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REVIEW ARTICLE **OPEN ACCESS**

A Review on Different Routes of Transmission of Covid-19

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ABSTRACT

Corona virus disease first appeared in China in December 2019 and has spread throughout the world more than 203 countries. This disease is caused by corona virus (COVID-19) which spread from person to person and causes death of many people. Since it is a novel virus we should know about the routes of transmission of this virus in detail. The main route of transmission of the infectious agent is air borne transmission. Also through contact from person to person, some certain contaminated areas and through the cough, sneeze of the infectious host. The viral particles spread in air are smaller or larger droplets and aerosols. It reaches other individuals or sticks on any solid material. So the mode of transmission of virus is needs to be emphasized. Certain studies are conducted to prove the persistence and viability of the virus in air. Nebraska University Hospital collected the samples of air from the hospital and its surroundings and conducted the test. They concluded that the virus is transmitted by means of air (airborne transmission). Here we discuss about the different routes of COVID-19 transmission.

Key words: Corona virus, COVID 19, SARS- CoV- 2, Airborne

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INTRODUCTION

World is fearfully witnessing the spread of corona virus disease by SARS-CoV-2 from country to country, person to person. The first corona case was reported in China (Wuhan) in December 2019. Later it slowly crossed the boundaries and since it becomes a pandemic disease. Spreading from person to person through droplets in air, aerosols etc. or by direct contact with affected person cause severe respiratory illness with cough, fever, cold and fatigue etc. As it reaches May 2020 there are 3.5 millions of confirmed cases and more than 2 lakhs of mortality rate reported in the world wide, and increasing day by day in the world.

Severe Acute Respiratory Syndrome (SARS) CoV-2 is a beta corona virus having an enveloped single-stranded RNA belonging to the sarbeco virus subgenus of family coronaviridae [1]. RNA genome is 29891 nucleotides in size encoding 9860 amino acids. The International committee on Taxonomy of viruses proposed the SARS CoV- 19 on the basis of this virus caused the outbreak of severe Acute Respiratory syndrome. The main pathogenesis of this virus is not widely known. In human SARS-CoV-2 will affect or infect the cells of the airway and mainly the respiratory system that lives the alveoli. In cell it get duplicates its genetic material and produce certain proteins needed, forms new viruses and appears on the cell surface and hence it is multiplying and get affected to cause these severe illness [2].

The infectious agents of the disease can be spread through different pathways. The mode of transmission of virus is classified into different types. It includes interpersonal transmission, airborne transmission and other means of transmission such as vector spread, other contaminated surfaces. Through the expelled air of an infected person the virus can reach the atmosphere as droplets or aerosol particles. The respiratory particles may often be distinguished as droplets having small particle size. When the virus reaches the atmosphere through cough or sneeze the virus particles are encapsulated in globs of saliva, mucus and water [14, 16]. Prince Wale Hospital (Hong Kong) as well as health care centers Toronto (Canada) conducted several studies on this. Also inside Wuhan Hospitals, Nebraska University Hospital SARS-COV-2 RNA was detected in air samples collected inside the hospitals [12, 13]. All these studies reaching out in the conclusion that airborne transmission is the main route of transmission of this corona virus.

METHODOLOGY

Several reliable sources and reputable journals and articles which explain much information related to the corona virus disease and routes of transmission of virus were analyzed.

CORONA VIRUS: ITS TRANSMISSION ROUTES

The corona virus is a virus having particle size of 120-160 nm while belong to bactocorona virus [3]. Phytogenic studies and analysis explains that when the covid-19 virus enters into a host it causes the outbreak of severe acute respiratory illness (SARS), since it is called SARS CoV-2. The International Committee on Taxonomy of viruses proposed this name. The sequence of the SARS-CoV-2 is similar to a corona virus isolated from bats so some hypothesis are arise from that this viruses originates from bats which the humans get infected [4].

Airborne transmission

The rapid rise in corona virus transmission can be by droplets or by aerosols. An infected person can produce droplets of more than 20 microns, during coughing, sneezing and screaming. But the aerosol particles are having the diameter below 10 microns which are more dangerous than droplets can travel several meters before falling the ground or any other subjects or things. The particles lesser than 5 microns of diameter can easily enter the nostrils or mouth and enter the lungs even it can reach the alveoli and cause pneumonia [6]. Even there droplets or smaller particle sticks on the surface of any objects and even if we touch the surface and touches the face it can easily spread through mouth. .The droplets drop in the air is called droplet nuclei and it affected by winds that float longer and can reach more distance and can spread to more area and more people [19, 21].

As per the government and the WHO guidelines the interpersonal distance of 2 meter is sufficient sometimes but in some cases of dry droplets of virus that can travel more distance is insufficient for the prevention of spreading. Therefore we need to use a face mask and maintain physical and social distance with other individual so that we can protect ourselves and other from this infection to a great extent.

