in a social insurance office have been completed (Grayson *et al.*, 2009).

Research that included a 34-month analysis revealed the effect of using alcohol gel hand sanitizer on the levels and forms of contamination in an extended care facility. A contrast of the disease types and concentrations for the units where the hand sanitizer was used with those

for control units where the hand sanitizer was not used showed a general reduction in infection rate of 30.4 percent. An analysis of the statistics for each year showed that the drop in percentage ranged from 11.6 percent in 1997 to 38.5 percent in 1999. Because the differences between years reflect variations in the average rate of disease per 1000 patient days for both the hand sanitizer units and the control units depending on the years studied, these distinctions are most likely indicative of a variety of infection levels from the usage of other than hand sanitizers. Both urinary tract (UTI) and respiratory tract infection also reported decreases. (Steere and Mallison, 1975)

Therefore, it is fair to conclude that the production and control disorders with multi-drug-safe pathogens such as MRSA, VRE and extended systematic infections are severe problems in intensive and long-haul care offices. (Fendler and Groziak, 2002) Alcohol rubs and hand sanitizers for the alcohol gel have the maximum antimicrobial adequacy and destroy pace against such healthy pathogens. Subsequently, the use of such products as a major element of a pollution control system can have a direct effect on both the effects of health and the costs of social insurance, particularly during a pandemic. (Larson *et al.*, 2000)

CONCLUSION

It could be concluded by stating that the lipophilic nature of soap causes the viral components that are self-assembled nanoparticles with a lipid (fatty) bilayer to either be inactivated or "killed" by disrupting the supramolecular interactions in the virus. It is therefore very important to recognize the importance of washing hands with soap and water, especially during a pandemic caused by a novel virus with non-specific characteristics, long period of incubation, protracted duration of the disease and transmission even after clinical recovery. Furthermore, microbiological evaluations of agents that may be associated with clinical symptoms of infection to determine agent-specific hand-hygiene practices may be included in future research under this subject.

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