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Letter to Editor

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COVID-19 Transmission via Fomites at Low Temperature: A Potential Silent SARS-CoV-2 Propagation Route

Umar Saeed*, Sara Rizwan Uppal, Zahra Zahid Piracha and Rizwan Uppal

Department of Research and Development, Islamabad Diagnostic Center (IDC), Pakistan

***Corresponding author:** Umar Saeed, Department of Research and Development, Islamabad Diagnostic Center (IDC), F8 Markaz Islamabad (44000), Pakistan.

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Abstract

To prevent second or third waves of COVID-19 spread across several countries of the world, it is important to consider certain environmental factors and significance of fomites in enhanced viral spread at low temperature. In contrast to WHO statement that temperature has no effect on COVID-19 spread, we suggest the importance of fomites at lower temperature and several factors such as congested environment, reduced hand washing and preferred indoor activities during winter which may cause increased chances of viral spread. In Pakistan second wave of COVID-19 is even more dangerous compared to the initial wave of SARS-CoV-2 infection and due to negligence in understanding the role of temperature in COVID-19 spread, the daily numbers of SARS-CoV-2 cases are increasing day by day. It is suggested to frequently refresh air and improve indoor air quality via wildfire using fireplace during COVID-19. It is highly recommended that, the government must assure implementation of standard operating procedures to prevent viral spread through fomites at low temperature during winter.

Keywords: COVID-19; SARS-CoV-2; Fomites; Second wave of infection; Pakistan

Letter to Editor

COVID-19 has affected 218 countries across the world and daily numbers of cases are continuously mounting. As of 24th November 2020, worldwide SARS-CoV-2 has infected 59.2 million people and caused 1.4 million deaths (COVID-19 Report 2020). Up till now, specific pharmacological treatment or vaccines against COVID-19 infection are not available. According to World Health Organization (WHO), temperature does not affect SARS-CoV-2 spread (COVID-19 advice for public 2020). However, this statement needs further investigations and confirmation. The part of earth that lies at north of the equator is the Northern Hemisphere and about 90 percent of world's population belongs to this region. The meteorological convention state June, July, and August as summer months while November, December, and January as winter months (National Geographic 2020). When we analyzed the COVID-19 infections across the world in 2020, the data from Johns Hopkins University statistics, we found that during 1st June to 31st August, the daily number of COVID-19 positive patients increased from 122917 to 264107 respectively. However, from 1st October to 7th November (within merely 38 days), the daily number of COVID-19 cases spiked 5.5 times (from 285016 to 1570855 cases) (John Hopkin COVID-19 update, 2020).

Last year also, in Hubei province of China, low temperature was reported to had greatly influenced COVID-19 infection Liu et al. [1]. It has been reported that by decreasing 1 unit of temperature increased (2.92 times) the risk of COVID-19 and deaths, while on the other hand increasing 1 unit of temperature decreased in death

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rate from SARS-CoV-2 virus. Similarly, the study based on analysis of COVID-19 spread in Argentina, Australia, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Egypt, Finland, France, Germany, Greece, Iceland, India, Indonesia, Iran, Ireland, Israel, Italy, Lebanon, Malaysia, Netherlands, Norway, Philippines, Poland, Portugal, Romania, Saudi Arabia, Singapore, Slovenia, South Korea, Sweden, Switzerland, Taiwan, Thailand, United, Arab Emirates, United Kingdom, and United States of America, revealed significantly decreased growth rate of COVID-19 with increase of temperature Notari [2].

