Sustainability of Coronavirus on Different Surfaces

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Coronavirus disease 2019 (COVID-19) is the name of the disease supposedly manifested in December 2019 from Wuhan, from the virus named SARS-CoV-2. Now, this disease has spread to almost all other parts of the world. COVID-19 pandemic has various reasons for its dramatic worldwide increase. Here, we have studied coronavirus sustainability on various surfaces. Various disinfectants and their roles are discussed from the available literature. The infection capabilities of SARS-CoV-1 and SARS-CoV-2 for different materials and finally studies on infection decay for SARS-CoV-1 and SARS-CoV-2 are discussed. (J Clin Exp Hepatol 2020;10:386–390)

Covid 19

The global disaster COVID-19 pandemic has various reasons for its dramatic increase worldwide. Some researchers opine that the SARS-CoV has its origin from bats and the prevalence of this virus to humans was through palm civets: the intermediate source between bats and human population.[1,2] The most responsible reasons for it include the large human population gathering and human intervention which have violated the ecosystem globally. The population of the world intrudes the various untouched ecologies and put themselves before the unknown viruses and bacteria without knowing their threat or impact of exposure to humankind.[3,4]

The coronavirus can travel beyond species boundaries. The earliest infection of SARS-CoV-2 was in Wuhan (China), and the World Health Organization (WHO) has called this pandemic as Coronavirus disease 2019 (COVID-19). Initially, it was thought that this virus also has its origin from the animals to humans, as some of the infected people were from a wholesale seafood market in Wuhan. At a later stage, infections were found in humans, those who have not even visited that particular market, thus making it clear that this virus can also spread by human-to-human exposure.[5–7]

There can be various ways of transmission for this virus to infect the human population. Spreading or transmission of COVID-19 can be through close contact of human beings or by touch or the aerosol spreading of the virus.[8–10] The most common way of spreading of this virus is through respiratory droplets as the infected one coughs or sneezes. These microdroplets containing the virus can infect a healthy human by settling on the face (mouth, nose, ears, eyes) or hands.[11] This virus can sustain for a long time on various surfaces which is also considered as a significant reason for its transmission. Frequent touching of the facial area, handshake and unavoidable touch to different surfaces while travelling (through various transport means) are also a significant threat to humans. In addition, the transmission is known as "hidden transmission" as the carrier unknowingly spreading the infection to other population exists.[12]

CORONAVIRUS SUSTAINABILITY ON VARIOUS SURFACES

Coronavirus can last for long durations on different metal surfaces, ranging from hours to days.[13,14] Recent studies show that the coronavirus can last about three days on a plastic surface as well as on stainless steel surface, it can also sustain for a period of whole one day on cardboard, while it can only sustain only for about four hours on a copper surface.[15]

DISINFECTANTS/SANITISERS AND THEIR ROLE

The use of disinfectants decimates microorganisms such as virus or bacteria on inner layers or inert surfaces by acting as an antimicrobial agent. Disinfectants are not always impressive against all kinds of microorganism such as bacterial spores unlike sterilisation, which kills all types of microorganisms by the use of extreme physical or chemical procedures.[16] Disinfectants play a critical role in decimating microorganisms outside the human body or on various surfaces. This fact distinguishes disinfectants from antibiotics and antiseptics, which act inside the human body or on living tissues, respectively. The mechanism of disinfection involves the destroying of the cell wall of microbes and the disinfectant enters into their metabolism to destroy or inactivate them.

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Table 2 Infection Capability of SARS-CoV-1 and SARS-CoV-2 for Different Materials.

Materials	SARS-CoV-1		SARS-CoV-2	
	Infection capability	Duration	Infection capability	Duration
Aerosol	104.3 to 103.5 TCID50	3 h	103.5 to 102.7 TCID50	3 h
Plastic	103.4 to 100.7 TCID50	72 h	103.7 to 100.6 TCID50	72 h
Stainless steel	103.6 to 100.6 TCID50	48 h	103.7 to 100.6 TCID50	48 h
Copper	no viability	8 h	no viability	4 h
Cardboard	no viability	8 h	no viability	24 h

TCID, Tissue Culture Infective Dose.

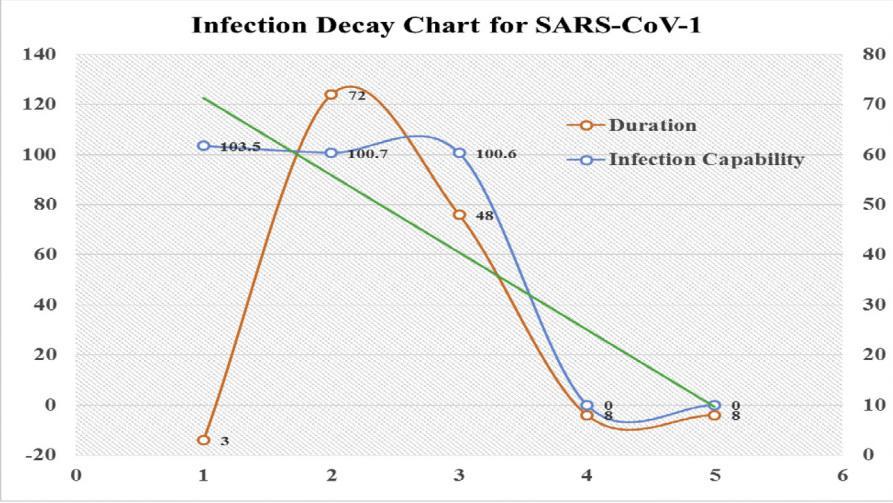

Figure 1 Infection decay chart for SARS-CoV-1.

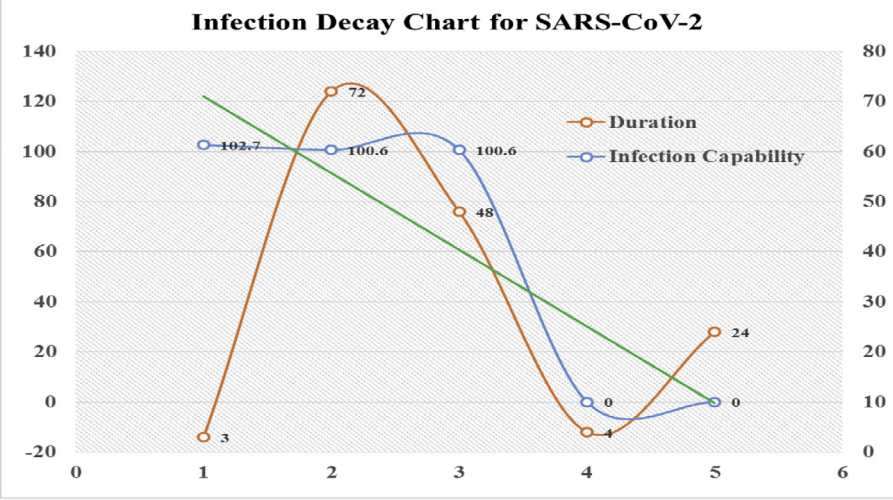

Figure 2 Infection decay chart for SARS-CoV-2.

concentration values were taken from Table 1, as those are the correct values of concentration at the end of sustaining time of virus on different metal surfaces.

It can be derived from Figures 1 and 2 that the sustainability of SARS-CoV-2 is more or less similar to that of SARS-CoV-1 for the given environmental conditions. We see a linear decrease in the infection capability of this virus, with respect to time, and the same varies in accordance with the medium (surface). This linear decrease shows the exponential decay in virus titre per litre of air or