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Covid -19 and Biochemistry of Hand Sanitizers

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ABSTRACT:

There are many ways to prevent spreading of corona virus infection among the peoples. One of the best ways for preventing spreading of corona virus infection is washing of hands with soap and water.On the bases of a chemical in the form of alcohol presence in the sanitizer, there are two type of hand sanitizers are available, Alcoholic and non-alcoholic. The main components of alcohol based sanitizers have 60-90% V/V alcohol. The alcohol free hand sanitizer has antiseptic as main ingredients. Literature shows that the use of hand sanitizer was first introduced in year 1966 in medicinal field like hospital and other health care facilities. Alcohol and antiseptics have the properties for breaking both types of interactive forces found in envelope of corona virus by making action on lipid and proteins layer of envelope. Without envelope it becomes impossible for corona virus strain to escape from infected host cell and enters in other new host cell.

Key Words:corona virus, alcohol,sanitizer, pathogens.

Introduction:

There are many ways to prevent spreading of corona virus infection in human society.one of the best ways out of many possible ways for preventing spreading of corona virus infection is washing of hands with soap and water. Hand washing for minimum of 20 seconds is recommended for effective cleaning thus it helps in decreasing the risk of getting infected.In the absence of availability of water and soap CDC recommends the use of hand sanitizer of alcohol based nature.Hand sanitizer is the combination of chemicals used to decrease the no of infectious pathogens on the on the hand. The other names used for hand sanitizer are hand antiseptic, hand rub and hand disinfectant. This is the supplement or alternative to water soap method of hand cleaning. This is available in three physical form gel, liquid and foams. Hand washing with soap and water is generally preferred due to its effectiveness in killing the various types of pathogens, removing of harmful chemicals from the hands and easy availability of water. Hand sanitizer use is generally recommended when soap or detergent and water are not available for hand cleaning, when repeated hand washing caused harms to the natural skin barrier and causing scaling or in the healthcare setting and other industries where a no of times hand washing is required. CDC also recommended at least 60 percentage of alcohol in sanitizer.Hand sanitizer is a very useful tool in prevention of spreading of pathogens among peoples in society. Alcohol base hand sanitizer shows more effectiveness against corona virus in comparison of other type of hand sanitizers. If it is it is difficult to find hand sanitizer on nearby medical store due to unavailability then hand sanitizer can also be prepared at home with the help of alcohol and other materials such as aloe Vera gel, water, lemon juice etc. Although hand sanitizer are become more popular in the pandemics situation, Health experts and agencies recommend hand washing with water and soap over the hand sanitizer to keep hands free from all type of virus and germs.Some news in 2019 of adding alcohol in non-alcoholic hand sanitizer was published in various social platforms. Take in account of these FDA make a statement not to recommend making such kind of hand sanitizer by mixing alcohol in non-alcoholic sanitizer. This type of hand sanitizer if nod made correctly may also cause harm to the skin of the hands in the form of burning.

History-

Literature shows that the hand sanitizer use was first introduced in year 1966 in medicinal field like hospital and other health care facilities. Hand sanitizer gets popularized in the early 1990s.The first patents in U.S. for hand sanitizer was Lincoln Stevenson U.S Patent 2,814,081for a Rapid hand sanitizer in 1957. He described rapid hand sanitizer as a device for quickly and efficiently rendering the hand sanitary. The user inserts the hands into the machine or device for cleaning of hands. In 1988 alcohol based gel hand sanitizer were used in food service and healthcare system in U.S. Society uses was started in 1996 in developed countries. In U.S. first foam based hand sanitizer was introduced for public in 2003.During the corona pandemic period a no of companies and industries are making hand sanitizer. Some reports shoes the oral consumption of alcohol based hand sanitizers. Due to this reason in 2019 the U.S. FDA issued a rule for three active ingredients in the form of ethyl alcohol (ethanol), Iso-propyl alcohol and Benzalkonium Chloride. Business studies show almost 500% increase in the Sales of hand sanitizer during corona period.

Chemical Composition of Hand Sanitizer-

On the bases of alcohol chemical there are two type of hand sanitizer are available, Alcoholic and non-alcoholic. A no of various type of hand sanitizer is available in market. These types of hand sanitizers have different chemicals as ingredients in various combinations. The mode of action also varies depending up composition of these chemicals in hand sanitizer. The main ingredient of alcohol based hand sanitizer is alcohol. Alcohols are the –OH group containing molecules made up of carbon, hydrogen and oxygen. The main components of alcohol based sanitizer have 60-90% V/V alcohol. Due to the presence of –OH functional group alcohols are highly water soluble in nature. Three alcohol generally used in alcohol based hand sanitizer are ethanol, iso propyl alcohol and n-propanol. Hydrogen Peroxide also an important part of hand sanitizer. Emollients, polyacrylate, base, colors and fragrance below 1 percentage also the part of hand sanitizer. Emollients help in protecting hand skin from alcohols drying effects. Poly acrylate when mixed with water form a gel. Water quantity is also having an important role in hand sanitizer combination as water helps in as carriers of all ingredients.The alcohol free hand sanitizer has antiseptic as main ingredients. The main Antiseptic is Chlorhexidine, Chloroxylenol, iodine/iodophores, quaternary Ammonium compounds, Tricloson and Benzalkonium chloride. Beside these antiseptic Glycerin, fragrance and color also added in hand sanitizer of both type.

Mechanism of action of hand sanitizer-

The main ingredient of alcohol based hand sanitizer is alcohol. Alcohols are organic molecules made up of carbon, oxygen and hydrogen. Corona class of virus structure shows that they have genetic material in the form of nucleic acids covered with a protein coat. Due to the presence of coat around the genetic material these type of virus are group in the category of enveloped virus.When corona-19 virus enters in the host cell it leaves protein envelope outside the cell and only genetic material of virus enters in the cell. After that genetic material multiply very rapidly and form many new strain of virus. When these corona virus 19 virus strains are ready to leave infected cell they become enveloped by making a coat made up of cells lipid based mixed with some of its own protein.The hydrogen bond and hydrophobic bond are responsible for holding lipid bilayers of surrounded envelop. Ethanol and same type of other alcoholshave the capacity of breaking these two types of interactive forces by making action on envelop lipid and proteins layer of virus envelope. Without envelope it becomes impossible for corona virus strain to escape from infected host cell and enters in new host cell. It is also a well-known fact that higher the concentration of alcohol more is the effectiveness of its reaction on envelope proteins.Therefore higher concentration of alcohol is needed in sanitizer. Theoptimumeffectiveness of this hand sanitizers is found at 90-95% of alcohol concentration. Few studies show that alcohol free hand sanitizer containing Benzalkonium Chloride as ingredients show very good effectiveness at a very low concentration that is 0.13%.

Conclusion-

Hand sanitizer is a very useful tool in prevention of spreading of pathogens among peoples in society. Alcohol base hand sanitizer shows more effectiveness against corona virus in comparison of other type of hand sanitizers. Although hand sanitizer are become more popular in the pandemics situation, Health experts and agencies recommend hand washing with water and soap over the hand sanitizer to keep hands free from all type of virus and germs.Alcohol and antiseptics have the properties for breaking both types of interactive forces found in envelope of corona virus by making action on lipid and proteins layer of envelope. Without envelope it becomes impossible for corona virus strain to escape from infected host cell and enters in other new host cell. Due to this reason hand sanitizer are very helpful in our fight against corona virus.

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