The covid-19 virus often causes clusters transmission within family clusters.in some cities, 50 % to 80 % of all confirmed cases of covid-19 are by cluster transmission [7, 8]. The studies conducted in South Korea show that many environmental surfaces were contaminated by MERS CoV (Middle East Respiratory Syndrome caused by corona virus) and viral RNA [10]. This is detected within 5 days after the last positive PCR of patients' respiratory samples [17, 18]. In patients with MERS feces and urine samples also yielded viral RNA. This given the proof of fecal contamination of SARS-CoV and MERS-CoV and their viability in feces. So it is possible that SARS-CoV-2 may also transmit through fecal routes [9, 11].

Airborne transmission of virus is depicted in Figure 1. This illustration shows three potential ways SARS-CoV-2 can spread from an infected host to a susceptible host.

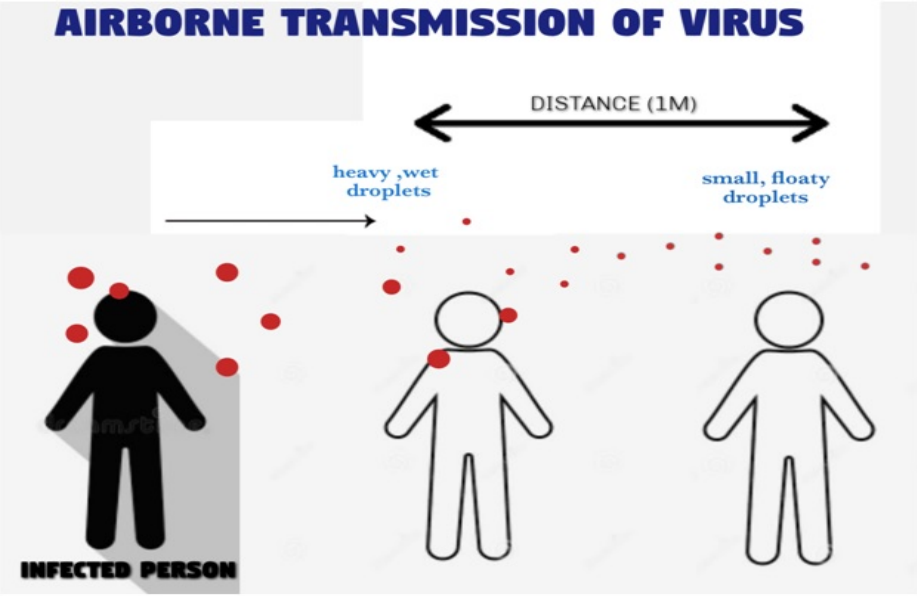

Figure 1: Clearly gives an idea about the particle size of droplets and potential ways of spread of SARS-CoV-2 from an infected host to a susceptible host

OTHER ROUTES

As we all know the virus particles can survive as infections form after sticking to the surface of object and also can survive in the air and infect the human body. There are several studies are conducted by Van Doremalen for detailing about the stability of SARS-CoV-2on inanimate objects and all. As per the result of studies they concluded that the SARS-CoV-2to be more stable in plastic materials, stainless steel is more than (72 hours) than copper (22 hours) and in cardboard (24 hours) [5, 15].

Certain precautions can be taken when the nation is responsible for the control of outbreak acknowledge the importance of this route of transmission. In china (National Health Commission of the People's Republic of China) started to circulate a series of prevention and control guidelines where the outbreak started [20]. Also these guidelines are updated around 6 times at the end of March 2020. It is very difficult to detail why the public.

Health authorities marginalize the significance of airborne transmission of SARS-CoV-2, reason it is very difficult to detect the presence of viruses traveling in the air directly. When the infected host expels the air the viral content get diluted and travels in air through air flow.

To summarize, the airborne transmission issue should be taken seriously now, during the course of pandemic. During the time of increase of infections, we all should understand and aware of basic science of viral infection spread [22, 23].

If this is the case after get infected, it will take several weeks for the confirmation of the injection or disease. This is the time for preventing the spreading of this disease and loses of life. Completely following the guidelines for precautions and control of disease from the government and certain public health authorities and maintain inter personal distance use face mask for the better recovery of the entire world from this terrible condition.

CONCLUSION

If everyone uses face mask and maintain the social distance of minimum 2 meter will reduce the air airborne transmission of the SARS-CoV-2. Since we know it is transmitted through nasal and oral routes. So it is necessary to wear a face mask while going outside and in public places. Not only in the public areas but also avoid the spreading of disease in indoor. So it is necessary to maintain inter- personal distance and self hygiene in public area and also in indoor. In the public area there are instructions from the government for keeping social distance and other control measures like air disinfection, avoiding air circulation, effective ventilation and avoiding the overcrowding of people in areas like hospitals, restaurants, public transports, offices, shops and other public buildings. But in our private place, we should take the responsibility to avoid the spreading of disease, since it is rapidly rising and spreading throughout the world.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest among the authors.

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