Why socio-economically advanced countries like United States of America remained unable to control the viral spread even though they also used standard operating procedures (SOPs)? One of the most important factors behind this could be the temperature. Pakistan is developing country of 220.8 million populations with weak healthcare sector and low educational standards. Human development index has ranked it at 152 out of 189 countries [3]. In Pakistan, 0.380 million have been infected with SARS-CoV-2 and caused 7,744 deaths across the country (COVID-19 Report 2020). The environmental temperature exceeds 47˚C (117˚F), during summer, while on average about 4˚C during winter (Climate of Pakistan, 2020). The COVID-19 infection started in Pakistan during February and March, however in the peak summer season (during July-August) the viral infections significantly dropped (John Hopkin COVID-19 update, 2020). SARS-CoV-2 is stable for > 28 days at 20˚C, while its stability decreased at elevated temperatures as approximately 7 days at 30˚C while < 48 h at 40˚C Riddell et al. [4]. During the initial wave of COVID-19 spread in different regions of Pakistan, through proper usage of standard operating procedures and active participation of people against COVID-19 battle, Pakistan successfully overcame the COVID-19 shortly within couple of months, and the daily number of cases significantly dropped significantly from 6604 to 196 cases (data obtained from 21st June to 10th September) (John Hopkin COVID-19 update, 2020). However, from the start of the winter in Pakistan, the second wave of COVID-19 appeared to be even stronger and besides active participation of general public against COVID-19. Despite of using standard SOPs the virus is keep on spreading day by day. Within only 19 days (1st November to 19th November) the daily number of SARS-CoV-2 positive cases have rapidly spiked from 977 to 2547 cases (John Hopkin COVID-19 update, 2020) in Pakistan, with positivity rate of 7.46%. 19% of COVID-19 positive patients were students who got infected from educational institutions Siddiqui [5]. During this time period, there has been increased surge in COVID-19 patients on ventilators (200% in Peshawar and Multan, 148% in Karachi, 114% in Lahore, and 65% in Islamabad) Siddiqui [5]. Spain has declared emergency which can extend till March 2021, United Kingdom announced four weeks lockdown, and Germany impose one-month partial lockdown [6-8]. Aforementioned countries have confirmed that the second wave of COVID-19 is more deadly than first wave (CNBC News 2020). Pakistan, due to weaker health system and fragile economy sector, might not be able to afford second phase of lockdown. If daily numbers of cases are not controlled here, there might be possibility of collapse in the health system.

Fomites are the inanimate objects or substances (such as clothes, utensils, and furniture) which when are contaminated can transfer the disease to a new host. SARS-CoV-2 survival on fomites is variable. The virus can survive for 5 to 10 min on the skin, 6 to 12 h on the plastic, and approximately 12 h on metal surfaces Nazari Harmooshi et al. [9]. There was high risk of SARS-CoV-2 transmission at temperature condition of < 3˚C Xie et al. [10]. Fomites at lower temperature may also increase viral spread during second wave of COVID-19 in winter. During winters, people prefer congested environment, indoor activities and are reluctant for refreshing air through ventilation. This might lead to flaw in social distancing practice in communities and might be a cause of enhanced viral spread during second or third waves of COVID-19 epidemics. Cold temperature and lack of exercise independently can lead to metabolic and circulatory changes that depress the immune system LaVoy et al. [11]. Also lack of frequent hand washing practice due to cold may cause increase in number of daily cases. In these scenarios the COVID-19 spread could become easier in winter.

Negligence on role of fomites at lower temperature, congested indoor air, and lack of frequent hand washing practice during winter may bring havoc during spread of COVID-19. It is suggested to frequently refresh air and use classical traditional indoor fireplace burning which can improve indoor air quality from wildfire smoke during pandemic [12]. Therefore, government should initiate special awareness campaigns through digital portfolio regarding importance of fomites in viral spread at low temperature to prevent further viral spread. This study can be very useful for COVID-19 policy makers to prevent further spread of second or third waves of COVID-19 and tactically tackling temperature variation during seasonal changes across several countries worldwide [13-17].

Declaration

Ethics approval and consent to participate

The study has been approved by ethical review board of Islamabad Diagnostic Center Pakistan, and informed patients concern was obtained.

Consent to publication

All authors approved the submission of the manuscript for publication

Availability of data and material

The data is available and can be used for the academic or research purposes.

Competing interests

The authors have no conflict of interest.

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Authors Contribution

RU conceived the study and is principal investigator of the study; US wrote manuscript and analyzed the data; ZZP and SRU assisted in manuscript writing and data analysis.

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