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Effect of Temperature on the Adaptability of SARS-CoV2 in Environment

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The world is facing the pandemic caused by SARS-CoV2. This virus has emerged in China during cold weather. During that time the temperature was near zero degrees Celsius. Many viruses can't survive at this temperature, but SARS-CoV2 has that ability. SARS-CoV2 spread from the country of origin China a cold temperate country to the whole world. The high temperate countries in the Middle East are also suffering from Covid19. A large number of cases are also reported from those countries. These countries have more than 40 degrees Celsius temperature. This indicates that SARS-CoV2 has an enormous ability to survive at any temperature.

Very few viruses that cause infection to human has this ability. This virus has a wide range of temperatures to grow. It has been reported that this virus can survive in metal and other objects for a significant duration of time. This is also a virulent factor for the virus. This ability to survive in high and low temperatures is also a potent virulent factor. This type of ability is very rare in other viruses. Other coronaviruses have also been reported in a few countries. However, this pattern of survival ability in the environment is not seen so far. Scientists are searching the clues regarding the potency of the virus. It has been postulated that SARS-CoV2 can mutate its gene according to environmental factors. Previously in the very early time of the outbreak, it was thought that this virus can't stay in Bangladesh due to the temperate zone. The current situation has proved that this is a wrong concept. This hypothesis gives a false signal to the decision-maker of Bangladesh. Therefore it creates unpreparedness for the people working in the health sector.

The transmission of SARS-CoV-2 appears to be primarily via aerosols[1-3] and few studies have shown that SARS-CoV-2 is able to remain infectious in airborne particles for greater than 3 hours[4-5]. The role of fomites in the current pandemic is yet to be fully determined, although they have been suggested as a potential mode of transmission also reflected by the strong focus on hand-washing by WHO and national control schemes[6]. Broadly, viruses have been shown to be readily transferred between contaminated skin and a fomite surface, with high contact surfaces such as touchscreens on mobile phones, bank ATMs, airport check-in kiosks and supermarket self-serve kiosks all acting as fomites for the transmission of viruses[7]. Fomite transmission has previously been shown to be a highly efficient procedure, with transmission efficiencies of 33% for both fomite to hand and fingertip to mouth transfer for bacteria and phages[8]. With the high efficiency of fomite transfer, the persistence of SARS-CoV-2 on environmental surfaces is therefore a critical factor when considering the potential for fomite transmission for this virus. Currently, there are conflicting reports on the survivability of SARS-CoV-2, with data ranging from 3 to 14 days at room temperature for a single surface type, stainless steel[4]. Temperature and humidity are both critical factors in viral survivability with an increase in either being detrimental to virus survival[2,5,7]. Survivability on stainless steel coupons for transmissible gastroenteritis virus and murine hepatitis virus (both coronaviruses) was reduced with higher humidity's and temperature and survivability of Middle East Respiratory Syndrome coronavirus also followed a similar pattern. The higher humidity of ~ 65% RH used by Chin et al[9] may explain the shorter persistence of virus when compared to the data presented here. SARS-CoV-2 has been shown to be rapidly inactivated under simulated sunlight.

Most viruses of human diseases can't survive in the open environment. It is an obligate intracellular pathogen. Thus this SARS-CoV2 can't grow without human cells. Artificial culture of the virus in the lab has been first done in Australia. Later several countries have done this. The in vitro viral culture has needed a range of 35 to 37 degrees Celsius which is the core temperature of the human body.

SARS-CoV2 virus is a new pathogen. Research is still needed to find out the cause of this adaptability. The genetic sequencing is also performed by BCSIR and NILMRC where several mutations have been detected. This may be the reason for the survival ability of the virus in any environment. It may be a special capacity of the virus. Thus the potency and virulence of the virus are increased day by day. We should wait to get the proper answer after research work.

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